Journal of Space Law

Volume 45|Number 1| 2021

THE UNIVERSITY of MISSISSIPPI
SCHOOL OF LAW

AIR AND SPACE LAW PROGRAM
P.O. Box 1848
University, MS 38677-1848
airandspacelaw.olemiss.edu

JOURNAL OF SPACE LAW

VOLUME 45, NUMBER 1
2021

JOURNAL OF SPACE LAW

VOLUME 45 | 2021 | NUMBER 1

All correspondence with reference to this publication should be directed to the JOURNAL OF SPACE LAW, University of Mississippi School of Law, 481 Coliseum Drive, University, Mississippi 38677; jsl@olemiss.edu; tel: +1.662.915.2688.

The subscription rate for 2021 is US$250 for U.S. domestic individuals and organizations; US$265 for non-U.S. individuals and organizations. Single issues may be ordered at $150 per issue. Add $10 for airmail.

Visit our website: airandspacelaw.olemiss.edu
Follow us on Facebook, LinkedIn and Twitter.

 Suggested abbreviation: J. SPACE L.
ISSN: 0095-7577

JOURNAL OF SPACE LAW

VOLUME 45 | 2021 | NUMBER 1

CONTENTS

FROM THE EDITOR

As much as 2021 offered considerable improvement over 2020, it seems that COVID was not ready to loosen a stranglehold grip on our society. Myriad delays, however, will not diminish the caliber of authors who have trusted us with their research. This issue of the *Journal of Space Law* was put together without an overarching theme, and yet one emerged: the need to explore and utilize space responsibly. This need is growing exponentially as more and more actors are accessing space—from new spacefaring nations to commercial entities to human tourists. While for the most part, each new mission brings new possibilities, we also witnessed an event which may well be considered the antithesis of responsibility. On November 15, 2021, Russia tested a direct-ascent anti-satellite missile that struck a Russian satellite. The impact created a debris field of more than 1,500 pieces of debris large enough to be tracked and hundreds of thousands of smaller, untrackable pieces.

Current law is clearly not providing an effective deterrent against this kind of detrimental conduct. Principles and obligations are couched in terms that leave yawning gaps in regards to many activities. Of course, finding agreement is difficult. The authors collected here offer important insight into both history and the future, with consideration of both the existential—encounters with non-terrestrial life forms—and the practical—improving access to Earth Observation data. Together, we consider emerging sources of law and application of current law to new problems. All in, it is another issue that we distribute with pride as well as gratitude (and awe) for our authors. We are embarking on a new era of space law and the foundation we lay now will dictate the success and sustainability of our future. We are humbled to be a trusted platform in which such ideas are introduced, tested, analyzed and celebrated.

Michelle L.D. Hanlon
Editor-in-Chief
Oxford, Mississippi
December 2021

ENVISIONING A LEGAL FRAMEWORK FOR OUTER SPACE CULTURAL HERITAGE

Lucas Lixinski, MM Losier and Hanna Schreiber[*]

ABSTRACT

Our desire to protect heritage on Earth is evidenced and supported by a series of treaties aimed at safeguarding intangible and tangible items and sites. The time is ripe to create a legal framework to formalize the safeguarding of such items in outer space. Indeed, it is increasingly clamant to expand the United Nations treaty regime over an area of human endeavor that continues to bear tangible and intangible elements of cultural heritage as a result of further, even yet unimaginable, progress in the exploration and use of outer space, particularly as their discernibility and inherent vulnerability increases without rules to qualify or safeguard them. The framework proposed herein goes further than simply offering means to physically protect and preserve sites and objects of historical significance on other celestial bodies. It recommends legal and institutional initiatives to ensure that space law continues to be a relevant part of global space governance by safeguarding a much wider breadth of heritage at the crossroads of cultural diversity and human creativity. These initiatives would evidence due regard not only for present and future generations, but also for past generations of humans who, across a plethora of cultures and over millennia, have sought to understand and explore the universe,

---

[*] Dr. Lucas Lixinski is a Professor at the University of New South Wales in Australia. Dr. MM Losier is the Principal at Losier González, PLLC in the United States. Dr. Hanna Schreiber is an Assistant Professor at the University of Warsaw in Poland. All three authors are legal experts of cultural heritage law at For All Moonkind. The authors would like to thank For All Moonkind Heritage Council member Professor Tullio Scovazzi (Italy), legal expert in cultural heritage law, for his insightful counsel and also interns Emma Kleiner (USA), Luís Benitez (Mexico) and Diego Juárez (Mexico) for their dedicated research assistance.

building upon our collective knowledge, advancing our technological capacities and increasing our physical and emotional ability to adapt longer and farther beyond our indigenous planet. It is through this cultural mechanism, galvanized by compounding individual cultural heritage segments, that humans have created outer space cultural heritage (OSCH). The authors intend this article to be considered a "guidance document." It suggests legal principles to govern OSCH, facilitate the progression and harmonization of space and cultural heritage law in a new space law instrument and support the legal capacity of spacefaring and not-yet spacefaring States to negotiate rules to regulate OSCH and participate in its safeguarding.

I. INTRODUCTION

A broad multilateral space law instrument may offer the best opportunity to safeguard cultural heritage (CH) existing in outer space (OSCH), including on the Moon and on other celestial bodies. For All Moonkind[1] has maintained, as a Permanent Observer (PO) to the United Nations (UN) Committee on the Peaceful Uses of Outer Space (COPUOS), that such a regime would help remedy a growing lacuna in space law,[2] the predominant basis of which is the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies[3] (1967 UN OST) and which is otherwise comprised

[1] For All Moonkind, Inc. (For All Moonkind) is a United States of America (US) 501(c)(3) non-profit organization.

[2] *See* Comm. on the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. on its Fifty-Eighth Session, U.N. Doc. A/AC.105/1203, at Annex I, Appendix I, ¶ 2.1 (2019) [hereinafter Fifty-Eighth COPUOS LSC Report]; Comm. on the Peaceful Uses of Outer Space, Dec. and Actions of the Legal Subcomm. on its Seventy-fifth Session, U.N. Doc. A/75/20, ¶¶ 2(5), 5(13) (2020) [hereinafter Seventy-Fifth COPUOS LSC Report].

[3] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

largely of five UN treaties[4] (UN Space Treaties) and their supporting principles.[5] It is increasingly clamant that space and cultural heritage law under the UN treaty regime expand over an "area of human endeavor"[6] that will continue to bear CH as a result of "further [even yet unimaginable] progress in the exploration and use of outer space."[7] The proposed regime could go further than simply supporting the "strengthen[ing of] the use of space technologies and their applications … to monitor cultural heritage sites and contribute to their preservation."[8] It could equip international law with the means to "safeguard [a much wider breadth of] heritage [and] promote more sustainable ways of living in resilient, inclusive and peaceful societies [, facilitate a] crossroads of heritage and creativity, and . . . play a part in achieving sustainable development" on and beyond Earth.[9]

In 2016, COPUOS asserted that "legal and institutional initiatives … [are needed] in order to ensure that international space

---

[4] In addition to the Outer Space Treaty, in this article, the term UN Space Treaties comprises: the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter Rescue and Return Agreement]; Convention on the International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S 187 [hereinafter Liability Convention]; Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention]; Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 1362 U.N.T.S. 3 [hereinafter Moon Treaty]. Note that the Moon Treaty has only been ratified by 18 parties at the time of writing, which, alongside the lack of ratifications by the major space powers, undermines any claim for customary law status.

[5] *See e.g.,* G.A. Res. 1962 (XVIII) (Dec. 13, 1963); G.A. Res. 47/68 (Dec. 14, 1992); G.A. Res. 37/92 (Feb. 10, 1982); G.A. Res. 41/65 (Dec. 3, 1986); G.A. Res. 51/122 (Dec. 13, 1996).

[6] G.A. Res. 2222 (XXI), Preamble (Dec. 19, 1966).

[7] Moon Treaty, *supra* note 4, Preamble. *See* Comm. on the Peaceful Uses of Outer Space, Future Role and Activities of the Comm. On the Peaceful Uses of Outer Space, Working Paper Submitted by the Chairman, ¶ 33, U.N. Doc. A/AC.105/L.268 (2007) ("need[ing] a fresh approach to … protecting designated areas[of] historical [and] cultural … significance").

[8] Comm. on the Peaceful Uses of Outer Space, Revised Zero Draft of the "Space2030" Agenda and Implementation Plan, ¶ 20(2.8), U.N. Doc. A/AC.105/2019/CRP.15, (2019) [hereinafter COPUOS Space 2030 Agenda].

[9] Audrey Azoulay, Foreword to the Basic Texts of the Convention for Safeguarding of the Intangible Cultural Heritage, Oct. 17, 2003, 2368 U.N.T.S. 3 (2018 ed.) [hereinafter Azoulay Foreward]. *See* UNESCO Convention on the Protection and Promotion of the Diversity of Cultural Expressions, Preamble, Oct. 20, 2005, 2440 U.N.T.S. 311 [hereinafter 2005 UN CD Convention].

law is a relevant part of global space governance in the twenty-first century."[10] It thus mandated its Legal Subcommittee (LSC) to "promote the progressive development of international space law"[11] by "identifying areas that may require additional regulation."[12] Those areas were generally identified as, *inter alia*, the long-term sustainability of outer space activities, space resources, space debris mitigation and remediation, space traffic management, planetary defense and space safety.[13] A "new item to be considered by the"[14] LSC for additional regulation should also be OSCH, particularly given its discernibility and inherent vulnerability in the absence of rules to identify, qualify or safeguard it.

The proposed OSCH regime endeavors to support COPUOS's mandate while advancing two of its seven *UNISPACE+50* thematic priorities, namely, the "legal regime of outer space and global space governance"[15] and "enhanced information exchange on space objects and events."[16] In so doing, this guidance document suggests legal principles to govern OSCH in its tangible and intangible manifestations beyond (not on) Earth that may come to be identified as meriting safeguarding.[17] It does not discuss important rules to regulate the OSCH itself, such as: the nomination or selection criteria for inclusion of OSCH on CH lists; the positive or negative obligations towards objects or sites beyond Earth; inter or intraplanetary movement and trade of tangible OSCH, particularly following their importation to Earth; nor national rules to support an international OSCH regime. Rules, such as those mentioned above, of legal and practical consideration are left instead for future research.

---

[10] Comm. On the Peaceful Uses of Outer Space, Rep. of the Legal Subcomm. On Its Fifty-Ninth Session, U.N. Doc. A/71/20, ¶296(2)(b) (2016) [hereinafter Fifty-Ninth COPUOS Report].

[11] *Id.* ¶ 296(2)(e).

[12] *Id.* ¶ 296(2). *See generally* Seventy-Fifth COPUOS LSC Report, *supra* note 2, ¶¶ 2(5), 5(6)(a), 5(13). *See* The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids for Peaceful Purposes, §9 NASA, https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf (last visited Sep. 9, 2021) [hereinafter Artemis Accords].

[13] COPUOS Space 2030 Agenda, *supra* note 8, ¶ 12.

[14] Seventy-Fifth COPUOS LSC Report, *supra* note 2, ¶ 5(14).

[15] Fifty-Ninth COPUOS Report, *supra* note 10, ¶ 296(2).

[16] *Id.* ¶ 296(3).

[17] *Id.* ¶ 296(2)(d). *See* Seventy-Fifth COPUOS LSC Report, *supra* note 2, ¶5(13); Fifty-Ninth COPUOS Report, *supra* note 10, ¶ 296(2)(c).

Given the extraterrestrial medium in which OSCH exists, a legal regime to regulate it may best be developed in a space law instrument. As the regime would regulate what would not solely be space objects and sites in outer space, but also CH, CH law principles already established in broad multilateral conventions,[18] including six UN CH treaties[19] (UN CH Treaties), should also be incorporated in that new space law instrument. Those CH law principles should "be interpreted and applied in the context of and in a manner consistent with"[20] the UN Space Treaties and their principles. The resulting framework could encourage the harmonization of international law[21] and "promote the free flow of ideas,"[22] "the spread of culture"[23] and "[m]aintain, increase and diffuse knowledge [about OSCH] [b]y assuring the conservation and protection of [humanity's] inheritance of … monuments of history and

---

[18] The Antarctic Treaty, art. IX, Dec. 1, 1959, 12 U.S.T. 794, 42 U.N.T.S. 71 [hereinafter Antarctic Treaty]; Antarctic Treaty, Annex V to the Protocol on Environmental Protection to the Antarctic Treaty Protocol, Oct. 17, 1991, 12 U.S.T. 794, 42 U.N.T.S. 71 [hereinafter Antarctic Treaty Annex V]; United Nations Convention on the Law of the Sea, arts. 149, 303, Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS].

[19] For the purposes of this article, the term UN CH Treaties comprises: Convention for the Protection of Cultural Property in the Event of Armed Conflict, May 14, 1954, 249 U.N.T.S. 240; Convention for the Protection of Cultural Property in the Event of Armed Conflict, First Protocol, May 14, 1954, 249 U.N.T.S. 215; Convention for the Protection of Cultural Property in the Event of Armed Conflict, Second. Protocol, Mar. 26, 1999, 2253 U.N.T.S. 212; Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property, Nov. 14, 1970, 823 U.N.T.S. 231 [hereinafter 1970 UN CP Convention]; Convention Concerning the Protection of the World Cultural and Natural Heritage, Nov. 16, 1972, 1037 U.N.T.S. 151 [hereinafter 1972 UN WH Convention]; Convention on the Protection of the Underwater Cultural Heritage, Nov. 2, 2001, 41 I.L.M. 37 [hereinafter 2001 UN UCH Convention]; Convention for Safeguarding of the Intangible Cultural Heritage, Oct. 17, 2003, 2368 U.N.T.S. 3 [hereinafter 2003 UN ICH Convention]; 2005 UN CD Convention, *supra* note 9.

[20] 2001 UN UCH Convention, *supra* note 19, art. 3.

[21] Vienna Convention on the Law of Treaties, art. 31(3)(c), May 23, 1969, 1155 U.N.T.S. 331 [hereinafter Vienna Convention]. *See* Constitution of the United Nations Educational Scientific and Cultural Organization, art. 2, Nov. 16, 1945, 4 U.N.T.S. 275 [hereinafter UNESCO Constitution]; Seventy-Fifth COPUOS LSC Report, *supra* note 2, ¶ 5(13).

[22] UNESCO Constitution, *supra* note 21, art. 1.

[23] *Id.*

science."[24] International conventions are necessary to achieve "international cooperation calculated to give the people of all countries access to [knowledge] produced by any of them."[25]

A. What Is OSCH?

Cultural traditions and identity are inextricably connected to our past, present and future – all in which, in a plethora of cultures over millennia, humans have sought to understand and explore the Universe, building upon our collective knowledge, advancing our technological capacities and increasing our physical and emotional ability to adapt longer and farther beyond Earth. It is through this cultural mechanism, "one of the mainsprings of development,"[26] galvanized by compounding individual, what we term, "cultural heritage segments" that humans have created OSCH – any element of which is innately composed of successive segments that "[c]reati[vely] draw[] on the roots of cultural tradition, but flourish[] in contact with other cultures."[27]

OSCH is the result of comprehensive human collaboration throughout history manifest through cultural expressions. Each element of OSCH attests to the successive "human effort and innovation [it] represent[s]."[28] Its innate nature prevents it from being defined as ethnically or locally nascent, or unilaterally asserted as an

---

[24] *Id.*

[25] *Id. See* 2005 UN CD Convention, *supra* note 9, Preamble ("culture [is a] strategic element in … international development policies").

[26] *Id.* at art. 2(5).

[27] United Nations Educational, Scientific and Cultural Organization Universal Declaration on Cultural Diversity, art. 7, Nov. 2, 2001, 41 I.L.M. 57, UNESCO Doc. 31C/Res. 25 [hereinafter UNESCO Cultural Diversity Declaration].

[28] One Small Step to Protect Human Heritage in Space Act of 2020, §2(a)(4), 2(b)(1), Pub. L. No. 116-275 [hereinafter One Small Step Act] (acknowledging "the thousands of individuals who have contributed to the[se] achievements [and whose] work … often went unacknowledged, [but] helped broaden the scope of space travel and charted new frontiers for humanity's exploration of space"). *See* 2003 UN ICH Convention, *supra* note 19, Preamble ("communities [&] individuals … enrich cultural diversity and human creativity.").

element of OSCH by one sovereign[29] (notwithstanding rights of jurisdiction, ownership and liability consistent with existing space law).[30]

"Cultural interaction and creativity [are] … vital …[in] nurtur[ing,] renew[ing] and enhance[ing] the role played by those involved in the development of [OSCH] for the progress of society at large."[31] The proposed working legal definition for OSCH attempts to reflect this tenet by shifting the notion of CH traditionally contextualized in national or ethnic distinctions to one that instead underscores collective human ingenuity. This category of CH has deliberately and inadvertently enabled international cooperation in facilitating the exploration and use of outer space.[32] The proposed working legal definition for OSCH set forth below is limited to CH that manifests or exists beyond Earth.

> 1. "Outer Space Cultural Heritage" means traces of human existence, together with their archaeological and natural contexts that occur in outer space, including on the Moon and other celestial bodies.

---

[29] *See* Antarctic Treaty Annex V, *supra* note 18, art. 8(2) ("[a]ny Party may propose"); UNCLOS, *supra* note 18, art. 149 ("particular regard [for] preferential rights of the State[s] or countr[ies] of origin, … cultural origin, or … historical and archaeological origin"); 2001 UN UCH Convention, *supra* note 19, art. 11(4) ("declaration … based on a verifiable link to the [UCH], particular regard [for] preferential rights of States of cultural, historical or archaeological origin"); 1972 UN WH Convention, *supra* note 19, art. 11(3).

[30] Outer Space Treaty, *supra* note 3, arts VII, VIII. *See generally* Liability Convention, *supra* note 3; Moon Treaty, *supra* note 4, art. 12(1).

[31] 2005 UN CD Convention, *supra* note 9, Preamble.

[32] *E.g.*, Agreement Concerning Cooperation on the Civil International Space Station, Jan. 29, 1998, 1998 U.S.T. LEXIS 212 [hereinafter ISS Agreement]; *Compare* the deliberate efforts to accomplish the 2020 Emirates Mars Mission (*Hope* orbiter co-created by Mohammed bin Rashid Space Centre (UAE) and three USA universities; transported from USA to UAE in Russian-operated, Ukrainian-built cargo plane; and launched from Japan in a Mitsubishi-built and operated rocket). *See* Kenneth Chang, *From Dubai to Mars, With Stops in Colorado and Japan*, N.Y. TIMES, Feb. 15, 2020 (updated Jul. 19, 2020), http://nytimes.com/2020/02/15/science/mars-united-arab-emirates.html) *to* the inadvertent but successive advances in astrology, mathematics throughout history. *See* For All Moonkind Cultural Heritage Segmentation Research Initiative, FOR ALL MOONKIND, https://www.forallmoonkind.org/about/moonkind-outer-space-cultural-heritage-segmentation-research-initiative/ (last visited May 27, 2021) [hereinafter For All Moonkind OSCH Segmentation Research Initiative].

> 2. Outer Space Cultural Heritage having a significant cultural, historical, archaeological, or other scientific character may include:
>
> a) objects, structures and cultural spaces;
>
> b) a first achievement of its kind that resulted directly or indirectly from human ingenuity over broad historical periods and between diverse cultural groups, and which has had a significant impact on human space exploration;
>
> c) human engineered methods permitting travel, human life, community and communication beyond Earth;
>
> d) practices, expressions, knowledge and skills that humans create in response to, and in interaction with, their extraterrestrial environment and which give them a shared sense of humanity and continuity with life on Earth; and
>
> e) symbolic markers in an extraterrestrial context that originate from and express human identity.[33]

The term OSCH to categorize and designate a new form of CH emphasizes the human being, rather than an inanimate or natural object,[34] as a form of life and itself a manifestation of heritage. The term breaks from traditional CH qualifiers[35] to minimize the influence of legal and ethical shortcomings reflected within their respective treaty regimes; contrasts the changed socio-political dynamics

---

[33] Definition of Heritage in Outer Space, FOR ALL MOONKIND, https://www.forallmoonkind.org/about/definition-of-heritage/ (last visited June 15, 2021).

[34] These categories are found throughout current UNESCO treaties and include the binaries of: movable/immovable cultural property; monuments, buildings and sites; natural formations; mixed cultural/natural sites/areas; underwater objects of an archaeological/historical nature; traces of human existence under water; marine areas of outstanding value; practices, representations, expressions, knowledge, skills; related instruments, objects, artifacts and cultural spaces; expressions, artistic creation, production, dissemination, distribution and enjoyment. For a discussion of these binaries in their legal context, see generally JANET BLAKE, INTERNATIONAL CULTURAL HERITAGE LAW (2015).

[35] *E.g.,* cultural property, cultural heritage ("CH"); "heritage of all the nations of the world," "cultural and natural heritage;" WH; common heritage; "historic sites and monuments;" UCH; ICH; cultural expressions. For a discussion of these qualifiers and the work they are employed in the law, *see id.*

amidst which those treaties were developed;[36] and circumvents the continued discord sown by those factors.[37]

II. A SPACE LAW INSTRUMENT COULD FRAME AN OSCH REGIME WITH ICH LAW PRINCIPLES

An innovative OSCH instrument could support the "progressive development of international space law,"[38] as well as that of international CH law, with the administrative support of COPUOS. The application of CH law is ultimately limited by the medium outside Earth in which the OSCH exists. The legal authority and practical expertise under which the UN Educational Scientific and Cultural Organization ("UNESCO") operates to oversee and enforce rules applicable to CH on Earth is dissimilar to that under which the UN body tasked with promoting international cooperation in space, COPUOS, operates.

Nevertheless, the intersectionality of COPUOS's mandate to "study the nature of [such] legal problems which may arise from the exploration of [OS],"[39] including "the interests of present and future generations,"[40] and UNESCO's mandate to "recommend such international agreements [and] … conventions … to promote [and] … assur[e] the conservation and protection of the world's inheritance"[41] offer an ideal legal framework for the qualification and safeguarding of OSCH. It is within the UNGA's mandate to "initiate studies and make recommendations for the purpose of … encouraging the progressive development of international law and its codifications."[42] Also within UNGA's mandate is to identify the "means

---

[36] Legal and ethical shortcomings net increasingly unsatisfactory resolutions.

[37] *E.g.*, Outer Space Treaty, *supra* note 3, art. 1 ("province of all [hu]mankind"); *Id.* at art. 2 ("not subject to national appropriation"). *See* Asteroid Resource and Space Resource Rights, Pub. L. No. 114-90, § 401, 129 Stat. 70 (2015) (51 U.S.C.S. § 51301), Loi 674 du 20 juillet 2017 sur l'exploration et l'utilisation des ressources de l'espace [Law 674 of July 20, 2017 on the Exploration and Use of Space Resources], art. 1, JOURNAL OFFICIEL DU GRAND-DUCHE DE LUX., July 28, 2017, http://legilux.public.lu/eli/etat/leg/loi/2017/07/20/a674/jo.

[38] Fifty-Ninth COPUOS Report, *supra* note 10, ¶ 296(2)(e).

[39] G.A. Res. 1472 (XIV), A(1)(b) (Dec. 12, 1959).

[40] Moon Treaty, *supra* note 4, art. 4(1).

[41] UNESCO Constitution, *supra* note 21, art. 2.

[42] U.N. Charter art. 13, ¶1.

for giving effect to programmes … which could appropriately be undertaken under the U[N] auspices,"[43] (i.e., COPUOUS and or UNESCO). An OSCH instrument elaborating CH law principles, but developed within the framework of the UN Space Treaties and its principles could "enhanc[e the] synergy and efficiency"[44] between UN organizational bodies and their legal frameworks. The proposed framework could support the purpose of the UN "to achieve international co-operation in solving international problems of a[] . . . cultural . . . character"[45] while "harmonizing the actions of nations in the attainment of th[is] common end[]."[46]

In working to achieve its 2016 mandate, COPUOS's LSC encouraged States "to regularly exchange information on developments in the area of national space-related regulatory frameworks."[47] Although not structured as such, but instead in an international CH-related framework, discussion over CH law principles may inspire rules to safeguard "landing sites, artifacts, spacecraft, and other evidence of activity on celestial bodies"[48] in outer space - as well as intangible and largely physically inaccessible manifestations of OSCH that are "vehicles of identity and social cohesion [that] also need[] to be protected and promoted."[49]

International CH law, based largely upon the UN Cultural Heritage Treaties and their supporting principles, offers the LSC a "schematic overview of [an adaptable legal] framework"[50] to regulate OSCH. Although The Antarctic Treaty[51] (Antarctic Treaty), the United Nations Convention on the Law of the Seas[52] (UNCLOS) and the Convention on the Protection of the Underwater Cultural Heritage[53] (UN UCH Convention) may provide exemplary legal

---

[43] G.A. Res. 1472 (XIV), A(1)(a) (Dec. 12, 1959).

[44] G.A. Res. 70/1, 70 (Sep. 25, 2015).

[45] U.N. Charter art. 1, ¶3.

[46] U.N. Charter art. 1, ¶4. *See* UNESCO Constitution, *supra* note 21, art. 2(c); G.A. Res. 1721 (XVI), B(3)(c) (Dec. 20, 1961).

[47] Fifty-Eighth COPUOS LSC Report, *supra* note 2, ¶ 122. *See also id.,* ¶ 121; Seventy-Fifth COPUOS LSC Report, *supra* note 2, ¶ 2(5)(a).

[48] Artemis Accords, *supra* note 12, § 9.

[49] Azoulay Foreward, *supra* note 9, ¶ 1.

[50] Fifty-Eighth COPUOS LSC Report, *supra* note 2, ¶ 122. *See* Seventy-Fifth COPUOS LSC Report, *supra* note 2, ¶ 5(13).

[51] Antarctic Treaty Annex V, *supra* note 18.

[52] UNCLOS, *supra* note 18, arts. 149, 303.

[53] 2001 UN UCH Convention, *supra* note 19.

frameworks to govern objects and sites beyond national jurisdiction, the UN Cultural Heritage Treaties' intangible cultural heritage (ICH) law principles, expressed in the Convention for Safeguarding of the Intangible Cultural Heritage[54] (UN ICH Convention), may be most helpful to broaden the traditional perception of CH as merely tangible. These ICH law principles, thus, could provide a theoretical basis upon which to conceptualize and structure within the law the manifestation of human culture in a new medium which exists beyond our indigenous planet. ICH law principles can legally accommodate the diversity of tangible and intangible OSCH;[55] mitigate the physical challenges of distance and inaccessibility in safeguarding OSCH beyond Earth; and assuage legal complications relating to sovereign and proprietary rights over it without prejudicing those provided for in the UN Space Treaties.[56]

Given the significant distances to and general inaccessibility of OSCH, particularly to civil society, a legal regime to safeguard it will require that it ultimately be measured against its intangible value. ICH law principles can, in spite of these factors, legally establish an ongoing cultural connection to a space object, site, event or practice without which the essence of heritage cannot be sustained and, therefore, would not merit safeguarding. A legal regime over OSCH structured upon these principles allays challenges presented by heritage that is inextricably complex in its proprietary, material, intellectual, temporal and cultural composition.

A legal regime to safeguard OSCH framed around ICH law principles also innately reflects the intangible mediums for human interaction that were created for the use and exploration of outer space, but that have subsequently been adapted for ever increasing intangible, *i.e.*, virtual, human interaction on Earth. Intangible CH

---

[54] 2003 UN ICH Convention, *supra* note 19.

[55] *Id.* at art. 2(1). *See* International Space Exploration Coordination Group, *Benefits Stemming from Space Exploration*, 5 (Sep. 2013), https://www.nasa.gov/sites/default/files/files/Benefits-Stemming-from-Space-Exploration-2013-TAGGED.pdf [hereinafter ISECG Report] (tangible includes objects manifesting advances in science and technology; intangible includes social and philosophical dimensions, enriching of culture, inspiration and mutual understanding).

[56] *See* Fifty-Eighth COPUOS LSC Report, *supra* note 2, ¶ 88 ("uncertainty regarding the applicability of space law and aeronautical law, . . . and that the existence of different regimes and mutually exclusive concepts, such as territorial sovereignty and the common heritage of humanity, gave the [LSC] substantial reason to keep the item on its agenda for future sessions").

law principles also, therefore, support the increasing reliance on intangibility as a medium for the development of culture between people beyond Earth, with people on Earth and amongst people on Earth. The essence of intangibility as a result of human space exploration has become a central character for the development of CH in the Universe and should be an integral tenet in a new space law instrument to safeguard OSCH.

A. Objects and Sites Form Part of the Intangible OSCH

Tangible OSCH is manifest in physical objects or cultural spaces (i.e., sites), whereas intangible OSCH is the non-physical manifestation of culture (i.e., practices, representations, expressions, knowledge and skills), "as well as the instruments, objects, artefacts and cultural spaces associated therewith – that communities, groups and, in some cases, individuals recognize as part of their cultural heritage."[57] Intangible OSCH comprises cultural traditions that are central to our identity as human beings. These cultural traditions have helped craft how we identify ourselves and in turn have influenced how we have given, and continue to give, meaning to our environment both on and beyond Earth.[58]

ICH law creates a legal distinction (albeit for sequencing and administrative purposes) between tangible and intangible CH. It concedes, however, that there is a "deep-seated interdependence between the [two]"[59] and proscribes that nothing can "alter[] the status or diminish[] the level of protection under the 1972 Convention concerning the Protection of the World Cultural and Natural Heritage of World Heritage properties with which an item of the intangible cultural heritage is directly associated."[60] Intangible CH law acknowledges the artificial separation between heritage as a "thing" and the manner in which we engage with it (heritage as a "practice"), thus, it can provide for the regulation of objects, sites and non-material manifestations of OSCH existing beyond Earth. Its principles serve as a conceptual umbrella that capture human

---

[57] 2003 UN ICH Convention, *supra* note 19, art. 2(1).

[58] *See id.* at art. 2; 2013 ISECG Report, *supra* note 55, at 11-12 ("human activity beyond Earth ... ha[s] profound influence on cultural and intellectual life around the world and on humanity's views and expectations of itself").

[59] 2003 UN ICH Convention, *supra* note 19, Preamble.

[60] *Id.* at art. 3(a).

relationships with culture and their tangible manifestations. Theoretically, all CH is intangible because humans value it on the immaterial basis in which we relate to it and before, or more than, any material value ascribed to it.[61]

ICH law principles provide for the regulation of both material and non-material CH, which ultimately do not need to be tied to a territorial jurisdiction in the latter case when OSCH does not physically exist; and in the former case when it is so vastly inaccessible to most, if not all, humans in the province of all humankind that methods for non-material preservation, i.e., memorialization, may prove the most effective, and foremost, means to safeguard it. When tangible OSCH, including cultural spaces, can be physically safeguarded, CH lists can be employed to structure a legal mechanism to protect and preserve them by invoking positive and negative obligations to achieve this objective.[62] *Safeguarding* underscores the importance of the CH's intangible character, whereas protection or preservation underscore the importance of its tangible elements.[63]

B. ICH Law Has Been Adopted by 180 of 195 States

ICH law principles can help "[d]efine and develop requirements for enhanced information exchange [embedded in] guidelines for the long-term sustainability of [OSCH, including] specifically addressing risk-reduction[,] capacity-building and outreach activities [harnessed i]n transparency and confidence-building measures."[64] The UN ICH Convention was established not to replace, but rather to supplement the preceding CH treaties in order to meet a then contemporaneous and growing appreciation for non-tangible CH, to protect its practices and to support an evolving practice of international law, which includes regional, bilateral and domestic rules that supplement

---

[61] *See* 2005 UN CD Convention, *supra* note 9, Preamble ("convey[s] identities, values [and] meanings[;] not ... solely [of] commercial value").

[62] See *infra* text accompanying footnotes 187 to 191.

[63] *See* OFFICE OF SCI. AND TECH. POLICY, PROTECTING & PRESERVING APOLLO PROGRAM LUNAR LANDING SITES & ARTIFACTS, 1 (2018) ("no legal definitions of 'preservation' and 'protection' precisely applicable to lunar sites and artifacts[;] … 'protection' means preventing further damage, whether by nature or human activity[;] … 'preservation' as 'the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property' [to] a site or artifact not being disturbed or harmed'").

[64] Fifty-Ninth COPUOS Report, *supra* note 10, ¶ 296(3).

and enforce it. The authority of the Convention is limited to the territories within States that are Party to it.[65]

Thus, both the authority and duty of a State Party under ICH law to safeguard culturally significant objects, sites or practices is legally derived from its jurisdiction over the object, site and or practicing heritage community located within its territory.[66] The jurisdictional tenet dictated by the UN ICH Convention to safeguard CH based on territoriality and national origin impedes its application—and generally that of other existing CH treaties—beyond Earth, as areas in the "province of all [hu]mankind"[67] are beyond the territories of SPs to any of the existing CH treaties. Additionally, Article II of the Outer Space Treaty explicitly prohibits the assertion of territorial rights by sovereignty or any other means.[68]

A challenge of potentially even utilizing ICH law principles to structure an OSCH space law instrument may be reluctance by the 13 of the 110 State Parties to the Outer Space Treaty that have not ratified the UN ICH Convention. Amongst these State Parties are the current spacefaring nations of Australia, Canada, Israel, Russian Federation, the United Kingdom of Great Britain and Northern Ireland and the United States of America.[69] This hurdle may not be insurmountable, as there are instances in which these States have nonetheless incorporated ICH law principles into their domestic regimes,[70] or are party to other UN Cultural Heritage Treaties thereby, indicating some degree of adherence to general principles of CH law, particularly, in some cases, to those that provide for the

---

[65] 2003 UN ICH Convention, *supra* note 19, art. 11(a).

[66] *Id.*

[67] Outer Space Treaty, *supra* note 3, art. I.

[68] *Id.* at art. II.

[69] Also Guyana, Holy See, Libya, New Zealand, San Marino, Sierra Leone and South Africa. *Compare Convention for the Safeguarding of the Intangible Cultural Heritage,* UNITED NATIONS TREATY COLLECTION, https://treaties.un.org/pages/showDetails.aspx?objid=080000028006656f (Last visited Sept. 30, 2021) *,with Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies*, UNITED NATIONS TREATY COLLECTION, https://treaties.un.org/pages/showdetails.aspx?objid=0800000280128cbd (last visited Sept. 30, 2021).

[70] For a discussion of incorporation of ICH law in Australia and Canada, for instance, see Lucas Lixinski, *Trialogical Subsidiarity in International and Comparative Law: Engagement with International Treaties by Sub-State Entities as Resistance or Innovation*, 55 CANADIAN YEARBOOK OF INTERNATIONAL LAW 1-32 (2018).

safeguarding of CH in areas beyond national jurisdiction on Earth.[71]

Article 34 of the Vienna Convention on the Law of Treaties (Vienna Convention) dictates that "[a] treaty does not create either obligations or rights for a third State without its consent."[72] Its Article 38 dictates also, however, that "[n]othing in article[] 34 … precludes a rule set forth in a treaty from becoming binding upon a third State as a customary rule of international law, recognized as such."[73] Thus, even if the UN ICH Convention is not considered an illustration of customary international law, it must still nevertheless be taken into consideration in treaty interpretation. As 180 of the 195 States in the world are party to the UN ICH Convention and 97 of the 110 Parties to the Outer Space Treaty are also parties to the UN ICH Convention,[74] there may be some consideration as to whether under Article 31(3)(c) of the Vienna Convention, "[t]here shall be taken into account, together with the context … any relevant rules of international [ICH] law applicable in the relations between the parties"[75] of COPUOS.

III. A BROAD MULTILATERAL INSTRUMENT SHOULD SAFEGUARD OSCH

"Recognizing the great importance of international cooperation,"[76] a broad multilateral instrument may most effectively safeguard OSCH and provide a greater number of people the opportunity to exercise their "right to freely participate in the cultural life [expressed by the exploration of outer space] and to share in

---

[71] *See* Antarctic Treaty Annex V, *supra* note 18 (to which Australia, Russia, the United Kingdom and the United States are parties); UNCLOS, *supra* note 18 (to which Australia, Canada, Russia, and the United Kingdom are parties); 2001 UN UCH Convention, *supra* note 19 (to which Australia, Canada, Israel, Russia, the United Kingdom and the United States have not parties).

[72] Vienna Convention, *supra* note 21, art. 34.

[73] *Id.* at art. 38.

[74] One hundred and ninety-three of those 195 States are UN Member States. The Holy See and Palestine are Permanent Observers to the UN. States that are not party to either the Outer Space Treaty or 2003 UN ICH Convention are: Liberland, Liechtenstein and Maldives. *See* discussion, s*upra* note 69.

[75] Vienna Convention, *supra* note 21, art. 31(c). *See* G.A. Res. 1962 (XVIII), art. 4 (Dec. 13, 1963). *See also* G.A. Res. 1721 (XVI), A(1)(a) (Dec. 20, 1961).

[76] G.A. Res. 1472 (XIV), A (Dec. 12, 1959).

[its] scientific advancement and its benefits."[77] It could also effectively provide for "the international community [to] contribute, together with [State Parties] to … the safeguarding of such [OSCH] in a spirit of cooperation and mutual assistance,"[78] thereby potentially establishing a more effective legal mechanism. Although national laws, regional, bilateral or other narrower multilateral agreements may be, relatively, effective in regulating CH on Earth, their reliance on sovereignty and territoriality cannot ultimately yield a like efficacy - where efficient - beyond it. The absence of territorial sovereignty and the increased national and ethnic amalgam of, albeit not lack of titular,[79] associations with OSCH increase the risk of diplomatic and legal conflict.[80] While a new OSCH instrument should not prejudice the rights, jurisdiction and duties of States under the UN Space Treaties, it should be interpreted and applied in the context of, and in a manner consistent with, international law.[81]

The aforementioned considerations may also hinder the ultimate success of narrower agreements. This is increasingly the case in complex legal disputes between individuals, groups, private and or public entities, and States over ICH, land-based movable, also immovable, CH and underwater CH on Earth – particularly when that tangible CH is discovered in areas beyond that of,[82] or within conflicting,[83] national jurisdiction; or when the rules to regulate, or regimes with legal jurisdiction over it have changed.[84]

Narrow agreements for the safeguarding of OSCH negotiated outside a broader multilateral forum may eventually threaten the

---

[77] G.A. Res. 217 (III), art. 27 (Dec. 10, 1948). *See id.* at art. 28 (all "entitled to … international order [where such] rights and freedoms … can be fully realized"); 2005 UN CD Convention, *supra* note 9, Preamble ("cultural diversity [to] realiz[e] human rights").

[78] 2003 UN ICH Convention, *supra* note 19, Preamble.

[79] Outer Space Treaty, *supra* note 3, art. VIII.

[80] *See* Vienna Convention on Succession of States in Respect of State Property, Archives and Debts, Apr. 8, 1983, 22 ILM 306 [hereinafter 1983 Vienna Convention]. This could encompass, for example, CH claims resulting from succession of States and conflicting legal regimes.

[81] Vienna Convention, *supra* note 21, art. 71; G.A. Res. 1721 (XVI), A(1) (Dec. 20, 1961).

[82] *See, e.g.*, UNCLOS, *supra* note 18, arts. 149, 303(1); 2001 UN UCH Convention, *supra* note 19, arts. 11-12.

[83] *See* UNCLOS, *supra* note 18, arts. 33, 303(2); 2001 UN UCH Convention, *supra* note 19, arts.7-10.

[84] *See* 1983 Vienna Convention, *supra* note 80, art. 9.

principles and authority of those space law instruments which were, or that may be, so negotiated when the terms of the former divert from or lessen the tenets of the latter.[85] Moreover, CH may also present challenges existing on Earth where such narrower agreements may require State-by-State approval and periodic renewals, which allow the initiating State more legislative and or juridical autonomy on a case-by-case basis over disputed CH linked to other States, rather than committing to a more consistent application of CH law principles.[86] This creates inconsistency and discord in the international CH legal regime and prevents the broad multilateral conventions from achieving their potential for legal authority, effectiveness and, ultimately, the harmonization of international law. Of particular concern also is the diminished leverage States representing a segment of OSCH may experience when narrower, rather than, broader, agreements are in place, or when broader agreements fail to consider their cultural interests in the OSCH resulting from diminished leverage during treaty negotiations.

A. Jurisdiction

The Outer Space Treaty dictates that "[o]uter space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[87] It further dictates that these areas constitute "the province of all [hu]mankind,"[88] thus, indicating an absence of sovereign jurisdiction in outer space or on other celestial bodies, except over "an object launched into [outer space over which] … the States Parties on whose registry [it was] launched …retain[s] jurisdiction and control."[89] The Treaty does not explicitly provide any right or obligation to its State Parties, be it positive

---

[85] *See, e.g.*, 2001 UN UCH Convention, *supra* note 19, art. 5(1) ("in full conformity with [&] not dilute … universal character"); Vienna Convention, *supra* note 21, art. 41 (if not prohibited by treaty, does not affect enjoyment by other parties, or bear provision/derogation incompatible with treaty); U.N. Charter art. 52(1).

[86] *See* Artemis Accords, *supra* note 12, §9 ("Signatories intend to preserve [OSCH], which *they* consider … historically significant …" (*emphasis added)*). Bilateral agreements can limit uniform CH policy benefitting all States of origin.

[87] Outer Space Treaty, *supra* note 3, art. II.

[88] *Id.* at art. I.

[89] *Id.* at art. VIII.

or negative, to safeguard OSCH.[90] Its text prohibiting "claim[s] of sovereignty"[91] may implicitly even caution against it, aside from any intention under the Convention on the International Liability for Damage Caused by Space Objects[92] to prevent "damage . . . to a space object . . . or property on board such a space object."[93]

An act to safeguard OSCH outside that permitted to a State over an object to which it maintains jurisdiction, control or ownership, for which it is liable as the launching State, or absent an international accord that "facilitate[s] and encourages international co-operation"[94] in that respect could be construed as a claim of sovereignty and, therefore, a violation of the Outer Space Treaty. In contrast, claims of sovereignty create such rights and obligations to safeguard CH under the UN Cultural Heritage Treaties, including the UN ICH Convention, which obligates its State Parties in respect of ICH in their individual territories.[95] Given the dichotomy between the Outer Space Treaty and the UN ICH Convention in this regard —and consistent with the proscription of the former's Article II—under UN Cultural Heritage law, it is outside the scope of authority of any of its treaties' State Parties to apply that law to safeguard CH in the province of humankind.

The inapplicability in outer space of existing CH treaties is predominantly due to the principle of territoriality, or the application of international law to a State's own territory and the territories for whose external relations that State is responsible. International law can, however, apply to areas outside a State's jurisdiction, if treaties are explicitly drafted as such.[96] That existing CH treaties have generally not been drafted as such can be attributed to several reasons. In our view, a key reason for this is that, initially, it was understood that CH did not exist in areas beyond national jurisdiction because those areas were themselves often

---

[90] *See id.* at art. IX; Moon Treaty, *supra* note 4, arts. 2, 4(1), 15(3); G.A. Res. 1962 (XVIII), art. 6 (Dec. 13, 1963) (introducing the concept of "due regard").

[91] Outer Space Treaty, *supra* note 3, art. II.

[92] Liability Convention, *supra* note 4.

[93] *Id.* at art. 3.

[94] Outer Space Treaty, *supra* note 3, art. I.

[95] 2003 UN ICH Convention, *supra* note 19, art. 11(a). *See* Vienna Convention, *supra* note 21, art. 29.

[96] Vienna Convention, *supra* note 21, art. 29.

thought to be devoid of human activity and, thus, devoid also of historical and cultural presence. Other reasons include the fear of encroaching jurisdiction; the challenge of reaching agreement over jurisdictional voids or areas of overlapping jurisdiction; and the risk of deadlock on overall treaty negotiations.

These challenges have, however, been overcome in international treaty law which apply outside areas of national jurisdiction in order to safeguard CH. In those instances, the law evolved, acknowledging that continuing human engagement outside these areas resulted, and will continue to result, in the creation of CH that merits safeguarding (i.e., the Antarctic Treaty,[97] the UNCLOS[98] and the 2001 UN UCH Convention[99]). This article does not advise that the texts of the Outer Space Treaty or the 2003 UN ICH Convention are amenable to extending jurisdiction over OSCH. In our view, *de lege ferenda* indicates that to safeguard OSCH, a new space law instrument could be written to allow its rules to apply in this specific context beyond areas of national jurisdiction[100] and, thus, for jurisdiction over OSCH to be amplified beyond that as provided for under the UN Space Treaties[101] — or even beyond that based on national origin, which is typically the basis for jurisdiction under the UN Cultural Heritage Treaties. This could be accomplished while conserving rights of control, ownership and liability over the OSCH consistent with existing space, property, and or intellectual

---

[97] Antarctic Treaty, *supra* note 18 (safeguarding of Historic Sites and Monuments formally introduced in 1991 at Annex V).

[98] UNCLOS, *supra* note 18, art. 149 ("All objects of an archaeological and historical nature found in the Area [, or seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction,] shall be preserved or disposed of for the benefit of [hu]mankind as a whole."); *Id.* at art. 303(1) ("States have the duty to protect objects of an archaeological and historical nature found at sea and shall cooperate for this purpose.").

[99] 2001 UN UCH Convention, *supra* note 19, arts. 11(1), 12 ("States Parties responsib[le[] to protect [UCH] in the Area in conformity with this Convention and Article 149 of [UNCLOS]").

[100] Vienna Convention, *supra* note 21, art. 29 ("[u]nless a different intention appears [or] otherwise established"); *Id.* at art. 31(1) ("A treaty shall be interpreted in good faith in accordance with the ordinary meaning to be given to the terms of the treaty in their context and in the light of its object and purpose.").

[101] UN Space Treaties, *supra* note 4. *E.g.*, ISS Agreement, *supra* note 32, art. 5(2). *See* Outer Space Treaty, *supra* note 3, art. VIII; Registration Convention, *supra* note 4, art. 2(2); Rescue and Return Agreement, *supra* note 4, arts. 3-5; G.A. Res. 1962 (XVIII), art. 7 (Dec. 13, 1963); G.A. Res. 37/92, Annex F(8) (Feb. 10, 1982).

property law,[102] thereby, allowing that "such a framework …be aligned with the Outer Space Treaty and provide legal certainty and predictability"[103] for spacefaring actors.

B. Terminology Should Reflect Principles Underlying OSCH

A new OSCH instrument should reflect modern space and CH norms. It should account for the effect of advanced technologies on legal and moral principles particularly as they have modified, or condemn, previous ones. It should also adequately express physical and ethical considerations particular to human interaction with outer space. In kind, the legal qualification for OSCH should reflect contemporary contributions to human space exploration by spacefaring and non-spacefaring States, as well as the historical contributions of communities existing, or having existed, within the territories of modern States. A new legal framework over OSCH should not turn a blind eye to, but instead acknowledge such essential contributions by modern non-spacefaring States[104] and pre-colonized and ancient societies.[105]

Terminology can be inadequate if it conveys a delusive understanding of which human communities have contributed to space exploration. It can fail to recognize the contributions of modern non-spacefaring States that have facilitated human space exploration by spacefaring States. It can also narrate, and inherently contribute to, a historical subjugation of communities, thus failing to recognize such essential contributions by pre-colonialized and ancient

---

[102] *E.g.*, Law of the Russian Federation No. 5663-1 of Aug. 20, 1993 on Space Activities, at art. 16 [hereinafter Russian Space Law]. *See supra* note 30. *See also* 2005 UN CD Convention, *supra* note 9, Preamble (addressing intellectual property rights in sustaining those involved in cultural creativity).

[103] Fifty-Eighth COPUOS LSC Report, *supra* note 2, ¶ 248.

[104] For example, satellites in Australia and Spain also supported telemetry for the 1969 *Apollo 11* mission. See Sarkissian, J. (2001). On Eagle's Wings: The Parkes Observatory's Support of the Apollo 11 Mission. Publications of the Astronomical Society of Australia, 18(3), 287-310. doi:10.1071/AS01038; and Jose M Urech, Space Communication Stations in Spain and their Contributions to Solar System Exploration, 57th International Astronautical Congress (02 October 2006 - 06 October 2006 – Valencia, Spain) https://doi.org/10.2514/6.IAC-06-E4.4.04.

[105] For All Moonkind OSCH Segmentation Research Initiative, *supra* note 32. 2005 UN CD Convention, *supra* note 9, art. 7 ("recogniz[ing] the important contribution of [those] involved in the creative process, cultural communities [and] their central role in ... the diversity of cultural expressions").

societies, particularly before they may have undergone destabilizing effects, for instance, from colonization or other calamitous political, migratory or environmental events, that ultimately curbed their continued contributions. The whole of these contributions form part—independently, or as formative factors — of OSCH. They should be researched, identified[106] and integrated into the legal qualification of OSCH, thereby, providing for the interests of all UN Member States and Permanent Observers in defining and safeguarding OSCH irrespective of their contemporary degree of economic or scientific development.[107]

Generally, adverse terminology should be avoided. Terms such as those embedded in colonial discourse,[108] for example, could exacerbate the perceived incapacity of States to develop (past, present, or future) societies, including in outer space; broaden political divides between States at varying spacefaring stages; aggravate historical woes; deepen socio-economic and cultural biases; and ultimately create conflicts in the negotiating process for a new space law instrument to safeguard OSCH.

C. OSCH Is Culturally and Historically Comprehensive

It would be flawed to categorize OSCH within a national (rather than an international) legal framework as CH on Earth has generally been organized, albeit imperfectly.[109] By acknowledging and establishing a place in CH law for the irrefutable contributions by a plethora of cultures over human history, the law not only mitigates perceived disparities in national contributions to human space exploration, but also recognizes legal standing with a wider diversity of States to participate in negotiating rules to regulate and safeguard OSCH. This thereby ensures that such initiatives will be "carried out for the benefit and in the interests of all countries"[110] – not just those of spacefaring States, or those States which

---

[106] For All Moonkind OSCH Segmentation Research Initiative, *supra* note 32.

[107] *See* Outer Space Treaty, *supra* note 3, art. I.

[108] Such terms include, for example, "civilization," "civilized" and "developed."

[109] *See* Fifty-Ninth COPUOS Report, *supra* note 10, ¶ 296(2)(d); *UNESCO Database of National Cultural Heritage Laws*, UNESCO.ORG, https://en.unesco.org/cultnatlaws (last visited June 22, 2021); UN CH Treaties, *supra* note 19.

[110] Outer Space Treaty, *supra* note 3, art. I. *See, e.g.*, 1972 UN WH Convention, *supra* note 19, art. 6 (CH "constitutes a world heritage for whose protection it is the duty of the international community [to] identif[y], protect[], conserv[e] and present[]").

generate tangible OSCH. This legal premise promises that "due regard to the corresponding interests of all other States Parties to the [Outer Space Treaty]"[111] be recognized for the contribution to space exploration that communities or individuals existing, or that historically existed, within their modern territories have made,[112] and may make, beyond that contribution made by those existing in contemporary spacefaring States.

The "diverse forms … culture [has] take[n] across time and space … is embodied in the uniqueness and plurality of the identities and cultural expressions of the peoples and societies [that have cumulatively] ma[d]e up humanity['s]"[113] capacity for space exploration. "Due regard sh[ould] be paid to the interests of present and future,"[114] but also past generations that contributed to the creation of OSCH. Understanding OSCH as nascent of a collective of human achievements over time and cultures not only ultimately "avoid[s] the extension of present national rivalries into this new field,"[115] but it yields a more accurate understanding of what it is.[116] It also theoretically advances that the regime over it be framed in a wide multilateral instrument consistent with the UN treaty regime, which could secure a more effective and diplomatically satisfactory "international mechanism for cooperation"[117] to safeguard it.

---

[111] Outer Space Treaty, *supra* note 3, art. IX. G.A. Res. 41/65, Annex, IV, XII (Dec. 3, 1986).

[112] *E.g.*, G.A. Res. 62/200, 1 (Dec. 19, 2007) ("The year 2009 marks the 400th anniversary of the first use of the telescope for astronomical observation by the Italian scientist Galileo Galilei in 1609.") UNESCO General Conference, *Proclamation of 2009 and the United Nations International Year of Astronomy*, U.N. Doc. 33 C/67, Ex. n. ¶ 5 (Oct. 11, 2005) ("hav[ing] great influence [on] understanding of the universe[,] technological, social and economic development[;] science, philosophy, religion and culture.").

[113] 2005 UN CD Convention, *supra* note 9, Preamble.

[114] Moon Treaty, *supra* note 4, art. 4(1).

[115] G.A. Res. 1472 (XIV*),* A (Dec. 12, 1959).

[116] *See* ISECG Report, *supra* note 55, at 6 ("tangible enhancements to the quality of life" and "intangible philosophical benefits"); W.H. Siegfried, *Space Colonization—Benefits for the World, in* SPACE TECHNOLOGY AND APPLICATIONS INTERNATIONAL FORUM AIP CONFERENCE PROCEEDINGS 1270-1278 (2003).

[117] Fifty-Ninth COPUOS Report, *supra* note 10, ¶ 208. *See* One Small Step Act, H.R. 3766, 116th Cong. § 2(a) (2019) (unilateral measures of "limited efficacy" without "binding international agreement").

D. The Pre-Eminence of Time in the Determination of OSCH Should Be Diminished

In legal theory, time presents a multidisciplinary challenge particularly when considering the intersection of varying subject areas, as in the case with space law and CH law. Under international law, CH is considered as such only after a determined (explicit,[118] or implicit[119]) amount of time has elapsed. The amount of time required to have elapsed for tangible objects to qualify as CH varies based on its category and the UN Cultural Heritage Treaty under which it is regulated. Even intangible CH, that is by definition constantly recreated, requires intergenerational continuity and, thus, elapsed time in order to qualify. CH beyond Earth spans several generations,[120] following the first successful orbital launch of *Sputnik 1* by the Union of Soviet Socialist Republics in October 1957. The relative novelty, until now, of human presence in outer space may present a general absence of elapsed time.[121] This can be problematic when utilizing time as a factor to qualify OSCH.

Custom is traditionally a key source of international law. It does not arise from conventional law, but from consistent State practice derived from a legal sense of obligation, or *opinio iuris*.[122]

---

[118] 1970 UN CP Convention, *supra* note 19, art. 1 ("antiquities more than [100] years"); 2001 UN UCH Convention, *supra* note 19, art. 1 ("partially or totally under water, periodically or continuously, for at least 100 years").

[119] 1970 UN CP Convention, *supra* note 19, art. 1 ("objects of paleontological interest; products relating to history… products of archaeological excavations"); 2001 UN UCH Convention, *supra* note 19, art. 1 ("with their archaeological and natural context"); 1954 UN Hague Convention, *supra* note 19, art. 1 ("historical"); 1972 UN WH Convention, *supra* note 19, art 1 ("from the point of view of history"); 2003 UN ICH Convention, *supra* note 19, art. 2 ("from generation to generation").

[120] Generational missions can be seen to include: *Soyuz* (USSR/Russia) ((1966-present; 1680+ launches) "Launches." *ROSCOSMOS*. Accessed September 29, 2021. en.roscosmos.ru/launch.) and *Apollo* (USA) ((1961-1972; *Apollo* 1-17) "The Apollo Missions." *Apollo*. February 1, 2019. Accessed September 29, 2021. nasa.gov/mission_pages/apollo/missions/index.html.).

[121] Twelve humans (1969-1972) have been on a celestial body other than Earth (Moon). "Who has Walked on the Moon?" *NASA Science: Solar System Exploration*. April 28, 2021. Accessed September 29, 2021. solarsystem.nasa.gov/news/890/who-has-walked-on-the-moon/. First human Earth orbit in 1961 ("Launches." *ROSCOSMOS*. Accessed September 29, 2021. en.roscosmos.ru/20786/.); continuous since 2000 ("International Space Station Facts and Figures?" *NASA*. September 7, 2021. Accessed September 29, 2021. nasa.gov/feature/facts-and-figures.).

[122] Statute of the International Court of Justice, Oct. 24, 1945, art. 38, 33 U.N.T.S. 993.

With respect to space law, however, human engagement with outer space has been juridically determined to be so novel that the required passage of time implied by custom could be disregarded.[123] This inspired the principle of instant custom.

In structuring a legal framework for OSCH, utilizing the principle of instant custom may help bridge conceptual challenges in qualifying and safeguarding that heritage. In this situation, which we term a *legal métissage*, elements of disparate legal regimes that intersect with respect to a specific subject matter are integrated. Conceding that "the passage of only a short period of time is not necessarily, or of itself, a bar to the formation of a new rule of customary international law"[124] could abate the intergenerational requirement for intangible OSCH or requirement of elapsed time for tangible OSCH under existing CH law principles.

The safeguarding of OSCH should not be foregone due to the relatively short span of human presence in outer space, nor the short but accelerated pace of technological development facilitating it because doing so would fail to account for the millennia of cumulative human ingenuity on Earth that ushered that capability. Cumulative human ingenuity nurtured in culture could be identified as an indispensable *intergenerational* component of modern science, technology and understanding of Earth in its context within the Universe[125] without which modern human space exploration would not be possible. It could thereby potentially account for the time elapsed component required for the qualification of CH.

---

[123] *See* G. A. Res. 1721 (XVI), A (Dec. 20, 1961) ("urgent need to strengthen international co-operation"); G.A. Res. 1962 (XVIII), ¶ 4 (Dec. 13, 1963).

[124] North Sea Continental Shelf (Den. v. Neth.), Judgment, 1969 I.C.J. 3, ¶74 (Feb. 20) ("within … short … period … though it might be, State practice … should have been both extensive and virtually uniform in the sense of the provision invoked; - and should moreover have occurred … to show a general recognition that a rule of law or legal obligation is involved").

[125] *See, e.g.*, *IAU Rules and Conventions*, INTERNATIONAL ASTRONOMICAL UNION, https://planetarynames.wr.usgs.gov/Page/Rules (last visited July, 6, 2021)(*e.g.*, planetary nomenclature from Greek/Roman mythology); Memorandum, UNESCO and the IAU Sign Key Agreement on Astronomy and World Heritage, UNESCO, https://whc.unesco.org/en/news/498 (Oct. 30, 2008) (documenting astronomical heritage on Earth (*i.e.*, monuments, sites & landscapes; instruments and & archives) evidencing astronomical knowledge).

Despite the current paucity of intergenerationality traditionally required for heritage formation that could be overcome by employing instant custom, its importance can in addition be abated. The relatively accelerated pace of technological advances facilitating human space exploration in little over half a century also nurtures an increased availability of potential OSCH worth safeguarding. This association raises important considerations. As advancing space technologies spur the creation of tangible objects, planetary sites of cultural significance and intangible knowledge and practices that result from human interaction with outer space, the question is raised as to if, and when, those human markers could or should be qualified as OSCH and safeguarded.

Inevitably, relatively compressed periods of time alter the historical lens through which we have traditionally qualified heritage. That historical lens, nevertheless, has augmented our acumen to recognize and create legal rules to categorize CH worth safeguarding in view of a wide diversity and quantity of CH on Earth, as well as established CH laws and practice inspired by anthropology, archaeology, history and other social sciences. It is through this lens that we can better discern the extraordinary and universal value of the collaborative cultural, scientific and technical contributions of humanity over time that should qualify OSCH and dictate its safeguarding.

The unprecedented importance of a forward rather than backward looking approach to CH also diminishes the significance of time. Heeding to the traditional latter approach in order to identify OSCH may even be injurious. If OSCH is not timely identified, qualified and safeguarded soon after it occurs, it may become increasingly vulnerable to "harmful impacts."[126] "[N]otwithstanding the precautionary measures to be taken by States and international intergovernmental organisations involved in the launching of space objects, damage may on occasion be caused by such objects."[127] "Activities directed at"[128] or "activities incidentally affecting"[129] the

---

[126] The Hague Int'l Space Res. Governance Working Grp., *Building Blocks for the Development of an International Framework on Space Resource Activities*, ¶10 (Nov. 12, 2019), universiteitleiden.nl/en/law/institute-of-public-law/institute-of-air-space-law/the-hague-space-resources-governance-working-group [hereinafter 2019 Hague WGBB].

[127] Liability Convention, *supra* note 4, Preamble.

[128] 2001 UN UCH Convention, *supra* note 19, art. 1(6).

[129] *Id.* at art. 1(7).

heritage may also, "directly or indirectly, physically disturb or otherwise damage" [130] OSCH. Not timely identifying, qualifying and safeguarding OSCH could also cause it to be lost in the collective memory of humanity before it has even become generally known on account of humans' overall physical inaccessibility to and lack of widespread knowledge about it by those outside the space industry,[131] i.e., *esse est percipi*.[132] A legal mechanism should be established preemptively in order to effectively safeguard OSCH.

If the traditional pre-eminence of time is not mitigated, its practical perils could pose a more significant threat to OSCH in a vast Universe than they pose to CH on Earth whose presence continues to be rediscovered, arguably, with more facility resulting from gradually increased accessibility, even in the profound depths of the Earth's oceans. Determining and safeguarding OSCH even without the legal factor of time elapsed would contemporarily acknowledge and consider its unique nature. It could meet a more immediate and "growing public interest in and appreciation"[133] for OSCH as a means of contemporaneous identity and association. Doing so could further inspire, in current time, the spirit and dedication of more humans to explore outer space and to utilize the knowledge therein acquired to further improve the quality of human life on Earth. This could proximately "open unlimited possibilities for the creative ability of the human spirit and … constitute … an incentive … to make a better and finer world."[134]

---

[130] *Id.* at art. 1(6); *see also* annex III ("surrounding natural environment to damage").

[131] *See* Outer Space Treaty, *supra* note 3, art. XI (State Parties "agree to inform … the public … of the nature, conduct, locations, and results of such [OS] activities"); Moon Treaty, *supra* note 4, art. 5(1) (State Parties "shall inform … the public … of their activities concerning the exploration and use of the moon").

[131] *See* Outer Space Treaty, *supra* note 3, art. XI (State Parties "agree to inform … the public … of the nature, conduct, locations, and results of such [OS] activities"); Moon Treaty, *supra* note 4, art. 5(1) (State Parties "shall inform … the public … of their activities concerning the exploration and use of the moon").

[132] To be is to be perceived.

[133] 2001 UN UCH Convention, *supra* note 19, Recitals.

[134] Press Release, NAT'L. AERONAUTICS AND SPACE ADMIN., Apollo 11 Goodwill Messages, at 12 (July 13, 1969) https://history.nasa.gov/ap11-35ann/goodwill/Apollo_11_material.pdf.

IV. ESTABLISHING PRINCIPLES FOR AN OSCH REGIME

ICH law principles are arguably considered to represent the most comprehensive understanding of CH. Several of those principles can advance space law tenets, including the "peaceful exploration and use of outer space"[135] and "international co-operation and understanding"[136] by enhancing the connection between culture and identity.[137] In consideration of these space law tenets, the following are principles that may underlie an OSCH legal regime.

A. OSCH Is Holistic

A principle that may underlie a legal regime for OSCH is that it is holistic. ICH links *intangible* "practices, representations, expressions, knowledge [and] skills"[138] with *tangible* "instruments, objects, artefacts and cultural spaces,"[139] but concedes that this intangible/tangible distinction does not reflect how humans experience or value CH. As tangible OSCH is inextricably constituted by both tangible and intangible elements, and intangible OSCH can be realized also in tangible manifestations, the holistic principle should underlie the legal qualification and regulation of OSCH.

In existing CH law practice, occasionally there is some proximity between tangible and intangible CH under distinct UN Cultural Heritage Treaty lists.[140] This has led to divergent (even litigious) appreciations of CH on Earth, but the divergence between

---

[135] Outer Space Treaty, *supra* note 3, art. IX.

[136] *Id.* at art. III.

[137] *See* International Covenant on Economic, Social and Cultural Rights, art. 1, Dec. 16, 1966, 993 U.N.T.S. 3 ("All peoples have the right of self-determination. By virtue of that right they … freely pursue their economic, social and cultural development."); *Id.* at art.15 ("right of every one [t]o take part in cultural life [, t]o enjoy the benefits of scientific progress … The steps to be taken by the States Parties to the present Covenant to achieve … this … include those necessary for the conservation, the development and the diffusion of science and culture") [hereinafter International Convenant]. *See also* G.A. Res. 217 (III), art. 27 (Dec. 10, 1948); UNESCO Cultural Diversity Declaration, *supra* note 27, art. 5 ("Cultural rights are an integral part of human rights, which are universal, indivisible and interdependent.").

[138] 2003 UN ICH Convention, *supra* note 19, art. 2(1).

[139] *Id.*

[140] UN CH Treaties, *supra* note 19. *Compare* 1972 UN WH Convention, *supra* note 19 (UNESCO World Heritage List: Pyrénées - Mont Perdu), *with* 2003 UN ICH Convention, *supra* note 19 (Representative List of the Intangible Cultural Heritage of Humanity: Summer solstice fire festivals in the Pyrenees).

intangible and tangible elements is less pronounced, less neglectable, in OSCH. Maintaining a conceptual continuum between tangible and intangible OSCH comprehensively reflects (without diverging and diluting) the holistic value of the OSCH, exclusive of which it is depreciated by a deceptive distinction between the two. In fact, tandem reliance on intangible and tangible elements of OSCH is necessary to materialize human space exploration. The more traditional dichotomy between intangible and tangible CH otherwise created (even in the evolving UN Cultural Heritage Treaty regime) should be avoided in an OSCH instrument, particularly as space, international and national, laws, nonetheless, acknowledge the legal distinction between intangible and tangible property. The dichotomy defers to legal rights and obligations over space objects, including "jurisdiction,"[141] "control,"[142] "ownership,"[143] liability[144] and responsibility[145] established under the UN Space Treaties.[146] It also, however, allows for due regard for the cultural interests of other States and civil society over OSCH.[147]

B. OSCH Is Non-Hierarchical

A second principle that may underlie a legal regime for OSCH is non-hierarchization wherein which the importance of CH elements is valued against themselves, as opposed to against each other.[148] The principle attests that each element of OSCH is equally

---

[141] Outer Space Treaty, *supra* note 3, art. VIII. *See* Rescue and Return Agreement, *supra* note 4, art. 5; Registration Convention, *supra* note 4, art. 2(2); Moon Treaty, *supra* note 4, art. 12(1).

[142] Outer Space Treaty, *supra* note 3, art. VIII.

[143] *Id*.

[144] *Id*. at art. VII. *See generally* Liability Convention, *supra* note 4.

[145] Outer Space Treaty, *supra* note 3, art. VI; Moon Treaty, *supra* note 4, arts. 8, 14.

[146] UN Space Treaties, supra note 4.

[147] *See* International Covenant, *supra* note 137, art. 15.

[148] *See* United Nations Educ., Sci. and Cultural Org., *Ethical Principles for Safeguarding Intangible Cultural Heritage,* 6, Decision 10. Com 15.A
((“Each community …. should assess the value of its own intangible cultural heritage and this intangible cultural heritage should not be subject to external judgements of value or worth.”); Int'l Council on Monuments and Sites, *Charter Principles for the Analysis, Conservation and Structural Restoration of Architectural Heritage*, art. 1(2) (Nov. 2011) (“Value and authenticity of architectural heritage cannot be based on fixed criteria because the respect due to all cultures also requires that physical heritage be considered within the cultural context to which it belongs”).

important to the groups who have a connection to it, thereby lending to a more inclusive framework for OSCH.[149] It validates the varied connections with OSCH that people throughout civil society may experience regardless of their State's spacefaring capacity and "irrespective of [its] degree of economic or scientific development."[150] This principle lends to a broad multilateral instrument that considers the significance of OSCH for all human communities.

C. Communities, Not States, Are the Key Holders and Transmitters Of OSCH

A third principle that may underlie a legal regime for OSCH is the focus on "communities, groups and, where appropriate, individuals,"[151] rather than on States, particularly spacefaring States, as the keyholders who "create, maintain and transmit"[152] OSCH. Attenuating the role of the modern State emphasizes the role in the development of OSCH to any one or more keyholders, keyholders attributed to more than one State,[153] and or keyholders who only now exist historically.[154] The principle supports the notion that space objects and or agents of modern spacefaring States are "envoys of [hu]mankind"[155] and provides for all people to assert OSCH as part of their CH. In addition, it underscores the importance of

---

[149] *See* Fifty-Eighth COPUOS LSC Report, *supra* note 2, ¶ 120 (view expressed: "all delegations should agree to respect the history of humans on the Moon, including the significance …for society"); NAT'L AERONAUTICS AND SPACE ADMIN., *NASA's Recommendations To Space-Faring Entities: How To Protect And Preserve The Historic And Scientific Value Of U.S. Government Lunar Artifacts* 5 (July 2011), nasa.gov/directorates/heo/library/reports/lunar-artifacts.html ("multilateral approach is developed to reflect various nations' views on lunar hardware of scientific and historic value") [hereinafter NASA Guidelines].

[150] Outer Space Treaty, *supra* note 3, art. I.

[151] 2003 UN ICH Convention, *supra* note 19, art. 15.

[152] *Id.*

[153] ISS Agreement, *supra* note 32; 2020 Emirate Mars Mission (*Hope* orbiter), *supra* note 32.

[154] *See* For all Moonkind, Outer Space Cultural Heritage Segmentation Charts (on file with For All Moonkind Cultural Heritage Segmentation Research Initiative, info@forallmoonkind.org).

[155] Outer Space Treaty, *supra* note 3, art. V; G.A. Res. 1962 (XVIII), art. 9 (Dec. 13, 1963).

"each State Party to endeavor to ensure the widest possible participation of [these keyholders in the] transmi[ssion]"[156] of OSCH. The "interests [in OSCH] of the inhabitants of these territories are paramount."[157] There is a responsibility "to ensure, with due respect for the culture of the peoples concerned, . . . just treatment [of their interests] . . . within the [UN] system."[158]

This principle, acknowledging collective temporal and cultural contributions, sustains that OSCH is nascent from a broad sector of humanity in incremental cultural, scientific and technical contributions over history—and not merely nascent from contemporaneous contributions of States, their instrumentalities, or private actors. The accumulation and evolution of these cultural heritage segments reflects human history on Earth and simultaneously continues to mark the trajectory for the creation OSCH.[159] It acknowledges especially unwitting past and present contributions to OSCH while nurturing future contributions.

This third principle prescribes that international cooperation in pursuance of an OSCH instrument be as diverse and inclusive as possible. It lends to an "international legal framework … developed in a manner that addresse[s] the concerns of all States,"[160] rather than "to norms, guidelines, standards or other measures that would limit the access of nations with emerging space capabilities."[161] Acknowledging a broad breadth of keyholders as transmitters of OSCH may help in "maintaining international peace and security and promoting international co-operation and understanding."[162] The view behind this principle has, with limited application, been peripherally present in political, cultural and legal discourse since

---

[156] 2003 UN ICH Convention, *supra* note 19, art. 15. *See* Moon Treaty, *supra* note 4, art. 4(2) ("as wide as possible"); 2019 Hague WGBB, *supra* note 126, § 1.1 ("take into account all interests and benefits all countries").

[157] U.N. Charter art. 73.

[158] *Id*.

[159] *See* ISECG Report, *supra* note 55, at 1.

[160] Fifty-Eighth COPUOS LSC Report, *supra* note 2, ¶ 35.

[161] *Id*.

[162] Outer Space Treaty, *supra* note 3, art. III.

the onset of space exploration.[163] Codifying it in a broad international treaty "for the benefit and in the interests of all countries,"[164] however, could leverage its capacity to garner wide multilateral support from both spacefaring and non-spacefaring States in deference to the "invaluable role of the intangible cultural heritage as a factor in bringing human beings closer together and ensuring exchange and understanding among them."[165]

D. OSCH Is Recreated in Response to Our Environment and Interaction With Nature and History

A fourth principle that may underlie a legal regime for OSCH is that CH is not static, but rather "constantly recreated by communities and groups in response to their environment, their interaction with nature and their history."[166] This fourth principle is realized continuously and will become more prominent as the substance, frequency and duration of human interaction with OS increases over time. As our knowledge of the Universe expands and our technology and capacities to interact with it increase, humans yield a greater quantity and diversity of OSCH. This principle supports a legal mechanism to sustainably and "incrementally address[] at the appropriate time"[167] the qualification and safeguarding of future OSCH.

E. Qualifying and Safeguarding OSCH Should Be Determined Collaboratively by States With a Cultural, Historical, Scientific or Technological Link to it

A fifth principle, derived from underwater CH law principles, that may underlie a legal regime for OSCH is that of verifiable links.[168] Identifying OSCH to safeguard and the means in which to

---

[163] William Safire, *B.C./A.D. or B.C.E./C.E.?*, THE N.Y TIMES MAGAZINE, Aug. 17, 1997 ("under God" excluded from *Apollo 11* plaque, yet nod with "*A.D.*"); Nat'l Aeronautics and Space Admin., *Where No Flag Has Gone Before: Political and Technical Aspects of Placing a Flag on the* Moon, NASA Contractor Report 188251 (1993), historycollection.jsc.nasa.gov/JSCHistoryPortal/history/flag/flag.htm ("We came in peace for all [hu]mankind" - not 'for Americans'; but American, not UN, flag erected).

[164] Outer Space Treaty, *supra* note 3, art. I.

[165] 2003 UN ICH Convention, *supra* note 19, art. 4.

[166] *Id.* at art. 2(1).

[167] 2019 Hague WGBB, *supra* note 126, ¶ 2.

[168] 2001 UN UCH Convention, *supra* note 19, art. 11(4).

do so should be determined collaboratively by States with a verifiable link, especially a cultural, historical, archaeologic, scientific or technological link, to the OSCH concerned.[169] A new space instrument should "reaffirm the importance of a link between culture and development for all countries, particularly"[170] not yet spacefaring countries, and "support actions undertaken nationally and internationally to secure recognition of the true value of this link."[171] This link may be expressed potentially by modern States to which there is an association with. an OSCH segment and may be drawn upon to partake in the qualification and safeguarding measure for that element of OSCH.[172] A formal mechanism of notification and consultation, therefore, could be strengthened around that already established in space law.[173]

V. SAFEGUARDING INTANGIBLE OSCH

The "deterioration or disappearance of any item of cultural or natural heritage constitutes a harmful impoverishment of the heritage of all the nations of the world."[174] Broad international cooperative measures to safeguard, develop and promote OSCH should be established in a new legal instrument to prevent this and or its "irrevocable loss [in the] collective memory" of humanity.[175]

---

[169] *See, e.g.*, *id.*; UNCLOS, *supra* note 18, art. 149.

[170] 2005 UN CD Convention, *supra* note 9, art. 1(f).

[171] *Id.*

[172] *See e.g.*, 2001 UN UCH, *supra* note 19, arts. 11-12.

[173] *See id.*; Fifty-Ninth COPUOS Report, *supra* note 10, ¶ 296(2)(c) (*e.g.*, registration & notification procedures); Outer Space Treaty, *supra* note 3, arts. V., IX-XII; Rescue and Return Agreement, *supra* note 4, arts. 1-3, 5; Registration Convention, *supra* note 4, art. 2; Moon Treaty, *supra* note 4, arts. 5, 7.

[174] 1972 UN WH Convention, *supra* note 19, at 1.

[175] United Nations Educ., Sci. and Cultural Org., *UNESCO Memory of the World Programme*, General Guidelines, Approved Text D, art. 2.1.2 (Dec. 2017). *See, e.g.*, 2003 UN ICH Convention, *supra* note 19, Preamble ("international community should contribute, together with the SPs to this Convention, to the safeguarding"); 2001 UN UCH Convention, *supra* note 19, Preamble ("States, international organizations, scientific institutions, professional organizations, archaeologists, divers, other interested parties and the public at large is essential for the protection of underwater cultural heritage"); 1972 UN WH Convention, *supra* note 19, art. 7 ("international cooperation and assistance designed to support [SP]s to the Convention in their efforts to conserve and identify"); 1970 UN CP Convention, *supra* note 19, art. 2(1) ("international co-operation constitutes one of the most efficient means of protecting").

States will have to undertake positive and negative obligations in order to safeguard OSCH. Safeguarding would entail: "measures aimed at ensuring viability of the intangible [and tangible] cultural heritage, including the identification, documentation, research, preservation, protection, promotion, enhancement, transmission, particularly through formal and non-formal education, as well as the revitalization of the various aspects of such heritage."[176] These measures express two modern tenets of CH law: first, heritage changes depending on how we relate to it, including over time and with the socio-cultural context in which it is valued; and second the law's role is not to "freeze" heritage in time forever. Unlike safeguarding, protection and preservation imply a static, and arguably increasingly limited, view of CH given the growing importance of the intangible character of CH in legal theory.

Using ICH law principles to qualify OSCH would facilitate its safeguarding by increasing awareness about it among humans who have little, if no knowledge or physical access to it. It would increase the ability of more humans to share in it. Rules can be created to safeguard OSCH's intangible character rather than solely "avoidance and mitigation of potentially harmful impacts"[177] to CH sites or objects.[178] Safeguarding OSCH's intangible features could transcend practical considerations caused by extra-terrestrial distances, extraordinary physical obstacles and threats of natural and human incidence. It could enhance access to OSCH and the opportunity for potentially all humans to share in it, thereby, "enabling [them] to create and [or] strengthen their means of cultural expression [for spacefaring capacity], including their cultural industries, whether nascent or established at the local, national and international levels."[179] Moreover, by broadening access to OSCH through ICH safeguarding principles, a new OSCH instrument could advance the 1948 UN Universal Declaration of Human Rights, particularly its tenet that every human has the "right freely to participate in . . . cultural life[;] to share in scientific advancement and its benefits"[180]

---

[176] 2003 UN ICH Convention, *supra* note 19, art. 2(3).

[177] 2019 Hague WGBB, *supra* note 126, § 10.

[178] *See id.*; 2020 Artemis Accords, *supra* note 12, § 9; COPUOS Space 2030 Agenda, *supra* note 8, ¶ 20(2.8).

[179] 2005 UN CD Convention, *supra* note 9, art. 2(4).

[180] G.A. Res. 217 (III), art. 27 (Dec. 10, 1948).

and "to realiz[e], through national effort and international co-operation[,] the . . . cultural rights indispensable for his dignity and the free development of his personality."[181]

A. Categorizing OSCH Into Distinct Domains

It is recommended that a mechanism to categorize OSCH into distinct domain-based CH lists on which they might be inscribed, if so qualified, be created. The domains could inspire three lists categorizing *intangible* elements of OSCH: first, "knowledge and practices concerning nature and the Universe";[182] second "social practices, rituals and festive events;"[183] and third, "expressions, including language as a vehicle of" OSCH.[184] The domain-based CH lists would inevitably include also *tangible* elements of OSCH[185] located in outer space, including on the Moon or on other celestial bodies, associated with the intangible element in its respective domain.[186]

In the first instance, the domain-based CH lists would memorialize the intangible and tangible elements of OSCH inscribed, thereby, supporting their safeguarding. In the second instance, the domain-based CH lists would generate an inventory from which tangible OSCH and tangible OSCH in danger could be identified in order to support their physical protection and preservation. By prioritizing the memorialization of OSCH's intangible elements the law can realize its CH value whether independently to, or in parallel with, any yet-to-be agreed physical means to protect or preserve its tangible elements.

i. Knowledge and Practices Concerning Nature and the Universe

A legal framework for OSCH might adopt a domain that categorizes on a list knowledge and practices concerning nature and our interaction with the universe[187] that have been vital to our ability

---

[181] *Id.* at art. 22.
[182] 2003 UN ICH Convention, *supra* note 19, art. 2(2)(d).
[183] *Id.* at art. 2(2)(c).
[184] *Id.* at art. 2(2)(a).
[185] *See id.* at art. 2(1).
[186] Nomination and selection criteria and mechanisms for inclusion of OSCH on such abovementioned lists are left for future research.
[187] *See, e.g.*, 2003 UN ICH Convention, *supra* note 19, art. 2(2)(d).

to exist physically and culturally beyond Earth. Potential intangible elements listed under this domain could be historical or contemporary knowledge and practices, as well as the "instruments, objects, artefacts and cultural spaces [existing as tangible elements in outer space] associated therewith.'[188] The elements in this domain may relate, *inter alia*, to: science, including the development of materials,[189] supporting human space exploration;[190] space medicine to protect the human body beyond Earth;[191] and creative design inspiring and facilitating space exploration.[192]

ii. Social Practices, Rituals and Festive Events

A legal framework for OSCH might adopt a domain that categorizes on a list social practices, rituals and festive events[193] comprising ongoing cultural practices performed in outer space by humans[194] and/or in collaboration with humans on Earth. Social practices, rituals and festive events are symbolic acts performed and "transmitted from generation to generation"[195] "by communities and groups in response to their environment, their interaction with nature and their history"[196] in outer space. It "provides them with a sense of identity and continuity."[197] In addition to the practices composing the intangible elements under this domain, the domain could include also tangible elements such as the instruments, objects, artifacts and cultural spaces (e.g., sites)[198] existing in outer space associated with the practices. Potential intangible elements

---

[188] *Id.* at art. 2(1)

[189] Potential examples of intangible OSCH [hereinafter Potential Intangible]: Metallurgy; creation of fabrics & plastics. Potential examples of tangible OSCH [hereinafter Potential Tangible]: Aluminum alloys; BNNT; Beta cloth.

[190] Potential Intangible: Physics; cartography; lasers. Potential Tangible: Radiation shields; rocket engines; objects 3D printed in space.

[191] Potential Intangible: Lessen OS effects on physical & mental performance. Potential Tangible: Medical instruments; exercise machines; clothing.

[192] Potential Intangible: Aerospace designs; geometric modelling. Potential Tangible: Telescopes; bodysuits; vehicles; modules; probes.

[193] *See, e.g.*, 2003 UN ICH Convention, *supra* note 19, art. 2(2)(c).

[194] Potential Intangible: Extravehicular activity; Earth-viewing. Potential Tangible: tethers; hand/footholds; *Nikon* cameras.

[195] 2003 UN ICH Convention, *supra* note 19, art. 2(1).

[196] *Id.*

[197] *Id.*

[198] Potential Tangible: Low Earth Orbit; nodes; modules; landing/crash and other archeologic sites.

listed under this domain might include, *inter alia*: specific rules of behavior;[199] modes of entertainment and work;[200] and/or space agencies or organizations that govern,[201] support,[202] or emerge from[203] space exploration. They might also include, *inter alia*, commemorative traditions, or rites, practiced in celebration[204] and/or *in memoriam*[205] in outer space.

Cultural practices might include annual commemorations like the UN's International Day of Human Space Flight that celebrates April 12, 1961 as the "first human space flight[] carried out by Mr. Yuri Gagarin, a Soviet citizen."[206] They might also include rites performed when humans physically or remotely land on a celestial body. The first such ritual was in July 1969 when, together with people on Earth watching on black-and-white televisions, three humans landed on the Moon for the first time. There the American *Apollo 11* astronauts placed several objects to celebrate this milestone of humanity and *in memoriam* of those who had perished in our quest to achieve it.[207] In these instances, the rite would be an

---

[199] Potential Intangible: Outer Space Treaty, *supra* note 3, art. XII (projected visits); Code of Conduct for the International Space Station Crew, 14 C.F.R. §1214.403 (2013); International Organization for Standardization, *Space Systems - Space Debris Mitigation Requirements*, ISO Doc. 24113:2019 (3d ed. 2019), https://www.iso.org/standard/72383.html.

[200] Potential Intangible: Religious activity; education; research; zero-gravity games/sports. Potential Tangible: Canadarms; Manned Maneuvering Units.

[201] Potential Intangible: UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, unoosa.org/ (last visited June 15, 2021); INTERNATIONAL TELECOMMUNICATION UNION, itu.int/en/Pages/default.aspx (last visited June 15, 2021); INTERNATIONAL ORGANIZATION FOR STANDARDIZATION, iso.org/home.html (last visited June 15, 2021).

[202] Potential Intangible: COMMITTEE ON SPACE RESEARCH, cosparhq.cnes.fr/ (last visited July 15, 2021); INTERNATIONAL ASTRONAUTICAL FEDERATION, iafastro.org/ (last visited July 15, 2021); Deep Space Network. See *What is the Deep Space Network*, NASA (Mar. 30, 2020), nasa.gov/directorates/heo/scan/services/networks/deep_space_network/about, for an overview of the Deep Space Network.

[203] Potential Intangible: ASSOCIATION OF SPACE EXPLORERS, space-explorers.org (last visited July 15, 2021); INTERNATIONAL DARK-SKY ORGANIZATION, darksky.org (last visited July 15, 2021); space spinoff offices.

[204] Potential Intangible: Placing of objects; live streaming landings. Potential Tangible: Flags; plaques; physical messages.

[205] Potential Intangible: Naming landing sites; moments of silence; remembrance days. Potential Tangible: Funerary objects; human remains.

[206] G.A. Res. 65/271, ¶ 3 (Apr. 7, 2011).

[207] *See, e.g.*, Plaque; Press Release, Apollo 11 Goodwill Messages, *supra* note 125, at 11 (for a list of the 73 messages from world leaders); American flag; boot print; medallions listing fallen space travelers.

intangible element; the objects and cultural spaces (i.e., sites) forming part of it the tangible elements.

iii. Expressions, Including Language as a Vehicle and Manifestation of OSCH

A legal framework for OSCH might adopt a domain that categorizes on a list expressions, including language as a vehicle and manifestation of cultural heritage in outer space.[208] Intangible elements of OSCH on this list might include, *inter alia*: expressions; space terminology; space languages; and modes of interspace and interplanetary communication.[209] They might include expressions that entered popular language initially through actual events, but are subsequently retold, memorializing momentous occasions in human space exploration.[210] They might also comprise representations,[211] phrases used in space contexts,[212] or terminology used for off-Earth operations.[213] Space languages might include those used by space communities.[214] Included among intangible elements may be modes for, and means to optimize, space and inter-planetary communications, as well as the tangible elements such as the instruments, objects, artifacts and cultural spaces existing in outer space with which they are associated.[215]

---

[208] 2003 UN ICH Convention, *supra* note 19, art. 2(2)(a).

[209] Potential Intangible: Telemetry (radio; wireless; lasers). Potential Tangible*:* satellites; transmitters/receivers; "Snoopy Caps."

[210] Potential Intangible: Backwards count to "blast off;" "Houston, we've had a problem here." (*Apollo 13*).

[211] Potential Intangible: Space agency logos; shuttle & crew patches.

[212] Potential Intangible: *Ad Astra Per Aspera*; L/T minus; abort; Earthrise; Spacecraft Event Time.

[213] Potential Intangible: Periapsis/apoapsis; inferior/superior conjunction; sun synchronous orbit; nadir/zenith; up/downlink.

[214] Potential Intangible: ISS use of "Ruglish." *See* Megan Ansdell, *Language protocols in international human spaceflight: Time for a common tongue?*, 28 SPACE POL'Y 2, 3-4 (2012).

[215] Potential Intangible: Coding languages; virtual communication. Potential Tangible: Ham Radio; smartphones; Synchronized Position Hold, Engage, Reorient, Experimental Satellites.

VI. PHYSICAL PROTECTION AND PRESERVATION OF TANGIBLE OSCH

The domain-based CH lists could provide an inventory where instruments, objects, artifacts and cultural spaces comprising elements therein inscribed could be added to a general CH registry of tangible OSCH (i.e., List of Tangible Outer Space Cultural Heritage),[216] which would support a legal mechanism to physically protect and preserve them. If needed, elements on that general CH registry of tangible OSCH could also be added to a registry of tangible OSCH in danger (i.e., List of Tangible Outer Space Cultural Heritage in Danger),[217] which could invoke proximate and coordinated international efforts to implement emergency safeguarding measures.[218]

To the extent possible, tangible OSCH can be protected or preserved using traditional means that include, *inter alia*, *in situ* preservation,[219] or multidimensional exclusion zones.[220] Innovative methods might include technical directives customized to the nature of the object, site and its environment[221] and which are consistent with the Outer Space Treaty.[222] Protecting or preserving

---

[216] *See generally* Antarctic Treaty Annex V, *supra* note 18, art. 8 ("Listed Historic Sites and Monuments shall not be damaged, removed, or destroyed"); 1972 UN WH Convention, *supra* note 19, at 11 ("World Heritage List"); United Nations Educ., Sci. and Cultural Org., *UNESCO Memory of the World Register*, https://en.unesco.org/programme/mow/register (last visited July 15, 2021); *UNESCO Astronomy and World Heritage Initiative*, UNESCO, https://whc.unesco.org/en/astronomy (last visited July 15, 2021); nation CH inventories; *Moon Registry*, FOR ALL MOONKIND, moonregistry.forallmoonkind.org/ (last visited July 15, 2021).

[217] *E.g.*, 1972 UN WH Convention, *supra* note 19, art. 11(4) ("List of World Heritage in Danger"); 2003 UN ICH Convention, *supra* note 19, art. 17 ("List of Intangible Cultural Heritage in Need of Urgent Safeguarding"); *Red List Database,* Int'l Council of Museums, icom.museum/en/resources/red-lists/ (last visited July 15, 2021).

[218] *E.g.*, S.C. Res. 2199 (Feb. 12, 2015); S.C. Res. 2347 (Mar. 24, 2017). (Nomination and selection criteria and mechanisms for inclusion of OSCH on such abovementioned lists are left for future research.).

[219] *See, e.g.*, Antarctic Treaty Annex V, *supra* note 18, art. 8(4) ("shall not be damaged, removed or destroyed"); 2001 UN UCH Convention, *supra* note 19, art. 2(5).

[220] *E.g.*, 1993 Russian Space Law, *supra* note 102, at art. 17(5); Artemis Accords, *supra* note 12, § 11(7); 2011 NASA Technical Guidelines, *supra* note 148, at 9. *See* Moon Treaty, *supra* note 4, art. 7(3); 2019 Hague WGBB, *supra* note 126, ¶ 11.

[221] *E.g.*, NASA Guidelines, *supra* note 149, § A1.

[222] Outer Space Treaty, *supra* note 3, art. I ("Outer space shall be free for exploration and use by all States") *Id.* at art. IX ("shall conduct … activities … with due regard to …

tangible OSCH, however, may in some cases not only be impractical, but also futile as space objects or sites could potentially: never again be seen by a human;[223] alone succumb to natural[224] or human-made threats[225] that "exist or may exist in the future;"[226] be superseded by other like instances;[227] be impossible to safeguard given contemporaneously available scientific and technological methods; or whose safeguarding may simply even be financially or legally averse to undertake. Rules solely to protect from inadvertent or intentional interference with tangible OSCH objects, sites or the location surrounding it may also be insufficient given environmental factors affecting OSCH, which could necessitate positive obligations for safeguarding it as well. Moreover, any rules for the physical safeguarding of tangible OSCH should necessarily also include methods to memorialize it, thereby, potentially ensuring cultural access to it by all of humanity independent of its physical status.

A. Tangible OSCH Should Have a Special Status Under the Law

OSCH is intrinsically composed of intangible and tangible elements. If tangible elements are qualified as OSCH, in addition to being recognized for their ICH value, they would require a special status under international law to ensure their physical safeguarding while they are beyond Earth. Such status and the rules supporting it should be developed in compliance with existing space law, with a greater number of State Parties to the UN Space Treaties

---

interests of all other States Parties"). *See* Fifty-Eighth COPUOS LSC 58th Report, *supra* note 2, ¶ 247.

[223] Potential Tangible: *Mariner 2* (launched; 1962 USA) in heliocentric orbit.

[224] *E.g.,* heat, magnetic energy and ionizing radiation; galactic cosmic rays; collision with natural space objects.

[225] *E.g.,* Collisions with human-made objects/space debris; plume impingement; intentional/accidental damage.

[226] National Aeronautics and Space Administration Transition Authorization Act of 2017, Pub. L. No. 115-10, sec. 831(b)(1), 131 Stat. 66, 67 (2017).

[227] Compare the Hubble Telescope, that was launched 1990, with the James Webb Space Telescope, that is expected to launch in 2021. *See Webb vs Hubble Telescope*, NASA, jwst.nasa.gov/content/about/comparisonWebbVsHubble.html (last visited July 16, 2021).

consolidating a more effective regime to safeguard particularly tangible OSCH.[228]

An initial point of compliance for a tangible element qualified as OSCH originally launched from Earth, for instance, would be that it should be subject to the 1974 Convention on Registration of Objects Launched into Outer Space.[229] This Convention requires that the "launching State shall register the space object by means of an entry in an appropriate registry which it shall maintain. Each launching State shall inform the Secretary-General of the United Nations of the establishment of such a registry … The Secretary-General shall maintain a Register with the information furnished"[230] in its Outer Space Objects Index. Tangible objects qualified as OSCH would also be subject to Article VIII of the Outer Space Treaty which states that "[o]wnership of objects launched into outer space, including object landed or constructed on a celestial body, and of their component parts, is not [to be] affected by their presence in outer space or on a celestial body or by their return to the Earth."[231] Although Article VIII does not impose positive or negative obligations to safeguard such objects, CH law principles could be used to create such obligations.[232]

To ensure the physical safeguarding of cultural spaces or sites of historic, inspirational and scientific nature that are qualified as tangible OSCH, a point of compliance with existing space law, for instance, would be Article II of the Outer Space Treaty, which pro-

---

[228] Rules to support the inter or intra planetary movement and trade of tangible OSCH, as well as the proprietary rights that may relate to them if they are imported to Earth (*i.e.*, for *ex situ* preservation) would also need to be developed. Consideration of such rules are left for future research.

[229] *See* Registration Convention, *supra* note 4 (72 State Parties have ratified). Comm. on the Peaceful Uses of Outer Space, Status of International Agreements Relating to Activities in Outer Space as at 1 January 2021, U.N. Doc. A/AC.105/C.2/2021/CRP.10 (2021); *Status of Treaties,* UNITED NATIONS OFFICE OF OUTER SPACE AFFAIRS, https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html (last visited Oct. 1, 2021).

[230] *Id.* at arts. 2-4. *See* G.A. Res. 1721 (XVI), B (Dec. 20, 1961).

[231] Outer Space Treaty, *supra* note 3, art. VIII.

[232] *See, e.g.*, Antarctic Treaty Annex V, *supra* note 18; UNCLOS, *supra* note 18, arts 149, 303; 2001 UN UCH Convention, *supra* note 19, arts 11, 12; UN CH Treaties, *supra* note 19. Consideration of any such positive or negative obligations are left for future research.

scribes any such sites to "national appropriation by claim of sovereignty, by means of use or occupation, or by any other means."[233] Ostensibly, those proscribed "by other means"[234] may include: an association of intangible cultural significance, or when a tangible element of OSCH under a State's jurisdiction, control and ownership is located on, below or above it.[235] The sites, however, being of particular cultural importance as "places of memory whose existence is necessary for expressing"[236] OSCH could be "report[ed] to other States Parties and to the Secretary-General concerning areas of the moon having special scientific interest in order that, without prejudice to the rights of other States Parties, consideration may be given to designation of such areas as international … preserves for which special protective arrangements [can] be agreed."[237]

Scientific and technological guidelines will need to be developed for object and site protection and preservation.[238] Those guidelines could inform rules established in CH law principles and established to comply with existing space law. The guidelines could ensure that these sites, and or objects *in situ* contributing to their significance, be physically safeguarded[239] with "particular regard being paid to the preferential rights of States of cultural, historical or archeological origin"[240] and who have "declare[d their] interest in being consulted on how to ensure the[ir] effective protection."[241]

---

[233] Outer Space Treat, *supra* note 3, art. 2.

[234] *Id.*

[235] *Id.* at arts. 2, 8; Moon Treaty, *supra* note 4, art. 11(3).

[236] 2003 UN ICH Convention, *supra* note 19, art. 14(c).

[237] Moon Treaty, *supra* note 4, art. 7(3). 18 State Parties have ratified. *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies*, UNITED NATIONS TREATY COLLECTION, https://treaties.un.org/pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXIV-2&chapter=24&clang=_en (last visited Oct. 5, 2021).

[238] *E.g.*, NASA Guidelines, *supra* note 149.

[239] *See* Antarctic Treaty Annex V, *supra* note 18; UNCLOS, *supra* note 18, art. 303; 2001 UN UCH Convention, *supra* note 19, arts 2, 6, 11, 12 ("State Parties are encouraged to enter bilateral, regional or other multilateral agreements…. [and] may invite States with a verifiable link … to join such agreements") (duty to report "intent[ion] to engage [to allow a]ny States Parties declare … interest"); 1972 UN WH Convention, *supra* note 19, §§ 2-3.

[240] 2001 UN UCH Convention, *supra* note 19, art.11(4).

[241] *Id. See supra* note 29; Outer Space Treaty, *supra* note 3, art. IX ("international consultations before[;] may request consultation"); *Id.* at art. XII ("advance notice [so] consultations may be held"); Rescue and Return Agreement, *supra* note 4, art. 1 ("close

Akin to space law principles, CH law principles encourage the creation of "bilateral, regional or other multilateral agreements or [the] develop[ment of] existing agreements"[242] in order to "adopt rules and regulations which would ensure better protection of"[243] CH sites and objects than those afforded in existing legal instruments, like the UN Space Treaties.[244] This is generally providing that all such agreements would be in conformity with the provisions of a broad multilateral OSCH instrument and would not dilute the broader instrument's universal character.[245]

VII. INSTITUTIONAL MEASURES TO SAFEGUARD OSCH

Safeguarding OSCH may be accomplished through positive obligations by States to "take all practicable measures to raise public awareness regarding the value and significance of [the] cultural heritage and the importance of protecting it."[246] If a new space law instrument were created to safeguard OSCH, the UN Secretary General may consider expanding the mandate of the UN Office for Outer Space Affairs (OOSA) to implement such a convention in addition to the current UN Space Treaties. OOSA maintains the UN Outer Space Objects Index,[247] which could potentially come also to include OSCH CH domain-based CH lists and tangible CH registries established under a new instrument.[248] These inventories could promote OSCH by recognition, respect and enhancement, which could thereby, make OSCH "more accessible to and better known by all sectors of civil society."[249] Alternatively, such duties

---

and continuing consultation[s]"); *Id.* at arts. 3, 5(3) ("upon the request of"); Moon Treaty, *supra* note 4, arts 7(3), 15; *see* 2019 Hague WGBB, *supra* note 126, ¶ 11.4.

[242] 2001 UN UCH Convention, *supra* note 19, art. 6.

[243] *Id.*

[244] UN Space Treaties, *supra* note 4.

[245] *See* 2001 UN UCH Convention, *supra* note 19, art. 6.

[246] *Id.* at art. 20.

[247] G.A. Res. 62/101, ¶ 5 (Jan. 10, 2008). *See* Registration Convention, *supra* note 4; G.A. Res. 1721 (XVI), § B (Dec. 20, 1961).

[248] G. A. Res. 1721 (XVI), § B(3)(c) (Dec. 20, 1961).

[249] Fifty-Eighth COPUOS LSC Report, *supra* note 2, ¶ 127. S*ee* ISECG Report, *supra* note 55, at 6 ("Cultural benefits may depend on exploration mission stories and images spreading broadly across society. Educational organizations, the media and communications industries play a role in interpreting and amplifying exploration data, so that citizens may understand and appreciate their significance."). *See generally* Fifty-Eighth COPUOS LSC Report, *supra* note 2, § VII.

could be undertaken by, or in conjunction with, public/private partnerships.

A. Capacity-Building, Training and Education

Capacity-building measures serve to safeguard the intangible elements of OSCH, strengthen support for the physical protection and preservation of its tangible elements and facilitate "the widest possible participation of communities, groups and where appropriate individuals that create, maintain and transmit such [OSC]heritage and to involve them actively in its management."[250] Such measures could

> promote the free dissemination and mutual exchange of information and knowledge [about OSCH] in cultural and scientific fields, assist in educational, social and economic development, particularly in the developing countries [have the potential to] enhance the qualities of life of all peoples and provide recreation with due respect to the political and cultural integrity of [all] States.[251]

They also bolster the tenet that "the wide diffusion of culture, and the education of humanity … are indispensable to the dignity of [hu]man [beings] and constitute a sacred duty which all the nations must fulfill in a spirit of mutual assistance and concern."[252]

Capacity-building initiatives around OSCH could include:[253] (1) information and awareness programs, particularly aimed at the general public and youth;[254] (2) training programs;[255] (3) promoting

---

[250] 2003 UN ICH Convention, *supra* note 19, art. 15.

[251] G.A. Res. 37/92, Annex A(2) (Feb. 10, 1982).

[252] UNESCO Constitution, *supra* note 21, Preamble.

[253] *See generally* 2003 UN ICH Convention, *supra* note 19, arts. 13-14.

[254] E.g., Space museums; virtual space access; publications/broadcasts; cultural products (e.g., movies, books & other visuals).

[255] E.g., Astronaut training programs. *See* Fifty-Eighth COPUOS LSC Report, *supra* note 2, ¶ 127.

research in science and technology;[256] (4) non-formal means of heritage transmission;[257] (5) establishing institutions for the management and transmission of heritage[258] through formal[259] and non-formal education,[260] and revitalization;[261] ^6) establishing institutions to archive and facilitate access to heritage;[262] (7) maintaining the public informed of threats to heritage and efforts to curtail them;[263] and (8) promoting the protection of objects or sites whose existence is necessary for expressing the intangible heritage.

The OOSA could facilitate public awareness regarding the value and significance of OSCH through such "capacity-building, training and education,"[264] initiatives that already fall within its capacity-building mandates under the UN Programme on Space Applications.[265] Through that program, OOSA disseminates information and builds capacity on space-related topics, as well as initiatives on space law in several thematic areas among which OSCH could come to be included. Moreover, implementation of the aforementioned initiatives could support OOSA's "national, regional and international efforts to further develop the practical aspects of space science[, exploration] and technology, in particular in developing countries, and to increas[e] knowledge of the legal framework within which space activities were carried out."[266]

---

[256] *See* Outer Space Treaty, *supra* note 3, arts. IX–XI; Moon Treaty, *supra* note 4, art. 6.

[257] E.g., Cultural practices (*i.e.*, Astro-mythology; solstice/eclipse festivals; annual celebrations).

[258] E.g., International Astronomical Union.

[259] E.g., Science, technology, engineering, mathematics, law, humanities & multicultural astronomy programs.

[260] *See* Fifty-Eighth COPUOS LSC Report, *supra* note 2, ¶¶ 127-140. E.g., Agriculture & navigation; oral/written literature; planet watching.

[261] E.g., Etymology; replication & commercial sale; annual celebrations; virtual experiences.

[262] E.g., OOSA; online space libraries; observatories; For All Moonkind.

[263] E.g., OOSA, *Space Mission Planning and Advisory Group*, unoosa.org/oosa/en/ourwork/topics/neos/smpag.html (last visited July 16, 2021; INTERNATIONAL ASTEROID WARNING NETWORK, iawn.net/ (last visited July 16, 2021); *International Dark Sky Places*, INTERNATIONAL DARK-SKY ASSOCIATION, darksky.org/our-work/conservation/idsp/ (last visited July 16, 2021).

[264] Fifty-Eighth COPUOS LSC Report, *supra* note 2, ¶ 127; COPUOS Space 2030 Agenda, *supra* note 8, at 5. *See* Seventy-Fifth COPUOS LSC Report, *supra* note 2, at 3.

[265] G.A. Res. 37/90, ¶ 7 (Dec. 10, 1982); G.A. Res. 54/68, ¶ 11(d) (Feb. 11, 2000).

[266] Fifty-Eighth COPUOS LSC Report, *supra* note 2, ¶ 127. *See generally* G.A. Res. 51/122, (Dec. 13, 1996).

Capacity-building measures could create a collective memory of OSCH that forms a sense of shared identity and connection to a "common heritage of [hu]mankind."[267] They could effectively create a quantitatively and qualitatively greater cultural connection to OSCH than could otherwise be achieved by: solely the physical protection or preservation of a tangible object or site for the benefit of significantly few, or no humans, to enjoy; or the view that the heritage originated from one or few States instead of from a temporally cumulative and culturally diverse human effort. The results of such initiatives could potentially also dampen sovereign and jurisdictional conflicts, as well as the economic costs, labor and demand for coordinated diplomatic and technical efforts to physically protect and preserve tangible OSCH, where and if possible. Memorialization through the safeguarding of intangible OSCH may be the most long-lasting and effective means to safeguard it for "present and future generations"[268] and for generally a greater aggregate of humans.

VIII. CONCLUSION

It has generally been the human experience, formalized most recently in cultural heritage law, to celebrate "preserve[], develop[], enrich[] and transmit[]"[269] cultural heritage "to future generations as a record of [our] human experience and aspirations in order to encourage creativity in all its diversity and to inspire a genuine dialogue between cultures."[270] We have already evidenced our desire to continue this pattern with cultural heritage beyond Earth as we celebrate our achievements in outer space and seek means to safeguard them, thereby, ensuring, even if not legally as of yet, an interconnectivity between past, present and future generations. The time is ripe to create a legal framework to formalize the safeguarding of OSCH and to facilitate the natural progression and harmonization of space and cultural heritage law in a new space law instrument under the UN treaty system that would memorialize and reflect on humanity's collective accomplishments and potential.

---

[267] Moon Treaty, *supra* note 4, art. 11.

[268] *Id.* art. 4(1).

[269] U.N., Econ. & Soc. Council, General comment No. 21, ¶50(a), U.N. Doc. E/C.12/GC/21 (2009).

[270] *Id.*

THE CONCEPT OF LONG-TERM SUSTAINABILITY OF OUTER SPACE ACTIVITIES AS AN EMERGING SOURCE OF INTERNATIONAL LAW

Jie Long and Wu Xie[*]

ABSTRACT

The United Nations Committee on Peaceful Uses of Outer Space agenda item on the Long-term Sustainability of Outer Space Activities (LTSOSA) has achieved preliminary results in the form of an initial set of guidelines, and progress continues with the establishment of a new working group on Long-term Sustainability (LTS). This article examines the possibility of the concept of LTSOSA becoming a source of international law. While it is not realistic to promote the concept of LTSOSA as an international treaty or a general principle of law, the authors assert that there is both a necessity and a feasibility of developing the concept of LTSOSA into customary international law. The existing practices and activities of various countries on the Earth and in outer space, the LTSOSA guidelines and national position documents on the LTSOSA can be treated as arguments supporting the existence of an objective element of customary international law. The subjective element of international custom can be satisfied by evaluating the factors of national space law and the emerging rules of international law. In addition, apart from the analysis based on the two-element theory, there are also some non-traditional ways which could promote LTSOSA reaching the status of an international custom.

---

[*] Jie Long is an Assistant Professor, School of Law, Shenzhen University. Visiting Scholar, London Institute of Space Policy and Law (2017). Wu Xie is a Research Assistant at the Institute of Space Policy and Law, Shenzhen University. This research is financed by China National Office for Philosophy and Social Sciences (Serial No. 21CFX088). The authors would like to thank Professor Yuhai Yin, Professor Yun Zhao, Dr. Yongliang Yan and Anonymous Reviewers for their insightful ideas and suggestions. The authors especially thank the editorial team for their industrious editing effort on this article. Any errors are the authors' alone.

I. INTRODUCTION

The current space law and regulatory regime is not sufficient to deal with emerging issues in outer space. Increasing numbers of space participants pursuing myriad space activities threaten to deteriorate the space environment. In 2007, Gérard Brachet, the former Chair of the United Nations (UN) Committee on the Peaceful Uses of Outer Space (COPUOS), first introduced the concept of the Long-term Sustainability of Outer Space Activities (LTSOSA).[1] A 2007 Working Paper submitted by the Chairman on the "Future Role and Activities of the Committee on the Peaceful Uses of Outer Space," promoted LTSOSA as one of a number of suggested initiatives.[2] Consequently, LTSOSA was first presented in the 2007 annual report of the Committee on the Peaceful Uses of Outer Space.[3] One decade after the concept of LTSOSA was first raised, the Long-term Sustainability (LTS) Working Group presented a draft working paper in June 2017 entitled "Guidelines for the long-term sustainability of outer space activities."[4] In October 2017, an updated proposal for a draft report and a preliminary set of draft guidelines were put forward.[5] Member States of the COPUOS reached

---

[1] Gérard Brachet, *The Origins of the "Long-term Sustainability of Outer Space Activities" Initiative at UN COPUOS*, 28 SPACE POL'Y 161, 161, 162 (2012).

[2] Chairman of the Comm. on the Peaceful Uses of Outer Space, *Future Role and Activities of the Committee on the Peaceful Uses of Outer Space*, U.N. Doc. A/AC.105/L.268, ¶¶ 15-41 (2007) (suggesting initiatives focused on topics of: "[c]ontribution of space systems to a better understanding and to global monitoring of the planet Earth;" "[c]oordination of global navigation satellite systems;" "[c]ontribution of satellite technology to sustainable development;" "[l]ong-term sustainability of space activities, "[i]nternational cooperation in space exploration;" "[p]rotection/conservation of designated areas of the Moon and other bodies of the solar system;" "[i]ssues related to the development of 'passenger space transport;'" and "[n]ear-Earth objects").

[3] Comm. on the Peaceful Uses of Outer Space, Rep. of the Comm. on Its Sixty-Second Sess., U.N. Doc. A/62/20, ¶ 305 (2007).

[4] Comm. on the Peaceful Uses of Outer Space, Guidelines for the Long-term Sustainability of Outer Space Activities, U.N. Doc. A/AC.105/L.308 (2017).

[5] Sci. & Tech. Subcomm. of the Comm. on the Peaceful Uses of Outer Space, Guidelines for the Long-term Sustainability of Outer Space Activities, U.N. Doc. A/AC.105/C.1/L.362/Rev.1 (2017); *see generally* Theresa Hitchens, *Forwarding Multilateral Governance of Outer Space Activities: Next Steps for the International Community*, *in* SPACE FOR THE 21ST CENTURY: DISCOVERY, INNOVATION, SUSTAINABILITY 75 (Michael Simpson et al. eds., 2016) (discussing history of efforts taken by UN COPUOS and international community to ensure stability and security in outer space).

consensus on the preamble and nine additional guidelines in 2018,[6] but the Working Group was unable to reach agreement on its final report.[7]

After excluding the controversial text of the guidelines, in June 2019, the 62nd session of the COPUOS adopted the Guidelines for the Long-term Sustainability of Outer Space Activities (2019 LTSOSA Guidelines or simply Guidelines).[8] This phased outcome document includes a consensus preamble and 21 guidelines and marks the end of the eight-year drafting process of the LTS Working Group.[9] The 2019 LTSOSA Guidelines provide guidance and suggestion regarding A) policy and regulatory frameworks for space activities, B) safety of space operations, C) international cooperation, capacity-building and awareness and D) scientific and technical research and development.[10] Relying on the knowledge and experience of States, international intergovernmental organizations and relevant national and international non-governmental entities, this latest set of Guidelines represents the consensus reached by member States of COPUOS on best practices for the LTSOSA at this stage.[11]

The concept of LTSOSA was raised against the background of a deteriorating space environment, increasingly fierce competition among spacefaring countries, increasing gaps between the developing and developed countries in space capability and stagnancy in the international space law framework.[12] Against this backdrop,

---

[6] Chair of the Working Group on the Long-term Sustainability of Outer Space Activities, *Working Group on the Long-term Sustainability of Outer Space Activities: Preambular Text and Nine Guidelines*, U.N. Doc. A/AC.105/C.1/2018/CRP.18/Rev.1 (2018).

[7] Chair of the Working Group on the Long-term Sustainability of Outer Space Activities, *Draft Guidelines for the Long-term Sustainability of Outer Space Activities*, U.N. Doc. A/AC.105/C.1/L.367 (2019).

[8] Rep. of the Comm. on Its Sixty-Second Sess., *supra* note 3, ¶ 163; Chairman of the Working Group on the Long-term Sustainability of Outer Space Activities, *Guidelines for the Long-term Sustainability of Outer Space Activities*, U.N. Doc. A/AC.105/C.1/L.366 (2018) [hereinafter *Guidelines for the LTSOSA*].

[9] *Guidelines for the LTSOSA*, *supra* note 8.

[10] *Id.*

[11] *Id.* ¶ 11.

[12] Chair of the Working Group on the Long-term Sustainability of Outer Space Activities, *Proposal for a Draft Report and a Preliminary Set of Draft Guidelines of the Working Ground on the Long-term Sustainability of Outer Space Activities*, U.N. Doc. A/AC.105/C.1/L.339 (2014) [hereinafter *Proposal for LTSOSA Working Group Guidelines*].

the concept of LTSOSA, now supported by the 2019 LTSOSA Guidelines that have been agreed by consensus among the international community, has far-reaching theoretical and practical significance.[13]

II. THE CONCEPT OF LTSOSA AND THE PRINCIPLE OF SUSTAINABLE DEVELOPMENT

A. Definition and Scope of the Concept of LTSOSA

The preamble of the 2019 LTSOSA Guidelines defines the LTSOSA:

> . . . as the ability to maintain the conduct of space activities indefinitely into the future in a manner that realizes the objectives of equitable access to the benefits of the exploration and use of outer space for peaceful purposes, in order to meet the needs of the present generations while preserving the outer space environment for future generations.[14]

Several key words stand out in the 2019 definition: "equitable access," "peaceful purposes," "outer space environment," "present generations" and "future generations." These terms reflect the essence and basic requirements of the concept of LTSOSA.

In addition, the Secure World Foundation (SWF) publication on space sustainability states that space sustainability is:

> [e]nsuring that all humanity can continue to use outer space for peaceful purposes and socioeconomic benefit now and in the long term. This will require international cooperation, discussion and agreements designed to ensure that outer space is safe, secure and peaceful.[15]

The two definitions share some similarities. Their common objective is to develop and use outer space in a peaceful and

---

[13] Guoyu Wang, *Long Term Sustainability of Outer Space Activities and China's Coping Approach*, 6 CHINA AEROSPACE 28, 30 (2012).

[14] *Guidelines for the LTSOSA*, *supra* note 8, ¶11 (discussing definitions, objectives and scope of guidelines).

[15] *See generally* SECURE WORLD FOUNDATION, SPACE SUSTAINABILITY: A PRACTICAL GUIDE 4 (2018) (presenting an overview of the space sustainability issue including definitions, the importance of the LTSOSA, and major challenges to space sustainability).

sustainable way, thus ensuring that current and future generations will benefit from outer space activities for a long time.

The 2019 LTSOSA Guidelines have a wide scope of application affecting national government, intergovernmental organizations and non-governmental entities.[16] The Guidelines cover all planned or ongoing space activities and involve all stages of a mission including launch, operation and end-of-life disposal.[17] The Guidelines are not legally binding under international law and must be implemented on a voluntary basis within the framework of international law and space law based on the UN Charter and the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty or OST).[18] States and intergovernmental organizations can voluntarily take measures to implement the Guidelines through their respective national and organizational mechanisms.[19] Further, these States and intergovernmental organizations can carry forward the spirit of international cooperation and mutual assistance in accordance with the 1996 Declaration on Space Cooperation.[20]

B. Principle of Sustainable Development in International Law

The concept of sustainable development has been emphasized in some international treaties.[21] It has even been recognized and reflected in national and regional legislation.[22] In addition, the principle of sustainable development has been further affirmed in numerous "soft laws," such as the Rio Declaration on Environment

---

[16] *Guidelines for the LTSOSA*, *supra* note 8, ¶ 11.

[17] *Id.*

[18] *Id.* ¶ 15. *See* Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

[19] *Guidelines for the LTSOSA*, *supra* note 8, ¶ 19.

[20] G.A. Res. 51/122, Annex, Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries (Dec. 13, 1996).

[21] *See generally* Convention on Biological Diversity, June 5, 1992, 1760 U.N.T.S. 79; United Nations Framework Convention on Climate Change, Mar. 21, 1994, art. 3(4), 2303 U.N.T.S. 148, 1771.

[22] *See* Maguelonne Déjeant-Pons, *Networks for Sustainable Spatial Development*, 37 ENV'T POL'Y & L. 325 (2007).

and Development,[23] the Draft Articles on Prevention of Transboundary Harm from Hazardous Activities (2001),[24] the International Law Association (ILA) New Delhi Declaration of Principles of International Law Relating to Sustainable Development (2002)[25] and the latest Dubai Declaration (2017).[26]

Even so, States still have a great deal of discretion in interpreting and implementing the legal obligations of sustainable development.[27] Judging whether an action related to outer space violates the principle of sustainable development is subject to further study and discussion, as it depends on the establishment of a series of codes of conduct for outer space activities.[28] Nevertheless, according to Article III of the OST, activities relating to the exploration and use of outer space must be carried out "in accordance with international law."[29] As such, there is no doubt that States should also follow the basic principles of international law, including those of sustainable development, when implementing their space activities. This means that the applicable laws include not only international norms that specifically apply to environmental protection in outer space but also international law in a broad sense. Whether these rules are customary law, convention or have other properties, every country should consider the space environment while pursuing national interests in outer space.[30]

---

[23] U.N. Conference on Environment and Development, *Rio Declaration on Environment and Development*, Principle 1, U.N. Doc. A/CONF.151/26/Rev.1 (Vol. I), Annex I (Aug. 12, 1992) [hereinafter *Rio Declaration*].

[24] *See* Int'l L. Comm'n, Rep. on the Work of Its Fifty-Third Session, at 146-170, U.N. Doc. A/56/10 (2001).

[25] *See* Permanent Rep. of Bangladesh to the U.N. and the Chargé d'affairees a.i. of the Permanent Mission of the Netherlands to the U.N., Letter dated Aug. 2002 from the Permanent Rep. of Bangladesh to the U.N. and the Chargé d'affaires a.i. of the Permanent Mission of the Netherlands to the U.N. addressed to the Secretary-General, U.N. Doc A/57/329 (Aug. 21, 2002).

[26] *See* Comm. on the Peaceful Uses of Outer Space, Rep. on the U.N./U.A.E. High-level Forum: Space as a Driver for Socioeconomic Sustainable Development, U.N. Doc. A/AC/105/1165 (2018).

[27] J. Verschurren, *Sustainable Development and the Nature of Environmental Legal Principles*, 9 POTCHEFSTROOM ELEC. L.J., (2006), at 1.

[28] *Id.*

[29] Outer Space Treaty, *supra* note 18, art. III.

[30] I.H. Ph. Diederiks-verschoor, *Environmental Protection in Outer Space*, 30 GERMAN Y.B. OF INT'L L. 144, 159 (1987).

i. Sustainable Development Generally

In the *Gabčikovo-Nagymaros Project*, the International Court of Justice (ICJ) Judge Weeramantry provided a separate opinion and stated that the idea of sustainable development is not only a concept, but also a principle with universal normative value.[31] Judge Weeramantry found that this principle of general international law which he indicated originally related to environmental protection, provides for a duty of control and of preventive action.[32] Judge Weeramantry argued that it called for the recognition of new standards and criteria aimed at promoting and coordinating the sustainable development of environment and economy.[33]

Similarly, the international jurist Ian Brownlie argued that the principle of sustainable development is "instant" customary international law, due to its quick emergence and should be universally observed by the international community.[34] In 1987, the World Commission on Environment and Development defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[35] In 1992, the Rio Declaration on Environment and Development reaffirmed the principle of sustainable development, noting that "human beings are at the centre of concerns for sustainable development."[36]

In the *Case Concerning Pulp Mills on the River Uruguay*, the ICJ provided a more comprehensive account supporting sustainable development as a principle of international law, indicating that the essence of sustainable development is the "interconnectedness between equitable and reasonable utilization of a shared resource and the balance between economic development and environmental

---

[31] Gabčíkovo-Nagymaros Project (Hung. vs. Slovk.), Judgment, 1997 I.C.J. Rep. 7, 110 (Sept. 25) (separate opinion by Weeramantry, VP) [hereinafter Gabčíkovo-Nagymaros Case]; *see also Symposium: The Case Concerning the Gabčíkovo-Nagymaros Project*, 8 Y.B. OF INT'L ENV'T L. 3 (1997).

[32] Gabčíkovo-Nagymaros Case, *supra* note 31, at 92.

[33] Gabčíkovo-Nagymaros Case, *supra* note 31, at 95; *see also* STEPHAN HOBE, COLOGNE COMMENTARY ON SPACE LAW, VOL. I: OUTER SPACE TREATY (2009).

[34] JAMES R. CRAWFORD, BROWNLIE'S PRINCIPLES OF PUBLIC INTERNATIONAL LAW 352 (8th ed. 2012).

[35] WORLD COMM'N ON ENV'T & DEV., OUR COMMON FUTURE 43 (1987).

[36] *Rio Declaration*, *supra* note 23, ¶ 1.

protection."[37] Against this history, it can be concluded the essence of the principle of sustainable development is the integration and coordination of the following factors: sustainable use of natural resources, environmental protection and intergenerational equity.[38]

ii. Sustainable Use of Natural Resources and Environmental Protection

Sustainable use of natural resources and the environment has often been the main element of sustainable development.[39] In the *Fisheries Jurisdiction* case in 1974, the ICJ stated that "under international customary law, taking into account the long-term benefits of the future of humankind, the State has an obligation to protect and conserve common natural resources for sustainable use."[40] The sustainable use of natural resources means avoiding over-exploitation of resources and irreversible damage, thereby maintaining the renewable capacity of natural resources.[41]

Another important element of sustainable development is environmental protection.[42] In a 1996 advisory opinion concerning the legality of the threat or use of nuclear weapons, the ICJ states the following:

> The Court recognizes that the environment is under daily threat and that the use of nuclear weapons could constitute a catastrophe for the environment. The Court also recognizes that the environment is not an abstraction but represents the living space, the quality of life and the very health of [current and future generations]. The existence of the general obligation of States to ensure that activities within their jurisdiction and

---

[37] Pulp Mills on the River Uruguay (Arg. v. Uru.), Judgment, 2010 I.C.J. Rep. 14, ¶ 177 (Apr. 20).

[38] Edith Brown Weiss, *Intergenerational Equity in International Law*, 81 AM. SOC'Y OF INT'L L. PROC. 129, 131 (1987).

[39] Parvez Hassan, *Environment and Sustainable Development*, 31 ENV'T POL'Y & L. 36, 38 (2001).

[40] Fisheries Jurisdiction (U.K. & N. Ir. v. Ice.), Merits, Judgment, 1974 I.C.J. Rep. 3, ¶ 72 (July 25); Fisheries Jurisdiction (Ger. v Ice.), Merits, Judgment, 1974 I.C.J. Re. 1974, 175, ¶ 64 (July 25).

[41] Hassan, *supra* note 39, at 37, 38.

[42] *See generally* Eric Dannenmaier, *A Symposium on Legal, Institutional, and Political Challenges for Environmental Protection and Sustainable Development*, 16 TUL. ENV'T L. J. 517 (2003) (discussing Cuba's progressive environmental legal framework and how its policies might affect broader international interests).

> control respect the environment of other States or of areas beyond national control is now part of [international environmental law].[43]

In short, to prevent transboundary pollution and eliminate environmental threats and damage to other countries or commons, States are obliged to act responsibly within their jurisdiction.[44]

iii. Intra-generational and Inter-generational Equity

There are numerous discussions on the connotations of "sustainable development,"[45] and it is undeniable that the term encompasses a wide range of ideas and activities.[46] In *Our Common Future* (Brundtland Report), which was published in 1987 by the United Nations World Commission on Environment and Development, the principle of sustainable development is defined as the ability to meet the needs of the contemporary generation "without compromising the ability of future generations to meet their own needs."[47] Therefore it can be concluded that sustainable development embraces two basic elements: the needs of the contemporary generation (intra-generational equity) and allowing future generations to meet their own needs (inter-generational equity).[48]

a. Intra-generational Equity

Intra-generational equity is an indispensable element of sustainable development.[49] Intra-generational equity means those in

---

[43] Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, 1996 I.C.J. Rep. 226, ¶ 29 (July 8).

[44] U.N. Conference on the Human Environment, *Declaration of the United Nations Conference on the Human Environment*, A/CONF.48/14/Rev.1, at 5 (June 16, 1972) ("States have… the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or areas beyond the limits of national jurisdiction.").

[45] PHILIPPE SANDS, PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW 252 (2d ed. 2003).

[46] *Rio Declaration*, *supra* note 23, ¶ 4; Jun Zhao, *Research on the Theoretical Base of the Environmental Law*, 3 J. HUAZHONG U. SCI. & TECH. (ED. SOC. SCIS.) 39 (2005).

[47] WORLD COMM'N ON ENV'T & DEV., *supra* note 35, at 43.

[48] SANDS, *supra* note 45, at 254.

[49] *See generally* Sharon Beder, *Costing the Earth: Equity, Sustainable Development and Environmental Economics*, 4 N.Z. J. ENV'T L. 227, 228-29 (2000); Igor Vojnovic, *Intergenerational and Intragenerational Equity Requirements for Sustainability*, 22 ENV'T

the same generation, regardless of their nationality, race, gender, economic status and cultural differences, have equal rights in enjoying a good living environment and utilizing natural resources.[50] Historically and presently, intra-generational inequality has been and continues to be a severe issue.[51] Despite their rapid economic development, the developed countries contribute to the increasing deterioration of the environment and even endanger the lives of others as a result of their contribution to the environmental crisis.[52] To ensure that there is equality between different countries and groups of people in the same generation, countries must take into account the needs of other countries when managing and utilizing natural resources. Also, these countries must take into consideration their share of responsibility in the environmental protection of each and every other country.[53] This kind of equity is not fairness in absolute terms, but fairness that is determined from both historical and current perspectives. For instance, the large number of emissions from the developed countries since the Industrial Revolution versus the more recent emissions by the newly developed countries must be considered.[54] It is real injustice for all countries to share environmental responsibilities indiscriminately because developing countries may have less say in the international political arena, while other developing nations are forced to suffer the

---

CONSERVATION 223, 223 (1995); Paul A. Barresi, *Beyond Fairness to Future Generations: An Intragenerational Alternative to Intergenerational Equity in the International Environmental Arena*, 11 TUL. ENV'T L. J. 59, 85-86 (1997).

[50] *Id.*

[51] S. Nazrul Islam, *Inequality and Environmental Sustainability* 1-4 (Dep't Econ. & Soc. Affs., Working Paper No. 145, 2015), https://www.un.org/esa/desa/papers/2015/wp145_2015.pdf.

[52] Fiona Harvey, *Humans Damaging the Environment Faster Than It Can Recover, UN Finds*, GUARDIAN (May 19, 2016), https://www.theguardian.com/environment/2016/may/19/humans-damaging-the-environment-faster-than-it-can-recover-report-finds.

[53] David Broadstock, Finding a Balance Between Economic and En-vironmental Sustainability, S. CHINA MORNING POST (May 27, 2016, 3:43 PM), https://www.scmp.com/business/global-economy/article/1956350/finding-balance-between-economic-and-environmental

[54] U.N. DEP'T OF INT'L & SOC. AFFS., THE UNITED NATIONS DEVELOPMENT AGENDA: DEVELOPMENT FOR ALL, at 47-65, U.N. Sales No. E.07.1.17 (2007).

repercussions of the environmental consequences of the developed countries, such as global warming.[55]

The principle of intra-generational equity, which was one of the themes of the United Nations Conference on Environment and Development in 1992, has also been endorsed by many international treaties and documents.[56] If human beings truly want to achieve intra-generational equity, the international community should reconsider the interests of all countries and establish a new international economic and legal order and a global partnership, although these will entail a long and difficult process with political, economic and social challenges.[57]

b. Inter-generational Equity

Inter-generational equity refers to the equal right of both the present and future generations to use natural resources to meet their own interests, both for survival and development purposes.[58] That is, the contemporary generation must leave their descendants the necessary environmental and natural resources for survival and development.[59] Inter-generational equity is another integral part of sustainable development and was first proposed by American international law scholar, Professor Edith Brown Weiss.[60] "Custody" of the Earth's resources is an important concept in inter-generational equity in that every generation is a trustee of the resources of the

---

[55] *See* Alex Kirby, *Are Developing Nations Equally to Blame for Climate Change?*, CLIMATE HOME NEWS (Sept. 17, 2013, 5:59 PM), http://www.climatechangenews.com/2013/09/17/developing-nations-equally-to-blame-for-climate-change-report/ ("[D]eciding which countries have contributed most to climate change depends on how you calculate historic and current emissions.").

[56] Beder, *supra* note 49, at 228.

[57] Vojnovic, *supra* note 49, at 225.

[58] Edith Brown Weiss, *The Planetary Trust: Conservation and Intergenerational Equity*, 11 ECOLOGY L.Q. 495, 499-500 (1984); Lynda M. Collins, *Revisiting the Doctrine of Intergenerational Equity in Global Environmental Governance*, 30 DALHOUSIE L.J. 79, 94-96 (2007); Burns H. Weston, *Climate Change and Intergenerational Justice: Foundational Reflections*, 9 VT. J. ENV'T L. 375, 382 (2008).

[59] WORLD COMM'N ON ENV'T & DEV., *supra* note 35, at 43-44. *See* Maja Göpel, *Guarding Our Future: How to Protect Future Generations*, 1 SOLS. J. 62 (2010); EDITH BROWN WEISS ET AL., UNITED NATIONS UNIV., ENVIRONMENTAL CHANGE AND INTERNATIONAL LAW: NEW CHALLENGES AND DIMENSIONS 385-412 (Edith Brown Weiss ed., 1992).

[60] *2007 International Environmental Law Award Recipient – Edith Brown Weiss*, CTR. FOR INT'L ENV'T L., https://www.ciel.org/about-us/2007-international-environmental-law-award-recipient-edith-brown-weiss/ (last visited May 17, 2021).

future generations. As such, it is posited that it is every generation's responsibility to protect the environment so that the resources on Earth can be passed to future generations with acceptable standards and due diligence.[61] Inter-generational equity is recognized to consist of three basic principles.[62] First, there is the principle of preservation of choice, which means that each generation should preserve a diversity of natural and cultural resources for future generations.[63] Preservation of choice recognizes that future generations are entitled to reap the same benefits from having options as enjoyed by those of the current generation.[64] Second, there is the principle of preservation of quality.[65] Under the principle of preservation of quality, each generation should ensure the quality of the resources on Earth and assure they are not substandard when passed over to the next generation.[66] In other words, the current generation should not destroy Earth's resources and assure they are available to future generations. Third, there is the principle of preservation of access and use.[67] According to the principle of preservation of access and use, each generation should provide its members with the right to parallel access and use of received, transmitted or inherited resources from previous generations, and preserve this right of access and use for future generations.[68]

There exists various philosophical literature surrounding whether or not the current generation of humans owe obligations to those who are yet to be born, which is closely related to inter-generational justice.[69] The primary issue of inter-generational justice

---

[61] Lynda Collins, The Doctrine of Intergenerational Equity in Global Environmental Governance 31-43 (Aug. 2006) (Master of Laws thesis, University of British Columbia, Aug. 2006) (on file with the University of British Columbia Library).

[62] EDITH BROWN WEISS, IN FAIRNESS TO FUTURE GENERATIONS: INTERNATIONAL LAW, COMMON PATRIMONY, AND INTERGENERATIONAL EQUITY 26 (1989).

[63] *Id. See also* Weston, *supra* note 58, at 396.

[64] Weston, *supra* note 58, at 396. *See* Dinah Shelton, *Intergenerational Equity*, *in* SOLIDARITY: A STRUCTURAL PRINCIPLE OF INTERNATIONAL LAW 123 (Rüdige Wolfrum & Chie Kojima eds., 2010).

[65] BROWN WEISS, *supra* note 62, at 26.

[66] *Id.*; Weston, *supra* note 58, at 396.

[67] BROWN WEISS, *supra* note 62, at 26.

[68] *Id. See* Edith Brown Weiss, *Our Rights and Obligations to Future Generations for the Environment*, 84 AM. J. INT'L L. 198 (1990).

[69] *See* Laurence J. Kotlikoff, *Measuring Intergenerational Justice*, 11 INTERGENERATIONAL JUST. REV. 56, 56-57 (2017); Andre Santos Campos,

is whether judicial considerations apply to inter-generational relationships, namely, the relationship between non-contemporaries.[70] If contemporary people have a long-term understanding of equity and justice from a broad inter-generational perspective, then the contemporary human has an unshakable responsibility and obligation to current and past generations.[71] On this issue of inter-generational justice, John Rawls has a representative and in-depth study.[72] He proposed the "just savings principle"[73] and the concept of the "well-ordered society,"[74] which, some suggest supports the view that: 1) contemporary people have a duty of justice and morality to future human beings; and 2) the next generation has the right to enjoy the various living rights that contemporary people are enjoying.[75] The obligation arising from inter-generational justice can arguably be manifested as an assertion that contemporary people should preserve the basic environment and conditions for future generations to be able to survive. In other words, the living conditions and environment of the future generation should at least not be worse than the previous generation. In terms of the sustainability theory based on inter-generational justice, Rawls further

---

Intergenerational Justice Today, 13 PHIL. COMPASS 1, 1 (2018), https://doi.org/10.1111/phc3.12477 ("A theory of intergenerational justice consists in the study of the moral and political status of the relations between present and past or future people, more specifically, of the obligations and entitlements they can potentially generate.").

[70] David Heyd, *A Value or an Obligation? Rawls on Justice to Future Generations*, *in* INTERGENERATIONAL JUST. 167, 177 (Axel Gosseries & Lukas H. Meyer eds., 2009).

[71] *See* Kasper Lippert-Rasmussen, *"Equality of What?" and Intergenerational Justice*, 19 ETHICAL PERSPS. 501 (2012).

[72] JOHN RAWLS, A THEORY OF JUSTICE, (Harvard Univ. Press, 1971 rev. ed. 1999). JOHN RAWLS, JUSTICE AS FAIRNESS: A RESTATEMENT, (E. Kelly ed., Harvard Univ. Press, 2001). *See* Lukas Meyer, *Intergenerational Justice* ¶ 4.4, STANFORD ENCYCLOPEDIA OF PHIL. (Aug. 10, 2015), https://plato.stanford.edu/archives/sum2020/entries/justice-intergenerational/. *See* Dominic Welburn, *Rawls, the Well-Ordered Society and Intergenerational Justice*, 33 POL. 56 (2013).

[73] JOHN RAWLS, JUSTICE AS FAIRNESS: A RESTATEMENT, at 189-190 (E. Kelly ed., 2001). Roger Paden, *Rawls's Just Savings Principle and the Sense of Justic*e, 23 SOC. THEORY & PRAC. 27, 31 (1997). The "just savings" principle "stipulates that the well-ordered society is to be preserved for no other reason than that of justice." Welburn, *supra* note 72, at 58.

[74] Welburn, *supra* note 72, at 58 (a "'well-ordered' society, with its 'just institutions', [can] meet the demands of intergenerational justice.").

[75] *Id.*; Paden, *supra* note 73, at 31.

proposed that each generation is supposed to be selfless.[76] Contemporary people want the previous generation to implement the principle of sustainable development; as such, the current generation should also implement the same or even higher standards to be responsible for the next generation.[77] This theory originating from inter-generational justice provides convincing theoretical support for the protection of both the living environment and cultural heritage.[78] That is to say, the contemporary generation has the right to understand and benefit from what is left behind by previous generations, but they should also preserve the legacy so that the next generation will also have access to what has been passed on from generation to generation. As an important concept of sustainable development, inter-generational equity has been widely incorporated in the field of public international law and has also been directly or indirectly recognized in some international treaties.[79]

C. Link Between Concept of LTSOSA and Principle of Sustainable Development

To generalize and apply the principle of sustainable development in the concept of LTSOSA means that space activities shall not only meet the needs of contemporary human beings for their outer space activities,[80] but also the ability of their descendants to meet their needs for their outer space activities. This is reflected in the need to integrate intra-generational and inter-generational equities, sustainable use and environmental development in outer

---

[76] *See* JOHN RAWLS, THE LAW OF PEOPLES, at 26-29 (1999). JOHN RAWLS, A THEORY OF JUSTICE, at 78-80 (rev. ed. 1999).

[77] WORLD COMM'N ON ENV'T & DEV., *supra* note 35, at 65.

[78] *See* Fabian Schuppert, *Climate Change Mitigation and Intergenerational Justice*, 20 ENV'T POL. 303, 305 (2011); Marc D. Davidson, *Intergenerational Justice: How Reasonable Man Discounts Climate Damage*, 4 SUSTAINABILITY 106 (2012); Joel Taylor, *Intergenerational Justice: A Useful Perspective for Heritage Conservation*, CEROART (Oct. 2013), https://doi.org/10.4000/ceroart.3510.

[79] Edith Brown Weiss, *Climate Change, Intergenerational Equity, and International Law*, 9 VT. J. ENV'T L. 615, 615-16 (2008).

[80] *See Proposal for LTSOSA Working Group Guidelines*, *supra* note 12, ¶ 11 ("States, international organizations, national and international non-governmental organizations and private sector entities that are involved in space activities should take steps to ensure that their activities do not diminish the ability of others to carry out their own space activities, either now or in the future.").

space activities.[81] In order to ensure theoretical uniformity and practical applicability, the connotations of the LTSOSA should also be consistent with the theories of sustainable development on Earth. Outer space activities play an irreplaceable role in supporting sustainable development on Earth and are also crucial for the success of the United Nations Millennium Development Goals,[82] as well as the post-2015 sustainable development agenda.[83] Thus, the concept of LTSOSA is not only an important issue for actors who are currently involved in space activities but also a matter of general concern to the international community.[84]

Faced with the increasing volume of space debris, congested Earth orbits and the growing possibility of physical collisions and electromagnetic interference in the operation of space objects, the international community has gradually become increasingly concerned about the LTSOSA.[85] These growing concerns are especially relevant in low Earth and geostationary orbits.[86] Attempts to apply the principles of global sustainable development in international law to the concept of LTSOSA are becoming more concrete in this new space era. The LTSOSA Working Group established an expert group to consider the topic of sustainable space utilization

---

[81] *Id.*

[82] *See* Rep. of the Third U.N. Conf. on the Expl. & Peaceful Uses of Outer Space, U.N. Doc. A/Conf.184/6, at 6-9 (1999). Space science and space applications are very important. They can contribute to the promotion of the fundamental knowledge of the universe, and through the monitoring of the environment, natural resource management, early warning systems, they can also help to mitigate potential disasters and support disaster management, meteorological forecasts, climate modelling, navigation and communication to improve the daily lives of people throughout the world. Space science and technology has already made a significant contribution to the well-being of humankind and, in particular, to the goals of the UN global conference that deals with all aspects of economic, social and cultural development.

[83] *See* G.A. Res. 70/1, Transforming Our World: The 2030 Agenda for Sustainable Development (Oct. 21, 2015). On 25 September 2015, the world-renowned "UN Summit on Sustainable Development" was held at the UN headquarters in New York. The meeting adopted a joint declaration supported by 193 Member States: the 2030 Agenda for Sustainable Development. This programmatic document, which includes seventeen sustainable development goals and 169 targets, will push the world to achieve three unprecedented extraordinary initiatives over the next fifteen years: eradicating extreme poverty, overcoming inequalities and injustices and curbing climate change.

[84] *See Proposal for LTSOSA Working Group Guidelines*, *supra* note 12.

[85] *Id.* ¶ 2.

[86] *Id.*

supporting sustainable development on Earth.[87] The expert group emphasized that the LTSOSA is closely linked to the sustainable development of Earth.[88] Specifically, this expert group believes that by promoting the LTSOSA, the role of space systems in the long-term sustainable development of Earth and disaster management will be reinforced, and as a result, all countries would have equal opportunity to participate in outer space activities and share the benefits of such activities.[89] In addition, from a goal-oriented perspective, the objective of the LTSOSA includes both long-term sustainable development on Earth and in the outer space environment. The 2019 LTSOSA Guidelines also demonstrates that the concept of LTSOSA has a close relationship with the principle of sustainable development, which is embodied by their common objectives and priorities.

Judging from the scope of the LTSOSA Guidelines,[90] the concept of LTSOSA has the potential to become customary international law instead of legally non-binding guidance. The concept of LTSOSA also has the potential to become an important principle of international law that would regulate outer space activities by following the principle of "peaceful uses of outer space,"[91] which means that it would contain more far-reaching implications and more legally binding requirements. However, the principle of sustainable development on the Earth does not appear to directly include the concept of LTSOSA because outer space activities are not a part of the current regulatory framework of global sustainable

---

[87] *Id.* ¶ 5.

[88] *Id.* at arts. II.7, II.8.

[89] Sci. & Tech. Subcomm. of the Comm. on the Peaceful Uses of Outer Space, Working Report of Expert Group A: Sustainable Space Utilization Supporting Sustainable Development on Earth, U.N. Doc. A/AC.105/C.1/2014/CRP.13 (2014) ("Space activities play a vital role in supporting sustainable development on Earth. They are essential for the achievement of the Millennium Development Goals and for the success of the post-2015 development agenda process. The proposed draft guidelines presented here are designed to improve the long-term sustainability of outer space activities in the context of the contribution of space systems to the support of sustainable development on Earth and to disaster management, and to ensure that the benefits of outer space activities are enjoyed by all nations. They are directed to all space actors, namely, States, international organizations, national and international non-governmental organizations and private sector entities").

[90] *Proposal for LTSOSA Working Group Guidelines*, *supra* note 12, ¶ 16-18.

[91] Olga Volynskaya, *Future Space is Challenge for International Law*, ROOM (2016), https://room.eu.com/article/future-space-is-challenge-for-international-law.

development, and there is a significant difference between the Earth environment and the outer space environment.[92] Therefore, the direct analogy of the application of the concept of LTSOSA as a principle of international law or customary international law lacks sufficient legal support. Unlike the general international law principle of sustainable development, the concept of LTSOSA has not yet developed into sources of international law. It is argued here that facilitating the development of the concept of LTSOSA into customary international law is more rational with a greater possibility of actualization.

III. FACILITATING CONCEPT OF LTSOSA AS SOURCES OF INTERNATIONAL LAW

The sources of international law are historical facts "out of which rules of conduct rise into existence" [93] or, put another way, they are the initial manifestation of the principles, rules, and regulations that evidence the existence of legally binding and universally applicable rules of international law and the legal forms that establish the validity of such rules.[94] Critics of classical international law do not seem to indicate the exact meaning of the word "source," critics unusually confuse it with the foundations of international law.[95] The term is used to convey some relevant legal concepts, including evidence, origin and basis.[96] Although defining legal sources is difficult and controversial, the concept of legal sources in and of itself has a significance that cannot be ignored. Legal sources are required to: (1) make the rules of law recognized; (2)

---

[92] *See* MIRIA M. FINCKENOR & KIM K. DE GROH, NASA INT'L SPACE STATION PROGRAM RSCH. OFF., A RESEARCHER'S GUIDE TO: SPACE ENVIRONMENTAL EFFECTS 5 (2015). Taking the ISS research environment as an example, it has the characteristics of microgravity, extreme conditions and low-earth orbit.

[93] 1 L. OPPENHEIM, INTERNATIONAL LAW: A TREATISE 20 (Ronald F. Roxburgh ed., 3d ed. 1920). *See* Jean d'Aspremont, *Hugh Thirlway: The Sources of International Law*, 57 GER. Y.B. INT'L L. 741, 745 (2014) (book review).

[94] *See* Maria-Luiza Hrestic, *Considerations on the Formal Sources of International Law*, 7 J. L. & ADMIN. SCIS. 103, 103 (2017)(Law sources are "also designated 'ways of formation of juridical norms, namely procedures and acts by which these norms come into 'juridical existence,' become part of the positive law, and acquire validity" (*citations omitted*)).

[95] OPPENHEIM, *supra* note 93, at 19.

[96] P.K. Menon, *Primary, Subsidiary and Other Possible Sources of International Law*, 1 SRI LANKA J. INT'L L. 113, 113 (1989).

distinguish the rules of law from other rules (such as invalid rules); (3) establish the legal validity of a new code of conduct; and (4) guide changes to the current rules.[97]

Before the establishment of the Statute of the International Court of Justice (ICJ Statute), there was no consensus on the classification of the various sources of international law or their own importance.[98] After the establishment of the ICJ, legal scholars generally agreed that the means by which the ICJ determined international disputes were the sources of international law.[99] Article 38 of the ICJ Statute sets out the law applicable to court decisions and,[100] although it does not directly refer to "sources," this Article is considered to have largely established and specified the sources of internationally accepted international law.[101] According to this

---

[97] Zhang Ying, *Oppenheim's International Law (9th edition) and the Development of International Law*, 4 WUHAN U. J. (PHIL. & SOC. SCIS.) 76 (1998) ("The Oppenheim's International Law has been revised several times since its first edition in 1905 and has been regarded as a classic by worldwide scholars in international law. This masterpiece has been carefully crafted by a number of jurists for nearly a century. All of the revisionists have tried their best to incorporate the theories and practices of international law in their respective times into the classical structure of this book, so that this masterpiece can far surpass its era. The latest version of the book, the ninth edition, was co-edited by a prominent British Jurist Sir Robert Jennings and Sir Arthur Watts."). *See* ROBERT JENNINGS & ARTHUR WATTS, EDS., OPPENHEIM'S INT'L LAW: VOL. 1 PEACE 23 (9th ed., 2008).

[98] Menon, *supra* note 96, at 113-14.

[99] *Id.* at 114.

[100] Statute of the International Court of Justice, art. 38(1), June 26, 1945, 59 Stat. 1031 [hereinafter ICJ Statute]. Article 38 reads:

> 1. The Court, whose function is to decide in accordance with international law such disputes as are submitted to it, shall apply:
>
> a) international conventions, whether general or particular, establishing rules expressly recognized by the contesting states;
>
> b) international custom, as evidence of a general practice accepted as law;
>
> c) the general principles of law recognized by civilized nations;
>
> d) subject to the provisions of Article 59, judicial decisions and the teachings of the most highly qualified publicists of the various nations, as subsidiary means for the determination of rules of law.
>
> 2. This provision shall not prejudice the power of the Court to decide a case *ex aequo et bono*, if the parties agree thereto.

[101] Zhang, *supra* note 97, at 76 ("Article 38 of the Statute of the ICJ does not indicate that it contains the sources of international law and that it cannot create the validity of

provision, the scope of the law applicable in cases of the ICJ ranges from international conventions, to international customs, to general legal principles.[102] Moreover, "judicial decisions and the teachings of the most highly qualified publicists of the various nations [are treated] as subsidiary means for the determination of rules of law."[103] With the consent of the parties concerned, judgments may also be based on the principle of "fairness and goodness" (*ex aequo et bono* or according to the right and good).[104]

Article 38 is often considered not only as the law that the ICJ applies but also as an authoritative account of the sources of international law.[105] As Article 38 does not directly indicate the sources of international law, some academics claim only the first three items, namely international conventions, international custom and general principles of law recognized by civilized nations are the actual sources of international law, while the last two, namely judicial decisions and teachings of the most highly qualified publicists, are intended to be just supplementary materials.[106] Other academics argue that only international conventions and international customs are sources.[107] However, it is commonly accepted that all international conventions and customs are recognized as the main sources of international law, and all other listed items are at least supplementary sources or reference materials.[108] It is worthwhile to mention here that this provision is not an exhaustive list of the sources of international law. With recent developments of

---

the law enumerated therein, as it is itself one of those sources. However, Article 38 is legally binding on the ICJ and is generally authoritative as it reflects the practice of the State.").

[102] ICJ Statute, *supra* note 100, art. 38(1).

[103] *Id.*

[104] Statute of the International Court of Justice, art. 38(2), June 26, 1945, 59 Stat. 1031.

[105] Shagufta Omar, *Sources of International Law in the Light of the Article 38 of the International Court of Justice*, SSRN, at 1, 2 (July 3, 2011), https://ssrn.com/abstract=1877123.

[106] JUSTICE BANKOLE THOMPSON, UNIVERSAL JURISDICTION: THE SIERRA LEONE PROFILE, INTERNATIONAL CRIMINAL JUSTICE SERIES, VOL 3. THE HAGUE: T.M.C. Asser Press, 5-13 (2015); Pavko, A. I, Sources of International Law: General and Special, (2012) 7 Juridical Science 116, 116-123.

[107] JUSTICE BANKOLE THOMPSON, UNIVERSAL JURISDICTION: THE SIERRA LEONE PROFILE, INTERNATIONAL CRIMINAL JUSTICE SERIES, VOL 3. THE HAGUE: T.M.C. Asser Press, 5-13 (2015).

[108] Christoph Schreuer, *Recommendations and the Traditional Sources of International Law*, 20 GER. Y.B. INT'L L. 103, 114 (1977).

international organizations and globalization, the resolutions of international organizations, especially those adopted by the United Nations General Assembly (UNGA), are gaining recognition as potential sources of international law and have increasingly attracted more attention and discussion.[109]

Article 38 of the ICJ Statute does not refer to the resolutions and documents that have reached consensus within the member States of international organizations. However, because of the substantial growth in international organizations and their rapid development, their resolutions and documents have become increasingly important in international law and are often mentioned in the practice of international law.[110] To a certain extent, this phenomenon confirms and clarifies the existing and emerging rules and principles of international law. This phenomenon may underlie the universal international conventions that will be formulated in the future, and may even directly establish the principles and norms of international law in certain fields.[111] Therefore, in this article, the

---

[109] Pierre-Marie Dupuy, *Soft Law and the International Law of the Environment*, 12 MICH. J. INT'L L. 420, 422-23 (1991); HUGH THIRLWAY, THE SOURCES OF INTERNATIONAL LAW 79 (1st ed. 2014) (discussing the role of General Assembly resolutions).

[110] CRAWFORD, *supra* note 34, at 20-47; Marko Divac Öberg, *The Legal Effects of Resolutions of the UN Security Council and General Assembly in the Jurisprudence of the ICJ*, 16 EUR. J. INT'L L. 879 (2006). The resolutions and unanimous documents of the international organizations and the non-binding agreements reached by various countries through international conferences have an increasingly important evidential value in proving and confirming the new developments in the sources of international law and in the creation of the principles and rules of international law. They can be regarded as new subsidiary means on determining legal principles. Moreover, when such resolutions are formed as general principles, they provide a basis for the gradual development of international practices and for the rapid formation of customary rules. Such as some important U.N. resolutions that then became international treaties: Declaration on the Granting of Independence to Colonial Countries and Peoples (1960), Declaration of Legal Principles Governing the Activities of States in the Exploration and Deployment of Space (1963), Declaration of Principles Governing the Sea-Bed and the Ocean Floor, and the Subsoil Thereof, beyond the Limits of National Jurisdiction (1970), Declaration on the Establishment of a New International Economic Order (1974), Charter of Economic Rights and Duties of States (1974), etc. These important U.N. documents also play a leading role in guiding the application of the U.N. Charter because of their universal authority and guiding significance and thus serving as auxiliary sources of international law.

[111] Zhang, *supra* note 97, at 76 ("It is impressive that the 9th edition of the *Oppenheim's International Law* specifically supplements the heading of 'the origins of international organizations and international law.' As Jennings noted, 'the most significant

UN resolutions and documents related with the LTSOSA guidelines and LTS Working Group which are the bearers of the concept of LTSOSA, will be taken as an important means of supporting the potential concept of LTSOSA in becoming an international custom.[112]

A. Dilemma of Facilitating the Concept of LTSOSA as an International Treaty

International treaties and conventions are the major sources of international law.[113] The principles and rules of modern international law have mainly been stipulated in international conventions, and the international community has also mainly adopted the principles and rules of international law in the form of international treaties.[114] The basic principles of the law of treaties are that "treaties must be observed" and "treaties only bind the state parties."[115]

International space law consists of the following five space treaties: the Outer Space Treaty (OST) (1967),[116] The Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space,[117] the Convention on

---

change in the international community over the past 50 years has been the increase in the number of international organizations and the development of their missions, which have a great influence on the sources of international law."').

[112] *See* CRAWFORD, *supra* note 34. Because of a lack of an international legal text to express the principles, rules and systems of customary international law, evidence must be found to prove the existence of an international custom, *id.* at 20-21. In international practices, references on proving international custom may be searched from the following three aspects: (1) various diplomatic instruments among nations; (2) resolutions and judgments of international agencies; and (3) domestic legislative, judicial and administrative documents and so on.

[113] *Id.* at 20-34.

[114] Christopher Greenwood, *Sources of International Law: An Introduction*, UNITED NATIONS OFF. LEGAL AFFS., http://legal.un.org/avl/pdf/ls/greenwood_outline.pdf (last visited Feb. 3, 2021).

[115] U.N. DEP'T ECON. & SOC. AFFS., HANDBOOK FOR PARLIAMENTARIANS ON THE CONVENTION ON THE RIGHTS OF PERSONS WITH DISABILITIES 39-45 (2007).

[116] Outer Space Treaty, *supra* note 18.

[117] The Agreement on the Rescue of Astronauts, The Return of Astronauts and The Return of Objects Launched into Outer Space, Apr. 22, 1968, 672 U.N.T.S. 119 (International obligation to render assistance to astronauts in distress) [hereinafter the Rescue Agreement].

International Liability for Damage Caused by Space Objects,[118] the Convention on Registration of Objects Launched into Outer Space,[119] and The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies.[120] Since the conclusion of the Moon Treaty, there have not been any new international treaties that regulate outer space activities.[121] It is difficult for these five major outer space treaties to adequately regulate ever-expanding space activities, such as the commercialization of outer space activities, tourists in outer space and space resource utilization.[122] Although the Outer Space Treaty is concerned with issues related to the outer space environment,[123] it does not explicitly address or put forward the concept of LTSOSA.[124]

In general, a treaty shall always reconcile two competing interests: stability and flexibility. The need for institutional stability is reflected in the customary international law that "the treaty must be observed" (*pacta sunt servanda*), so all countries are willing

---

[118] Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 (Covers international liability of States in the launching and attempted launching of space objects) [hereinafter the Liability Convention].

[119] Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 (Handles the international obligations of States when launching and procuring launches of space objects) [hereinafter the Registration Convention].

[120] The Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 5, 1979, 1363 U.N.T.S. 3 (Governs the Activities of States and their non-governmental actors on the Moon and other celestial bodies. This is the least accepted international space law Treaty) [hereinafter the Moon Treaty].

[121] Loren Grush, *How an International Treaty Signed 50 Years Ago Became the Backbone for Space Law*, THE VERGE (Jan. 27, 2017), https://www.theverge.com/2017/1/27/14398492/outer-space-treaty-50-anniversary-exploration-guidelines.

[122] *See* Stephan Hobe et al., *Space Tourism Activities - Emerging Challenges to Air and Space Law?*, 33 J. SPACE L. 359 (2007); Henry Hertzfeld, *Current and Future Issues in International Space Law*, 15 ILSA J. INT'L & COMPAR. L. 325 (2009).

[123] Outer Space Treaty, *supra* note 18, art. IX (Article IX of the Outer Space Treatyin particular restricts the "harmful contamination" of space).

[124] *See* RAM JAKHU & ISAVELLA MARIA VASILOGEORGI, *The Fundamental Principles of Space Law and the Relevance of International Law, in* IN HEAVEN AS ON EARTH? THE INTERACTION OF PUBLIC INTERNATIONAL LAW ON THE LEGAL REGULATION OF OUTER SPACE 29-30 (Stephan Hobe & Steven Freeland eds., 2012). The most relevant principles established by the Outer Space Treaty are the peaceful uses of outer space, environmental protection of outer space, international cooperation, special care for the developing States and common interests of humankind, these principles have a close relationship with the sustainable development of both outer space and the Earth.

to conclude a treaty.[125] However, the treaty cannot always adapt to the changing needs of the State party, as the treaty regime may become ineffective as the environment and customs change.[126] With the evolution of the international strategic environment, the formation of a multi-polar international pattern and the growing interest of States in space activities, a more in-depth examination of the reason for the lack of a new international space treaty reveals that there is a conflict between the interest demands of the different countries involved.[127] This is mainly reflected in the conflicts of interest between developed and developing countries, spacefaring and non-spacefaring countries, and spacefaring nations themselves.[128] It is the diverse interest demands of nations in the activities of outer space that makes it difficult to reach consensus on many space treaty articles.[129] For example, non-spacefaring countries are more likely to support restrictions on the exploitation and utilization of outer space resources while the capable space powers are more inclined to emphasize more flexibility in the freedom of utilization and development of those resources.[130] In addition, it is noteworthy that the States parties to the five outer space treaties do not include all countries of the international community. Even though the impacts of outer space activities are global, obligations cannot be imposed onto non-contracting States without their consent. Conversely, rights can be granted to non-contracting States in

---

[125] Rebecca Crootof, *Change without Consent: How Customary International Law Modifies Treaties*, 41 YALE J. INT'L L. 237, 239 (2016).

[126] *Id.*

[127] Duncan Blake & Steven Freeland, *As the World Embraces Space, the 50-year-old Outer Space Treaty Needs Adaptation*, THE CONVERSATION (July 10, 2017), https://theconversation.com/as-the-world-embraces-space-the-50-year-old-outer-space-treaty-needs-adaptation-79833.

[128] *Id.*

[129] Ma Xinmin, Deputy Dir.-Gen., Dept. of Treaty & L., Ministry of Foreign Aff., People's Republic of China, Speech at United Nations/China/APSCO Workshop on Space Law; The Development of Space Law: Framework, Objectives and Orientations (Nov. 17, 2014), http://www.unoosa.org/documents/pdf/spacelaw/activities/2014/splaw2014-keynote.pdf.

[130] For example, the space strategy unveiled by President Donald J. Trump on March 23, 2020, "prioritizes American interests first and foremost, ensuring a strategy that will make America strong, competitive, and great," which also possibly implies the breaking of the limitations of the existing space law system. Donald J. Trump, *President Donald J. Trump is Unveiling an America First National Space Strategy*, TRUMP WHITE HOUSE (Mar. 23, 2018), https://trumpwhitehouse.archives.gov/briefings-statements/president-donald-j-trump-unveiling-america-first-national-space-strategy/.

an international treaty.[131] This also makes it difficult for non-parties to realize the unification of their rights and obligations under the LTSOSA Guidelines in outer space activities.[132] Therefore, promoting the LTSOSA Guidelines which embody the Concept of LTSOSA as an international convention is unrealistic due to the complexities of the different national interests and the relatively limited scope of the subjects of international law.

B. Dilemma of Facilitating the Concept of LTSOSA as a General Principle of Law

Article 38 of the ICJ Statute stipulates that the general legal principles recognized by all civilized nations can be applied in court decisions.[133] This means that the general principles of law need to be recognized by all civilized States in order to be applicable to the ICJ. The mode of this "recognition" is often explicitly stated in international treaties and implicitly confirmed in international norms.[134] In terms of determining the "general principles of law," the ICJ Statute is ambiguous. Academics have proposed the following perspectives.

First, some believe that the general principles of law are also the general principles or basic principles of international law, which are, for instance, recognized by the legal system of the former Union of Socialist Soviet Republics.[135] In fact, the general or basic principles of international law are already enshrined in international

---

[131] HERSCH LAUTERPACHT ED., OPPENHEIM'S INTERNATIONAL LAW: A TREATISE VOL. 1, PEACE 20 (8th ed. 1955) ("[c]ompared with international customary law, it is more appropriate to formally regard the treaty as a source of rights and obligations rather than as a source of law. Because the source of law usually has its generality and autonomy in its application, which could not be embodied by the treaty.").

[132] *See* Comm. On the Peaceful Uses of Outer Space, *Legal Subcomm., Status of International Agreements Relating to Activities in Outer Space as at 1 January 2017*, U.N. DOC. A/AC.105/C.2/2017/CRP.7 (Mar. 23, 2017). The total number of countries that have ratified the five space treaties are: 105 (OST), 95 (Rescue Agreement), 94 (Liability Convention), 63 (Registration Convention), Moon Agreement (17). *See generally* Status of International Agreements Relating to Activities in Outer Space, U.N. OFF. FOR OUTER SPACE AFF. http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html (last visited Apr. 11, 2021).

[133] ICJ Statute, *supra* note 100, art. 38.

[134] FABIÁN O. RAIMONDO, GENERAL PRINCIPLES OF LAW IN THE DECISIONS OF INTERNATIONAL CRIMINAL COURTS AND TRIBUNALS 7-16 (2008).

[135] *Id.*

treaties and international conventions, so there cannot be alternative "general legal principles."[136]

Second, some argue that the general principles of law rest on a "general legal consciousness," which is represented by the theories of natural law.[137] In fact, it is impossible to produce a unified "general legal awareness" in the international community, which is composed of sovereign countries with different social, political and economic systems.[138] It is also impossible to extract principles and rules of international law from the abstract notion of "general legal consciousness."[139]

Third, some scholars claim that the "general principles of law" are the common principles of all developed legal systems.[140] Although there are significant differences among the legal systems of various countries, there are also some common principles, which according to *Brownlie's Principles of Public International Law*, include: the principle of reciprocity, consent, finality of awards and settlement, equality of States, the legal validity of agreements, good faith, domestic jurisdiction and the freedom of the seas.[141]

According to the existing classics of international law, such as Brownlie's, it is acceptable to regard the "general principles of law" as the common legal principles in domestic legal systems, provided that they can be used to handle international relations and can be considered as the basis of international binding rules.[142] Since general legal principles that are applicable to different countries are often recognized through international treaties and customs,[143] the possibility of facilitating the LTSOSA into a source of international

---

[136] *Id.*

[137] HERMANN MOSLER, GENERAL PRINCIPLES OF LAW, ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW 511-527 (Rudolf Bernhardt eds., 1984).

[138] GIORGIO GAJA, GENERAL PRINCIPLES OF LAW, THE MAX PLANCK ENCYCLOPEDIA OF PUBLIC INTERNATIONAL LAW 370-378 (Rüdiger Wolfrum, eds., 2007).

[139] *Id.*

[140] Michael Bogdan, *General Principles of Law and the Problem of Lacunae in the Law of Nations*, 46 NORDIC J. INT'L L. 37, 37–53 (1977).

[141] CRAWFORD, *supra* note 34, at 37.

[142] JENNINGS & WATTS, *supra* note 97, at 29; THIRLWAY, *supra* note 109, at 111-116.

[143] *See* JENNINGS & WATTS, *supra* note 97, at 29; THIRLWAY, *supra* note 109, at 129-142. The sources of international law are not separate, but interrelated, and the rules of each source should be understood in the context of the rules arising from other sources.

law through general legal principles is limited.[144] As a concept that is "familiar" for Earth but "remote" for outer space, the LTSOSA would possibly face more complicated issues in the process of evolving into a general legal principle that regulates outer space activities. It is therefore unrealistic to promote the LTSOSA as a general principle of law.

C. Necessity and Feasibility of Facilitating the Concept of LTSOSA into International Custom

International customs are legally binding and unwritten rules of conduct that countries repeatedly practice in international exchanges.[145] International custom is one of the main sources of international law.[146] Providing evidence of international custom requires the demonstration of two factors. The first factor is the repeated acts of all countries, that is, the existence of commonality (generality), which is considered as an objective or material factor.[147] The second factor is the consciousness of legal binds, or the so-called legal convictions, which is considered as a subjective or psychological factor.[148] In order to be considered international custom, that is general practices accepted as law which are legally

---

[144] *See* JENNINGS & WATTS, *supra* note 97, at 6-7. As for the general legal principle, there is a heated debate in the international law circle, focusing on the identification of general legal principles. In practice, this did not put the ICJ in trouble, because the ICJ rarely have the opportunity to apply the general legal principle. International treaties and customary law are generally sufficient to provide the necessary basis for a trial. In Jennings' opinion, the significance of recognition of the general legal principle as a source of international law is to make up for the legal deficiencies and vulnerabilities that international custom and treaty may have in their functioning, and to provide a context for the application of the custom and treaty and even to modify the application of the custom and treaty in their operation.

[145] *See* CRAWFORD, *supra* note 34, at 24-27; THIRLWAY, *supra* note 109, at 53-80. The formation of international custom is a long-term process that requires countries to repeat similar acts and form certain rules, and countries also need to gradually consider the rules to be legally binding. Such as the principle of non-interference was recognized as a basic principle of international law after more than 200 years.

[146] *Id.*

[147] Andre da Rocha Ferreira et al*, Formation and Evidence of Customary International Law*, 1 UFRGS MODEL U.N. J., 182, 182-201 (2013).

[148] Noora Arajärvi, *The Requisite Rigour in the Identification of Customary International Law: A Look at the Reports of the Special Rapporteur of the International Law Commission*, 19 INT'L COMM. L. REV. 9, 9-46 (2017).

binding for all countries, both material and psychological factors should be shown.[149]

i. Perspective of Necessity

If the concept of LTSOSA is to become an international custom, it should: 1) be applicable to the entire international community; and 2) remedy the limitations of the changes in the scope of subjects in international space treaties. If the concept of LTSOSA is effective as an international custom, this could not only avoid the complexities of identifying and applying the general principles of law,[150] but also have the possibility of positively modifying the existing space treaty regime.[151]

Moreover, the concept of LTSOSA as a customary international law would have a prioritized role in guiding the practices, measures, procedures, policies, principles and rules related to the space activities of all countries.[152] The priority here does not refer to prioritizing a specific issue of space activity, such as the issue of space debris, militarization of outer space or commercialization of outer space, nor does it involve the option of prioritizing between making technical rules or legal rules. Instead, priority refers to the requirements and obligations of implementing practices, measures, procedures, policies, principles and rules that could contribute to

---

[149] *Id.*

[150] *See* RAIMONDO, *supra* note 134, at 58-70; M. Cherif Bassiouni, *A Functional Approach to General Principles of International Law,* 11 MICH. J. INT'L L. 768 (1990). For the study on the application of the general principles of law, general principles of law are those principles that are widely ascertained in domestic legal systems. In the application process of the general principles of law, there may be the issue of transforming these domestic principles into international laws, and the analogy between the domestic applicable situation and that of the international law is a complicated task, if there is a similarity between them, there is a possibility that the domestic general principles may be applied as international binding rules.

[151] *See* Crootof, *supra* note 125, at 239. It is highlighted in Crootof's article of the possibility of modification by subsequently developed customary international law as an alternative means of treaty evolution.

[152] SECURE WORLD FOUND., *SPACE SUSTAINABILITY: A PRACTICAL GUIDE* (2014), https://swfound.org/media/121399/swf_space_sustainability-a_practical_guide_2014__1_.pdf.

the development of the concept of LTSOSA, whether at the level of international cooperation or through domestic management.[153]

In addition, the concept of LTSOSA would guide the future development of space law. The LTS Working Group documents have repeatedly emphasized that the LTSOSA guidelines are voluntary.[154] They lack legal binding effect under international law and in no way form amendments, qualifications or reinterpretation of the principles and norms of space law.[155] The 2019 LTSOSA Guidelines are not to be interpreted as bringing new legal obligations to all nations.[156] Nevertheless, if the LTSOSA guidelines are generally accepted and supported by member States and various organizations and become the best practice guidelines that are observed and promoted in practices with a wide scope of application, they may be considered to form a binding international custom.

Finally, the concept of LTSOSA will enhance and broaden international space cooperation. The importance of the LTSOSA is not only reflected in the field of space law but also in the entire field of space activities, such as space science and technology, space applications and operations, space cooperation and space traffic management.[157] There is a long-term need for sustainable development in each space activity field; judging from the working methods of

---

[153] Secure World Foundation, Statement under the Long-Term Sustainability of Space Activities Agenda Item, Scientific and Technical Subcommittee of the U.N. Comm. On the Peaceful Uses of Outer Space (Feb. 11, 2014), https://swfound.org/media/165792/swf%20statement%20on%20lts%20for%20stsc%20-%20feb%202014.pdf.

[154] Comm. On the Peaceful Uses of Outer Space, Terms of Reference & Methods of Work of the Working Grp. on the Long-term Sustainability of Outer Space Activities of the Sci. & Tech. Subcomm., Working Paper Submitted by the Chair of the Working Grp., ¶12(b) U.N. Doc. A/AC.105/L.277 (Jun. 8, 2010); Comm. On the Peaceful Uses of Outer Space, Proposal for a Draft Rep. & a Preliminary Set of Draft Guidelines of the Working Grp. on the Long-term Sustainability of Outer Space Activities, Working Paper by the Chair of the Working Grp., ¶ 9(b), U.N. Doc. A/AC.105/C.1/L.339 (Nov. 1, 2013) ("[b]e consistent with existing international legal frameworks for outer space activities, be voluntary and not be legally binding.").

[155] Comm. On the Peaceful Uses of Outer Space, Guidelines for the Long-term Sustainability of Outer Space Activities, Working Paper by the Chair of the Working Grp. on the Long-term Sustainability of Outer Space Activities, ¶ 14-15, U.N. Doc. A/AC.105/C.1/L.366 (July 17, 2018).

[156] *Id.*

[157] Comm. On the Peaceful Uses of Outer Space, Terms of Reference & Methods of Work of the Working Grp. on the Long-term Sustainability of Outer Space Activities of the Sci. & Tech. Subcomm., Working Paper Submitted by the Chair of the Working Grp., ¶ 13, U.N. Doc. A/AC.105/L.277 (June 8, 2010).

the LTS Working Group and the proposed LTS 2.0 working group whose main task is to implement the 2019 LTSOSA Guidelines and draft new guidelines,[158] the concept of LTSOSA has the potential to promote a relatively new international cooperation platform.[159] Both the scope of its agenda on the guideline issues and its working methods demonstrate that the LTS Working Group has set new standards on the breadth and depth of international cooperation.[160] Therefore, the concept of LTSOSA as an international custom would promote the development of international cooperation in the field of space activities and generate a large number of bilateral, regional and even international cooperation agreements.[161]

ii. Perspective of Feasibility

a. Objective factors

There are five main factors that are proposed by academia concerning the required elements to demonstrate general national practices: internationality, number of States, consistency, duration and repeatability.[162] The purpose of internationality is to prove the generality of practice which is difficult to define. It is not easy to discern whether national practices are applicable to international issues,[163] as things like regulation of domestic and foreign nationals

---

[158] U.N. GAOR, Rep. of the Comm. On the Peaceful Uses of Outer Space, 74th Sess., U.N. Doc. A/74/20, ¶ 165 (July 3, 2019). In 2019, at its 62nd session, the COPUOS decided to establish a new working group under the LTS agenda item of the Scientific and Technical Subcommittee.

[159] *See* Comm. On the Peaceful Uses of Outer Space, Guidelines for the Long-term Sustainability of Outer Space Activities, Note by the Secretariat, ¶ 26(4), U.N. Doc. A/AC.105/C.1/L.362/Rev.1 (Oct. 10, 2017). International cooperation is specifically emphasized in the draft LTSOSA Guideline 26(4), it states that the cooperation between government and non-governmental entities should be nurtured and stressed. These non-governmental entities include professional institutions, industry associations and academic institutions that are able to actively participate in the related professional research on the LTSOSA and promote the implementation of relevant LTSOSA measures and operations. Specific areas of cooperation include: the mitigation of space debris, the active removal of space debris, the coordinated use of space orbital and spectrum resources, the sharing of data and development of applications related to space activities.

[160] *Id.*

[161] Wang, *supra* note 13, at 30-33.

[162] Michael P. Scharf, *Accelerated Formation of Customary International Law*, 20 ILSA J. INT'L & COMPAR. 305 (2014).

[163] Andre da Rocha Ferreira *supra* note 147, at 182-201.

will include both national and international characteristics. Thus, it can be argued that internationality is not appropriate as a specific element for judging the generality of national practices.[164] Instead, we can accept the number of States as manifesting abstract expressions such as generality and universality.

As for the requirement of consistency, there are relatively few disagreements among international law scholars. Consistency requires that the practices of all countries are substantively general and common, though not necessarily entirely the same in form.[165] In terms of duration and repeatability, if the consistency and universality of national practices have been proven and verified, there are no specific requirements on the length of time and the frequency of such practices. The passage of time is a coherent and spontaneous component of duration and repeatability,[166] and long periods of practice are not necessary.[167] International custom related to air space and the continental shelf have been derived and rapidly matured in a short period.[168] Moreover, the practices of the ICJ do not emphasize time as a factor in this regard.[169]

Based on the mainstream viewpoints and national practices in outer space activities, it is considered in this article that the eligibility criteria for becoming a general national practice which forms an integral part of international custom should be composed of three factors: universality, consistency and repeatability. These three factors create organic integrity. It is possible that the LTSOSA can have universality, consistency and repeatability, and thus constitute a qualified general national practice, as discussed in the Part IV of this article.

---

[164] *Id.*

[165] CRAWFORD *supra* note 34, at 24-25.

[166] *Id.*

[167] *Id.*

[168] *See generally* North Sea Continental Shelf Cases (Germany v. Denmark), Judgment, 1969 I.C.J. Rep. 3 (Feb. 20). Bin Cheng, *From Air Law to Space Law*, *in* 13 CURRENT LEGAL PROBS. 228, 228-254 (1960). I.H. Ph Diederiks-verschoor, Pablo Mendes de Leon, AN INTRODUCTION TO AIR LAW, 1-20 (9th ed. 2012).

[169] *See* JAMES CRAWFORD, BROWNLIE'S PRINCIPLES OF PUBLIC INTERNATIONAL LAW 34-36 (7th ed., 2008). *See generally* Bin Cheng, *From Air Law to Space Law*, *in* 13 CURRENT LEGAL PROBS. 228, 228-254 (1960); Bin Cheng, *The Legal Status of Outer Space and Relevant Issues: Delimination of Outer Space and Definition of Peaceful Use*, 11 J. SPACE L., 89 (1983); BIN CHENG, STUDIES IN INTERNATIONAL SPACE LAW 125 (1997). In each case, scholars Bin Cheng and Brownlie put forward the concept of "Instant Customary International Law."

b. Subjective factors

Besides general national practices, *opinio juris et necessitates* (accepted as law) is a critical subjective element of customary international law.[170] Given the complexities of international relations and the large number of international and national acts that may lead to legal repercussions, as well as the numerous criteria for determining the subjective requirements of *opinio juris*,[171] the authors suggested that a broad interpretation of what is "accepted as law" should be adopted to avoid the endless and complicated need to prove this element.[172] That is to say, if *opinio juris* is extended and applied to various other standards related to both national and international law, and even the fundamental theories of jurisprudence, the many difficulties in determining legal concepts would be addressed.[173] Therefore, based on general criteria, there could be a diversity of situations that could be taken as proof of *opinio juris*, such as conforming to related domestic law and the emerging rules of international law.[174] Moreover, the *opinio juris* from the perspective of less developed countries is playing an increasing role in the formation of international custom.[175] As a result, there are more ways in which the LTSOSA could build legal recognition. Accordingly, this will increase the feasibility of facilitating the concept of LTSOSA as an international custom.

In summary, in considering the deteriorating environment of outer space, facilitating the development of the concept of LTSOSA into international custom has become an ideal option, which is both necessary and feasible. It is also an essential means of resolving the

---

[170] CRAWFORD, *supra* note 34, at 25.

[171] *See* Stefan Talmon, *Determining Customary International Law: The ICJ's Methodology between Induction, Deduction and Assertion*, 26 EUR. J. INT'L L. 417, (2015).

[172] CRAWFORD *supra* note 34, at 26. In the process of ascertaining an international custom, it usually requires a high standard of proof of *opinio juris*.

[173] Robert Kolb, *Selected Problems in the Theory of Customary International Law*, 50 NETH. INT'L L. REV. 119, 139 (2003).

[174] U.N. GAOR, Rep. of the Int'l L. Comm'n, 70th Sess., Ch. VI, A/70/10 (Aug. 24, 2015).

[175] *See* B. S. Chimni, *Customary International Law: A Third World Perspective*, 112 AM. SOC'Y INT'L L. 1, (2018). Chimni claims that a "postmodern" conception of customary international law that would contribute to the global common good. "A postmodern doctrine would redefine the epistemology and ontology of CIL formation in order to help work toward a just world order. Such a doctrine can only be given life through the sustained effort of those social forces that are dissatisfied with the current global order."

plight of the currently imminent but difficult to substantiate legal regulations for the environmental protection of outer space. However, it should be noted that this article does not consider that facilitating the LTSOSA into an international custom is the only means to address the lack of legal regulation for the environmental protection of outer space because it does not conflict with other ways and measures which would allow the LTSOSA to become a source of international law.[176] Among these ways and measures, international treaties can even serve as a cornerstone to bring the concept of LTSOSA closer to becoming an international custom. Therefore, all of these ways and measures can act as mutual references and complement each other.[177]

IV. FACILITATING CONCEPT OF LTSOSA INTO INTERNATIONAL CUSTOM: OBJECTIVE FACTORS

As discussed above, the essential objective elements for forming national practice are universality, consistency and repeatability, but to date, the understanding of the concept of LTSOSA are not extensive, consistent and repetitive due to its late emergence.[178] It is argued here that the paths for facilitating the code of conduct contained in the 2019 LTSOSA Guidelines into national practices can be broadly divided into two actions. One is to summarize existing relevant practices on the earth and in outer space so as to provide general guidelines for the formation of LTSOSA national practices. The second is to guide and promote the development of LTSOSA national practices in accordance with the specific contents of the 2019 LTSOSA Guidelines and State positions and statements on the issue of the LTSOSA in the UN platform.

---

[176] *See generally* Jörg Kammerhofer, *Uncertainty in the Formal Sources of International Law: Customary International Law and Some of Its Problems*, 15 EUR. J. INT'L L. 523, (2004).

[177] *Id.*

[178] *See* Comm. On the Peaceful Uses of Outer Space, Guidelines for the Long-term Sustainability of Outer Space Activities, *Conf. Room Paper by the Chair of the Working Grp. on the Long-term Sustainability of Outer Space Activities*, U.N. Doc. A/AC.105/2016/CRP.17 (June 16, 2016).

A. Practical Basis from Existing Practices

Due to the late emergence of the LTSOSA, relatively few practices specifically center around this concept.[179] In general, the practices of sustainable development on Earth could be applied as reference, and the provisions related to environmental protection and other space issues contained in the space treaties and resolutions could also provide the practical basis for the implementation of the 2019 LTSOSA Guidelines.

i. Learning from Practices of Sustainable Development

Although the principle of sustainable development on Earth cannot directly provide the legal basis for the LTSOSA, the 3rd United Nations Conference on the Exploration and Peaceful Uses of Outer Space that was held in 1999 adopted the "Space Millennium: Vienna Declaration on Space and Human Development."[180] This declaration recognizes the critical role that space activities play in supporting global sustainable development,[181] which presages the possibility that space activities will become an integral component of global sustainable development. In addition, from the perspective of environmental protection, the environment of the low Earth orbit and the geostationary orbit, currently affected by space debris, is arguably an incontrovertible part of the global

---

[179] *Id.*

[180] *See* Rep. Third U.N. Conf. on Expl. & Peaceful Uses of Outer Space, U.N. Doc. A/CONF.184/6 (Oct. 18, 1999). The Vienna Declaration was adopted by the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), at its 10th plenary meeting, on 30 July 1999. The preamble of this declaration states: "Noting the benefits and applications of space technologies in addressing the unprecedented challenges to sustainable development, and noting also the effectiveness of space instruments for dealing with the challenges posed by the pollution of the environment, depletion of natural resources, loss of biodiversity and the effects of natural and anthropogenic disasters,…"; Article 1(b) states: "Using space applications for human security, development and welfare: action should be taken: (vi) To assist States, especially developing countries, in applying the results of space research with a view to promoting the sustainable development of all peoples;"

[181] Rep. Third U.N. Conf. on Expl. & Peaceful Uses of Outer Space, U.N. Doc. A/CONF.184/6 (Oct. 18, 1999). The supporting of global sustainable development covers a variety of actions to "(1) Protect the global environment and manage natural resources; (2) Increase the use of space applications for human security, development and welfare; (3) Protect the space environment; (4) Increase developing countries' access to space science and its benefits."

environment.[182] Therefore, the relevant practices of global sustainable development could at least provide a practical basis for the concept of the LTSOSA in long-term sustainability development, which will be discussed from the viewpoint of the following three selected factors.

In the first place, judging from the initial "Proposal for a draft report and a preliminary set of draft guidelines of the Working Group on the Long-term Sustainability of Outer Space Activities" (LTSOSA Proposal), the objective of the LTS Working Group was to draft a set of guidelines which could be voluntarily applied and have no legally binding effects under international law.[183] The Guidelines were intended to complement existing policies, regulations and scientific, technical and management aspects of space activities.[184] In addition, the report of the LTS Working Group also pointed out that the goal steering the drafting of these Guidelines was to provide a robust set of common beliefs and principles for all countries and space activity participants to use and develop outer

---

[182] *See* Comm. On the Peaceful Uses of Outer Space, *Towards Long-term Sustainability of Space Activities: Overcoming the Challenges of Space Debris*, A Report of the International Interdisciplinary Congress on Space Debris, U.N. Doc. A/AC.105/C.1/2011/CRP.14 (Feb. 2, 2011).

[183] Comm. On the Peaceful Uses of Outer Space, Proposal for a Draft Rep. & a Preliminary Set of Draft Guidelines of the Working Grp. on the Long-term Sustainability of Outer Space Activities, Working Paper by the Chair of the Working Grp., ¶ 7, U.N. Doc. A/AC.105/C.1/L.339 (2013). "The purpose of the present working paper is to identify areas of concern for the long-term sustainability of outer space activities and provide guidance to States, international organisations, national and international non-governmental organisations and private sector entities by proposing measures that could enhance sustainability in all its aspects, including the safe and sustainable use of outer space for peaceful purposes, for the benefit of all countries." Comm. On the Peaceful Uses of Outer Space, Proposal for a Draft Rep. & a Preliminary Set of Draft Guidelines of the Working Grp. on the Long-term Sustainability of Outer Space Activities, Working Paper by the Chair of the Working Grp., ¶ 8 U.N. Doc. A/AC.105/C.1/L.339 (2013). "The proposed measures, compiled in a set of voluntary guidelines, provide a foundation for the development of national and international practices and safety frameworks for conducting outer space activities, while allowing for flexibility in adapting such frameworks to specific national circumstances and organisational structures. The guidelines address the policy, regulatory, scientific, technical and management aspects of space activities."

[184] Comm. On the Peaceful Uses of Outer Space, Proposal for a Draft Rep. & a Preliminary Set of Draft Guidelines of the Working Grp. on the Long-term Sustainability of Outer Space Activities, Working Paper by the Chair of the Working Grp., ¶ 8 U.N. Doc. A/AC.105/C.1/L.339 (2013).

space in a long-term and sustainable manner.[185] It can be inferred that the potential objective of the LTSOSA Guidelines is to make the LTSOSA into "soft law."[186] International environmental law also has the characteristic of "soft law,"[187] which is a positive indication for the future of the concept of LTSOSA. Some of the "soft law" principles can be implemented through various countries and then evolve into legally binding customary international law, thus developing into a legally binding force on States.[188]

The concept of global sustainable development which has also stemmed from "soft law" underwent a series of national practices, and then eventually became what many consider to be a legally binding basic principle.[189] Therefore, according to these precedents, the LTSOSA could also start as a "soft law" and gradually become legally binding international custom evidenced and supported by various practices.

Secondly, the 21 guidelines that have reached consensus in the 2019 LTSOSA Guidelines emphasize in many ways the needs and interests of developing countries, which can be viewed as a direct manifestation of the concept of intra-generational equity within global sustainable development.[190] According to the concept of intra-generational equity, in the course of promoting the LTSOSA as a universal concept of international law, all countries in the international community, irrespective of their level of economic and technological development, should have the opportunity to participate in outer space activities and enjoy the benefits reaped from

---

[185] *See* Comm. On the Peaceful Uses of Outer Space, Working Rep. of Expert Grp. D: Regulatory Regimes and Guidance for Actors in the Space Arena, ¶ 7 U.N. Doc. A/AC.105/C.1/2014/CRP.1 (Feb. 3, 2014).

[186] *See* Fabián Augusto Cárdenas Castañeda, *A Call for Rethinking the Sources of International Law: Soft Law and the Other Side of the Coin*, 13 ANUARIO MEXICANO DE DERECHO INTERNACIONAL 355, 376-78 (2013). ("Soft law" is a very remarkable phenomenon in the field of international environmental protection. It refers to an international document that is not legally binding in the strict sense but has some legal effect.).

[187] *See generally id.*

[188] *See generally* TIEYA WANG, INTERNATIONAL LAW 326-327 (1995).

[189] *See* HIKMAT NASSER, SOURCES AND NORMS OF INTERNATIONAL LAW: A STUDY ON SOFT LAW (2008).

[190] Comm. On the Peaceful Uses of Outer Space, Proposal for a Draft Rep. & a Preliminary Set of Draft Guidelines of the Working Grp. on the Long-term Sustainability of Outer Space Activities, Working Paper by the Chair of the Working Grp., ¶2, ¶18-19, Guideline A.4, Guideline B.2, Guideline B.8, Guideline C.3, Guideline D.1.U.N. Doc. A /AC.105/C.1/L.366 (Nov. 1, 2013).

outer space.[191] Thus, achieving intra-generational equity and contributing to the LTSOSA can be considered to be gradually becoming a binding international custom.[192]

In terms of the interests of developing countries, the Rio Declaration on Environment and Development (1992) (1992 Rio Declaration) further complements and improves on the principle of sustainable development.[193] Principle 6 of the 1992 Rio Declaration states that the environmental vulnerability of developing countries should be taken into account, and special attention should be given to the special needs of developing countries.[194] Furthermore, Principle 11 states that effective national environmental legislation is quite necessary and the environmental protection standards and management objectives of each country should be adapted to the actual conditions of their circumstances rather than imposing unrealistic national standards on developing countries.[195] Moreover, consideration of the special situation and needs of developing countries is also found in the international treaties and practices on the protection of the atmosphere and marine environment, management and conservation of resources and management of hazardous wastes in transboundary movements.[196] Since consideration for the exceptional circumstances and needs of developing countries is an

---

[191] G.F. Maggio, *Inter/Intra-Generational Equity: Current Applications under International Law for Promoting the Sustainable Development of Natural Resources*, 4 BUFF. ENV'T L. J. 161, 161-224 (1997).

[192] *See* Yun Zhao, *New Perspective and Emerging Approach on Sustainable Development in Outer Space from China's Practice in Space Cooperation*, 3 CHINESE REV. INT'L L. 60, (2017). Tha only some countries have the ability to participate in outer space activities is not ideal for the LTSOSA. The international community should strive to help the less-developed countries to enhance their ability to explore and use outer space and ensure that all countries, especially the vast majority of developing countries, can reap the benefits of outer space activities and outer space resources.

[193] Rep. of the U.N. Conference on Env't & Dev., Annex 1 U.N. Doc. A/CONF.151/26 (Vol. I) (June 3-14, 1992).

[194] *Id.* at Principle 6 ("The special situation and needs of developing countries, particularly the least developed and those most likely vulnerable, shall be given special priority.").

[195] *Id.* at Principle 11 ("States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards for use by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries.").

[196] *See generally* Thierry Ngosso, *The Right to Development of Developing Countries: An Argument against Environmental Protection?*, 5 PUB. REASON 2, 3 (2013).

integral part of the principle of sustainable development, this consideration should also be extended to the concept of LTSOSA. This will cement the commonality between the principles of global sustainable development and the concept of LTSOSA. Therefore, in terms of protecting the particular situation and needs of the developing countries, the principle of sustainable development on Earth will provide a corresponding practical basis for the LTSOSA.

Thirdly, the guidelines advocated in the concept of LTSOSA include various aspects, including policy and regulatory mechanisms, scientific and technical research and development and space traffic management.[197] Currently, there are several areas covered in the environmental protection of the Earth that mirror the factors mentioned in the 2019 LTSOSA Guidelines, including the polar regions and international seabed areas that have the characteristics of a public domain like outer space.[198] For example, the "Arctic Environmental Protection Strategy" adopted in 1991 included ten principles that fully reflected those of sustainable development and related policies.[199] In the same year, the Arctic Monitoring and Assessment Programme, which involves regulation, science and technology, was established.[200] The Arctic Council was established in 1996 to fulfill the Arctic Environmental Protection Strategy and address "common concerns across Arctic States—with a special

---

[197] Comm. On the Peaceful Uses of Outer Space, *Proposal for a Draft Rep. and a Preliminary Set of Draft Guidelines of the Working Grp. on the Long-term Sustainability of Outer Space Activities*, Working Paper by the Chair of the Working Grp., ¶ 8, U.N. Doc. A/AC.105/C.1/L.339, (Nov. 1, 2013).

[198] Timo Koivurova, *Environmental Protection in the Arctic and Antarctic: Can the Polar Regimes Learn From Each Other?*, 33 INT'L J. LEGAL INFO. 204, 218 (2005); INTERNATIONAL SEABED AUTHORITY, *Protection of the Seabed Environment*, INT'L SEABED AUTH. (ISA), https://www.isa.org.jm/files/documents/EN/Brochures/ENG4.pdf (last visited May 16, 2021).

[199] Declaration on the Protection of the Arctic Environment, art. 2 (June 1991), http://library.arcticportal.org/1542/. ("The Strategy is also designed to guide development in a way that will safeguard the Arctic environment for future generations and in a manner that is compatible with nature.") *See* Ron Huebert, *New Directions in Circumpolar Cooperation: Canada, the Arctic Environmental Protection Strategy, and the Arctic Council*, 5 CAN. FOREIGN POL'Y J. 37, (1998).

[200] *See* ARCTIC MONITORING & ASSESSMENT PROGRAMME (AMAP), https://arctic-council.org/explore/work/cooperation/ (last visited May 16, 2021); *Arctic Monitoring and Assessment Programme*, ARCTIC COUNCIL, https://arctic-council.org/index.php/en/about-us/working-groups/amap (last visited May 16, 2021). The Arctic Monitoring and Assessment Programme (AMAP) is responsible for the preparation of Arctic environmental pollution assessment report and the design of a test project.

emphasis on the protection of the Arctic environment and sustainable development."[201] Arguably, this structure demonstrates that the relevant policies and systems for the sustainable development of the public environment are inherently unified. Therefore, the State practices in respect of the environmental protection of the public domains of Earth can, in a sense, be regarded as the national practices of the LTSOSA guidelines in the space environment.

The three discussed factors are only some of the components of global sustainable development that can be used to argue for the similarities between sustainable development in outer space and on Earth. Outer space and Earth are mutually dependent and complete and complement each other.[202] Therefore it is reasonable to conduct an analogy between these two mutually dependent environments and draw regulatory and practical management experiences, expectations and obligations from each other.

ii. Relevant Practices in Treaties and Resolutions

Many international treaties and documents related to outer space activities touch on two important issues, namely space pollution and space debris.[203] The 1963 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, the first treaty to address the protection of the space environment,[204] requires State parties to prevent, prohibit and abstain from implementing nuclear explosions in any environment (the atmosphere, outer space, underwater) where such explosions cause radioactive debris outside the territorial limits of the State that carried out the

---

[201] ARCTIC MONITORING & ASSESSMENT PROGRAMME (AMAP), www.amap.no (last visited May 16, 2021). The Arctic Commission began monitoring and coordinating the Arctic Environmental Strategy in June 1997.

[202] Christopher Ingraham, *What Humanity's History in Space Tells Us About Our Future in the Stars*, WASHINGTON POST (Oct. 25, 2017), https://www.washingtonpost.com/news/wonk/wp/2017/10/25/what-humanitys-history-in-space-tells-us-about-our-future-in-the-stars/?utm_term=.5979d69ae278.

[203] Comm. On the Peaceful Uses of Outer Space, Proposal for a Draft Rep. and a Preliminary Set of Drafting Guidelines of the Working Grp. on the Long-term Sustainability of Outer Space Activities, Working Paper by the Chair of the Working Grp., ¶2, ¶9, ¶15 U.N. Doc. A/AC.105/C.1/L.339 (Nov. 1, 2013). Such examples include the OST, Rescue Agreement, Liability Convention, Registration Convention and Moon Treaty, UN Doc. A/AC.105/C.1/L.339. Para. 2, 9, 15, etc.

[204] Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water, Oct. 10, 1963, 14 U.S.T. 1313, 480 U.N.T.S 45.

explosion.[205] Article I of the OST also takes into consideration the interests of the entire international community, especially those of the developing countries.[206] Moreover, Article IX of the OST particularly focuses on the environmental protection of both Earth and outer space.[207] The Registration Convention has a mandatory registration system for objects launched into outer space, which has a close relationship with the tracking and management of space debris.[208] It can also be inferred from the Liability Convention that the launching State should also be held liable and compensate for damages to persons and property of other countries where its identifiable space debris has caused an injury.[209] As for the Rescue Agreement, Article 5 provides that the parties have the obligation to take remedial measures to eliminate any danger or damage that could be caused by hazardous space objects.[210] Article 7 of the Moon

---

[205] *Id.* at art. I.

> Each of the Parties to this Treaty undertakes to prohibit, to prevent, and not to carry out any nuclear weapon test explosion, or any other nuclear explosion, at any place under its jurisdiction or control: (a) in the atmosphere; beyond its limits, including outer space; or under water, including territorial waters or high seas; or (b) in any other environment if such explosion causes radioactive debris to be present outside the territorial limits of the State under whose jurisdiction or control such explosion is conducted. It is understood in this connection that the provisions of this subparagraph are without prejudice to the conclusion of a treaty resulting in the permanent banning of all nuclear test explosions, including all such explosions underground, the conclusion of which, as the Parties have stated in the Preamble to this Treaty, they seek to achieve.

Id. For further information, *see* Treaty Banning Nuclear Weapon Tests in The Atmosphere, in Outer Space and Under Water (Partial Test Ban Treaty-PTBT), NUCLEAR THREAT INITIATIVE, http://www.nti.org/learn/treaties-and-regimes/treaty-banning-nuclear-test-atmosphere-outer-space-and-under-water-partial-test-ban-treaty-ptbt (last visited Mar. 31, 2021).

[206] Outer Space Treaty, *supra* note 18, art. I.

[207] *Id.,* art. IX. *See* Mahualena Hofmann, *Role of COSPAR Guidelines in Interpreting Article IX OST*, 54 PROC. INT'L INST. SPACE L. 311, 316 (2011).

[208] Registration Convention, *supra* note 119, art. IX. *See* Gunnar Leinberg, *Orbital Space Debris*, 4 J. L. & TECH. 93, 94 (1989).

[209] Liability Convention, *supra* note 118, art. IX. *See* Kevin Heard, *Space Debris and Liability: An Overview*, 17 CUMB. L. REV. 167, 167-203 (1986).

[210] Rescue Agreement, *supra* note 117, art. 5. *See* Zeldine Niamh O'Brien, *Rescue Agreement and Private Space Carriers*, 51 PROC. INT'L INST. SPACE L. 126, 127 (2008).

Treaty also clearly stipulates that the current environment of the Moon should be protected from contamination.[211]

Besides these legally binding international treaties, non-binding UN documents including the Principles Relevant to the Use of Nuclear Power Sources in Outer Space (1992),[212] Space Debris Mitigation Guidelines of the Committee on the Peaceful Uses of Outer Space (2010)[213] and the Safety Framework for Nuclear Power Source Application in Outer Space (2009)[214] also provide a series of guiding principles for practices that protect the outer space environment. Moreover, in terms of the use of satellite orbital and spectrum resources, the Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting (1982) and the Principles Relating to Remote Sensing of the Earth from Outer Space (1986) also provide relevant principles for outer space activities.[215] These principles are UN resolutions and not binding international law; in other words, the outer space activities of a country that are contrary to these principles would not lead to any liability actions and compensation, but from a long-term perspective, they have a positive role in promoting voluntary space practices, operating procedures and technical standards to become universal customary practices for the international community gradually.[216]

It is worth noting that the intra-generational equity and inter-generational equity found in the principles of global sustainable development are not directly mentioned in the above practices in space-related treaties and UN documents. Most of the treaties and documents related to the protection of the space environment are based on considerations such as national strategies, national security, the safety of space activities, efficiency of the utilization of

---

[211] Moon Agreement, *supra* note 120, art. 7. *See* James R. Wilson, *Regulation of the Outer Space Environment Through International Accord: The 1979 Moon Treaty*, 2 FORDHAM ENV'T L. REV. 173, 173-184 (2011).

[212] G.A. Res. 47/68 (Dec. 14, 1992).

[213] U.N. GAOR 62nd Sess., Supp. No. 20, Annex, U.N. Doc. A/62/20.

[214] Comm. On the Peaceful Uses of Outer Space, Safety Framework for Nuclear Power Source Applications in Outer Space, U.N. Doc. A/AC.105/934 (May 19, 2009). Endorsed by the UN COPUOS at its fifty-second session.

[215] G.A. Res. 37/92 (Dec. 10, 1982); G.A. Res. 41/65 (Dec. 3, 1986).

[216] *See generally* Marko Divac Öberg, *The Legal Effects of Resolutions of the UN Security Council and General Assembly in the Jurisprudence of the ICJ*, 16 EUR. J. INT'L L. 879, (2006).

resources and protection of the interests of victims of space activities.[217] Although national practices conducted under the framework of the treaties and guidelines do not explicitly mention the facilitation of the LTSOSA, they have demonstrated consistency with the essence of global sustainable development, which provides a valuable practical basis for the concept of LTSOSA to become international custom.

B. Future Directions of LTSOSA: UN Documents and National Stance

Practice and cognition are a dialectical unity; cognition not only comes from practice but can also guide practice.[218] The concept of LTSOSA as customary international law needs to be confirmed and interpreted by various international and national documents before the establishment of its legally binding effect.[219] This section focuses on explaining the expectations and arrangements of the international community for future national practices of the LTSOSA guidelines from the UN LTSOSA documents and national position papers which could be considered as the cognitive resources of the international community. These UN documents and State position papers are not legally binding in form, but as they are highly reputed internationally and the UN platform is influential, the UN documents that are endorsed by different countries and their voluntary representation in international occasions could serve as guidance for national practices in implementing the concepts of the LTSOSA.[220]

Nevertheless, members of the international community have developed, within a short period of time, new procedures to support the implementation of collective action.[221] International organizations are still viewed as only providing different venues for the

---

[217] *See* Paul G. Dembling, *The Evolution of the Outer Space Treaty*, 33 J. Air L. & Com. 419, (1967). To see the drafting background of the Outer Space Treaty.

[218] Alexander Spirkin, *Cognition and Practice*, DIALECTICAL MATERIALISM, https://www.marxists.org/reference/archive/spirkin/works/dialectical-materialism/ch04-s02.html (last visited Mar. 31, 2021).

[219] Panos Merkouris, *Interpreting the Customary Rules on Interpretation*, 19 INT'L CMNTY. L. REV. 126, 126-155 (2017).

[220] Marko Divac Öberg *supra* note 216, at 879-906.

[221] OPPENHEIM'S INTERNATIONAL LAW: UNITED NATIONS, PART 2 (Rosalyn Higgins et al. eds., 2017).

production of legal rules and their legal validity is derived from traditional sources of international law.[222] Nevertheless, Jennings and Watts noted that, at some point in the future, collective action taken by the international community within the framework provided by international organizations means that there is the possibility of obtaining an independent natural source of law.[223] In the short term, these international consensuses should be observed in outer space activities from the perspective of international morality; in the long term, these guidelines and national statements within the UN have the potential to become an integral part of the sources of space law.[224]

i. Report of LTS Working Group and 2019 LTSOSA Guidelines

The LTSOSA Proposal initiated by the LTS Working Group in 2013 is an important start to the official drafting process of the 2019 LTSOSA Guidelines.[225] The LTSOSA Proposal includes the origins of the LTSOSA, preliminary recommended guidelines for outer space activities, common practices undertaken by spacefaring countries and themes for future consideration.[226] The preliminary LTSOSA guidelines contained in the 2013 LTSOSA Proposal provided a solid foundation for future discussion and updates on the UN COPUOS platform.[227] Three years later in 2016, the first set of LTSOSA guidelines was proposed in the UN COPUOS annual

---

[222] *Id.*

[223] *See* Zhang, *supra* note 97, at 76-80; JENNINGS & WATTS, *supra* note 97.

[224] Zhang, *supra* note 97, at 76. In the long run, the theory of the source of international law will definitely make a breakthrough along with the development of international organisations, in other words, the status of the resolutions and documents produced in these organisations will also have a new status.

[225] Comm. On the Peaceful Uses of Outer Space, *Proposal for a Draft Rep. and a Preliminary Set of Draft Guidelines of the Working Grp. on the Long-Term Sustainability of Outer Space Activities*, Working Paper by the Chair of the Working Grp., UN Doc. A/AC.105/C.1/L.339 (Nov. 1, 2013).

[226] *Id.*

[227] Comm. On the Peaceful Uses of Outer Space, Updated Set of Draft Guidelines for the Long-term Sustainability of Outer Space Activities, Note by the Secretariat, U.N. Doc. A/AC.105/C.1/L.340 (Oct. 22, 2014) (The preliminary edition was revised in 2014 and 2015). Comm. On the Peaceful Uses of Outer Space, Near- Earth Objects, Interim Report of the Action Team on Near-Earth Objects, U.N. Doc. A/AC.105/L.298, (Dec. 10, 2015). For the latest version of the LTSOSA guidelines, *see* Comm. On the Peaceful Uses of Outer Space, *Guidelines for the Long-term Sustainability of Outer Space Activities*, Note by the Secretariat, ¶26, UN Doc. A/AC.105/C.1/L.362/Rev.1 (Oct. 10, 2017).

report in its 59th session,[228] which could be considered as an achievement of the LTS Working Group. However, as the remaining preamble texts and guidelines which had not received consensus by the member States involved some complex issues of outer space activities,[229] the work schedule of the LTS Working Group was inevitably affected and postponed for two years.[230] The report of the 60th Session of the UN COPUOS in 2017 mentioned that the substantial workload of the LTS Working Group resulted in very limited remaining working time under the postponed work plan.[231] The LTS Working Group had to look for opportunities at informal occasions to report on the draft LTSOSA guidelines for multilateral consultation, which provided the opportunity for more delegates to fully understand and respond to the drafted guidelines.[232]

Adopted in 2019,[233] the Guidelines apply to all space activities, whether planned or ongoing, including all phases of mission life cycles, including launches, operations and end-of-life disposal.[234] The Guidelines are decidedly comprehensive. The vast amount of space operation knowledge and procedural standards described are based on the experience of States, international organizations, national

---

[228] U.N. GAOR, 71st Sess., Supp. 20, Annex, U.N. Doc. A/71/20 (June 8-17, 2016).

[229] Comm. On the Peaceful Uses of Outer Space, Guidelines for the Long-term Sustainability of Outer Space Activities, Note by the Secretariat, ¶26, UN Doc. A/AC.105/C.1/L.362/Rev.1 (Oct. 10, 2017). The preamble texts and guidelines waiting to be discussed include: developments and changes of the LTSOSA guidelines (background, definitions, goals, scope, status, implementation and review); registration of space objects (Guideline 6); commitments to conduct outer space activities for peaceful purposes only (Guideline 7); space security operations (Guidelines 8, 9, 10, 11, 14, 15. etc.), including procedures and standards for active removal and systematic destruction of space objects, operational standards of design and implementation of small space objects, observance of precautions when using laser beam light in outer space, etc.); international space cooperation, capacity-building and awareness (Guidelines 23, 24), which also includes procedures relating to the exchange of information on space activities.

[230] *Id.*

[231] U.N. GAOR, 71st Sess., Supp. 20, ¶137 U.N. Doc. A/71/20 (June 8-17, 2016).

[232] Comm. on the Peaceful Uses of Outer Space, Rep. of the legal Subcomm. on its Sixtieth Session, U.N. Doc. A/72/20, (2016), at para.153.

[233] Comm. on the Peaceful Uses of Outer Space, Report of the Committee on the Peaceful Uses of Outer Space, U.N. Doc. A/74/20, ¶ 163 (2019).

[234] Comm. on the Peaceful Uses of Outer Space, Report of the Committee on the Peaceful Uses of Outer Space, U.N. Doc. A/74/20, Annex II ¶ 11 (2019).

and international non-governmental organizations and private entities.[235]

As such, the 2019 LTSOSA Guidelines provide policy and regulatory guidance to government and non-governmental entities on most aspects of outer space activities. Specifically, the Guidelines:

- encourage the establishment of national regulatory frameworks that support the long-term sustainability of outer space activities;[236]

- provide project safety operation guidance for the space activities of various entities;[237]

- encourage the promotion of technical cooperation and capacity-building;[238]

- give special consideration to developing countries;[239] and

- provide professional scientific and technical guidance to governments, international organizations and private entities that carry out space activities.[240]

---

[235] Comm. on the Peaceful Uses of Outer Space, Report of the Committee on the Peaceful Uses of Outer Space, U.N. Doc. A/74/20, Annex II ¶17 (2019).

[236] Comm. on the Peaceful Uses of Outer Space, Guidelines for the Long-term Sustainability of Outer Space Activities, U.N. Doc. A/AC.105/C.1/L.366, (2019). Guideline A.1 ("When adopting, revising, amending or implementing national regulatory frameworks, States should consider the need to ensure and enhance the long-term sustainability of outer space activities.")

[237] *Id.* at Guideline B.1. ("Provide updated contact information and share information on space objects and orbital events"); B.2 ("Improve accuracy of orbital data on space objects and enhance the practice and utility of sharing orbital information on space objects"); B.3 ("Promote the collection, sharing and dissemination of space debris monitoring information.").

[238] *Id.* at Guidelines C.1 and C.3.

[239] Comm. on the Peaceful Uses of Outer Space, Guidelines for the Long-term Sustainability of Outer Space Activities, U.N. Doc. A/AC.105/C.1/L.366, (2019) Guideline C.1 ("Promote and facilitate international cooperation in support of the long-term sustainability of outer space activities"); C.2 ("Share experience related to the long-term sustainability of outer space activities and develop new procedures, as appropriate, for information exchange"); C.3("Promote and support capacity-building"); C.4 ("Raise awareness of space activities.").

[240] *Id.* at Guideline D.1 ("Promote and support research into and the development of ways to support sustainable exploration and use of outer space"); D.2 ("Investigate and consider new measures to manage the space debris population in the long term.").

The 2019 LTSOSA Guidelines are the fruit of eight years of discussion among many countries, international organizations and private entities. By tying in past, present and future developments of outer space activities, the LTS Working Group gradually developed a set of comprehensive guidelines that could be acceptable to all member countries of the UN COPUOS. Therefore, it can be inferred that the extensiveness of the LTSOSA Guidelines and the diversity of the discussion participants could facilitate the subsequent implementation of these guidelines in respect of all future space activities. The 2019 LTSOSA Guidelines will be able to guide countries in their national practices in a balanced and meaningful way.[241] In the face of an ever-changing space environment, the role of the LTSOSA as a non-binding "soft law" is becoming more prominent in this new space era and is likely to become the practical basis for facilitating the concept of LTSOSA into an international custom as the current legal frameworks of space treaties are unlikely to undergo major changes in the short term.[242] The LTSOSA may even have the potential to lead future enhancements and revisions of the OST space law regime.[243]

ii. National Stance

The stance which is taken by nations on international occasions often represents the guidelines and policies of States in handling and managing their international affairs and domestic activities.[244] The UN is the most authoritative and representative platform for all of its member countries to voice their national stance.[245] Since the initiation of the drafting process of the 2019 LTSOSA Guidelines, the international community has actively participated in the discussion of responsible space exploration. These

---

[241] *See generally* Laura Delgado López et al., *The Importance of the United Nations Guidelines for the Long-Term Sustainability of Space Activities and Other International Initiatives to Promote Space Sustainability*, 20 OASIS, 37, (2014).

[242] *Id.*

[243] *Id.*

[244] Christopher D. Johnson & Victoria Samson, *A summer update on the COPUOS long-term sustainability guidelines,* THE SPACE REVIEW, (July 24, 2017), http://www.thespacereview.com/article/3291/1.

[245] U.N. Sec. Council, *Cooperation between United Nations, Regional, Subregional Organisations 'Mainstay' of International Relations, Security Council Hears throughout Day-long Debate*, (Aug. 6, 2013), https://www.un.org/press/en/2013/sc11087.doc.htm.

discussions include traditional spacefaring nations such as the United States (US), the United Kingdom (UK), Russia, China and some European countries, as well as developing countries that have just started to build a presence in the aerospace industry, including Latin American countries, such as Brazil.[246] This section will provide an introduction and analysis of the national stance of some of these nations so as to predict the general direction of the future development of the concept of LTSOSA as custom.

a. Views of US and UK on LTSOSA Guidelines

The US and the UK expressed positive support for the establishment of the LTS Working Group by the UN COPUOS and the 2019 LTSOSA Guidelines.[247] The US acknowledged the clarity, practicality and credibility of the findings of the four expert groups that were established under the LTS Working Group. After the adoption of the 2019 LTSOSA Guidelines, the US and the UK also indicated that a new working group should be set up to guarantee the implementation of these agreed Guidelines.[248] The US stated that the compendium of the preamble and 21 guidelines can promote increased communication, coordination and capacity-building.[249] The US also indicated that the Guidelines can enhance practical international cooperation and advance cooperative frameworks that promote responsible uses and exploration of outer space.[250] The UK also demonstrated a strong belief that member States should now focus their efforts on not just implementing the

---

[246] *See generally* U.N. OFF. FOR OUTER SPACE AFFS., Annual Rep. 2016, ST/SPACE/70.

[247] Comm. on the Peaceful Uses of Outer Space, Views of the United States on Draft Guidelines for the Long-Term Sustainability of Outer Space Activities, U.N. Doc. A/AC.105/2015/CRP.18, at ¶1; Comm. on the Peaceful Uses of Outer Space, Voluntary Implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities and Proposed Reporting Approach by the United Kingdom, U.N. Doc. A/AC.105/C.1/2020/CRP.15 (2020).

[248] *See* Comm. on the Peaceful Uses of Outer Space, Conference Room Paper by Canada, France, Japan, the United Kingdom and the United States on its Sixty-Second Session, U.N. Doc. A/AC.105/2019/CRP.7/Rev.1 (2019).

[249] *Id.* ¶4.

[250] *Id.*

Guidelines, but sharing the approaches, practices and lessons learned in doing so.[251]

b. Working Paper Submitted by the Russian Federation

Russia called the development of the LTSOSA Guidelines a major, comprehensive and systematic project that involved extensive national and international planning and cooperation.[252] A working paper submitted by Russia in 2014 proposed that the essence of the LTSOSA could be enriched through collective international efforts to systematically examine the complex issues at stake.[253] Another working paper submitted by Russia in 2015 further elaborated its continued support for the development of the LTSOSA guidelines.[254] Here, Russia stated that in considering the dynamic nature of space activities and global sustainable development, the scope of the management of space activities covered by the LTSOSA guidelines should be as broad as possible; otherwise, it would detract from its overall effectiveness when implemented.[255] In order to promote the long-term development of the LTSOSA, Russia recommended that all countries and international nongovernmental organizations positively demonstrate their commitment to the new LTSOSA values and consider international moral considerations as an integral part of their national regulatory framework for space activities—especially for the emerging unregulated issues in outer space, which should be regularly monitored.[256]

---

[251] Comm. on the Peaceful Uses of Outer Space, Conference Room Paper by the Secretariat of the Comm. on the Peaceful Uses of Outer Space, Voluntary Implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities and Proposed Reporting Approach by the United Kingdom, U.N. Doc. A/AC.105/C.1/2020/CRP.15 (2020), at ¶4. Comm. on the Peaceful Uses of Outer Space Sci. and Tech. Subcomm. Fifty-eighth session, United Kingdom: Update on our reporting approach for the voluntary implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities, U.N. Doc. A/AC.105/C.1/2021/CRP.16 (2021), at ¶1-5.

[252] Comm. on the Peaceful Uses of Outer Space, Working Paper Submitted by the Russian Federation to Sci. and Tech. Subcomm., at its Fifty-First Session, U.N. Doc. A/AC.105/C.1/L.338, (2014), ¶5.

[253] *Id.* ¶6.

[254] Comm. On the Peaceful Uses of Outer Space, Working Paper Submitted by the Russian Federation to Sci. and Tech. Subcomm., at its Fifty-First Session, U.N. Doc. A/AC.105/L.296, (2015).

[255] Comm. on the Peaceful Uses of Outer Space, Working paper submitted by the Russian Federation, U.N. Doc. A/AC.105/L.296, (2015), at ¶1.

[256] *Id.*

Further demonstrating their support for the Guidelines, Russia advocated that these non-binding LTSOSA Guidelines should be further validated in a timely manner politically, legally and materially, and through information technology and other types of support to ensure that the Guidelines can be implemented in every aspect of space activity.[257]

c. China's Position on LTSOSA

China is an active advocate of the concept of LTSOSA within the UN and considers the LTSOSA as a suitable means of promoting mutual trust and cooperation among countries in the process of outer space governance.[258] Cooperating countries can promote the LTSOSA by jointly seeking to formulate relevant measures of transparency and confidence in outer space activities following their national situations.[259] China recognizes that: there are a series of current emerging issues in outer space, such as increased congestion in orbit, the proliferation of space debris, weaponization of outer space and the increasing risk of military confrontations in outer space;[260] and no country can face or deal with these issues on its own.[261] Against this context, China believes that the LTSOSA agenda is an effective way and means of implementing space governance, as it reflects the common interests and common aspirations of all States.[262] China also believes that the international community has sufficient motivation to establish a common vision and take joint actions.[263] China indicated that its space legislation has been incorporated into its national legislative.[264] As a response

---

[257] *Id.*

[258] Comm. on the Peaceful Uses of Outer Space, Working Paper by China Submitted to the Sci. and Tech. Subcomm. at its Fifty-Third Session, U.N. Doc. A/AC.105/C.1/2016/CRP.13, (2016), at ¶3.

[259] *Id.*

[260] *Id.* ¶6.

[261] *Id.*

[262] *Id.*

[263] Comm. on the Peaceful Uses of Outer Space, Working Paper by China Submitted to the Sci. and Tech. Subcomm. at its Fifty-Third Session, U.N. Doc. A/AC.105/C.1/2016/CRP.13, (2016).

[264] Comm. on the Peaceful Uses of Outer Space, China's Position Paper on the Issue of Long-term Sustainability of Outer Space Activities, UN Doc. A/AC.105/C.1/2016/CRP.13, ¶11; Comm. on the Peaceful Uses of Outer Space, Rep. of the Comm. on its Fifty-Fourth Session, UN Doc. A/66/20, Annex 2, ¶16.

to the 2019 LTSOSA Guidelines, China has submitted a proposal on the newly established Working Group (LTSWG 2.0), the LTSWG 2.0 will base its work on previous efforts and examine the concept of LTSOSA in the wider context of global sustainable development, including the contribution to the achievement of the Sustainable Development Goals (SDGs).[265]

d. BRICS, GRULAC and Europe

In 2015, a delegation of the BRICS countries (Brazil, Russia, India, China and South Africa) issued a joint statement on the LTSOSA guidelines.[266] The statement indicates the sentiment that the LTSOSA agenda of the Science and Technical Subcommittee (STSC) of the UN COPUOS provides a unique opportunity for all countries to collaborate in developing effective outer space governance measures, finding the common interests of all countries and thus ensuring the safety of outer space operations.[267] The BRICS countries averred that a complete set of LTSOSA guidelines would help to promote the interests of all countries and the international community as a whole.[268] At the same time, they indicated their belief that the guidelines should be institutionalized and properly linked with the transparency and confidence-building measures.[269] The statement finally suggested that all member States should continue to constructively cooperate under the existing review and consultative framework of the UN COPUOS, and further promote the unification of the LTSOSA guidelines based on the principle of absolute consensus.[270]

The Group of Latin America and Caribbean Countries (GRULAC) also made their own observations and revisions for the

---

[265] Comm. on the Peaceful Uses of Outer Space, Proposal submitted by the Delegation of the People's Republic of China on Terms of References, Methods of Work and Workplan of the Newly Established Working Group on the Long-term Sustainability of Outer Space Activities (LTSWG 2.0) U.N. Doc. A/AC.105/C.1/2020/CRP.9 (2020), ¶6-7.

[266] Comm. on the Peaceful Uses of Outer Space, Joint Statement of the delegation of BRICS States at the 58th session of the UN Committee on the Peaceful Uses of Outer Space on Issues Pertaining to the Elaboration of the Guidelines on Long-Term Sustainability of Outer Space Activities, U.N. Doc. A/AC.105/2015/CRP.20 (2015).

[267] *Id.*

[268] *Id.*

[269] *Id.*

[270] *Id.*

revised LTSOSA guidelines in 2015.[271] These countries agreed that important progress had been made in the negotiation and drafting of the LTSOSA guidelines.[272] Specifically, they confirmed that the LTSOSA guidelines are crucial to establishing a legally binding international framework of codes of conduct for activities in outer space.[273]

Some European countries, including France,[274] Germany[275] and the Netherlands,[276] have submitted their own opinions and suggestions for the LTSOSA guidelines. They have also expressed support for the development of the LTSOSA guidelines and hold the same position on some of the principal issues proposed by the US, Russia and China.

e. National Research on Space Debris and Nuclear Power Sources

The agenda item of "National research on space debris, safety of space objects with nuclear power sources on board and problems relating to their collision with space debris" at the annual STSC meetings held by the UN COPUOS receives different responses

---

[271] Comm. on the Peaceful Uses of Outer Space, Comments and Proposed Amendments to the Updated set of Draft Guidelines for the Long-Term Sustainability of Outer Space Activities (document A/AC.105/C.1/L.340), U.N. Doc. A/AC.105/C.1/2015/CRP.19/Rev.1, (2015); Comm. on the Peaceful Uses of Outer Space, Updated set of Draft Guidelines for the Long-Term Sustainability of Outer Space Activities U.N. Doc. A/AC.105/C.1/L.340, (2015).

[272] Comm. on the Peaceful Uses of Outer Space, Comments and Proposed Amendments to the Updated set of Draft Guidelines for the Long-Term Sustainability of Outer Space Activities (document A/AC.105/C.1/L.340), U.N. Doc. A/AC.105/C.1/2015/CRP.19/Rev.1, (2015), p.1. Background and comments.

[273] *Id.*

[274] Comm. on the Peaceful Uses of Outer Space, Comments and Proposed Amendments to the Updated set of Draft Guidelines for the Long-Term Sustainability of Outer Space Activities (U.N. Doc. A/AC.105/C.1/L.340), U.N. Doc. A/AC.105/C.1/2015/CRP.28, (2015).

[275] Comm. on the Peaceful Uses of Outer Space, Comments on and Proposed Amendments to the Updated set of Draft Guidelines for the Long-Term Sustainability of Outer Space Activities (U.N. Doc. A/AC.105/C.1/L.340), U.N. Doc. A/AC.105/C.1/2015/CRP.11, (2015).

[276] Comm. on the Peaceful Uses of Outer Space, Rep. of the Sci. and Tech. Subcomm. on its Fifty-Seventh Session, U.N. Doc. A/AC.105/2014/CRP.22, (2014).

from the member States every year.[277] As the issues of space debris, nuclear power sources and the collision of space debris are all related with the concept of LTSOSA, the responses of the different countries and organizations are also valuable references for assessing and predicting the national practices undertaken by different States in protecting the outer space environment. We offer the 2014 COPUOS Conference Paper as an example.[278] The document received contributions from five member States (Canada, Mexico, Switzerland, Thailand and the UK) and three non-governmental organizations that have permanent observer status (the Committee on Space Research (COSPAR), the World Security Foundation (WSF) and the Space Generation Advisory Council (SGAC)).[279] These countries and organizations provided their effective national and organizational space practices and research achievements in mitigating and reducing space debris and other space

---

[277] Some of the recent reports published pursuant to the Agenda item "National research on space debris, safety of space objects with nuclear power sources on board and problems relating to their collision with space debris" published by the UN COPUOS include: Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris, U.N. Doc. A/AC.105/951, (2010); Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris, U.N. Doc. A/AC.105/C.1/2012/CRP.11, (2012); Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris. U.N. Doc. A/AC.105/C.1/107, (2013); Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris, U.N. Doc. A/AC.105/C.1/2014/CRP.6, (2014); Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris, U.N. Doc. A/AC.105/C.1/2015/CRP.7, (2015); Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris, U.N. Doc. A/AC.105/C.1/110, (2016); Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris, UN Doc. A/AC.105/C.1/111, (2017); Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris, UN Doc. A/AC.105/C.1/113, (2018).

[278] Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris, U.N. Doc. A/AC.105/C.1/108, (2014).

[279] *Id.*

environmental protection issues.[280] The submissions of the member States and international organizations to this document are conducive for monitoring and supervising the implementation of the guidelines of the LTSOSA.[281] The contents of this document, which include relevant practices of the different member countries, allow experience exchange and information sharing, which not only contributes to continuous improvement and enhancement of the space capability of each member country but also provides guidance and reference to the specific practice of other countries.[282] The authors argue that since the practices of international customs are derived from those of States, international organizations and international judicial bodies,[283] the practices and research results of the protection of the outer space environment submitted by the States and international organizations under this UN agenda item can sustain the identification of common national practices for the LTSOSA.

The different submissions by the countries mentioned above are evidence that the international community places a high priority and actively participates in the drafting and negotiating process of the LTSOSA guidelines. In the drafting process, some countries hope that the LTSOSA guidelines would be adopted by the COPUOS as soon as possible,[284] while others claim that national

---

[280] *Id.*

[281] Each year, the UN COPUOS receives submissions from states and organisations, *see* Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris, UN Doc. A/AC.105/C.1/2018/CRP.10, (2018); Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris, U.N. Doc. A/AC.105/C.1/2017/CRP.12, (2017); Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris, U.N. Doc. A/AC.105/C.1/2016/CRP.8, (2016); Comm. on the Peaceful Uses of Outer Space, National Research on Space Debris, Safety of Space Objects with Nuclear Power Sources on Board and Problems Relating to Their Collision with Space Debris, U.N. Doc. A/AC.105/C.1/2015/CRP.8, (2015)..

[282] *See generally infra* note 270.

[283] Andre da Rocha Ferreira, *Formation and Evidence of Customary International Law*, 1 UFRGS MODEL UNITED NATIONS J. 182, 187-190 (2013).

[284] Comm. on the Peaceful Uses of Outer Space, Comments on and Proposed Amendments to the Updated Set of Draft Guidelines for the Long-Term Sustainability of Outer Space Activities (A/AC.105/C.1/L.340), U.N. Doc. A/AC.105/C.1/2015/CRP.11, (2015); Comm. on the Peaceful Uses of Outer Space, Long-Term Sustainability of Outer Space

legislations should actively implement specific procedures and standards of the 2019 LTSOSA Guidelines.[285] Still, others hope that the Guidelines will not limit the space activities of emerging space actors.[286] Finally, some believe that the overall security interests of the international community should have precedence over the national interests of individual countries and that the interests of developing countries also deserve special attention.[287]

On the whole, different countries emphasize different issues in their national stance, as they have different interests.[288] However, as demonstrated by the active discussion of LTSOSA in the COPUOS, over the past ten years, most countries have shown a positive attitude toward open cooperation on the LTSOSA issues. Increasingly more countries are gaining a profound awareness that the sustainable development of outer space will directly affect the common destiny of all humankind,[289] and some have begun to emphasize on environmental protection and peaceful development in

---

Activities: Proposal to Adopt and Refer to the General Assembly for Endorsement the Compendium of Guidelines for the Long-Term Sustainability of Outer Space Activities, U.N. Doc. A/AC.105/2018/CRP.26/Rev.2 (June, 20-29 2018).

[285] Comm on the Peaceful Uses of Outer Space, Additional Considerations and Proposals for Building up Understanding of the Priority Aspects, Comprehensive Meaning and Functions of the Concept and Practices of Ensuring the Long-Term Sustainability of Outer Space Activities, U.N. Doc. A/AC.105/L.296, (2015); Comm. on the Peaceful Uses of Outer Space, Voluntary Implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities and Proposed Reporting Approach by the United Kingdom, U.N. Doc. A/AC.105/C.1/2020/CRP.15, (2020); Comm. on the Peaceful Uses of Outer Space, Proposal by Canada, Japan and the United States of America for the Establishment of a Working Grp. Under the Agenda item on the Long-Term Sustainability of Outer Space Activities of the Sci. and Tech. Subcomm., U.N. Doc. A/AC.105/C.1/2020/CRP.5, (2020).

[286] Comm. on the Peaceful Uses of Outer Space, Views of the United States on Draft Guidelines for the Long-term Sustainability of Outer Space Activities, U.N. Doc. A/AC.105/2015/CRP.18, (2015).

[287] Comm. on the Peaceful Uses of Outer Space, Comments and Proposed Amendments to the Updated set of Draft Guidelines for the Long-Term Sustainability of Outer Space Activities (document A/AC.1-05/C.1/L.340), U.N. Doc. A/AC.105/C.1/2015/CRP.19/Rev.1, (2015).

[288] *See* Dimitri Linden, *The Impact of National Space Legislation on Private Space Undertakings: Regulatory Competition vs. Harmonization*, (Leuven Centre for Global Governance Studies, Working Paper No. 190, Sept. 2017).

[289] U.N. G.A., Rep. of the Third United Nations Conference on the Expl. and Peaceful uses of Outer Space (Vienna, 19-30 July 1999), U.N. Doc. A/Conf.184/6 (Oct. 18, 1999).

outer space.[290] Since there are different paths and standards used to achieve these common goals, there are still many areas where States need to bear the spirit of international cooperation in mind to carry out the coordination activities and make concessions. It could be seen from these national position documents that the international community as a whole expects to gradually form a set of unified and standardized rules supporting sustainable State practices in outer space, which provides solid grounds that would facilitate the concept of LTSOSA into an international custom.

V. FACILITATING CONCEPT OF LTSOSA INTO INTERNATIONAL CUSTOM: SUBJECTIVE FACTORS

As discussed above, the subjective factor of *opinio juris sive necessitatis* (opinion of law or necessity) or simply *opinio juris* is also an indispensable element of an international custom.[291] Each member of the international community must subjectively perceive that a particular general practice is accepted as law and legally binding. In light of the broad criteria of *opinio juris*, the discussion of the subjective factors that facilitate the concept of LTSOSA into an international custom can be evaluated from the perspectives of national space law and the forming of the rules of international law.

A. National Space Law

In light of the deteriorating outer space environment and the gradual maturity of the exploitation activities of outer space resources, many countries are now quickening the pace of their respective space legislation process.[292] These countries have included

---

[290] Comm. on the Peaceful Uses of Outer Space Sci. and Tech. Subcomm., United Kingdom: Update on our reporting approach for the voluntary implementation of the Guidelines for the Long-term Sustainability of Outer Space Activities, Annex 2 D1, UN Doc. A/AC.105/C.1/2021/CRP.16, (2021) ("It is important to consider and support the development of technologies that minimize the environmental impact of space activities throughout their lifecycle."). China-Russia draft Treaty on the Prevention of the Placement of Weapons in Outer Space, the Threat or Use of Force against Outer Space Objects (PPWT), June 10, 2014. EU Draft International Code of Conduct for Outer Space Activities (ICoC), Mar. 31, 2014.

[291] *See* CRAWFORD, *supra* note 34.

[292] *See* Ram S. Jakhu, NATIONAL REGULATION OF SPACE ACTIVITIES vii-ix (2010); Yuri Takaya, Presentation on the Legal Analysis of National Space Legislation for the

the obligations of current outer space treaties in their domestic legislation. This also involves the issue of the protection of the outer space environment and the exploitation of resources that take into consideration sustainable development.

The development of domestic space laws can be seen as the basic statutory codes of conduct proposed by a State for its space activities. These codes also share some similarities with the 2019 LTSOSA Guidelines. National space legislation can be considered as a high-level *opinio juris* of a country for norms that would be part of the LTSOSA.[293] Thus, national space law would not only have binding legal requirements for the countries that legislate space activities, but also the effect of guiding other countries in their space legislation.[294] Ultimately, domestic legislation will guide the development of the national practices of space activities for all countries. It can be concluded that the interdependence between national and international laws signifies that it is reasonable and fundamental to treat domestic space law as a means for determining the *opinio juris* of LTSOSA practices.[295]

Specifically, the importance of national space regulation is also emphasized in the 2019 LTSOSA Guidelines. For instance, Guideline A.1 recommends the adoption, amendment or revision of national regulatory frameworks for activities in outer space as needed so as to build on and enhance the LTSOSA.[296] Guideline A.2 states that several elements should be considered, as necessary, for the formulation, revision or modification of national regulatory frameworks for space activities.[297] Guideline A.3 refers to the supervising of national space activities. In supervising the space activities of non-governmental entities, sovereign States need to ensure that entities under their jurisdiction or control have: an appropriate organizational structure; adopted necessary procedures for the

---

Exploitation of Space Resources (Mar. 4, 2018), (Slides available at http://stig.pp.u-tokyo.ac.jp/stig/wp-content/uploads/2018/02/Takaya.pdf); Chatterjee Joyeeta et al., *National Space Legislation for Emerging Space-Capable Nations*, SSRN (Oct. 18, 2012), https://swfound.org/media/169351/national_space_legislation_emerging_space_capable_nations.pdf.

[293] *See* Jonathan F. Galloway, *International Implications of National Space Legislation*, 54 Proc. Int'l Inst. Space L. 538 (2011).

[294] *See id.*

[295] *See id.*

[296] UN Doc. A/AC.105/C.1/L.366, (2019), *supra* note 236, at Guideline A.1.

[297] *Id.* at Guideline A.2

responsible implementation of space activities; and the means for complying with the relevant national and international regulatory frameworks, requirements, policies and procedures that promote the LTSOSA.[298] Thus, within the LTSOSA framework, State governments have both the task of implementing the Guidelines in their national space activities, and at the same time, supervising their private entities to assure they are carrying out space activities in a manner that complies with the LTSOSA standards.

Judging from the 2019 LTSOSA Guidelines, the highest governmental level of each country is seen to have a crucial role in advancing the development of the concept of LTSOSA. This is usually reflected in the attitude and position of the governors and legislators of a country in their domestic legislation, which is also the direct embodiment of the *opinio juris* on national practices. If increasing countries are able to support and agree to further the development of the LTSOSA in the form of domestic laws, the concept of LTSOSA will have an improved chance of becoming an international custom.

For example, the UK's Outer Space Act (1986), which was amended by the Deregulation Act 2015, was adopted during the early space era and provided the basic national legal framework for the UK to fulfill its obligations under the UN space treaties.[299] The objective of the Deregulation Act 2015 is to secure compliance with the international obligations of the UK with respect to the launching and operating of space objects and the carrying out of other activities in outer space by persons in connection with the UK.[300] The Act requires any British organization or individual to first obtain permission from the UK government before any space operations are carried out.[301] In 2018, the UK Space Industry Act was formulated on the basis of considering the development of the potential commercial aerospace market in the UK.[302] It supported LTSOSA

---

[298] *Id.* at Guideline A.3.

[299] The Outer Space Act 1986, c.28 (UK), https://www.legislation.gov.uk/ukpga/1986/38/pdfs/ukpga_19860038_en.pdf; Deregulation Act 2015 c.20 (UK), https://www.legislation.gov.uk/ukpga/2015/20/enacted.

[300] Deregulation Act 2015 c.20 (UK), §12 https://www.legislation.gov.uk/ukpga/2015/20/enacted.

[301] The Outer Space Act 1986, c.28 (UK), §5 https://www.legislation.gov.uk/ukpga/1986/38/pdfs/ukpga_19860038_en.pdf.

[302] Space Industry Act 2018 (UK).

Guideline A.1 which recommends that States adopt legislative measures by taking into account the proposal of the UNGA Resolution 68/74 on national space legislation. Thus, the UK's space legislation can also be understood as an essential national practice of promoting the concept of LTSOSA.

B. Emerging Rules of International Law

The emerging rules of international law are a forward-looking description of the concept of the LTSOSA and whether the LTSOSA can become a rule of international law depends on how the international players perceive the strength of the conviction that the concept of LTSOSA could become an integral part of binding international law. The *opinio juris* is an abstract concept which makes it difficult to be recognized universally.[303] Nevertheless, it could be concluded *opinio juris* exists as numerous international treaties and documents, as well as relevant national legislation on environmental protection and resource utilization from many different countries, can support the idea that the principle is legally binding for national practices.[304] However, for the newly emerging concept of LTSOSA, whether these countries have the same conviction depends on whether the outer space environment is seen to be comparable or related to the global environment on Earth. As the impacts of the outer space environment on human beings have become increasingly evident, to some extent, the potential dangers resultant of the outer space environment can be even more devastating than those that are of Earth itself.[305] Therefore, the future confidence of various nations in the adoption of the concept of LTSOSA as a customary international law should not be any less than that towards global sustainable development. In general, solidarity in the legally binding need to protect the common environment of human beings also lends support to facilitating the concept of LTSOSA into international custom.

---

[303] *See generally* Jo Lynn Slama, *Opinio Juris in Customary International Law*, 15(2) OKLA. CITY U. L. REV. 603 (1990).

[304] *See generally* Virginie Barral, *Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm*, 23(2) EUR. J. OF INT'L L. 377, (2012).

[305] *See generally* Panagiotis K. Marhavilas, *The Space Environment and its impact on human activity*, 29(10) RECORDER, 1, (2004).

VI. OTHER WAYS OF REACHING STATUS OF INTERNATIONAL CUSTOM

Besides the subjective and objective factors discussed above, it is argued in this section that international practices and national law, international non-governmental courts and cooperation among international organizations may also offer a non-traditional but influential path for the concept of LTSOSA to reach the status of an international custom.

A. International Practices and National Law

The definitions of "practice" and "custom" are often confused.[306] There are both narrow and broad interpretations of practice. The former defines practice as non-legally binding "usage," such as maritime ceremonial salutations and the exemption of foreign vehicles from parking prohibition laws.[307] The latter defines the practice as both non-binding "usage" and a binding "custom."[308] This section discusses practices that are of the former definition; that is, practices as non-legally binding "usage." Before the 20th century, international practices had a mainstay role in the sources of international law, as general international practices were regarded as the main constituents of binding international customary norms.[309] Therefore, there is a close historical relationship between international practice and international customs.[310] State practices usually appear in international commercial activities, such as the universal commercial practices found in the United Nations Convention on Contracts for the International Sales of Goods (GISG)[311]

---

[306] *See generally* Kenneth S. Abraham, *Custom, Noncustomary Practice, and Negligence*, (Pub. L. and Legal Theory Research Paper Series No. 2009-02, 2009), (Discussing the differences between practice and custom with regard to evidentiary material).

[307] BVerwG, Parking Privileges for Diplomats Case, Federal Republic of Germany, Federal Administrative Court 22 January 1971. *See* E. Lauterpacht, ed., 70 INT'L L. REP., 396 (1986); CRAWFORD, *supra* note 34.

[308] *Id. See also* Abraham *supra* note 306.

[309] Charles G. Fenwick, *Sources of International Law*, 16 MICH. L. REV. 6, 393-394 (1918).

[310] *See generally* Arnold D. McNair, *International Law in Practice*, 32 TRANSACTIONS YEAR, 154 (1946).

[311] Convention for the International Sale of Goods, Apr. 11, 1980, 1489 U.N.T.S. 3. The CISG was developed by the United Nations Commission on International Trade Law (UNCITRAL). It codifies widely accepted rules which govern contracts for the international sale of goods.

and the Uniform Customs and Practice for Documentary Credits (UCP),[312] which are the typical examples of practices that are practical, universal and subjective, and have sanctions.[313] Their practicality and universality conform to the objective characteristics of international customs in State practices.[314] The practicality of these commercial practices is that first, their unwritten characteristics differ from those in the statutes formulated by the States; and second, their compilation is carried out spontaneously by non-governmental commercial organizations. As for universality, these practices seem to accommodate international commercial relations because of the fairly widespread and applicable scope of the commercial practices in different cases and geographical areas. Also, the contents of these practices have a certain degree of international consensus, which is widely understood and accepted by a number of countries. Subjectivity is in line with *opinio juris,* which is a subjective factor. Subjectivity is manifested when these practices are strictly complied with, and such compliance gives rise to expectations that the practices should be respected.

In addition, the sanctions that arise from breaching these commercial practices also show that these international practices have some coercive power, but are not as legally binding as that of international custom.[315] Due to the commonalities between general international practices and international custom, there is the possibility that the former may form the latter on this basis.[316] Although the 2019 LTSOSA Guidelines are not compulsorily binding, they have the potential to become a series of international practices if an increasing number of States voluntarily comply with them, and thus the subjective and objective requirements for international customs can be satisfied. Even if this does not materialize, international practices might also have some legal effect in carrying out the missions of an international custom.

---

[312] Int'l Chamber of Commerce, *Uniform Customs and Practice for Documentary Credits*, The UCP is a series of rules and practices on the commercial issuance and use of letters of credit. These commercial practices were standardized by the International Chamber of Commerce in 1993 and are updated on a regular basis.

[313] *See* CHRISTIAN BUEGER & FRANK GADINGER, INTERNATIONAL PRACTICE THEORY 21-58 (2nd ed., 2014).

[314] *See id.*

[315] *See id.*

[316] *See id.*

Legally binding practices could also be confirmed by the national regulatory framework and domestic standards. As the commercialization of space activities continues to evolve, many space operations are gradually being turned over to private entities.[317] Therefore, a national law that governs personal civilian relationships inevitably involves outer space activities.[318] Although the US Commercial Space Launch Act (1984),[319] the UK Outer Space Act (1986),[320] the Swedish Act on Space Activities (1982),[321] the Law of Russian Federation on Space Activities (1993),[322] Japan's Basic Space Law (2008),[323] Act on Space Activities of Finland (2018),[324]

---

[317] Kristin Houser, *Private Companies, Not Governments, Are Shaping the Future of Space Exploration*, FUTURISM (June 12, 2017), https://futurism.com/private-companies-not-governments-are-shaping-the-future-of-space-exploration/.

[318] *See* Anthony L. Velocci, *Commercialization in Space: Changing Boundaries and Future Promises*, 33 HARV. INT'L L. REV. 49 (Mar. 30, 2012).

[319] The latest version of U.S. Commercial Space Launch Competitiveness was adopted in 2015*, see* Commercial Space Launch Competitiveness Act, 51 U.S.C. §10101.

[320] Outer Space Act 1986, c. 61 (UK), https://www.legislation.gov.uk/ukpga/1986/38/contents.

[321] Lag (1982:963) om rymdverksamhet, U.N. OFF. OF OUTER SPACE AFFS., SELECTED EXAMPLES OF NATIONAL LAWS GOVERNING SPACE ACTIVITIES: SWEDEN, (1982), http://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/sweden/act_on_space_activities_1982E.html.

[322] In August 1993, Russia promulgated the "Russian Federation Aerospace Activities Act," which was revised in November 1996. *See* Sergey P. Malkov & Catherine Doldirina, *Regulation of Space Activities in the Russian Federation, National Regulation of Space Activities*, in RAM S. JAKHU, ED., NATIONAL REGULATION OF SPACE ACTIVITIES 315-333 (2010).

[323] Basic Space Law (Law No. 43 of 2008), <http://stage.tksc.jaxa.jp/spacelaw/country/japan/27A-1.E.pdf>, accessed 28 March 2020; Aoki S, "Introduction to the Japanese Basic Space Law of 2008 / Uberblick uber das Japanische Weltraumbasisgesetz 2008 / Introduction a la Loi (de Base) Spatiale 2008 Japonaise," (2008) 57(4) ZLW 585.

[324] Finland's President signed the Finnish Space Act on January 12, 2018, and it came into effect on January 23, 2018. It is the first comprehensive space legislation of this country. *See* Jaroslaw Adamowski, *Finnish President Signs Space Act as Country's First Commercial SAR Microsatellite Launched,* SpaceNews (Jan. 19, 2018), https://spacenews.com/finnish-president-signs-space-act-as-countrys-first-commercial-sar-microsatellite-launched/; Within the EU there is national space legislation at least in Denmark, Sweden, Austria, Belgium, the Netherlands, the United Kingdom and France. *See* Ministry of Economic Affairs and Employment, Työryhmä valmistelemaan kansallista avaruuslainsäädäntöä, https://tem.fi/artikkeli/-/asset_publisher/tyoryhma-valmistelemaan-kansallista-avaruuslainsaadantoa?_101_INSTANCE_KbgSvtizPgsM_languageId=en_US, (Last visited Apr. 8, 2021); National Land Survey of Finland, *Space Act entered into force this week*, NATIONAL LAND SURVEY OF FINLAND, http://www.maanmittauslaitos.fi/en/topical_issues/space-act-entered-force-week, (last visited Apr. 8, 2021).

and UK Space Industry Act (2018)[325] are all related to space launch services contracts, these national space laws are not purely private in nature and their contents do not include the issue of protecting the outer space environment.

In considering the experience of the World Trade Organization (WTO) in supervising the implementation of commercial trade agreements and contracts between member States, and establishing a sound world economy and trade order,[326] it is suggested that the WTO framework could be a source of inspiration for the concept of LTSOSA. Specifically, it is worth noting that one of the aims of the WTO is to persist in sustainable development,[327] which means that all member countries should promote the optimal utilization of the world's resources, protect and safeguard the environment and adopt various measures in line with the needs of members at different levels of economic development.[328] Moreover, disputes among the member States can be resolved in an efficient manner by means of a mechanism of trade and investment law dispute settlement.[329] In terms of supporting the development of the developing countries, the WTO also encourages making active efforts to ensure that developing countries, especially the least developed countries, enjoy their share of natural resources and benefits of these resources that are compatible with their level of economic development in the growth of international trade.[330]

Based on the recognition of the WTO of sustainable development and special consideration for developing nations, it can be said that the WTO mechanism could be a model for implementing the LTSOSA practices: that is, to universally incorporate the 2019 LTSOSA Guidelines into the national regulatory framework and domestic standards, thus establishing corresponding requirements for civil and commercial contracts related to outer space activities.

---

[325] Space Industry Act 2018, https://www.legislation.gov.uk/ukpga/2018/5/contents/enacted/data.htm

[326] World Trade Organization, *What is the World Trade Organization?,* https://www.wto.org/english/thewto_e/whatis_e/tif_e/fact1_e.htm (last visited Dec. 15, 2021)(Founded in January 1995, it has had 164 Member-States since July 2016.

[327] *See* INTERNATIONAL INSTITUTE FOR SUSTAINABLE DEVELOPMENT, THE WORLD TRADE ORGANISATION AND SUSTAINABLE DEVELOPMENT: AN INDEPENDENT ASSESSMENT 1-12 (1996).

[328] *See id.*

[329] THIRLWAY, *supra* note 109, at 190-193.

[330] *Id.*

The result could be promising in forming international commercial practices which could pave the way for the formation of an international custom.

B. International Non-Governmental Tribunals

International non-governmental tribunals, also known as people's tribunals, are innovative and progressive legal attempts made by the international community to rectify certain issues.[331] They started with the "Russell Tribunal" which was also known as the International War Crimes Tribunal in 1967 to try the activities of the US in Vietnam[332] and furthered through a series of subsequent tribunals.[333] The Women's International War Crimes Tribunal is another an example of a people's tribunal. This was composed of legal experts, scholars and human rights activists from various countries and regions, and was held in December 2000.[334] Although these trials of the people's tribunals are not legally binding, they have a wide range of influence and provide room for the imagination of the development of the concept of LTSOSA. Similarly, a suggested people's tribunal composed of space law experts, environmental jurists, civil societies of space law and environmental protection organizations in various countries could be established, with

---

[331] Akbar Varvaii et al., *Non-Governmental Organisations Participation in Criminal Processes*, 9(9) J. POL. & L., 110, 110-180 (2016).

[332] The Russell Tribunal, one of the people's tribunal, also known as the International War Crimes Tribunal, was a non-governmental body organized by a British philosopher and hosted by a French philosopher and writer in 1966. It was constituted in November 1966, followed the publication of Bertrand Russell's book, War Crimes in Vietnam, and became an investigative body using the name of Russell Tribunal to investigate and try war crimes, human rights violations and environmental protection principles. *See* Marcos Zunino, *Subversive Justice: The Russell Vietnam War Crimes Tribunal and Transitional Justice*, 10 INT'L J. OF TRANSITIONAL JUST. 211, (2016).

[333] Such as the Russel Tribunals on Repression in Brazil, Chile and Latin America (1974-1976); on human right in Psychiatry (2001); on Iraq (2004); on Palestine (2009-2014*). See* Russell Tribunal on Palestine, http://www.russelltribunalonpalestine.com/en/ (last visited Dec. 15, 2021).

[334] The Women's International War Crimes Tribunal was a people's tribunal organized by Violence Against Women in War-Network Japan (VAWW-NET Japan). Its objective was to try instances of Japan's military sexual slavery. Its main function was to gather testimony from women victims, and then try groups and people for sexual slavery or rape. The tribunal's final statement was issued in The Hague on December 4, 2001. *See* Rumi Sakamoto, *The Women's International War Crimes Tribunal on Japan's Military Sexual Slavery: A Legal and Feminist Approach to the 'Comfort Women' Issue*, 3 NEW ZEALAND J. OF ASIAN STUDIES, 49, 49-58 (2001).

the non-binding duty to try cases that involve blatant violations of the LTSOSA guidelines. While this people's tribunal may not be legally binding on participants of outer space activities, the professionals of the tribunal and the wide variety of experience of its members may mean that the judgment of the tribunal based on professional knowledge could exert moral pressure on States, organizations and related private entities. Optimistically, this would contribute to the commitment of numerous parties to promote the development of the LTSOSA and encourage participants in space activities to enhance their knowledge and consideration of the concept of LTSOSA, which may establish a unified value system for national practices in outer space activities worldwide and provide valuable reference for the confirmation of common national practices and *opinio juris* from the people.

C. Cooperation Among International Organizations

At present, the major international organizations concerned with outer space activities comprise intergovernmental, non-governmental, global and regional bodies including, among others, the UN COPUOS, European Space Agency (ESA), Asia-Pacific Space Cooperation Organization (APSCO), Committee for Space Research (COSPAR), World Security Foundation (WSF), Space Generation Advisory Council (SGAC) and the International Telecommunication Union (ITU). The functions of each organization, the areas covered, and the applicable subjects of international law differ, but the 2019 LTSOSA Guidelines and concept can be theoretically applicable to all of these international organizations.

Among these organizations, non-governmental organizations require regulatory and technical support from inter-governmental organizations. Meanwhile, inter-governmental organizations require collective advice from various relatively neutral and objective non-governmental organizations.[335] On the other hand, global organizations need to coordinate with regional organizations for management and regulatory frameworks and promote technical standards, while regional organizations need global organizations to provide appropriate guidance. They also need to communicate and

---

[335] Giuseppe Reibaldi, Max Grimard, *Non-Governmental Organisations importance and future role in Space Exploration*, 114 ACTA ASTRONAUTICA 130, 130-137 (2015).

collaborate with other regional organizations through these global organizations.[336]

During the implementation of the 2019 LTSOSA Guidelines, international organizations at different levels and regions can each use what they need and work with each other, and gradually form the basis and means for a long-term cooperation mechanism among the various international organizations under the guidance of the concept of LTSOSA. In addition, cooperation between international organizations has the potential to stimulate space cooperation among nations and promote the concept of intra-generational equity which is part of the LTSOSA concept. According to Zhao, intra-generational equity in the context of space-sustainable development means that the development of outer space activities must consider meeting the needs of the present generation, namely, while a country is conducting outer space activities and utilizing outer space resources to meet its own needs, the needs of other countries should also be taken into consideration.[337] These "other countries" should not only include the developed countries that have relatively advanced and mature space technology, but also a large number of developing countries with little or no space capability.[338] Such "needs" of the current generation, in particular, the needs of the world's most impoverished and backward countries and their people, should be given priority, which is what should be considered equitable among the different generations in the context of space sustainability.[339] Therefore, compared to merely persuading each country to implement the 2019 LTSOSA Guidelines, promoting cooperation among different international organizations would improve the efficiency of the formation of common national practices and *opinio juris*.

---

[336] Ulrike M. Bohlmann, ESA Legal Department, Presentation to the UN/Thailand/ESA Workshop on Space Law, Regional and International Cooperation: The Role of bilateral and multilateral legal Agreements, https://www.unoosa.org/pdf/pres/2010/SLW2010/01-04.pdf (last visited May 16, 2021).

[337] *See* Yun Zhao, *New Perspective and Emerging Approach on Sustainable Development in Outer Space from China's Practice in Space Cooperation*, 3 CHINESE REV. INT'L L. 60 (2017)

[338] *Id.*

[339] *Id.*

VII. CONCLUDING REMARKS

The 2019 LTSOSA Guidelines adopted by the UN COPUOS contains a comprehensive set of current best practices, operating procedures, technical standards, regulations and policies related to the environmental protection of outer space and the safety of outer space operations. These Guidelines constitute the specific content of the concept of LTSOSA, and they are being gradually accepted and voluntarily implemented by the international community. Judiciary systems are the crucial means of keeping laws alive, promoting the concept of LTSOSA as a binding international custom cannot be examined apart from the relevant judgment of the ICJ.[340] However, previous disputes in outer space activities were usually resolved through diplomatic means rather than judicial means, and there are currently no relevant international judicial cases on space law. The *status quo* of the concept of LTSOSA and its implementing Guidelines means that its transition into an international custom may be a challenging endeavor in international law. However, it is encouraging that its facilitation into an international custom is relatively fluid, as the effectiveness of these Guidelines will ultimately affect every natural person through States, international organizations and even private entities by means of space cooperation in various space endeavors. In a new space era where all States are connected and share the same destiny, the future development of the concept of LTSOSA is directly related to every people of the international community.

---

[340] "All law has ultimately to be put to the test of 'How would a court decide?' (*ubi judex, ibi jus*), even when, as in the case of disputes between many members of the international community, there exists no mechanism for judicial examination and settlement unless and until the parties so agree." THIRLWAY, *supra* note 109, at 2. *See* Michael Wood, *The Sources of International Law*, 4 CAMBRIDGE J. INT'L & COMPAR. L. 201, 202 (2015).

EXPLOITING THE FINAL FRONTIER – SOME INITIAL THOUGHTS ON REGULATING HUMANITY'S RELATIONSHIPS WITH NON-TERRESTRIAL LIFE FORMS

Rob Amos[*]

ABSTRACT

Scientists recently raised the prospect of microbiotic life existing on Venus. If confirmed, the history of our interactions with terrestrial species shows that humanity's curiosity and desire to investigate will eventually give way to our urge to exploit. Although just as likely to be the result of currently unknown abiotic processes, the mere possibility that such life forms exist poses questions over the law's role in regulating their exploitation. How should the risks associated with bringing alien life forms to Earth be managed? How should ownership of non-terrestrial resources be determined? Is it even appropriate to view such life forms as resources, or should we instead develop rights-based frameworks? Drawing on international instruments that address issues similar to these in respect of terrestrial species, this article presents some initial thoughts on how humanity's relationships with alien life forms might be regulated.

I. INTRODUCTION

A 2020 study has brought us closer to answering the question of "are we alone in the universe?" by raising the prospect of microscopic life forms living within the clouds of Venus.[1] Unexpectedly

---

[*] Associate Staff, Faculty of Laws, University College London, r.amos.12@ucl.ac.uk.
I am grateful to Priscila Carvalho (UCL Energy Institute) for her comments on a previous version of this paper.

[1] *See* Jane S. Greaves et al., *Phosphine Gas in the Cloud Decks of Venus*, 4 NATURE ASTRONOMY 9 (2020).

high levels of a biosignature gas, phosphine (PH_3), have been detected in Venus's atmosphere, which is being produced either by a chemical process that would be new to science, or by bacteria.[2]

No one is suggesting that life definitely exists on Venus. As the authors of the study themselves point out, their findings are evidence of "unexplained chemistry" to which the presence of life is one plausible explanation.[3] Nevertheless, the mere possibility that we have found life in what amounts to Earth's backyard raises important legal questions. First, the natural progression of scientific investigation would eventually lead to us bringing back a sample of these life forms for research.[4] Without wishing to indulge in the hyperbole of science fiction movies, there are risks in exposing the Earth's biosphere to these organisms if they were released or escaped from a controlled environment. How should these risks be managed?

Second, how should ownership of resources collected from space be determined? Sending a probe to Venus to collect a sample of the microbes would involve considerable technical and financial resources. Only the world's richest nations and commercial enterprises would be able to undertake this. Should they be allowed to control the results of their endeavors or, as has been the case for other resources that are inaccessible for most States, should they be considered the common heritage of humankind?

This relates to an even more fundamental question: should alien life be seen as resources? Would a more appropriate starting point for any legal framework governing our relationships with alien life forms instead be a rights-based framework?

Drawing on international environmental law, which addresses similar issues concerning humanity's exploitation of and relationships with other terrestrial species, this article provides initial thoughts on how these questions might be answered. After summarizing the science behind the study, I consider how the risks inherent to bringing alien microbes into terrestrial environments might be regulated. Attention then turns to the question of "ownership,"

---

[2] *See id.* at 6.

[3] *See id* at 7.

[4] From the mid-1960s, the Soviets were sending probes into Venus's atmosphere and, given the advances in spaceflight technology, a return flight to Venus has to be considered feasible. *See* Nicholas L. Johnson, *Soviet Atmospheric and Surface Venus Probes*, 20 SPACEFLIGHT 224 (1978).

with rules regarding resources that are recognized as the common heritage of humanity compared to those that govern the exploitation of global commons. Finally, I examine the extent to which rights-based frameworks could and should apply to our interactions with non-terrestrial life forms.

II. THE SCIENCE – WHAT WE (DON'T) KNOW

To aid in their search for extra-terrestrial life, scientists have been looking for a biosignature, i.e., a readily-identifiable chemical substance that is only, or primarily, known to be a product of biotic processes. Phosphine is an ideal candidate because on Earth it is only produced through human manufacturing processes or by anaerobic bacteria.[5] Observations using the James Clerk Maxwell Telescope, subsequently confirmed using the Atacama Large Millimetre/submillimetre Array, detected phosphine on Venus and is the strongest indication to date that life may exist on other planets.[6]

Venus is not where one would expect to find life. The temperatures at its volcanic surface are extreme, with pressure levels ninety times higher than those that are encountered on Earth.[7] However, in the 1960s, Morowitz and Sagan suggested that conditions in Venus's clouds might be more inhabitable. Pressure levels are equivalent to Earth's and temperatures are similar to temperate terrestrial ecosystems.[8] The theory, one that may now be confirmed, is that as surface conditions on Venus became increasingly hostile due to global warming, microbial life forms migrated upwards and adapted to life in the clouds.[9]

Having established the presence of significant levels of phosphine in Venus's atmosphere, the next question was whether there was any abiotic natural process that would account for this. A series of experiments replicating chemical reactions that could occur on Venus were conducted. Scientists concluded that these would only account for approximately one-ten-thousandth of the phosphine

---

[5] Clara Sousa-Silva et al., *Phosphine as a Biosignature Gas in Exoplanet Atmospheres*, 20 ASTROBIOLOGY 235 (2020).

[6] Greaves et al., *supra* note 1, at 7.

[7] Jeffrey Kluger, *Signs of Life on Venus Hint at Biology Pretty Much Anywhere in the Universe,* TIME (Sep. 15, 2020), https://time.com/5889099/venus-signs-of-life/.

[8] Harold Morowitz & Carl Sagan, *Life in the Clouds of Venus?*, 215 NATURE 1259 (1967).

[9] *Id*. at 1260.

that had been detected.[10] Phosphine is also a short-lived molecule. That significant amounts were detected on two different occasions, using separate telescopes, indicates that something is continuously producing phosphine in Venus's atmosphere.[11]

There is one outstanding issue that casts doubt over the hypothesis that Venus's phosphine is being created by microscopic life forms. The clouds in which they would live consist of exceptionally corrosive sulphuric acid (H_2SO_4).[12] While some life forms are known to live in acidic environments on Earth, the level of extreme acidity of Venus's clouds is incompatible with terrestrial biochemistry.[13] Consequently, if life does exist on Venus, it has either evolved with a fundamentally different system of biochemistry, or Venusian biochemistry is similar to Earth's and the life forms have adapted to the hyper-acidic conditions.[14] Certain plants coat themselves in a protective substance that has a degree of resistance to acidity and it is conceivable that life on Venus has developed similar defensive mechanisms.[15] In either case, the possibility of life on Venus offers exciting opportunities for science, but also raises questions over the potential benefits and risks resulting from their exploitation that should be accounted for through a robust, and equitable, legal framework.

III. REGULATING THE RISKS OF BRINGING ALIEN LIFE FORMS TO EARTH

Risk is a complex concept and its application in regulatory decision-making is contested. The issue is not so much the inevitable

---

[10] *See* Greaves et al., *supra* note 1, at 7-9 and accompanying text.

[11] *Id.*

[12] Sara Seager et al., *The Venusian Lower Atmosphere Haze as a Depot for Desiccated Microbial Life: A Proposed Life Cycle for Persistence of the Venusian Aerial Biosphere* 21 ASTROBIOLOGY (Aug. 13, 2020). https://www.liebertpub.com/doi/full/10.1089/ast.2020.2244.

[13] An ecosystem has evolved in the Cueva de Villa Luz of Mexico, for example, where hydrogen sulphide (H_2S) rises from springs in the ground, reacts with oxygen and water and forms sulphuric acid. *See*Gaëtan Borgonie et al., *Refuge from Predation, The Benefit of Living in an Extreme Acid Environment?*, 219 BIOLOGICAL BULL. 268 (2010).

[14] *See generally* Seager et al., *supra* note 12.

[15] This characteristic is now being utilized to help protect manufacturing equipment that is cleaned using acid. *See* Bochuan Tan et al., *Papaya Leaves Extract as a Novel Eco-Friendly Corrosion Inhibitor for Cu in H_2SO_4 Medium*, 582(B) J. COLLOID AND INTERFACE SCI. 918 (2021).

uncertainties of scientific risk assessment, but how these uncertainties feed into political discourse regarding the management of risks. While risk assessment is a purely technical process conducted by experts, risk management is a hybrid process involving both technical determinations (how can an identified risk be mitigated?) and political judgements on the acceptability of a risk (what is safe enough?).[16] There may be a high risk that an activity will result in a particular harm, but this harm may be sufficiently small that society is willing to accept it. Conversely, the harm involved may be considered so severe that even though scientists assert that the chances of it occurring are negligible, the risk is still deemed too great. We saw this debate play out following the 2011 Fukushima nuclear accident in Japan. Germany announced that it would phase out nuclear power by 2022, in what was a major policy U-turn for the German government,[17] whereas in the United Kingdom political support for the nuclear industry remained strong.[18] Risk acceptability is also about making trade-offs between potentially incommensurable values.[19] A scientist's claim that there is a minimal risk of an incident occurring at a nuclear power station will not address an environmentalist's concern over the disposal of its waste, or a resident's desire to protect the aesthetics of the local area.

The law primarily accounts for the uncertainty inherent to questions of risk through the application of the precautionary principle. Originating in German domestic law as the *Vorsorgeprinzip*, the precautionary principle has been adopted as a core principle of the European Union[20] and has subsequently been applied, with varying degrees of legal strength, in a number of international regimes.[21] Its exact legal status is debatable, however. It has

---

[16] Maria Lee, *Beyond Safety? The Broadening Scope of Risk Regulation*, 62 CURRENT LEGAL PROBS. 242, 243-47 (2009).

[17] Luigi Grossi, Sven Heim & Michael Waterson, *The Impact of the German Response to the Fukushima Earthquake*, 66 ENERGY ECON. 450, 452 (2017).

[18] Garry Owen & Sze-wan Chan, *Impact of Fukushima Disaster on International Nuclear Transport Safety: UK Perspective*, 25 PACKAGING, TRANSPORT, STORAGE & SEC. OF RADIOACTIVE MATERIAL 89 (2014).

[19] Lee, *supra* note 16, at 247-48.

[20] Treaty on the Functioning of the European Union art. 191, May 9, 2008, OJ 115 0132-0133.

[21] PHILIPPE SANDS & JACQUELINE PEEL, PRINCIPLES OF INTERNATIONAL ENVIRONMENTAL LAW 229-40 (4th ed. 2018). Most environmental regimes reflect the

arguably not crystallized as rule of customary international law.[22] At most, it might be said that Lowe's position on sustainable development as a legal principle currently applies, i.e., the precautionary principle has interstitial normativity as an interpretative guide for pre-existing rules of international law.[23]

One reason why the precautionary principle cannot be said to be customary law is that consensus has yet to be reached on a single definition, particularly with regards to the level of uncertainty that would trigger the adoption of mitigatory measures.[24] Within environmental scholarship, a distinction is often drawn between weak and strong versions of the principle. The former simply states that lack of scientific certainty about the existence or nature of a risk should not justify the postponement or avoidance of mitigatory measures. This version of the principle is typically seen in international instruments and although it arguably does not go beyond good practice, it does create space for political debate on how decisions on certain activities are reached.[25] A strong interpretation of the precautionary principle, in contrast, demands that no action be taken unless it can be shown to be risk-free. Rather than providing guidance, the strong interpretation of the precautionary principle has been criticized for precluding any action, including inaction, as it is impossible to prove "zero risk."[26] More nuanced interpretations of the principle are provided by Sunstein, who suggests that precautionary measures should be taken to avoid irreversible and

---

principle as it is defined in Principle 15 of the Rio Declaration on Environment and Development: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." Rio Declaration on Environment and Development, U.N. Doc. A/CONF.151/26, at 3 (Aug. 12, 1992).

[22] Although there is evidence to suggest that it is in the process of doing so. *See, e.g.,* Responsibilities and obligations of states with respect to activities in the Area, Advisory Opinion, Feb. 1, 2011, 17 ITLOS Rep. 10, ¶135.

[23] *See* Vaughan Lowe, *Sustainable Development and Unsustainable Arguments*, in INTERNATIONAL LAW AND SUSTAINABLE (Alan Boyle & David Freestone eds., 1999). Support for this can be found in the International Court of Justice's Judgment in *Pulp Mills on the River Uruguay*, which states that "a precautionary approach may be relevant in the interpretation and application" of the agreement that was central to the dispute. (Arg. v. Uru.), Judgment, 2010 I.C.J. Rep. 135, ¶ 164 (Apr. 20).

[24] SANDS & PEEL, *supra* note 21, at 234.

[25] MARIA LEE, EU ENVIRONMENTAL LAW, GOVERNANCE AND DECISION-MAKING 5-6 (2d ed. 2014).

[26] Cass R. Sunstein, *Beyond the Precautionary Principle*, 151 U. PA. L. REV. 1003, 1020 (2003).

catastrophic harms.[27] Such an approach would provide important thresholds against which action taken under the weak precautionary principle could be measured and offer clearer guidance for action than the strong interpretation.

A comprehensive account of the precautionary principle is beyond the scope of this work,[28] but it should be noted that the extent to which the principle conditions the discretion of decisionmakers depends on the context in which it is being applied.[29] In the *Waddenzee* case, for example, the Court of Justice of the European Union held that the obligation to conduct an appropriate assessment of an activity that may impact on a site protected under the Habitats Directive[30] was triggered by the "mere probability" that the activity would have a significant effect on the site and that in light of the precautionary principle, "such a risk exists *if it cannot be excluded on the basis of objective information*"[31] This can be contrasted with the approach taken in *Pfizer*, which concerned the European Commission's ban on the use of certain antibiotics in animal feed due to the potential human health implications. Here, the then-European Court of First Instance (now the General Court) stated that precautionary measures "may be taken only if the risk, although the reality and extent thereof have not been 'fully' demonstrated by conclusive scientific evidence, appears nevertheless *to be adequately backed up by the scientific data* available at the time when the measure was taken."[32]

---

[27] Cass R. Sunstein, *Irreversible and Catastrophic*, 91 CORNELL L. REV. 841 (2006).

[28] For a more detailed anlaysis, *see* Minna Phyälä, Anne Christine Brusendorff & Hanna Paulomäki, *The Precautionary Principle*, *in* RESEARCH HANDBOOK ON INTERNATIONAL ENVIRONMENTAL LAW (Malgosia Fitzmaurice, David M. Ong & Panos Merkouris eds., 2010); Jonathan B. Wiener, *Precaution*, *in* THE OXFORD HANDBOOK OF INTERNATIONAL ENVIRONMENTAL LAW (Daniel Bodansky, Jutta Brunneé & Ellen Hey eds., 2007).

[29] *See* Elizabeth Fisher, *Opening Pandora's Box: Contextualising the Precautionary Principle in the European Union*, *in* UNCERTAIN RISKS REGULATED (Ellen Vos & Michelle Everson eds., 2009).

[30] Council Directive 92/43/EEC, art. 6(3), 1992 OJ (L 206) 7, 11.

[31] Case C-127/02, Landelijke Vereniging tot Behoud van de Waddenzee v. Staatssecretaris van Landbouw, Natuurbeheer en Visserij, 2004 E.C.R. I-7405, ¶¶ 41, 45 (emphasis added).

[32] Case T-13/99, Pfizer Animal Health SA v Council of the European Union, 2002 E.C.R. II-3405, ¶ 144 (emphasis added). The Court found that the Commission's decision was adequately backed-up by the available scientific data. *Id.*

A "mere probability" arguably constitutes a lower threshold than "adequately backed up by the scientific data" and the reason for this is that the proper operation of the Habitats Directive depended on a broad interpretation being given to the obligation to conduct an appropriate assessment of potentially harmful activities.[33] That it can be adapted to require a level of mitigatory action appropriate to the context in which it is being applied is arguably a positive feature of the precautionary principle. However, that the principle lacks the legal force that would follow from being recognized as a binding rule of international law limits its ability to constrain activities which, from an environmental perspective, are questionable. Environmental impact assessment, which generally lacks the ability to compel changes to proposed activities that carry potentially significant adverse environmental effects,[34] is one example where a stronger obligation to respond to uncertain harms would prevent predictable, but not guaranteed, environmental damage. Due to the degree of uncertainty and potential for significant harm associated with bringing alien life forms to Earth, arguably a strict interpretation of the precautionary principle, along the lines seen in *Waddenzee* or in accordance with Sunstein's catastrophic and irreversibility conceptualizations, should be applied to this.

Although it predates the widespread recognition of the precautionary principle, an element of precaution can nevertheless be identified in Article IX of the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty).[35] This states, inter alia:

---

[33] The obligations to mitigate the adverse effects of a proposed activity in Article 6(4) of the Habitats Directive, and consequently the Directive's ability to achieve its conservation objectives, rests on the identification of potential effects through the appropriate assessment. If operators were not required to identify likely impacts of their activities, they could not then be required to mitigate them. *See Waddenzee*, 2004 E.C.R. I-7405, ¶¶ 69-74 (opinion of Advocate General Kokott).

[34] *See* JANE HOLDER, ENVIRONMENTAL ASSESSMENT: THE REGULATION OF DECISION MAKING, Ch. 7 (2004).

[35] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies art. IX, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S 205 [hereinafter Outer Space Treaty].

> States Parties to the Treaty shall pursue studies of outer space, including the Moon and other celestial bodies, and conduct exploration of them *so as to avoid their harmful contamination and also adverse changes in the environment of the Earth* resulting from the introduction of extra-terrestrial matter and, where necessary, shall adopt appropriate measures for this purpose (emphasis added).

This reflects the early concern of both scientists and policymakers over the potential for contamination of the Earth's environment by material from space,[36] evident in the strict quarantine measures imposed on the first crewed spaceflights.[37] However, the vague language of Article IX is problematic. It gives no indication of what may constitute "harmful contamination" or "adverse changes" and significant discretion is afforded to States in determining when the adoption of "appropriate" measures becomes "necessary." The wording of the provision is also such that the subsequent references to consultation only apply to activities that may cause "harmful interference with activities of other States Parties in the peaceful exploration and use of outer space."[38] Nothing in Article IX precludes States from consulting on activities that risk contamination of the Earth's environment, but this is still a gap.

Article IX has been elaborated through the Committee on Space Research's (COSPAR) Policy on Planetary Protection (PPP).[39] COSPAR is a subsidiary body of the International Science Council, a global non-governmental organization that brings together scientists working in all fields of study. Consequently, the PPP is not law in a strictly formal sense and so cannot bind States to perform space exploration in a specific manner. Nevertheless, the Policy represents important international standards that are widely respected by States, to the extent that it has been suggested that they might form the basis for new rules of customary

---

[36] Darlene A. Cypser, *International Law and Policy of Extraterrestrial Planetary Protection*, 33 JURIMETRICS J. 315 (1993).

[37] Victoria Sutton, *Planetary Protection and Regulating Human Health: A Risk That Is Not Zero*, 19 HOUSTON J. OF HEALTH L. & POL'Y 71, 73 (2019).

[38] Peter H. Sand, *Space Programmes and International Environment Protection*, 21 INT'L & COMPAR. L. Q. 43, 50 (1972).

[39] *Panel on Planetary Protection*, COSPAR (updated Feb. 5, 2021), https://cosparhq.cnes.fr/scientific-structure/panels/panel-on-planetary-protection-ppp/ [hereinafter COSPAR PPP].

international law.[40] This may be true, but they have yet to crystalize as such. Hofmann concludes that while there is sufficient State practice showing conformity with certain standards within the PPP, the criteria relating to *opinio juris* have yet to be met.[41] Relevant national legislation is framed as meeting Article IX of the Outer Space Treaty, rather than implementing the PPP, and so it cannot be established that States view the PPP as containing legally-binding norms.[42] This does not preclude the PPP from having some normative effect as commonly accepted international standards, however.

The PPP divides space missions into five categories. Category I missions are to targets that hold no interest in terms of investigating the presence or origin of life and as such are not subject to PPP guidelines.[43] Missions that are to celestial bodies that are relevant to such investigations are classified under Categories II, III and IV in terms of the risk that matter from Earth may contaminate the target body and thereby compromise future investigations.[44] Category V includes all Earth-return missions.[45] Those that are to celestial bodies on which there is no prospect of indigenous life are classified as "unrestricted Earth return" and are subject only to the applicable outbound recommendations under Categories II, III or IV.[46] All other Category V missions are classified as "restricted Earth return" and recommendations have been established for both the return flight and the post-mission phases.[47] During a mission's return, any equipment that came into contact with the target body must remain in containment, as must any unsterilized samples that have been collected.[48] The PPP also contains an absolute prohibition on destructive impact returns from restricted Earth return missions.[49] Post mission, any unsterilized sample must be kept in strict containment and analyzed in a timely manner

---

[40] *See* Mahulena Hofmann, *Role of COSPAR Guidelines in Interpreting Article IX OST*, 54 PROC. INT'L INST. OF SPACE L. 311 (2011).

[41] *Id.* at 316.

[42] *Id.*

[43] COSPAR PPP, *supra* note 39, at 1.

[44] *Id.* at 2.

[45] *Id.* at 2-3.

[46] *Id.* at 3.

[47] *Id.* at 7-10.

[48] COSPAR PPP, *supra* note 39, at 7-10.

[49] *Id.*

using "the most sensitive techniques."[50] If evidence of a "non-terrestrial replicating entity" is found, the sample must remain in containment until effectively sterilized.[51]

These are sound measures to mitigate the risks that arise when returning nonterrestrial life forms to Earth for study. The absolute prohibition on destructive impact returns and emphasis on maintaining containment prior to effective sterilization arguably represent a stronger interpretation of the precautionary principle than is typically seen in international law. The PPP does not, however, provide detailed recommendations on how to mitigate the risks of nonterrestrial life forms being released into the Earth's environment. This is not a criticism of the PPP, but may instead be seen as a reflection of COSPAR's remit being principally focused on space exploration. Guidance on how to manage the risks associated with release can instead be found in those regimes concerned with controlling the spread of invasive/alien species (IAS), i.e., non-native terrestrial species that are deliberately or inadvertently released into a new area. While, for obvious reasons, there has yet to be a detailed assessment of the risks associated with bringing alien life forms to Earth, the impacts of IAS on ecosystems provide some indication of what these risks might be. IAS are a key driver of biodiversity loss.[52] Once established, an IAS can compete with native species, introduce diseases to which native species have no defense or engage in predatory behaviors that native species have not previously encountered.[53] The presence of IAS has also been shown to have a wider destabilizing effect on ecosystems, reducing their overall resilience and capacity to cope with other disturbances.[54] It can be anticipated that non-terrestrial IAS would have similar impacts on the Earth's biomes if they were released.

Preventing and responding to the establishment of IAS is addressed by a range of international instruments.[55] One of the most comprehensive regimes is the Guiding Principles for the

---

[50] *Id.* at 3.

[51] *Id.*

[52] SECRETARIAT TO THE CONVENTION ON BIOLOGICAL DIVERSITY, GLOBAL BIODIVERSITY OUTLOOK 5, 74-76 (2020).

[53] ROB AMOS, INTERNATIONAL CONSERVATION LAW: THE PROTECTION OF PLANTS IN THEORY AND PRACTICE 165 (2020).

[54] RBG KEW, THE STATE OF THE WORLD'S PLANTS REPORT 48 (2016).

[55] AMOS, *supra* note 53, at 165-66.

Prevention, Introduction and Mitigation of Impacts of Alien Species that Threaten Ecosystems, Habitats or Species Guiding Principles) that have been developed by States party to the Biodiversity Convention.[56] It should be noted that these do not constitute a legally-binding framework, but as the contents of a Decision by the Conference of the Parties they may be seen as having some normative effect and an argument can be made that they should form the basis of a new protocol to the Biodiversity Convention.[57]

Precaution is central to the Guiding Principles, with Principle 1 stating:

> The precautionary approach should also be applied when considering eradication, containment and control measures in relation to alien species that have become established. Lack of scientific certainty about the various implications of an invasion should not be used as a reason for postponing or failing to take appropriate eradication, containment and control measures.[58]

It is evident from this that the Guiding Principles incorporate a weak version of the precautionary principle. Whether this would be a suitable interpretation to use when considering bringing alien life forms to Earth is, as noted above, debatable. A stronger application of the principle, for example by only permitting the collection of alien microbes if all practicable steps have been taken to prevent their unintentional release, would arguably be more appropriate given the level of uncertainty over how they might interact with the Earth's environment.

Principle 2 sets out a response hierarchy to a biological invasion.[59] Wherever possible, IAS should be prevented from establishing a population through the monitoring of likely pathways and the

---

[56] Decision VI/23, Alien Species That Threaten Ecosystems, Habitats or Species, UNEP/CBD/COP/DEC/VI/23, 2002, Annex [hereinafter Guiding Principles]. This elaborates on Article 8(h) of the Convention on Biological Diversity, June 5, 1992, 31 I.L.M. 822 (1992) [hereinafter Biodiversity Convention]. *See also* AMOS, *supra* note 53, at 167-75.

[57] AMOS, *supra* note 53, at 167-75.

[58] Guiding Principles, *supra* note 56, Guiding Principle 1. Note that use of the term "precautionary approach" reflects some States' resistance to recognizing precaution as a formal principle of international law.

[59] *Id.* at Guiding Principle 2.

use of early detection measures.[60] This is reflective of another important principle of environmental law, i.e., that prevention of environmental harms is preferable (in terms of damage to the environment and economic costs) to remediation.[61] Where preventative measures fail, the first recommended response is eradication (Principle 13).[62] There are three difficulties with this, however. First, there are potential ethical considerations. Animal welfarists place the wellbeing of individual animals above concerns for the wider environment and will therefore oppose extermination as a control mechanism.[63] This is arguably not as great a concern when the life forms in question are bacteria, although this is a very anthropocentric view of the value of bacteria and if the Venusian microbes survive in the acidic clouds because they have a unique biochemistry, then that they are more complex than Earth's microscopic life forms cannot be ruled out. More relevant is that to be successful, eradication must be achieved throughout the affected ecosystem. In New Zealand, efforts to eradicate the invasive common wasp (*Vespula vulgaris*) have failed because areas that have been cleared are soon recolonized.[64] Third, that the life forms in question would be microbes would make detection and eradication virtually impossible. This has been of particular concern in the regulation of marine IAS, as many marine species spend at least part of their lifecycle as microorganisms.[65]

If eradication is not feasible, the Guiding Principles call for the population of the IAS to be contained to prevent it from impacting on the wider ecosystem.[66] If this is not possible, for example because the IAS was not detected before it migrated beyond the initial

---

[60] *Id.*

[61] *See generally Pollution Prevention Law and Policies,* ENV'T PROT. AGENCY, https://www.epa.gov/p2/pollution-prevention-law-and-policies#define (last visited June 13, 2021).

[62] Guiding Principles, *supra* note 56, Guiding Principle 2 & Guiding Principle 13.

[63] Stuart Harrop, *Trade-offs Between Animal Welfare and Conservation in Law and Policy*, *in* TRADE-OFFS IN CONSERVATION: DECIDING WHAT TO SAVE 128-29 (Nigel Leader-Williams, William Adams & Robert Smith eds., 2010).

[64] *See* Jacqueline R. Beggs et al., *The Difficulty of Reducing Introduced Wasps (Vespula vulgaris) Populations for Conservation Gains* (1998) 22 N. Z. J. ECOLOGY 55 (1998).

[65] AMOS, *supra* note 53, at 180. *See also* Guy R. Knudsen, *International Deployment of Microbial Pest Control Agents: Falling Between the Cracks of the Convention on Biological Diversity and the Cartagena Biosafety Protocol?*, 30 PACE ENV'T L. REV. 625, 646-49 (2013).

[66] Guiding Principles, *supra* note 56, Guiding Principle 14.

invasion site, the Guiding Principles call for States to introduce control measures.[67] These should focus on reducing both the damage caused by the IAS and its population size. Principle 15 notes that effective control measures will "rely on a range of integrated management techniques,"[68] but research suggests that the frameworks necessary to deliver these do not exist.[69] This would be one explanation of why IAS remain a major driver of biodiversity loss.[70] A further issue relevant to the control of alien bacteria is that, again, containment and control may be possible for large (i.e., biologically complex) species, but not for microscopic life forms.[71]

That the Guiding Principles are of limited use in controlling microscopic IAS restricts the role they can play in managing the risks in bringing Venusian life forms to Earth and, given that they are one of the more sophisticated IAS regimes, highlights a lack of preparedness in the law to deal with risks posed by non-terrestrial IAS outbreaks. This gap applies equally to legal literature. It is notable that in one of the leading texts on international environmental law, the release of alien life forms into the Earth's biosphere is not listed as a problem that will be encountered in our exploration and use of outer space.[72] A first step in addressing this would be to establish a program of work, either under the Biodiversity Convention or other suitable body, to identify the potential impacts of microscopic IAS and appropriate regulatory and scientific responses.

Note should also be made of the Biosafety Protocol,[73] which was adopted in furtherance to Article 19(3) of the Biodiversity Convention. This concerns the transboundary movement of living modified organisms (LMOs) and so, given the level of collaboration between scientific institutions, may provide an important template for regulating the transboundary exchange of alien life forms. The Protocol goes further than other international instruments in highlighting the importance of the precautionary principle (or approach)

---

[67] *Id.* at Guiding Principle 15.

[68] *Id.*

[69] E.D. Dana, J.M. Jeschkle & J. García-de-Lomas, *Decision Tools for Managing Biological Invasions: Existing Biases and Future Needs*, 48 ORYX 56 (2013).

[70] AMOS, *supra* note 53, at 173.

[71] *Id.* at 180.

[72] SANDS & PEEL, *supra* note 21, at 290.

[73] Biodiversity Convention – Cartagena Biosafety Protocol, Jan. 29, 2000, 29 I.L.M. 1027 [hereinafter Biosafety Protocol].

in managing the movement of genetically modified organisms.[74] This contrasts with the parent treaty, which only contains an implicit endorsement of the principle in its preamble.

The Biosafety Protocol's core control mechanism is the measures for advanced informed agreement (AIA).[75] In short, the party of export is required to notify the party of import prior to the movement of an LMO.[76] The party of import must inform the party of export, within ninety days of receipt of the notification, whether the import can proceed and under what conditions.[77] This decision must be based on a risk assessment, the process for which is set out in Annex III.[78] The risk assessment should include estimations of the likelihood of adverse consequences the LMOs may have on the intended receiving environment, of what those adverse consequences might be and a recommendation as to whether the risk posed by the likelihood and nature of those consequences is manageable and acceptable.[79] The results of these risk assessments are part of the information that States are required to send to the Biosafety Clearing House, established by Article 20 of the Biosafety Protocol. It is clear how a similar system of submitting information to a central body responsible for its global dissemination, coupled with a wider framework incorporating key elements of the Biodiversity Convention's IAS Guiding Principles, would contribute to a binding regime intended to aid States in managing the risks associated with bringing alien life forms to Earth. While it does not prohibit this important milestone of scientific research, requiring States to make every effort to prevent their unintended release and respond appropriately should this occur is a measured response to the environmental risks posed by alien life forms.

---

[74] *See id.* at arts. 1, 10(6). *See also* MICHAEL BOWMAN, PETER DAVIES & CATHERINE REDGWELL, LYSTER'S INTERNATIONAL WILDLIFE LAW 613 (2d ed. 2010).

[75] Biosafety Protocol, *supra* note 73, arts. 7-10. For a detailed overview of the Protocol. *See* THE CARTAGENA PROTOCOL ON BIOSAFETY: RECONCILING TRADE IN BIOTECHNOLOGY WITH ENVIRONMENT AND DEVELOPMENT? (Christoph Bail, Robert Falkner & Helen eds., 2002).

[76] Biosafety Protocol, *supra* note 73, art. 8. This notification should include the information listed in Annex I of the Protocol.

[77] *Id.* at arts. 9, 10.

[78] *Id.* at art. 15.

[79] *Id.* at Annex III, ¶ 8.

IV. COMMON HERITAGE OR *CAELUM LIBERUM*?

Resources can be divided into two categories: those that are found within the jurisdiction of States and those that are not. In terms of the former, the peremptory norm of permanent sovereignty over natural resources means that States are largely free to exploit these as they wish.[80] States have a duty to prevent activities in their jurisdiction from resulting in environmental harm to others, but this is an obligation of due diligence, i.e., to take the necessary steps to prevent harm, rather than an obligation of result.[81] It can also now be argued that States' right of exploitation is qualified by an obligation of sustainable use following a number of international judgments to this effect.[82] Again, though, there are limits to how far this will constrain States' activities, particularly if there is no direct transboundary impact, and so no clear grounds for an inter-State dispute that could be resolved through arbitration.

Sovereign resources of States account for the vast majority of those that are accessible on Earth. The main exception to this is those that that fall outside national jurisdiction because they are located in or under the high seas.[83] It is not the case, however, that the exploitation of these resources is completely unregulated.[84] Two principal rules of international law apply according to the resources' location and whether they are living.[85]

---

[80] This is reaffirmed in numerous international agreements. For a typical construction, *see* Biodiveristy Convention, *supra* note 56, art. 3.

[81] PATRICIA BIRNIE, ALAN BOYLE & CATHERINE REDGWELL, INTERNATIONAL LAW & THE ENVIRONMENT 137 (3d ed. 2009).

[82] AMOS, *supra* note 53, at 12-13. *See also* NICO SCHRIJVER, SOVEREIGNTY OVER NATURAL RESOURCES: BALANCING RIGHTS AND DUTIES, Ch. 4 (1997).

[83] The U.N. Convention on the Law of the Sea establishes a number of maritime zones over which coastal and other States enjoy various rights. Dec. 10, 1982, 1833 U.N.T.S. 39 [hereinafter UNCLOS]. Resources found in coastal States' territorial seas and exclusive economic zones (EEZ) are considered to fall under national jurisdiction, subject to certain rules. *See id.* at arts. 2, 56, 193. Areas beyond the 200-mile limit of the EEZ are not subject to national jurisdiction. *Id.* at art. 89.

[84] That the absence of a regulatory authority could result in commons resources being subject to unsustainable levels of exploitation is the basis of Hardin's "tragedy of the commons." Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1968).

[85] The only land resources that may be considered to be outside national jurisdiction are those found in Antarctica, but note that under Article IV of the 1959 Antarctic Treaty, States have only suspended their sovereignty claims over Antarctica rather than renounced them entirely. Dec. 1, 1959, 12 U.S.T. 794, 402 U.N.T.S. 71.

First, resources found within the water column of the high seas fall under the *mare liberum*, or freedom of the high seas.[86] The freedoms of the high seas reflect all States' interest in these regions as, inter alia, navigation routes and fishing grounds and seek to guarantee equitable and universal access to marine resources.[87] States' activities in this region are nevertheless subject to certain obligations, most notably by the environmental protection provisions of the United Nations Convention on the Law of the Seas (UNCLOS).[88] These are again obligations of due diligence, however, rather than substantive standards of protection.

Second, non-living resources found on or beneath the seabed of the high seas (the Area) are considered to be the common heritage of humankind.[89] As such, any activities concerning the Area must "be carried out for the benefit of [hu]mankind as a whole, irrespective of the geographical location of states. . . and taking into particular consideration the interests and needs of developing states and of peoples who have not attained full independence or other self-governing status. . ."[90] To further this ambition, the UNCLOS established the International Seabed Authority (ISA), the primary purpose of which is to monitor deep seabed mining.[91] It is important to note that although environmental protection forms part of the ISA's remit,[92] this appears secondary to managing the commercial exploitation of deep seabed resources.[93]

---

[86] UNCLOS, *supra* note 83, arts. 87, 89.

[87] Douglas Guilfoyle, *The High Seas*, *in* THE OXFORD HANDBOOK ON THE LAW OF THE SEA 203 (Donald R. Rothwell, et al. eds., 2015).

[88] UNCLOS, *supra* note 83, arts 117-119. While in relation to fishing, these obligations are set out in Articles 117-119, additional environmental protection measures are contained in Part XII. Also relevant are the various regional marine agreements that have been adopted and treaties on specific issues, such as pollution. *See* RESEARCH HANDBOOK ON INTERNATIONAL MARINE ENVIRONMENTAL LAW, pts. II & V (Rosemary Rayfuse ed., 2015).

[89] *See* UNCLOS, *supra* note 83, arts. 133-91.

[90] *Id*. at art. 140.

[91] *Id*. at arts. 171-85.

[92] *See* Michael Lodge, *Protecting the Marine Environment of the Deep Seabed*, *in* RESEARCH HANDBOOK ON INTERNATIONAL MARINE ENVIRONMENTAL LAW, *supra* note 88, at 151-169. *See also* Responsibilities and Obligations of States with Respect to Activities in the Area, Case No. 17, Advisory Opinion, Feb. 1, 2011, ITLOS Rep. 2011, 10, ¶¶ 131-37, 141-50.

[93] UNCLOS, *supra* note 83, art. 157.

Determining how to regulate access to deep seabed resources proved contentious during the UNCLOS negotiation. Developed States favored a simple licensing system to which any State or commercial entity could apply for permission to mine the seabed.[94] Developing States, in contrast, argued that the principle of common heritage required exploitation of the seabed to be conducted by an international organization in which all States were equal partners.[95] A compromise system was agreed during the third United Nations Conference on the Law of the Sea, with mining sites divided into two groups. One group of sites are open on a "first-come, first-served" licensing system.[96] The other sites are reserved for developing States, with access to them made possible through the Enterprise, i.e., a subsidiary body of the ISA responsible for conducting activities in the Area.[97]

The Enterprise was established through Article 170 of the UNCLOS.[98] Its operation was largely suspended by the 1994 Agreement Relating to the Implementation of Part XI of the Convention,[99] however, with most of its functions currently being carried out by the ISA's Secretariat.[100] The 1994 Implementation Agreement also addressed developed States' concerns that they would be responsible for funding the Enterprise's operations by requiring that its initial activities be achieved through joint ventures.[101] One application for a joint venture between the Enterprise and Nautilus Minerals, a Canadian company, was received in 2013 and although the ISA Council (the executive body of the ISA responsible for overseeing the implementation of the Part XI of the UNCLOS) concluded that it was too soon for the Enterprise to function

---

[94] Michael Lodge, *The Deep Seabed*, in THE OXFORD HANDBOOK OF THE LAW OF THE SEA 238 (Donald Rothwell, et. al., eds) (2015).

[95] *Id*. (citations omitted).

[96] *Id*.

[97] *Id*. *See also* MYRON H. NORDQUIST, UNITED NATIONS CONVENTION ON THE LAW OF THE SEA 1982: A COMMENTARY 39-41 (2003).

[98] *See* UNCLOS, *supra* note 83, Annex IV.

[99] Agreement Relating to The Implementation of Part XI of the United Nations Convention on the Law of the Sea, July 28, 1994, 1836 U.N.T.S. 3.

[100] *See id.* at Annex, § 2.

[101] *Id.* at Annex, § 2(2).

independently of the Secretariat, further work has been done on the legal and financial implications of its intended operation.[102]

The law of the sea therefore provides two templates that could be applied to any life forms that exist on Venus and other celestial resources.[103] States could agree to view these as the common heritage of humankind and must therefore be utilized in a manner that benefits humanity as a whole. In theory, a case could be made for this in international law, as celestial resources are the only other context in which "common heritage" is used.[104] As I discuss at the end of this section, however, this position may not be sustainable. Alternatively, States could pursue an approach based on a principle of *caelum liberum*, or freedom of the stars, with the exploitation of celestial resources subject only to obligations of due diligence similar to those that have emerged in relation to the freedom of the high seas.

A number of agreements have been adopted concerning activities in outer space, two of which are relevant to the exploitation of celestial resources.[105] The first is the Outer Space Treaty.[106] This does not use the term "common heritage" in relation to non-terrestrial resources but can be read to implicitly endorse the principle, although there is by no means consensus on this point. Article I states that "[t]he exploration and use of outer space, including the

---

[102] Lodge, *supra* note 94, at 239. *See also Nautilus Minerals Propose Joint Venture with the Enterprise*, INT'L SEABED AUTHORITY, https://www.isa.org.jm/news/nautilus-minerals-propose-joint-venture-enterprise (last visited Mar. 12, 2021).

[103] Article 133 of the UNCLOS only includes non-living resources under the scope of "common heritage" has proven controversial following the discovery of deep-sea life forms that constitute potentially valuable genetic resources. UNCLOS *supra* note 83, art. 133. Through a somewhat strained interpretation of the UNCLOS, Dire Tladi suggests that living resources may be included within the meaning of Article 133. Dire Tladi, *Conservation and Sustainable Use of Marine Biodiversity in Areas Beyond National Jurisdiction: Towards an Implementing Agreement*, *in* RESEARCH HANDBOOK ON INTERNATIONAL MARINE ENVIRONMENTAL LAW, *supra* note 88, at 261-262. His arguments are flawed, however, because the wording of Article 133 is explicit and cannot reasonably be read to include living resources. Article 87 provides only an indicative list of the freedoms that States enjoy on the high seas and so can be said to include the exploitation of living resources found on the deep seabed.

[104] Other terms such as "common interest" have been applied, particularly in relation to the conservation of biodiversity. While providing a rationale for international action on conservation, however, such phrases lack the specific legal content of "common heritage." *See* BIRNIE, BOYLE & REDGWELL, *supra* note 81, at 657-62.

[105] SANDS & PEEL, *supra* note 21, at 290-91.

[106] Outer Space Treaty, *supra* note 35.

Moon and other celestial bodies, *shall be carried out for the benefit and in the interests of all countries*… and shall be the province of all [hu]mankind." [107] The Treaty's focus is on ensuring that unilateral actions are conducted in a manner that respects the interests of other States.[108] Article XI also commits States to informing the United Nations and the international scientific community, "to the greatest extent feasible and practicable," of the results of their activities.[109] Note, however, that the scope of Article XI is limited to the sharing of information, not the sharing of benefits resulting from the use of that information.[110]

More robust is the 1979 Agreement Governing Activities of States on the Moon and Other Celestial Bodies (Moon Agreement).[111] Article 1 makes it clear that provisions in the treaty that refer to the Moon also apply to other celestial bodies in the solar system unless these are subject to an alternative legal regime.[112] The central provision of the Moon Agreement is Article 11, which begins by confirming that "the Moon and its natural resources are the common heritage of [hu]mankind." [113] Although the Moon Agreement does not per se establish a formal institution to manage celestial resources for the benefit of humankind, States party have committed to create "an international regime" for this purpose and some form of institutional architecture will inevitably have to be established to oversee this. According to Article 11(7), the objectives of this regime will include:

> (a) The orderly and safe development of the natural resources of the Moon;
>
> (b) The rational management of those resources;
>
> (c) The expansion of opportunities in the use of those resources;

---

[107] *Id.* at art. I (emphasis added).
[108] *Id.* at art. IX.
[109] *Id.* at art. XI.
[110] *Id.*
[111] Agreement Governing the Activities of States on the Moon and Other Celestial Bodies art. 11(3), Dec. 18, 1979, 1363 U.N.T.S. 22 [hereinafter Moon Agreement].
[112] *Id.* at art. 1.
[113] *Id.* at art. 11(1).

> (d) An equitable sharing by all States Parties in the benefits derived from those resources, whereby the interests and needs of the developing countries, as well as the efforts of those countries which have contributed either directly or indirectly to the exploration of the Moon, shall be given special consideration. [114]

These provisions allow for consideration of issues such as those raised in this article. The reference to the "safe" development of celestial resources indicates that there is an important role for the precautionary principle in decisions relating to their use. Similarly, the use of the term "rational management" creates space for a more normative debate over whether celestial resources, particularly if they are lifeforms rather than minerals, should be exploited at all. Some may argue that it is not "rational" to exploit alien life under any circumstances.

Less clear is how subparagraph (d) would operate. The sharing of benefits resulting from the utilization of natural genetic resources has been addressed in the Nagoya Protocol to the Biodiversity Convention.[115] The operation of the Nagoya Protocol, however, rests on the agreement of mutually beneficial terms between the party seeking access to natural resources and the State (and potentially community) or origin.[116] This approach will clearly not work when the resources in question are not subject to national jurisdiction. One possible option would be to establish a body similar to the ISA's Enterprise. As experience under the ISA shows, however, developed States have proven reluctant to fund such communal endeavors and so its success would depend on the interest and capability of commercial entities.

Notwithstanding this apparent gap, the Moon Agreement constitutes a sound template for determining who "owns" any life forms that are brought back from Venus. While the interests of those parties that invest in exploration and collection efforts have "special consideration," it is clear that resources, including living resources, found on other planets in the solar system must be exploited for the

---

[114] *Id.* at art. 11(7).

[115] Biodiversity Convention - Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from Their Utilisation, Oct. 29, 2010, https://www.cbd.int/abs/ (last visited Jan. 25, 2021) [hereinafter Nagoya Protocol].

[116] *Id.* at art. 5.

benefit of humanity as a whole, not just those who have the financial and technical resources to acquire them. Unfortunately, the Moon Agreement has never enjoyed the widespread support of States actively engaged in space exploration. Since its negotiation, the Agreements' main proponents have been States that lack this capacity and are therefore concerned with ensuring that celestial resources are exploited equitably.[117] As such, the number of States that have ratified the Moon Agreement, and are consequently bound by its provisions, is just eighteen and excludes certain key States.[118] In the absence of additional ratifications, the only way the Moon Agreement's provisions could have wider legal effect would be if they crystallized as norms of customary international law. This would, inter alia, require sufficient State practice indicating that States considered celestial resources to be the common heritage of humankind,[119] but recent announcements from States that are actively considering exploiting the resources of outer space suggest that State practice is instead coalescing around a principle of *caelum liberum*.[120] This is concerning, not only from the perspective of ensuring equitable access for developing States to the considerable resources that exist in outer space, but as experience from the

---

[117] *See* Bin Cheng, *The Moon Treaty: Agreement Governing the Activities of States on the Moon and Other Celestial Bodies within the Solar System other than the Earth,* 33 CURRENT LEGAL PROBS. 213 (1980).

[118] *See* Comm. On the Peaceful Uses of Outer Space, Legal Subcomm., *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2019*, U.N. Doc. A/AC.105/C.2/2019/CRP.3 (Apr. 1, 2019). States that have not signed the treaty include the United States, the United Kingdom, China and Russia.

[119] JAMES CRAWFORD, BROWNLIE'S PRINCIPLES OF PUBLIC INTERNATIONAL LAW 24-27 (8th ed. 2012).

[120] NASA recently published the Artemis Accords, a proposed framework to govern activities in outer space. NASA, THE ARTEMIS ACCORDS: PRINCIPLES FOR COOPERATION IN THE CIVIL EXPLORATION AND USE OF THE MOON, MARS, COMETS, AND ASTEROIDS, NASA, https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf [hereinafter Artemis Accords]. Although these reaffirm Article II of the Outer Space Treaty (i.e. that extraction of resources does not constitute an exertion of sovereignty over celestial bodies), they cannot be said to endorse the view that the principle of common heritage applies to the use of celestial resources. *Id.* § 10. To date, ten countries in addition to the United States have agreed to the Artemis Accords. These include: Australia, Canada, Italy, Japan, Luxembourg, New Zealand, South Korea, the United Kingdom, the United Arab Emirates and Ukraine. Elizabeth Howell, *New Zealand Signs Artemis Accords to Urge Sustainability in Space Mining,* SPACE.COM (June 4, 2021), https://www.space.com/new-zealand-joins-artemis-accords-exploration-standards.

exploitation of marine resources in the high seas illustrates, because States have proven incapable of restricting their exploitation of commons resources to sustainable levels.[121]

V. ALIEN RIGHTS?

To talk of how alien lifeforms should be "owned" presupposes that they would be nothing more than resources for humans to exploit, but it is this anthropocentrism, the contentious assertion of humanity's dominance over nature, that is a root cause of the Earth's ecological crises.[122] It has proven to be a failed model for our relationships with other species and should not, therefore, be the starting point for our interactions with non-terrestrial lifeforms.[123] One alternative would be to recognize that such life forms have rights similar to those that we have granted ourselves.

That humanity is no more than equivalent to other species is at the heart of many ecocentric theories. Leopold's land-ethic, for example, views humans as equal members of a community that encompasses plants, animals and nonliving natural entities.[124] The land-ethic draws on the wider theory of deep ecology, one of the core tenets of which is biocentric equality, or the idea that all organisms are of equal intrinsic value as part of a coherent ecological whole.[125] Similarly, wild law views the recognition that all species are equally legitimate components of the Earth's natural systems as integral to their concept of Earth jurisprudence, i.e., a system of law and governance that maintains and enhances the relationships between society and nature.[126]

---

[121] YOSHIFUMI TANAKA, THE INTERNATIONAL LAW OF THE SEA 224-25 (2012).

[122] David Ehrenfeld, *Why Put a Value on Biodiversity?*, *in* BIODIVERSITY 212, 215 (Edward O. Wilson ed., 1988). Interestingly, the definition of "resources" in § 51301 of the US Asteroid Act is "an abiotic resource in situ in outer space, which would preclude life forms. Whether this is amended should alien life forms are ever discovered remains to be seen.

[123] AMOS, *supra* note 53, at 11.

[124] ALDO LEOPOLD, A SAND COUNTY ALMANAC AND SKETCHES HERE AND THERE 204 (1949).

[125] BILL DEVALL & GEORGE SESSIONS, DEEP ECOLOGY: LIVING AS IF NATURE MATTERED 67-69 (2007).

[126] Thomas Berry, *Rights of Earth: We Need a New Legal Framework Which Recognises the Rights of All Living Beings*, *in* EXPLORING WILD LAW: THE PHILOSOPHY OF EARTH JURISPRUDENCE 229 (Peter Burdon ed., 2011). On Earth jurisprudence, *see* CORMAN CULLINAN, WILD LAW: A MANIFESTO FOR EARTH JUSTICE 110-21 (2d ed. 2011).

Philosophically, the arguments of deep ecologists and wild law advocates may be compelling, but they are not without flaws. Deep ecology has been criticized for relying on individual, masculine experiences of "the wilderness" to redress societal environmental harms.[127] There are therefore limits to how it can guide societal actions that take increasing account of a wide range of social, cultural and collective experiences in devising holistic solutions to environmental challenges. Wild law, on the other hand, draws the norms and principles of Earth jurisprudence from the Great Jurisprudence, a set of axiomatic norms that are considered self-evidently correct but defy codification.[128] This undermines the utility of the Great Jurisprudence as a basis for law and policy.[129]

In terms of the specific suggestion that non-human species have legal rights, a key limitation is that nature cannot speak. Stone overcomes this problem by suggesting a form of guardianship. In short, an appropriate human actor is designated as a natural entity's guardian to represent it in legal and administrative matters.[130] This model has been used to recognize the legal rights of the Whanganui River and Te Urewera region in New Zealand, with representatives from the indigenous Maori community and New Zealand government serving as the guardian.[131] It is important not to overstate the significance of New Zealand's recognition of the rights of these natural entities. For the government, recognizing the "personhood" of these natural features was more about reconciling tensions with the Maori over who owns them than a formal endorsement of the idea that nature has rights.[132] It is nevertheless an important step towards a more widespread recognition

---

[127] VAL PLUMWOOD, FEMINISM AND THE MASTERY OF NATURE 1 (Teresa Brennan ed., 1993).

[128] CULLINAN, *supra* note 126, 77-94. Similarities can be drawn between the Great Jurisprudence and the theory of natural law as a basis for public international law. CRAWFORD, *supra* note 119, at 7-9. The key distinction is that norms of natural law primarily concern inter-state and inter-human relations, whereas the norms of the Great Jurisprudence concern humanity's individual and collective interactions with the environment.

[129] AMOS, *supra* note 53, at 235-36.

[130] Christopher Stone, SHOULD TREES HAVE STANDING? LAW, MORALITY AND THE ENVIRONMENT, 1-32 (3d ed. 2010).

[131] *See* Te Awa Tupua (Whanganui River Claims Settlement) Act 2017 (N.Z.); Te Urewera Act 2014 (N.Z.).

[132] *See generally* Katherine Sanders, *'Beyond Human Ownership'? Property, Power and Legal Personality for Nature in Aotearoa New Zealand*, 30 J. ENV'T L. 207 (2018).

of the rights of nature as it has overcome, in a practical manner, the conceptual hurdle ingrained in society that nature cannot have rights.[133]

This hurdle may not be as high when it comes to the rights of aliens. Although a legal basis for treating non-terrestrial lifeforms as resources subject to human ownership can be made out in international law, there has yet to be a wider normative debate over whether aliens have rights (or rather, whether humans should recognize the rights of aliens). The scope of most ecocentric theories is limited to Earth. It would not be a major intellectual leap, however, to expand their core concepts to include non-terrestrial life. The community in Leopold's land-ethic could be read to include other beings with which we share our solar system and wild law advocates should readily accept the need for humanity to respect the integrity of other planetary ecosystems.

A more problematic issue, and one that is confronted in scholarship on the value and rights of nature, is determining which non-human species "deserve" rights. This relates to how the value of different species is perceived, which in turn feeds into how society's relationships with them are manifested. In conservation practice, for example, charismatic species of megafauna, such as the polar bear (*Ursus maritimus*), are used as flagship species to rally public support and deliver broader messages about the perilous state of nature. While a legitimate marketing tool,[134] however, the use of flagship species has been shown to have a detrimental effect on wider conservation efforts, as it can create the false perception that endangered species that do not enjoy flagship status are not at risk.[135]

A flagship approach can also be identified in the law concerning nature's rights and the wider animal rights movement, with certain species that are regarded as similarly sentient to humans, notably primates and cetaceans, being the principal subjects of

---

[133] AMOS, *supra* note 53, at 239-47.

[134] Robert J. Smith, Diogo Veríssimo & Douglas C. MacMillan, *Marketing and Conservation: How to Lose Friends and Influence People*, *in* TRADE-OFFS BETWEEN ANIMAL WELFARE AND CONSERVATION IN LAW AND POLICY 219 (Nigel Leader-Williams et al. eds., 2010)

[135] *See* Leo R. Douglas & Gary Winkel, *The Flipside of the Flagship*, 23 BIODIVERSITY & CONSERVATION 979 (2014).

legal disputes and academic debate.[136] The appeal of using such species is clear. Both are considered to have high degrees of cognitive and emotional intelligence,[137] but this marks them out as being different to other species, not better than them. Framing animal rights arguments in this arbitrary, anthropocentric manner undermines the wider philosophy, inherent to ecocentrism, that all species, regardless of evolutionary advancement, have rights.

Our perceptions of the value of other species, and the implications of this for how they are treated in legal and socio-political debates on their status, will inevitably influence our relationships with non-terrestrial lifeforms. I would hope and expect that an E.T.-like species that has achieved a level of biological and social evolution similar to our own would be widely recognized as having rights. The Venusian lifeforms, if they exist, will be microscopic, however, and bacteria on Earth are clearly not viewed in the same way as primates and whales. However, that humans fail to appreciate the unique value of bacteria does not negate the argument, from an ecocentric perspective, that they are as entitled to being recognized as the holders of formal legal rights as other species.[138] Following this line of reasoning, it is wrong for society to assume ownership of extra-terrestrial resources, regardless of whether their exploitation is pursued for the benefit of humanity as a whole, simply because we appear to be more evolved than them.[139]

If it is accepted that our starting point in interacting with non-terrestrial lifeforms is a recognition of their rights, the next question is: what rights do aliens have? For the sake of completeness, it is necessary to briefly consider what rights we may perceive more advanced alien species to have, although this is perhaps venturing too far into the realms of conjecture. An obvious source would be

---

[136] *See, e.g.,* Davidson Anestal, *Chimpanzees in Court: Limited Legal Personhood Recognition for Standing to Challenge Captivity and Abuse*, 15 DARTMOUTH L. J. 75 (2017); Anthony D'Amato & Sudhir K. Chopra, *Whales: Their Emerging Right to Life*, 85 AM. J. INT'L L. 21 (1991).

[137] *See, e.g.,* Lori Marino, *Brain Structure and Intelligence in Cetaceans*, *in* WHALES AND DOLPHINS: COGNITION, CULTURE, CONSERVATION AND HUMAN PERCEPTIONS (Philippa Brakes & Mark Peter Simmonds eds., 2011).

[138] This reflects ideas of intrinsic value (i.e. the belief that all beings have internal value independent from how they might be used or perceived by others). AMOS, *supra* note 53, at 20-22.

[139] To approach this issue from a different position, would we accept the role of resources if we encountered a species that was more advanced than ourselves?

the wealth of law, policy and literature on human rights. This includes individual rights, such as the right to life, but also collective rights. A number of instruments recognize indigenous communities' right to continue to practice their traditional ways of life,[140] for example, and a similar respect for alternative but equally legitimate social systems and practices would appear to be a sound basis for our engagement with non-terrestrial species.

In terms of microscopic lifeforms, which may be of more immediate concern, guidance can be drawn from ecocentric literature. A core principle of wild law is "wholeness," the idea that everything is at the same time operating individually but also as a constituent part of a coherent, ecological whole. Maintaining the ecological integrity of social and natural systems is therefore considered paramount and, as a corollary to this, respecting beings' rights to that internal and external ecological integrity.[141] It is also important to note that rights-based approaches to defining our relationships with non-terrestrial species do not necessarily preclude their exploitation. A distinction can be drawn, for example, between society's right to exploit species, which we arguably have,[142] and the right to exploit species to the extent that they are no longer self-sustaining, which we do not.[143] This again speaks to the idea of ecological integrity and illustrates how it may be given practical effect. As it is in relation to terrestrial species, this may be a pragmatic way of reconciling legitimate ethical concerns for alien species and the societal realities of scientific and commercial endeavor.

Less contested (in a legal sense) than recognizing that other species have rights is the suggestion that consideration should be given to the welfare of alien life forms that are captured, brought back to Earth and subsequently exploited. Imposing welfare standards on these activities is a poor substitute for recognizing the

---

[140] *See, e.g.*, INTERNATIONAL LABOUR ORGANIZATION, C169 INDIGENOUS AND TRIBAL PEOPLES CONVENTION, arts. 7, 8 (1989), https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_ILO_CODE:C169.

[141] Ian Mason, *One In All: Principles and Characteristics of Earth Jurisprudence*, *in* EXPLORING WILD LAW: THE PHILOSOPHY OF EARTH JURISPRUDENCE 36-37 (Peter Burdon ed., 2011).

[142] This is as much based on the consequences of our biological evolution as a species that eats meat as it is a fact of law. It is of course qualified by considerations relating to how we exploit other species and the reasons why we are doing so.

[143] AMOS, *supra* note 53, at 243.

rights of non-human life,[144] but benefits from a stronger basis in international law. It may be argued that a general principle of international law promoting animal welfare exists, although this would not hold States to specific standards of animal welfare.[145] Instead, and to the same extent that sustainable development exists as a general principle of international law,[146] decision-makers may only be required to reconsider policies to take greater account of welfare concerns.[147]

Regardless of whether animal welfare is accepted as a general principle of international law, it is the case that a number of environmental agreements address animal welfare in a range of contexts.[148] These include the capturing and taking of animals from the wild and the transportation of animals and their treatment in captivity. Multiple agreements prohibit unnecessarily violent, painful or indiscriminate methods of capture. Article 8 of the Bern Convention, for example, calls on States to outlaw the use of, inter alia, explosives, gassing and poison in the hunting of mammals.[149] The prohibition of such activities responds not only to ethical concerns over the suffering of individual animals, but the impact they may have on conservation efforts.[150]

Measures to ensure that animals are "comfortable" during transit are common in regimes that provide for the transboundary movement of animals. The Convention on International Trade in Endangered Species of Fauna and Flora[151] only permits the transportation of species listed in its Appendices if the relevant national authority has determined that they will be prepared and shipped so as to "minimize the risk of injury, damage to health or cruel treatment."[152] The wellbeing of non-terrestrial life forms during transit is clearly an important consideration, given the lengths of time

---

[144] *See generally* David Sytzbel, *The Rights of Animal Persons*, 4 ANIMAL LIBERATION PHIL. AND POL'Y J. 1 (2006).

[145] BOWMAN, DAVIES & REDGWELL, *supra* note 74, at 676-80.

[146] BIRNIE, BOYLE & REDGWELL, *supra* note 81, at 126-27.

[147] BOWMAN, DAVIES & REDGWELL, *supra* note 74, at 680-81.

[148] *Id.* at 682-95.

[149] Council of Europe, Convention on the Conservation of European Wildlife and Natural Habitats art. 8, Sept. 19, 1979, 19 I.L.M. 15 (Sept. 19, 1979). *See also id.* at art. 10.

[150] Harrop, *supra* note 63, at 124-25.

[151] Convention on International Trade in Endangered Species of Wild Fauna and Flora, Mar. 3, 1973, T.I.A.S. No. 11,079, 993 U.N.T.S. 243.

[152] *Id.* at arts. III(2)(c), IV(2)(c), V(2)(b).

involved. With regards to Venus, it would take a period of months for a vessel to return. As we currently have no idea how the life forms may be interacting with what is a very different environment, there are questions over how this would be achieved without causing them harm. This further highlights the importance of underpinning such endeavors with a robust interpretation of the precautionary principle. Responding appropriately to the inherent uncertainties of bringing extra-terrestrial lifeforms to Earth is about also minimizing the risks to them.

Research on species for conservation is generally permitted within international environmental law, although this can be controversial if lethal methods are used.[153] However, in the case of alien life forms, the considerable expense in acquiring them would be a powerful incentive for keeping the specimens alive. In Europe, animal experimentation is strictly regulated under the 1986 Council of Europe Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes (1986 Convention).[154] Article 2 permits animal experimentation for scientific research that may not necessarily relate to the protection of the environment, and a similar measure would provide a legal basis for experimenting on alien lifeforms simply to understand their ecology and biochemistry. [155]

There are two points to note regarding the 1986 Convention. First, Article 5 requires that any animal that is to be used in an experiment is "provided with accommodation, an environment, at least a minimum degree of freedom of movement, food, water and care, appropriate to its health and well-being."[156] Second, the 1986 Convention does not prohibit any experiment that might cause pain or other distress to animals. Rather, it merely requires States to

---

[153] Japan's "scientific" whaling program made excessive use of lethal research methods was one reason why it was found to fall outside the scientific research exception to the International Convention for the Regulation of Whaling's moratorium on commercial whaling. Whaling in the Antarctic *(*Austl. v. Japan, N.Z. intervening*)*, Judgement, 2014 I.C.J. 226, ¶ 226 (Mar. 31). *See also* International Convention for the Regulation of Whaling, Dec. 2, 1946, 62 Stat. (2)1716, 161 U.N.T.S 72, as amended by the Protocol to the International Convention for the Regulation of Whaling, Nov. 19, 1956, T.I.A.S. 4228, 338 U.N.T.S 336.

[154] Council of Europe, European Convention for the Protection of Vertebrate Animals used for Experimental and Other Scientific Purposes, Mar. 18. 1986, E.T.S. No. 123.

[155] *Id.* at art 2.

[156] *Id.* at art. 5. *See also id.* at Appendix A.

ensure that any procedures take all practicable steps to minimize this.[157] In each case, that Venusian lifeforms may have evolved with a unique biochemistry raises problems in fulfilling similar obligations if they were adopted in relation to non-terrestrial beings. As noted in the first part of this article, the atmosphere in which the Venusian lifeforms would live is extremely acidic. To replicate it poses significant human and environmental health concerns, but if the lifeforms have evolved with a completely different biochemistry to terrestrial life this may be the only way to ensure their wellbeing. In terms of their welfare during procedures, their potentially unique biochemistry means that there will, at least initially, be limits to our understanding of what causes them pain or distress.

VI. CONCLUSION

The unusual readings from Venus may turn out to be the results of a previously unknown abiotic process. The arguments set out in this article will therefore be little more than speculation on a hypothetical scenario; academically interesting but of little practical merit. Nevertheless, that life exists on Venus cannot be ruled out and scientists continue to search our solar system and beyond for extra-terrestrial beings. As this article has shown, the law has an important role to play if and when those efforts prove successful and, although a specific legal regime has yet to emerge, guidance on what form this should take can be drawn from pre-existing rules of international environmental law.

Precaution should be central to this regime due to the inherent uncertainties and risks in exposing Earth's environment to alien lifeforms. The Biodiversity Convention's Guiding Principles on IAS provide a template for responding to these risks, although would need to be enhanced. In particular, a stronger interpretation of the precautionary principle than is typically seen in the law should underpin the legal framework and measures to address the challenges in managing microbial lifeforms need to be devised.

In relation to the question of ownership of non-terrestrial resources, the law of the sea provides two models. Celestial resources could be considered to fall under a principle of *caelum liberum*, equivalent to the rights States enjoy under the freedom of the high

---

[157] *Id.* at art. 8.

seas. Alternatively, States could reaffirm that the principle of common heritage applies and establish an institution similar to the ISA to ensure that all States benefit from the exploitation of these resources. Under the 1979 Moon Agreement, it is the latter position which currently persists in international law. However, support for this position appears questionable and recent State practice suggests that a principle of *caelum liberum* is emerging.

To claim ownership over lifeforms on another planet would, however, be the height of anthropocentricity and a worrying indicator that we intend to pursue the same destructive behaviors in the stars as we have on our own planet. Drawing on ecocentric theories, an argument can be made that we should instead recognize and respect the rights of alien lifeforms. At the very least, consideration should be given to how we can ensure their welfare if we attempt to bring them to Earth. The potential discovery of life on Venus provides opportunities not only for scientific endeavor and societal advancement, but to redefine our relationships with other species.

TOWARDS FULL AND OPEN ACCESS: CHALLENGES AND OPPORTUNITIES FOR THE LEGAL INTEROPERABILITY OF EARTH OBSERVATION DATA

Marco Borghi[*]

ABSTRACT

The evolving quality and quantity of Earth observation data enables an ever-increasingly profound knowledge of the climate crisis, enhancing the efficacy of mitigation strategies as well as the management of risk and natural or man-made disasters. The environmental emergency, while having severe global effects, will not affect all States equally. Poorer, less developed countries (LDCs) are predicted to face severe challenges directly related to climate change and will experience the large majority of climate-induced human mobility, be it internally displaced people or climate migrants. Open data policies regarding Earth observation, specifically those tackling the causes and effects of the climate emergency, are thus an important tool to guarantee access to LDCs without independent access to satellite imagery.

This article will assess the challenges which initiatives such as the Global Earth Observation System of Systems (GEOSS) face in their efforts to establish open data policies on satellite imagery data with full legal interoperability. Various obstacles will be identified and discussed, including: those relating to the definitions of key terms in policy and legal instruments; challenges arising from the different applicable jurisdictions; the wide range of exceptions

[*] Marco Borghi is a graduate of Durham University and the London School of Economics, specializing in History and International Relations. He has obtained an Advanced Master's at KU Leuven (Belgium) majoring in Space Law and Policy. After collaborating with the Space Economy Evolution Lab at SDA Bocconi (Milan, Italy) as research assistant, he now works as Consultant for the Space Sector with SpaceTec Partners. The conclusions contained in this article were presented at the Young Lawyer's Symposium organized by ESA's European Centre for Space Law in June 2020.

to open data which have been called upon to restrict access; and restrictions in respect of copyrightable material. The legal uncertainty arising from the *sui generis* database rights providing exclusive rights to parts of compilations of information, even of non-copyrightable factual data, will be assessed. Ultimately, it will be argued that the further consolidation of a system of waivers and licenses is warranted in order to better ensure access to data useful for the fight against climate change and environmental crises to the widest user base possible.

I. INTRODUCTION

As climate change continues to fuel environmental disasters both in the short term, such as fires and floods, and in the long-term, such as desertification and deforestation, space-based Earth Observation (EO) has become a fundamental element of climate research and disaster management. The unique capabilities of satellites are well suited to tackle the environmental emergency, generating vast amounts of accurate and reliable data over long periods of time. Exploiting the value of these observations to their highest potential requires the technical and legal interoperability of data and information acquired through EO activities. This is defined as ensuring access with the fewest possible restrictions, of any variety, to multiple users and allowing for derivative and integrative works to be created through analyses of various data sources.

This article discusses the challenges and opportunities that characterize open data[1] policies, such as the Global Earth Observation System of Systems[2] (GEOSS), set up through the Group on

---

[1] The term open data has been conceptually described as data that is "accessible public data that people, companies, and organizations can use to launch new ventures, analyse patters and trends, make data-driven decisions, and solve complex problems." JOEL GURIN, OPEN DATA NOW 9 (2014). The International Open Data Charter similarly defines open data as "digital data that is made available with the technical and legal characteristics necessary for it to be freely used, reused, and redistributed by anyone, anytime, anywhere." International Open Data Charter, opening clause, https://opendatacharter.net/wp-content/uploads/2015/10/opendatacharter-charter_F.pdf [hereinafter Open Data Charter].

[2] *About GEOSS,* GROUP ON EARTH OBSERVATIONS, https://earthobservations.org/geoss.php (last visited June 19, 2021).

Earth Observation[3] (GEO), as well as the International Charter Space and Major Disasters.[4] First, this article will present a brief overview of the unique technical characteristics of EO activities. Second, the relevance of open data for climate action will be discussed, focusing on the provisions contained in the United Nations Framework Convention on Climate Change[5] (UNFCCC). Third, the differences and inequalities in normative definitions of data and information in various jurisdictions and international frameworks will be tackled, as will the various approaches to the establishment of open data. Specific reference will be given to GEOSS, the International Charter Space and Major Disasters and Copernicus,[6] as they are the most ambitious initiatives with active participation from a multitude of space actors—public and private as well as large and small alike.

Fourth, the challenge to open data policies posed by shutter control will be assessed, focusing upon the exemptions to full and open access for the purposes of national security and international relations. Here, it will be argued that while this practice can be problematic, mitigating factors such as global best practices following the United Nations Remote Sensing Principles[7] (Remote Sensing Principles) espoused to by initiatives such as GEO have caused some reticence in the systematic restriction of access, lest States be seen as not following the established non-discriminatory principle.

---

[3] The Group on Earth Observation is "a partnership of more than 100 national governments and in excess of 100 Participating Organizations that envisions a future where decisions and actions for the benefit of humankind are informed by coordinated, comprehensive and sustained Earth observations." GROUP ON EARTH OBSERVATIONS, https://earthobservations.org/geo_community.php (last visited June 19, 2021).

[4] INT'L CHARTER SPACE & MAJOR DISASTERS, https://disasterscharter.org/web/guest/home;jsessionid=15E3D70FF2C4A69E033A2E44C76CAD8C.APP1 (last visited June 19, 2021).

[5] U.N. Framework Convention on Climate Change, June 4, 1992, FCCC/INFORMAL/84 GE.05-62220(E)200705, https://unfccc.int/resource/docs/convkp/conveng.pdf [hereinafter UNFCCC].

[6] "Copernicus is the European Union's Earth observation programme, looking at our planet and its environment to benefit all European citizens. It offers information services that draw from satellite Earth Observation and in-situ (non-space) data." COPERNICUS, https://www.copernicus.eu/en/about-copernicus (Last visited June 19, 2021).

[7] G.A. Res. 41/65, Principles Relating to Remote Sensing of the Earth from Outer Space (Dec. 3, 1986) [hereinafter U.N. Remote Sensing Principles].

Fifth, attention will be drawn to the relationship between open data and intellectual property rights (IPR) in the form of both copyright and the *sui generis* database protection. IPR can pose significant constraints to open data, increasing uncertainty and thus damaging the legal interoperability of large scale initiatives such as GEOSS. Key differences in national legislations and their implications will be evinced to examine the challenge posed to open data. Sixth, the possibility of employing a standardized system of licenses in order to alleviate the obstacles to interoperability generated by IPR will be discussed. Creative Commons[8] licenses will be identified as solutions for the short term, though a specific license valid in as many jurisdictions as possible would be of great value for the reduction of legal uncertainty. Finally, a conclusion will be offered summarizing the key findings of the article.

II. TECHNICAL CHARACTERISTICS OF EARTH OBSERVATION ACTIVITIES

In order to frame the discussion surrounding open data for EO, a brief introduction of the technical characteristics of these activities is warranted due to their nature and peculiarities.[9] EO data is collected by detection, quantification and recording of electromagnetic energy reflected or emitted by the Earth through remote sensing.[10] Two general categories of satellites performing these activities can be identified: active and passive.[11] The former generates electromagnetic waves and collect data analyzing the reflection of

---

[8] "Creative Commons is a nonprofit organization that helps overcome legal obstacles to the sharing of knowledge and creativity to address the world's pressing challenges." CREATIVE COMMONS, https://creativecommons.org/about/ (last visited June 19, 2021). The organization

> [p]rovide[s] Creative Commons licenses and public domain tools that give every person and organization in the world a free, simple, and standardized way to grant copyright permissions for creative and academic works; ensure proper attribution; and allow others to copy, distribute, and make use of those works

Id.

[9] For an excellent introduction to scientific and technical concepts of remote sensing, see SIAMAK KHORRAM ET AL., REMOTE SENSING (2012), which the author relied on extensively in preparing this portion of the article.

[10] *See* Fabio Tronchetti, *Legal Aspects of Satellite Remote Sensing,* 501 *in* HANDBOOK OF SPACE LAW (Frans Von Der Dunk & Fabio Tronchetti, eds. 2015).

[11] *Id.*

these off their targets. The latter do not have such capabilities, but instead detect radiation reflected or emitted by the Earth.[12] The combination of active and passive sensing, coupled with the capability to analyses radiation in each band of the electromagnetic spectrum, provide EO activities with extreme versatility. In the context of action against climate change and environmental crises, EO has become a driving factor in the furthering of knowledge of the emergency through the long-term monitoring of fundamental anthropogenic and natural variables, as well as greatly enhancing the effectiveness of mitigation efforts.[13]

The quality and quantity of remote sensing imagery is in constant evolution, as are the methods of processing and storing of data and information. For instance, cloud computing and machine learning have increasingly become areas of significant interest and investments, furthering the practice of "Big EO Data."[14] Two major factors which impact the scientific, economic and strategic value of satellite imagery are resolution and orbit altitude.[15] The former relates to the definition of the image; it describes the limits in the size of discernible objects. The latter also has a significant impact on the possibilities of remote sensing, as a lower altitude will provide for better spatial resolution but a narrower area coverage.[16] As Youssef Sneifer noted, this factor often separated military and commercial activities due to their diverging targets and objectives, as "narrow vision lowers the commercial value of the image, makes it unattractive for commercial users, and shortens the life of the satellite."[17] However, the increasing prevalence of dual use satellites has blurred this distinction.

Data acquired by satellites in orbit is sent via telemetry to ground stations, where it is processed and often corrected or

---

[12] *Id.*

[13] See e.g. Jun Yang et al., *The Role of Satellite Remote Sensing in Climate Change Studies*, 3 NATURE CLIMATE CHANGE 875, 875-83 (2013)..

[14] Yao Xiaochuang et al., *Enabling the Big Earth Observation Data via Cloud Computing and DGGS: Opportunities and Challenges*, 12 REMOTE SENSING 1 (2020).

[15] *See* Tronchetti, *supra* note 10, at 503-4.

[16] *See* WIM H. BAKKER ET AL., PRINCIPLES OF REMOTE SENSING 124 (Klaus Tempfli et al. eds., 4th ed. 2009); Ann M. Florini, *The Opening Skies: Third-Party Imaging Satellites and U.S. Security*, 13 INT'L SEC. 91, 91-95 (1988).

[17] Youssef Sneifer, *The Implications of National Security Safeguards on the Commercialization of Remote Sensing Imagery*, 19 SEATTLE UNIV. LAW REV. 539, 543-544 (1996).

calibrated with computer analyses as well as *in situ* data. Pixel matching using precise geographic coordinates to ensure accurate portrayal of the area analyzed is an example of this initial processing.[18] Clearly, these procedures are dictated by the nature and target of the observations. Different studies will lead to various degrees of processing, which, as will be discussed below, might produce far-reaching implications on the legal status of the processed data.

One commonality amongst the various approaches to EO is the significant generation of technical, societal and commercial value characterizing the chain from raw data to information products. The scientific, socioeconomic, political and military benefits of independent EO capabilities are well documented.[19] Access to space has become increasingly widespread and as a result of its value generation potential, remote sensing is one of the primary objectives of newborn space agencies, especially in developing countries.[20] Thus, a multitude of new space actors, both private and public, have arisen. For instance, 2019 saw the launch of NARSSCube-2,[21] Egypt's first domestically built satellite,[22] as well as ETRSS-1, the first Ethiopian owned and operated satellite, built and launched by China.[23] Unsurprisingly, both conduct EO activities.

Open data for EO can have a two-pronged benefit. First, States and organizations which do not yet possess the technological and economic capacities for autonomous activities are still able to benefit from the unique possibilities offered by outer space. Use and re-

---

[18] BAKKER ET AL., *supra* note 16, at 311-12.

[19] *See e.g.* SATELLITE EARTH OBSERVATIONS AND THEIR IMPACT ON SOCIETY AND POLICY, (Masami Onoda & Oran R. Young, eds. 2017); Dario Sgobbi et. al., *Earth Observation for Defense*, in HANDBOOK OF SPACE SECURITY (Kai-Uwe Schrogel et. Al., eds. 2015).

[20] *See* Neel V. Patel, *There Has Never Been a Better Time to Start a Small Space Agency,* TECH. REV. (Nov. 26, 2019), https://www.technologyreview.com/2019/11/26/131822/why-its-now-the-perfect-time-to-start-a-small-space-agency/.

[21] *NARSScube 1, 2 (Egycubesat 1)*, GUNTER'S SPACE PAGE, https://space.skyrocket.de/doc_sdat/narsscube-1.htm (last visited Mar. 24, 2021).

[22] *Egypt to Launch Two Experimental Satellites Ahead of a Planned NGEO Constellation*, SPACE IN AFRICA (Mar. 13, 2020), https://africanews.space/egypt-to-launch-two-experimental-satellites-ahead-of-a-planned-ngeo-constellation/.

[23] *ETRSS1*, GUNTER'S SPACE PAGE, https://africanews.space/egypt-to-launch-two-experimental-satellites-ahead-of-a-planned-ngeo-constellation/ (last visited Mar. 24, 2021).

use of EO datasets with the least amount of restrictions has become integral to a variety of applications and activities, both scientific and commercial. Second, open data might encourage further international collaboration and partnerships amongst public and private entities in order to shore up the necessary competencies required to tackle global challenges, of which the climate crisis is the foremost example.[24]

To better complement efforts within the scope of national, regional and global agendas—of which the United Nations Sustainable Development Goals[25] (SDGs) are a primary example—legal and technical interoperability of EO data and information must be furthered, ensuring the full harnessing of its potential by the widest audience of users possible. Specifically, some obstacles to the technical ease of use which must be negotiated include "EO data accessibility and handling; EO data validity and fitness for purpose; integration of information from different data streams; and data continuity."[26] These challenges, coupled with those arising from the legal regimes in place which will be further discussed below, have been tackled by multiple international and intergovernmental organizations. These efforts are most clearly embodied in work of the GEO as well as the Committee on Earth Observation Satellites[27] (CEOS).

---

[24] For an interesting discussion on how international collaboration within the space sector is of paramount importance to Africa's development, see Gbenga Oduntan, *Geospatial Sciences and Space Law: Legal Aspects of Earth Observation, Remote Sensing and Geoscientific Ground Investigations in Africa*, 9 GEOSCI. 149 (2019).

[25] G.A. Res. 70/1 (Sept. 25, 2015). *See also* UNITED NATIONS, https://sdgs.un.org/goals (last visited June 19, 2021).

[26] Trevor Dhu et al., *National Open Data Cubes and Their Contribution to Country-Level Development Policies and Practices*, 4 DATA 144, 2 (2019). For a more technical discussion on the developments and implementation of EO Data Cubes aimed at efficiently handling Big Earth Observation, see Gregory Giuliani et al., *Earth Observation Open Science: Enhancing Reproducible Science Using Data Cubes*, 4 DATA 147 (2019).

[27] The Committee on Earth Observation Satellites

> was established in September, 1984 in response to a recommendation from a Panel of Experts on Remote Sensing from Space and set up under the aegis of the G7 Economic Summit of Industrial Nations Working Group on Growth, Technology, and Employment. This Panel recognized the multidisciplinary nature of space-based Earth observations and the value of coordinating international Earth observation efforts to benefit society.

COMM. ON EARTH OBSERVATION SATELLITES, https://ceos.org/about-ceos/overview/ (last visited June 19, 2021).

III. RELEVANCE OF OPEN DATA TO CLIMATE ACTION

Despite controversial political disputes on the causes and effects of climate change, unequivocal evidence on the environmental emergency has been collected for years.[28] Increasingly, it has become evident that in order to obtain the information needed for accurate climate monitoring, an extensive satellite component is essential.[29] While integration with *in situ* observations is required for a holistic and comprehensive analysis, the satellite component offers a unique advantage: the capacity to build datasets with decades worth of observations while providing constant, up to date and reliable information.[30] The versatility of EO thus enables research into the causes and threats of climate change and increased effectiveness of mitigation strategies.

The unique value of EO for climate action has thus prompted efforts for the establishment of an "architecture calling for a constellation of research and operational satellites, a broad, open data-sharing policy, and contingency planning."[31] Within the context of climate action at large, the UNFCCC essentially established the commitment of States to employ open data regimes.[32] Parties in the framework are called to, among other things:

> Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system…
>
> Promote and cooperate in the full, open and prompt exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate

---

[28] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014 SYNTHESIS REPORT SUMMARY FOR POLICYMAKERS (2014), https://www.ipcc.ch/site/assets/uploads/2018/02/AR5_SYR_FINAL_SPM.pdf.

[29] MARK DOWELL ET AL., STRATEGY TOWARDS AN ARCHITECTURE FOR CLIMATE MONITORING FROM SPACE 7 (2013), https://ceos.org/document_management/Meetings/COP-21/COP-21_2015/Strategy-Towards-Architecture-for-Climate-Monitoring-from-Space.pdf.

[30] U.N. OFF. FOR OUTER SPACE AFF., SPACE AND CLIMATE CHANGE: USE OF SPACE-BASED TECHNOLOGIES IN THE UNITED NATIONS SYSTEM 29-31 (2011), https://library.wmo.int/doc_num.php?explnum_id=7750.

[31] DOWELL ET AL., *supra* note 29, at 7.

[32] UNFCCC, *supra* note 5, art. 5(b).

.

> change, and to the economic and social consequences of various response strategies.[33]

Principles of openness are restated in Article 5, which commits States to support international and intergovernmental efforts to strengthen technical capabilities with specific concern to developing countries, as well as "promote access to, and the exchange of, data and analyses thereof obtained."[34]

The relevance of open data goes beyond just these commitments, as the UNFCCC expands upon the "common but differentiated responsibilities" of developed and developing States.[35] To this effect, the Preamble of the Convention acknowledges the need for "the widest cooperation by all countries and their participation in an effective and appropriate international response, in accordance with their common but differentiated responsibilities and respective capabilities."[36] Moreover, at the sixteenth session of the Conference of the Parties to the UNFCCC (COP 16 held in Cancun, Mexico in 2010) the parties agreed to a procedure for developing countries to submit medium and long-term National Adaptation Plans (NAPs) in order to combat the adverse effects of climate change.[37] Support mechanisms for NAP implementation through financing, capacity building and technology transfer is were later set out by COP 17 in 2011, with financial aid being further reinforced by the Green Climate Fund through its Readiness and Preparatory Support Programme. [38] In both the combating of the climate emergency at large and in preventing or managing environmental crises, access to long-term, reliable and accurate data becomes fundamental.

---

[33] *Id*. at art. 4(1)(g), (h).

[34] *Id*. at art. 5(b).

[35] *Id*. at Preamble.

[36] *Id*. This is further expanded in Article 3, establishing the responsibilities of developed States to "take the lead in combating climate change." *Id.* at art. 3.

[37] "Report of the Conference of the Parties on its sixteenth session, held in Cancun from 29 November to 10 December 2010", United Nations Framework Convention on Climate Change, FCCC/CP/2010/7/Add.1, available at https://undocs.org/en/FCCC/CP/2010/7/Add.1. See especially paragraphs 13-16.

[38] Report of the Conference of the Parties on its seventeenth session, held in Durban from 28 November to 11 December 2011, United Nations Framework Convention on Climate Change, FCCC/CP/2011/9/Add.1, Decision 5/CP.17, available at https://undocs.org/FCCC/CP/2011/9/Add.1, Report of the thirteenth meeting of the Board, 28-30 June 2016, GCF/B.13/33, Decision B.13/09. The Green Climate Fund Executive Director can approve funding up to $3 million per country.

It appears clear that a broad, full and open information sharing regime is thus required for developing States which do not yet possess independent EO capabilities to benefit from satellite observations. This is indeed recognized within the scope of NAPs, and it thus becomes evident that operating EO activities through open data, thus enabling developing countries to better plan their mitigation strategies, falls under the responsibilities of spacefaring States as set forth in the UNFCCC.[39]

Moreover, open data is well suited to further the SDGs due to the versatility and great potential for integration of multiple data sources. Climate action (Goal 13) is an obvious topic, though others such as Cities (Goal 11) and Life on Land (Goal 15) will also necessarily depend on EO activities.[40] The achievement of these goals for the 2030 Agenda for Sustainable Development[41] will partly depend on the establishment and development of extensive practices promoting the full and open access to data and information allowing for independent derivative and integrative works.[42]

IV. NORMATIVE DEFINITIONS

The great variety in the definitions of key terms related to EO activities and approaches to open data policies offer an initial challenge to legal interoperability, understood as the achievement of full access to both computer interpretable and human understandable data through a regime establishing legal certainties.[43] An overview of applicable international provisions and national laws in

---

[39] UNFCCC, *supra* note 5, art. 3.

[40] G.A. Res. 70/1, (Sept. 25, 2015). *See* Zhan Qingming et al., *Quality Assessment for Geo-spatial Objects Derived from Remotely Sensed Data*, 26 INT'L J. REMOTE SENSING 2953 (2005).

[41] G.A. Res. 70/1 (Sept. 25, 2015). *See Transforming Our World: the 2030 Agenda for Sustainable Development,* UNITED NATIONS, https://sdgs.un.org/2030agenda (last visited June 19, 2021).

[42] Alyssa K. Whitecraft et al., *No Pixel Left Behind: Toward Integrating Earth Observations for Agriculture into the United Nations Sustainable Development Goals Framework*, 235 REMOTE SENSING ENV'T 1(2019); MARC PAGANINI ET AL., SATELLITE EARTH OBSERVATIONS IN SUPPORT OF THE SUSTAINABLE DEVELOPMENT GOALS (2018), http://eohandbook.com/sdg/files/CEOS_EOHB_2018_SDG.pdf.

[43] While a harmonised international legal regime would greatly help to achieve this goal, it does not represent a prerequisite for its establishment. *See* Amedeo Santosuosso & Alessandra Malerba, *Legal Interoperability as a Comprehensive Concept in Transnational Law*, 6 LAW. INNOVATION & TECH. 51 (2014).

major spacefaring States is thus warranted. The interdependence between primary data, processed data and information will be discussed first, highlighting salient differences in the understanding of these terms in various jurisdictions and international frameworks. Different approaches to open data policies will also be discussed, focusing on GEOSS, the International Charter Space and Major Disasters and Copernicus.

A. Data and Information

A formal international legal regime setting forth definitions of key terms related to EO activities is lacking, as no treaties or conventions have been so far concluded. The most pertinent document tackling these issues is the Principles Relating to Remote Sensing of the Earth from Outer Space, adopted by the United Nations General Assembly in 1986.[44] In Principle I, a clear distinction among the terms "primary data," "processed data" and "analysed information" is made, depending on the degree of processing applied.[45] Thus, the first term defines the "raw data that are acquired by remote sensors" transmitted or delivered through telemetry to ground stations.[46] "Processed data" is defined as "products resulting from the processing of the primary data" which allows for their usability.[47] Finally, "analysed information" refers to "the information which results from an interpretation of the processed data."[48] It is worth noting that the Remote Sensing Principles, while not legally binding, carry significant legal and political weight, and at least some of the principles contained in the resolution are considered to have become customary international law.[49] In addition, core tenets such as that of nondiscrimination have fundamentally informed several intergovernmental policies and practices of information

---

[44] U.N. Remote Sensing Principles, *supra* note 7.

[45] *Id.* at Principle I.

[46] *Id.* at Principle I(b)

[47] *Id.* at Principle I(c).

[48] *Id.* at Principle I(d). *See also* Sa'id Mosteshar, *Regulation of Remote Sensing by Satellites*, *in* ROUTLEDGE HANDBOOK OF SPACE LAW, 145-50 (Ram S. Jakhu & Paul Stephen Dempsey eds., 2016).

[49] The most accepted example is Principle XI on the protection of humankind from natural disasters. *See* Frans G. von der Dunk, *Big Brother or Eye in the Sky? Legal Aspects of Space-Based Geo-Information for Disaster Management*, *in* GEO-INFORMATION FOR DISASTER MANAGEMENT 35 (Peter van Oosterom et al. eds., 2005).

sharing, such as for instance those followed by the World Meteorological Organization.[50]

While not adopting the same language as the Remote Sensing Principles, the International Charter Space and Major Disasters also functions by distinguishing data and information. The Charter defines "space data" as meaning "raw data gathered by a space system . . . and transmitted or conveyed to a ground receiving station."[51] The term "information" is set out to refer to "data that have been corrected and processed by the parties using an analysis program" forming the basis for specific products for use on location.[52]

National approaches to definitions of Earth observation activities and products are varied. The implications arising from the United States (US) Land Remote Sensing Policy Act of 1992[53] are not dissimilar to the Remote Sensing Principles. Land remote sensing is defined as "the collection of data which can be processed into imagery,"[54] while the term unenhanced data is defined as meaning "land remote sensing signals or imagery products that are unprocessed or subject only to data pre-processing."[55] This distinction between data and information based upon the degree of processing applied is also present in Canadian national law, enshrined in the Remote Sensing Space Systems Act of 2005.[56] Here, a remote sensing product is defined as being "produced from raw data in any way that transforms the raw data."[57] Thus, while notions of data and information exist in Canadian national law, processed data and analyzed information become packaged into the category of remote sensing product.

European approaches to definitions of EO data differ significantly, as they often do not maintain the clear distinction between data and information present in the Remote Sensing Principles and the US and Canadian national laws. The European Space Agency's

---

[50] WORLD METEOROLOGICAL ORG. [WMO], RESOLUTION 40 (June 1995), https://community.wmo.int/resolution-40.

[51] Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters art. 1, Nov. 1, 2000, https://disasterscharter.org/web/guest/text-of-the-charter.

[52] *Id.*

[53] Land Remote Sensing Policy Act of 1992, Pub. L. No. 102-555, 106 Stat. 4163.

[54] *Id.* § 3(5).

[55] *Id.* § 3(13).

[56] Remote Sensing Space Systems Act, S.C. 2005, c 45 (Can.).

[57] *Id.* § 2.

Data Policy[58] does indeed refer to the Remote Sensing Principles but goes on to differentiate categories of data not based upon their degree of processing, but their availability. Thus, two datasets are identified, the "free dataset" and the "restrained dataset."[59] After *ad hoc* data policies for individual ESA missions were implemented during the 1990s and 2000s, a unified data policy was established in 2011 encompassing data and information (termed "products") from Envisat, ERS-1 and -2, GOCE, SMOS, CryoSat and Earth Explorer.[60]

Some individual European States have a long history of EO missions outside the frameworks of international organizations such as ESA or the European Organisation for the Exploration of Meteorological Satellites (EUMETSAT) and have therefore developed legal regimes applicable to national space operations. France is a primary example. French national law, much like ESA's data policy,[61] does not distinguish between the dissemination of data and information, and indeed does not present a clear definition of either, instead focusing on the obligations placed upon a "primary space-based data operator."[62] These are related not to the degree of processing but to technical characteristics such as "resolution, location accuracy, frequency band and quality."[63] Another example is German national law, which, seeking in principle to maximize the data flow to scientific and commercial users, purposefully nullifies the differentiation between raw data, processed data and the information arising from their interpretation. The German Satellite Data Security Law of 2007 thus defines data for the purposes of EO activities as "signals from one or more sensors […] and all products

---

[58] *See* EUROPEAN SPACE AGENCY [ESA], ESA DATA POLICY FOR ERS, ENVISAT AND EARTH EXPLORER MISSIONS (Oct. 2012), https://earth.esa.int/c/document_library/get_file?folderId=296006&name=DLFE-3602.pdf.

[59] *Id.* at 2.

[60] European Space Agency, ENVISAT and ERS MISSIONS Data Access Guide, (2011=, https://earth.esa.int/c/document_library/get_file?folderId=13019&name=DLFE-570.pdf

[61] *Id.*

[62] Philppe Clerc & Julien Mariez, *Law No. 2008-518*, 34 J. SPACE L. 453 (2008) (translating French national law).

[63] *Id.* at 468.

derived from them, regardless of the degree of their processing and the way in which they are stored or displayed."[64]

Those organizations pushing the pursuit of full open data in national and international space agencies have consistently bundled raw data and information products (despite maintaining separate definitions) calling for the dissemination of both, as displayed in the frameworks of the International Charter Space and Major Disasters and GEO.[65] This bundling appears appropriate to reflect their profound interdependence. In addition, the call for these distinct terms to be commonly defined as one echoes the regulatory practices of some organizations, as "differentiation between raw EO data and information in products is normally omitted [in contracts and licenses] even by the players under the jurisdiction of states that recognize it."[66] Further, acceptance of an inherent difference between them is neither common nor entirely useful in practical applications, as "what for some applications is considered data, for others is information."[67] This notwithstanding, the important distinctions between data and information are relevant for the purposes of copyright law, as the degree of processing and the "creativity" injected have a tangible effect on the copyrightability of the subject matter. As will be discussed, the uncertainty and

---

[64] Gesetz zum Schutz vor Gefährdung der Sicherheit der Bundesrepublik Deutschland durch das Verbreiten von hochwertigen Erdfernerkundungsdaten (Satellitendatensicherheitsgesetz - SatDSiG), Nov. 23, 2007, *Bundesministerium der Justiz und für Verbraucherschutz*, BGBI. IS. 259, https://www.gesetze-im-internet.de/satdsig/BJNR259000007.html (author's translation). On French and German national remote sensing laws, see also Lesley Jane Smith & Gina Petrovici, *Legal Aspects of Satellite Based Earth Observation – An Introduction*, *in* SATELLITE-BASED EARTH OBSERVATION: TRENDS AND CHALLENGES FOR ECONOMY AND SOCIETY 172, 174 (Christian Brünner et al. eds., 2018)

[65] *See* Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters, Art. 2, Nov. 1, 2000, https://disasterscharter.org/web/guest/text-of-the-charter, GRP. ON EARTH OBSERVATIONS, IMPLEMENTATION GUIDELINES FOR THE GEOSS DATA SHARING PRINCIPLES, 4 (Nov. 18, 2009), https://www.earthobservations.org/documents/geo_vi/07_Implementation%20Guidelines%20for%20the%20GEOSS%20Data%20Sharing%20Principles%20Rev2.pdf.

[66] Lesley Jane Smith & Catherine Doldirina, *Law Relating to Remote Sensing*, *in* ROUTLEDGE HANDBOOK OF SPACE LAW 241, 261 (Ram S. Jakhu & Paul Stephen Dempsey eds., 2016).

[67] Catherine Doldirina, *Open Data and Earth Observations: The Case of Opening Up Access to and Use of Earth Observation Data Through the Global Earth Observation System of Systems*, 6 JIPITEC 73, 74-75 (2015).

dissimilarity in these key definitions is inimical to the furthering of legal interoperability.

B. Open Data Policies

Various approaches to open data have been set up by multiple actors, within the framework of both international organizations and partnerships encompassing both States and private enterprises, the primary example being GEOSS.[68] The organization's core policy is set out in the GEOSS Data Sharing Principles, first drawn up in 2005 and later amended in 2015.[69] The document clearly acknowledges that the full benefits of EO can only be reaped through the effective sharing of "data metadata and products."[70] The first principle states that "data, metadata and products will be shared through GEOSS as Open Data by default . . . without charge, without restrictions on reuse."[71] According to the second principle, should international instruments, national policies or legislation preclude the following of full open data policies, shared data must be made available "with minimal restrictions on use and at no more than the cost of reproduction and distribution."[72] The third principle establishes that all categories of data should "be made available with minimum time delay."[73] The restrictions identified in the second principle were further elaborated upon in the Implementation Guidelines of 2009,[74] where they were identified as pertaining mainly to "concerns regarding the protection of national security, financial viability, proprietary interests, privacy, confidentiality, indigenous rights, and conservation of sensitive ecological, natural, archaeological, or cultural resources."[75]

The regime of open data which GEOSS seeks to establish is applicable not only to public bodies, but to private and mixed

---

[68] GEO is now composed of 110 member countries and 136 participating organizations. *See About Us: GEO Community*, GRP. ON EARTH OBSERVATIONS, http://www.earthobservations.org/geo_community.php (last visited Mar. 24, 2021).

[69] GRP. ON EARTH OBSERVATIONS, DATA SHARING PRINCIPLES POST 2015 (Mar. 10, 2014), https://www.earthobservations.org/documents/dswg/Annex%20III%20-%20GEOSS%20Data%20Sharing%20Principles%20Post-2015.pdf.

[70] *Id.* at 1.

[71] *Id.* at 2.

[72] *Id.* at 3.

[73] *Id.*

[74] GRP. ON EARTH OBSERVATIONS, *supra* note 69.

[75] *Id.*

players as well. The principle of full and open access to EO data is understood as beneficial to all stakeholders, and is based upon the view that shared data and information represents a public good.[76] This understanding arises from the premise that the promotion of an extensive regime favoring "unrestricted re-use, re-dissemination, and legal interoperability" of EO data and information will not only maximize their intrinsic value, but also give rise to new and more profound scientific and socioeconomic benefits.[77]

Furthermore, organizations such as the International Charter Space and Major Disasters have established open data policies to specifically tackle environmental crises, both in terms of prevention and management. The Charter sets out two fundamental purposes: to supply data to States or communities in imminent danger or victims of natural or technological disasters; and to foster participation "by means of this data and of the information and services resulting from the exploitation of space facilities, in the organization of emergency assistance or reconstruction and subsequent operations."[78] The pricing policies of the providing organizations are suspended during the time of the disaster, and data provided is full, free and open.[79] This approach is well supported by the Remote Sensing Principles, specifically Principles X and XI, calling for, respectively, the dissemination of information for the purposes of protection of the Earth's natural environment and the protection of humankind from natural disasters.[80]

Copernicus, the most ambitious EO initiative to date and "the most significant European contribution to GEOSS and the 1992 United Nations Framework Convention on Climate Change," also

---

[76] GRP. ON EARTH OBSERVATIONS, WHITE PAPER: MECHANISMS TO SHARE DATA AS PART OF GEOSS DATA-CORE 14 (2014), https://www.earthobservations.org/documents/dswg/Annex%20VI%20-%20%20Mechanisms%20to%20share%20data%20as%20part%20of%20GEOSS%20Data_CORE.pdf.

[77] GRP. ON EARTH OBSERVATIONS, *supra* note 76, at 3.

[78] Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters art. 2, Nov. 1, 2000, https://disasterscharter.org/web/guest/text-of-the-charter.

[79] *Id.* at art. 3.

[80] It is important to note that in Principle XI on the protection from natural disasters both data and information should be provided "as promptly as possible," while Principle X only applies to information in the possession of the sensing State without referring to time frames. U.N. Remote Sensing Principles, *supra* note 7, Principles X-XI.

functions utilizing an open data policy.[81] The Copernicus data policy was first set out in 2010 and later supplemented in a European Union (EU) regulation in 2013, retaining and expanding upon the elements of full, free and open access to Copernicus data and information.[82] No restrictions on use (commercial vs. noncommercial) or users (European vs. non-European) are established, and a free of charge version of any dataset is to be made available on the Copernicus dissemination platform.[83] This data sharing policy is directly related and congruent to the GEOSS Data-CORE, a mechanism promoting "access to Earth observation datasets and enable use and reuse of the data without restrictions."[84] Nevertheless, the Copernicus data policy identifies multiple restrictions on access, both based upon legal grounds, in particular conflicts with international agreements, intellectual property regulations or the protection of personal data, as well the security interests of the EU or its member States.[85]

The commonalities between these three significant examples of initiatives operating on the basis of open data are clear to see. Terms such as "full," "free" and "open" are widespread, and are common to other organizations such as EUMETSAT, though the policy of the latter is restricted to member States of the organization.[86] However, despite their widespread use, definitions of terms such as "full" and "open" become murky, as "many jurisdictions and organisations use [these terms] as umbrella concepts that in fact encompass conditions of access and use, as well as rules regarding cost of access."[87] This lack of clarity provides some uncertainty to the

---

[81] EUR. COMM'N, PROPOSAL FOR A REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL 28 (Mar. 13, 2019), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2018%3A447%3AFIN.

[82] Council Regulation No. 911/2010, 2010 O. J. (L 276/1) (on the European Earth monitoring programme (GMES) and its initial operations (2011 to 2013)); Comm'n Regulation No. 1159/2013, 2013 O.J. (L309/1) (supplementing Regulation (EU) No 911/2010 of the European Parliament and of the Council on the European Earth monitoring programme (GMES) by establishing registration and licensing conditions for GMES users and defining criteria for restricting access to GMES dedicated data and GMES service information).

[83] *See* Comm'n Regulation No. 1159/2013, *supra* note 82.

[84] GRP. ON EARTH OBSERVATIONS, *supra* note 65, at 3.

[85] 2013 O.J. (L 309/1) 19.11.2013, art. 13.

[86] *See* EUMESTAT, EUMETSAT DATA POLICY (Jan. 1, 2021), https://www-cdn.eumetsat.int/files/2021-01/45173%20Data_Policy.pdf.

[87] Doldirina, *supra* note 67, at 77.

establishment of legal interoperability of EO data and information. Nevertheless, there has been increasing support from governments to accept GEO's interpretation of the terms and include the full and open principle as a foundation for legislations or policies, such as those in Argentina, Finland and Japan.[88]

Two primary challenges to the establishment of extensive practices of open data can thus be identified. First, exceptions to policies calling for full, free and open access abound for a remarkably extensive number of reasons, with national security and international relations being amongst the most frequently called upon exemptions. Second, copyright regulations in various jurisdictions as well as the *sui generis* database protection provide further legal uncertainty to users. These challenges and opportunities to mitigate their restrictive natures will be analyzed further in the following sections.

V. SHUTTER CONTROL & MITIGATING FACTORS

Notwithstanding the general principle of openness and free access to data which acts as foundation and *raison d'être* of the abovementioned policies, allowances for exceptions are both envisaged in these frameworks and frequently called upon. In their study of various EO open data policies, Harris and Baumann identified eighteen different reasons cited for restrictions and limitations of access.[89] Amongst the most common reasons featured international

---

[88] GEO DATA SHARING WORKING GROUP, INTERPRETATION OF THE "FULL AND OPEN" ACCESS TO AND USE OF (GEOGRAPHIC) DATA: EXISTING APPROACHES (Oct. 2013), https://www.earthobservations.org/documents/dswg/08_Interpretation%20of%20the%20full%20and%20open%20access%20to%20and%20use%20of%20geographic%20data%20existing%20approaches.pdf.
Argentina, Honorable Cámara de Diputados de la Nación, "Creación de Repositorios Digitales Institucionales de Acceso Abierto, Propios o Compartidos," Proyecto de Ley 1927-D-2011, April 18th, 2011, https://www.hcdn.gob.ar/proyectos/proyectoTP.jsp?exp=1927-D-2011, Finland 2025, Space Strategy 2018, Ministry of Economic Affairs and Employment of Finland and Ministry of Transport and Communications, https://tem.fi/documents/1410877/3227301/Final+report+of+the+Working+Group+on+Revision+of+the+National+Space+Strategy/89ffc447-fecd-dd3a-71eb-b6b5a3cb4356/Final+report+of+the+Working+Group+on+Revision+of+the+National+Space+Strategy.pdf, Japan Open Data Charter Action Plan, National Strategy office of Information and Communications Technology, October 29, 2013, https://japan.kantei.go.jp/policy/it/2013/1029_fulltext.pdf.

[89] Ray Harris & Ingo Baumann, *Open Data Policies and Satellite Earth Observation*, 32 SPACE POL'Y 44, 52 (2015).

relations and foreign policy, national security, defense, national legislation and IPR.[90] It is perhaps unsurprising to see various conduits for national interests being the most common causes of restrictions on EO information. As Clark noted, "the reality of the EO industry is not an altruistic one," as political considerations play a fundamental and often defining role.[91] Most open data initiatives mention the protection of these interests specifically within their policies, including GEOSS and Copernicus. International instruments, national policies or legislations are identified as exemptions in the former,[92] while the European Commission restricts access to Copernicus data and information where it "presents an unacceptable degree of risk to the security interests of the Union or its Member States."[93]

"Shutter control" describes such regulatory means in national laws which seek to monitor the collection and dissemination of sensitive data and information.[94] While the implementation of such restrictive means has ebbed in an encouraging international trend, with significant bottom-up efforts by research institutions and universities coupling top-down approaches, imagery and information regarding certain areas and regions are still protected under national legislations.[95] One such example is the German Satellite Data Protection Law of 2007,[96] which sets out a case-by-case procedure to establish the sensitivity of data through a four-step process.

---

[90] *Id.* at 52.

[91] Nathan E. Clark, *Towards a Standard Licensing Scheme for the Access and Use of Satellite Earth Observation Data for Disaster Management*, 139 ACTA ASTRONAUTICA 325, 327 (2017).

[92] GRP. ON EARTH OBSERVATIONS, *supra* note 65, at 3.

[93] 2013 O.J. (L 309/1) 19.11.2013, art. 12(1), https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1159&qid=1401259246443&from=EN.

[94] *See* Jennifer La Fleur, *Government, Media Focus on Commercial Satellite Images*, 27 THE NEWS MEDIA & THE LAW 36, 36-38 (2003); Elizabeth S. Waldrop, *Integration of Military and Civilian Space Assets: Legal and National Security Implications*, 55 A.F. L. REV. 157, 157-158, 204-06 (2004).

[95] Ulrike Bohlmann & Alexander Soucek, *From "Shutter Control" to "Big Data": Trends in the Legal Treatment of Earth Observation Data*, *in* SATELLITE-BASED EARTH OBSERVATION: TRENDS AND CHALLENGES FOR ECONOMY AND SOCIETY 189-90 (Christian Brünner et al. eds., 2018).

[96] *See* Gesetz zum Schutz vor Gefährdung der Sicherheit der Bundesrepublik Deutschland durch das Verbreiten von hochwertigen Erdfernerkundungsdaten (Satellitendatensicherheitsgesetz - SatDSiG), Nov. 23, 2007, *Bundesministerium der Justiz und für Verbraucherschutz*, BGBI. IS. 259, https://www.gesetze-im-internet.de/satdsig/BJNR259000007.html.

The content of the product, the area observed, the time of acquisition and dissemination and the ground segments through which the information will be shared are assessed to determine possible threats to German national security and evaluate limitations on dissemination.[97]

While these possibilities of exemptions safeguarding national interests are problematic, the support for open data for EO activities has buttressed efforts to obviate these restrictions.[98] The work of GEO, together with organizations such as the United Nations Platform for Space-based Information for Disaster Management and Emergency Response[99] (UN-SPIDER) and the Space Data Association,[100] have undoubtedly encouraged best effort approaches. Despite the rights of States to impose shutter control on satellite information by restricting and interrupting access or degrading data quality, open and nondiscriminatory access have gradually become the rule rather than the exception.

Partial restrictions can be imposed, but the total denial of access has been made increasingly ineffective due to "the commercialisation of remote sensing and the Internet."[101] The restrictions placed upon high resolution images of Israel and the Occupied Territories in the US are an example of this. Until July 2020, the Kyl-Bingaman Amendment to the 1997 US National Defense

---

[97] *Id.*

[98] *See* TIM DAVIES ET AL., THE STATE OF OPEN DATA: HISTORIES AND HORIZONS 103-118, 137-150 (2019). See especially Chapter 7 on environment data and Chapter 9 on geospatial data.

[99] G.A. Res. 61/110 (Dec. 14, 2006). The United Nations Platform for Space-based Information for Disaster Management and Emergency Response is a United Nations whose mission is to "[e]nsure that all countries and international and regional organizations have access to and develop the capacity to use all types of space-based information to support the full disaster management cycle." *Id. See What Is UN-SPIDER?,* U.N. OFFICE OF OUTER SPACE AFFAIRS, https://www.un-spider.org/about/what-is-un-spider (last visited June 20, 2021).

[100] "The Space Data Association (SDA) is an international organization that brings together satellite operators to support the controlled, reliable and efficient sharing of data critical to the safety and integrity of the space environment. The SDA membership includes the world's major satellite communications companies." SPACE DATA ASSOC., https://www.space-data.org/sda/ (last visited June 20,2021).

[101] FRANCIS LYALL & PAUL B. LARSEN, SPACE LAW: A TREATISE 427 (2007). *See also* Dyan Franciska Dumaris Sitanggang, *International Law Analysis of The Restrictions Imposed on Remote Sensing Satellite Through Shutter Control*, 30 MIMBAR HUKUM 389, 397-98 (2018); Ram S. Jakhu, *International Law Governing the Acquisition and Dissemination of Satellite Imagery*, 29 J. SPACE L. 65, 72-74, 80-81 (2003).

Authorisation Act limited the availability of satellite imagery with a resolution of 2 meters over this area, and although this only applied to the US, for years this had a significant global effect.[102] The resolution limit was at first maintained in 2018, as while there were judged to be non-US commercial sources with higher resolution capabilities, "very little of this imagery is available for sale" and "is not easily accessible enough to be readily available."[103] This decision was duly revisited in July 2020 prompting an alteration to the resolution limit, reducing it from 2 meters to 0.4 meters due to data of Israel with a resolution of 0.4 meters being "readily and consistently available from non-U.S. commercial sources."[104] While the Kyl-Bingaman amendment "has become institutionalized in the commercial satellite imagery market" of the US, its effective global application has been rendered much harder and will become unsustainable.[105] Another clear implication of wide commercialization is found in the data denial policies between for instance the US and EUMETSAT, which have been established in order to guarantee access to authorized users even "in case of a crisis or war situation."[106]

Further, during the fighting in Afghanistan in 2001, the US was able to persuade France to restrict their dissemination of data collected by the SPOT satellites. In order to ensure their enemy's lack of access to satellite imagery, "the Pentagon preemptively brought up, for $1.9 million per month, all the other possibly useful, high-resolution imagery of Afghanistan that the alternative private sources could generate."[107] The multitude of State actors and private players active today would make a similar venture

---

[102] National Defense Authorisation Act for Fiscal Year 1997, Pub. L. No. 104-201, 110 Stat. 265 (1996).

[103] Notice of Findings Regarding Non-U.S. Commercial Availability of Satellite Imagery with Respect to Israel, 83 Fed. Reg. 51,929 (Oct. 15, 2018).

[104] Notice of Findings Regarding Commercial Availability of Non-U.S. Satellite Imagery With Respect to Israel, 85 Fed. Reg. 44059, (July 21, 2020)

[105] Andrea Zerbini & Michael Fradley, *Higher Resolution Satellite Imagery of Israel and Palestine: Reassessing the Kyl-Bingaman Amendment*, 44-45 SPACE POL'Y 14, 14-15 (2018).

[106] EUMETSAT, EPS DATA DENIAL GUIDE 6 (Feb. 19, 2009), https://www-cdn.eumetsat.int/files/2020-04/pdf_eps_data_denial_guide.pdf. *See also* Ray Harris, *Remote Sensing Policy*, *in* THE SAGE HANDBOOK OF REMOTE SENSING 23-24 (Timothy A. Warner, M. Duane Nellis, & Giles M. Foody eds., 2009).

[107] David A. Koplow, *ASAT-isfaction: Customary International Law and the Regulation of Anti-Satellite Weapons*, 30 MICH. J. INT'L L.1187, 1196 (2009).

unachievable. Even as early as the Iraq war of 2003 the potential suppliers of satellite imagery were enough to prevent US authorities from exercising this "checkbook shutter control."[108]

Another mitigating factor in respect of the challenge which restrictions due to national interests and international relations pose to open data is the pressure placed upon States and organizations to uphold the value of openness. This was espoused in influential frameworks such as the Remote Sensing Principles[109] as well as of course GEOSS,[110] UN-SPIDER[111] and the International Charter Space and Major Disasters.[112] United Nations resolutions, although not legally binding, have the capacity to acquire significant political and moral relevance, preventing the willful negligence or repudiation of their tenets.[113] This is especially true for the Remote Sensing Principles as they were adopted by consensus, prompting Gabrynowicz to note that "no nation or data supplier wants to appear to denounce the nondiscriminatory access policy and the UN Principles."[114]

Some national regulatory practices appear at least in value well suited to avert the overzealous application of exemptions to open data, especially with regards to government-produced or -held information. For instance, a ruling in the US by the Supreme Court of Connecticut identifies a "general policy of openness expressed in the [Freedom of Information Act (FOIA)] legislation," and affirms that the FOIA "expresses a strong legislative policy in favor of the

---

[108] Jessica West, *The Space Security Index: Changing Trends in Space Security and the Outer Space Treaty*, *in*
CELEBRATING THE SPACE AGE: 50 YEARS OF SPACE TECHNOLOGY, 40 YEARS OF THE OUTER SPACE TREATY 119-23 (U.N. Inst. for Disarmament Research Conference Report, Apr. 2007).

[109] U.N. Remote Sensing Principles, *supra* note 7, at Principles VI, X & XI.

[110] GRP. ON EARTH OBSERVATIONS, IMPLEMENTATION GUIDELINES FOR THE GEOSS DATA SHARING PRINCIPLES, *supra,* note 65, at 1.

[111] United Nations Platform for Space-based Information for Disaster Management and Emergency Response: programme for the period 2007-2009 and workplan for the biennium 2008-2009, Committee on the Peaceful Uses of Outer Space, September 12th, 2007, A/AC.105/894, Annex I Activity A, https://www.unoosa.org/pdf/reports/ac105/AC105_894E.pdf.

[112] Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters, *supra* note 65, art. 2.

[113] von der Dunk, *supra* note 49, at 38.

[114] NAT'L CTR. FOR REMOTE SENSING, AIR & SPACE LAW, THE LAND REMOTE SENSING LAWS AND POLICIES OF NATIONAL GOVERNMENTS: A GLOBAL SURVEY 13 (Joanne Irene Gabrynowicz ed. 2007).

open conduct of government and free public access to government records."[115] Disclosure of data held by public authorities is thus to be understood as the rule, and "any exception to that rule will be narrowly construed in light of the general policy of openness expressed."[116] International initiatives within the frameworks of the United Nations Educational, Scientific and Cultural Organization[117]and Open Government Partnership[118] have pushed for greater acceptance of these principles in various States, through the adoption of clearer regulations tackling access to information and the release of data.

Within the EU, open data practices have been set through a 2003 EU Directive which was amended in 2013. While accepting "the protection of national security and defense" as valid reasons for the restrictions of access to information, the EU Directive pushes for greater consideration of States to meet the demand of open access from both citizens and industry, favoring the emergence of regulatory practices supporting open data.[119] One such example is Italy, which passed national legislation to harmonize with the EU Directive 2013/37/EU defining conditions for access and reuse of government data. Following GEOSS's language, the national legislation has oriented government practices to Open data by default.[120] In addition, Italy has since committed itself to further its Open data capabilities, "simplifying the way users can access information on key issues such as the environment" by "developing and promoting evolved web services to facilitate the use of the FOIA and

---

[115] Bd. of Educ. v. Freedom of Info. Comm'n, 545 A.2d 1064, 1069 (Conn. 1988) (*quoting* Wilson v. Freedom of Info. Comm'n, 435 A.2d 353, 357 (Conn.1980)).

[116] Ottochian v. Freedom of Information Comm'n, 604 A.2d 351, 354 (Conn. 1992) (internal citation omitted).

[117] *See, e.g,* UNESCO, ACCESS TO INFORMATION: A NEW PROMISE FOR SUSTAINABLE DEVELOPMENT (2019), https://unesdoc.unesco.org/ark:/48223/pf0000371485?posInSet=1&queryId=02db91b1-945f-46da-8806-12828867cff3.

[118] *See* "Open Government Partnership Global Report", Open Government Partnership, Vol. 1, 2019, https://www.opengovpartnership.org/wp-content/uploads/2019/09/Global-Report_Volume-1.pdf

[119] Directive 2013/37 of the European Parliament and of the Council of 26 June 2013 amending Directive 2003/98/EC on the re-use of public sector information, 2013 O.J. (L175) 1, 5, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013L0037&from=EN.

[120] *See* Legge 27 febbraio 2004, n.46, G.U. Feb. 27, 2004, n.158 (It.).

other forms of citizen access (i.e., access to environmental information)."[121]

Restrictions to access based upon national interests prevent the full interoperability of EO data and limit the development of international collaboration. Nevertheless, efforts of international frameworks and research institutions favoring the emergence of best practices have reinforced the adoption of open data as a fundamental rule rather than an exception. As Harris and Baumann noted, exemptions due to "foreign policy, national security or defence are subject to rapidly changing political considerations and assessments."[122] It is precisely in this environment that activities furthering the establishment of open data policies are hugely valuable. Within the scope of the fight against climate change and environmental crises, information-sharing regimes such as that espoused by the International Open Data Charter can favor a greater understanding of the challenges set by the global emergency and the possible mitigation strategies.[123] These can only be achieved through full and open access, thus ensuing the value adding practices of derivative and integrative works created by independent users.[124]

VI. INTELLECTUAL PROPERTY RIGHTS

A. Copyright

The most daunting obstacle to an effective and extensive practice of open data arises from the uncertainty regarding copyright protection of datasets, or parts thereof, and information products. The scope of copyright protection is defined in national legislations which are bound to entail differing approaches, creating inequalities in terms of the copyrightability of subject matter, exemptions

---

[121] GOV'T OF ITALY, 4TH NATIONAL ACTION PLAN FOR OPEN GOVERNMENT 12 (June 2019), https://www.opengovpartnership.org/wp-content/uploads/2019/07/Italy-Action-Plan-2019-2021-English.pdf.

[122] Harris & Baumann, *supra* note 89, at 52.

[123] International Open Data Charter, *supra* note 1. *See* G8 OPEN DATA CHARTER AND TECHNICAL ANNEX (2013), https://www.gov.uk/government/publications/open-data-charter/g8-open-data-charter-and-technical-annex (U.K. policy paper).

[124] *See* G8 OPEN DATA CHARTER AND TECHNICAL ANNEX, *supra* note 123.

and the duration of protection.[125] Although Article 2 of the Berne Convention of 1886 lists examples of works covered by protection, most national legislations operate through open lists, leaving the subject matter's copyrightability to be defined by "policy priorities in a given jurisdiction."[126]

One source of legal uncertainty as related to the copyrightability of EO data is the criterion of intellectual creation, first mentioned in the Berne Convention,[127] and the related approaches taken by different jurisdictions. Civil and common law systems diverge in their understanding of what is required for the criterion to be fulfilled. In the former, the reflection of the author's personality or the expression of the author's intellectual creation are established as preconditions of originality and therefore of copyrightability.[128] In contrast, the latter defines an original work as being the "result of its author's own skill, labor, judgment and effort," thus establishing that "creativity, especially artistic creativity, so that the work is shaped according to the author's individual personality, plays no role."[129] While in recent years common law systems, especially the US, have arguably edged towards a more creativity oriented approach, there is still much dissonance among various States, as well as "in individual court decisions within the same jurisdiction."[130]

While factual (raw) data is understood to not be covered by the scope of copyright protection, as per the World Intellectual Property Organisation Treaty of 1996 complementing the Berne Convention, the originality criterion is viewed as fulfilled when data undergoes

---

[125] *See* Berne Convention for the Protection of Literary and Artistic Works, Sept. 9, 1886, 828 U.N.T.S. 11850 (as last amended Sept. 28, 1979).

[126] Doldirina, *supra* note 67, at 78.

[127] Berne Convention for the Protection of Literary and Artistic Works, Paris Act of July 24, 1971, as amended on September 28, 1979, art. 2 (5).

[128] *See e.g.,* the German Copyright Law. Gesetz über Urheberrecht und verwandte Schutzrechte (Urheberrechtsgesetz) (Sept. 9, 1965) (as last amended Nov. 28, 2018), *Bundesministerium der Justiz und für Verbraucherschutz*, BGBl I.S. 2014, https://www.gesetze-im-internet.de/urhg/UrhG.pdf.

[129] Andreas Rahmantian, *Originality in UK Copyright Law: The Old 'Skill and Labour' Doctrine Under Pressure*, 44 IIC INT'L REV. INTELLECTUAL PROP. & COPYRIGHT L. 4, 5 (2013).

[130] Doldirina, *supra* note 67, at 78. Rahmantian disputes the extent of this shift towards creativity approaches in the United Kingdom. *See* Rahmantian, *supra* note 129.

a large enough degree of processing.[131] Specifically, almost all jurisdictions include maps as a copyrightable creation, leading to the straightforward conclusion that some processed EO data and information products are in fact protected by copyright.[132] However, the processing required in order to transmute non-copyrightable raw data into an intellectual creation within the scope of copyright legislation is unclear and problematic. Different applications will employ varying degrees of processing in order for information to be extrapolated, creating more uncertainty as to when products are protected.[133] This is further exacerbated by the diverging interpretations and approaches to the definitions of data and information in various jurisdictions.[134]

Another issue related to national approaches to copyright arises from the exemptions to the author's exclusive rights put in place for users to access works and facilitate the creation of a new subject matter. With the EU Directive 2019/790 on copyright in the Digital Single Market, the EU has sought to facilitate the use of copyright protected material for research, innovation, education and preservation of cultural heritage fostering text and data mining.[135] While the exceptions to copyright protection can only be applied "in certain special cases that do not conflict with the normal exploitation of the works or other subject matter," this development favors the furthering of open data policies for environmental action, as knowledge of the climate crisis is deeply rooted in all the categories mentioned above.[136] Other jurisdictions have followed a different approach for copyright exemptions. For instance, the US functions through the fair use procedure, which encompasses exceptions for a different and theoretically wider audience of users and works

---

[131] WIPO Copyright Treaty arts. 2, 5, Dec 20, 1996, https://wipolex.wipo.int/en/text/295157.

[132] *See* J. Richard West, *Copyright Protection for Data Obtained by Remote Sensing: How the Data Enhancement Industry Will Ensure Access for Developing Countries*, 11 NW. J. INT'L L. & BUS. 403, 405-07 (1990).

[133] *See* Smith and Doldirina, *supra* note 66.

[134] *Id.*

[135] Directive 2019/790 of the European Parliament and of the Council of 17 April 2019 on copyright and related rights in the Digital Single Market and amending Directives 96/9/EC and 2001/29/EC 2019, 2019 O.J. (L 130) 92, https://eur-lex.europa.eu/eli/dir/2019/790/oj.

[136] *Id.* at 93.

to those within the EU legislation.[137] Moreover, concessions in India are based upon the concept of fair dealing, wherein acts such as "private or personal use including research, criticism or review, and the reporting of current events and affairs" do not constitute an infringement of copyright.[138]

These examples serve to illustrate the legal uncertainty surrounding diverging national copyright law. The exemptions to be applied to EO data may differ according to their jurisdiction, with users being restricted in their abilities to integrate multiple datasets in order to create new products as they may be subject to conflicting copyright protection regimes. Thus, legal interoperability of EO data can suffer significantly due to the uncertainty through which users might have to navigate.

B. Sui Generis Database Protection

Matters are further complicated by the *sui generis* database protection which once again sees little harmonization among different jurisdictions. Within the EU, a *sui generis* right is granted to databases created by companies in EU territories which exhibit "qualitatively and/or quantitatively a substantial investment in either the obtaining, verification or presentation of the contents."[139] This right lasts for 15 years and can be extended by a substantial modification or update, effectively establishing a new set of rights for a further 15 years.[140] The criterion for originality is thus specifically omitted, which leads to an independent yet complementary relationship between this *sui generis* protection and copyright, as the database can be protected regardless of whether its contents are covered by copyright. In addition, the protection of the structure of the database under copyright regulations does not restrict the applicability of the protection by the *sui generis* right.[141]

---

[137] 17 U.S.C. § 107.

[138] The Copyright Act, 1957, §52.

[139] Council Directive 96/9, 1996 O.J. (L 77/20), art. 7(1), https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31996L0009:EN:HTML [hereinafter EU Database Directive].

[140] *Id.* art. 10.

[141] Katleen Janssen & Jos Dumortier, *The Protection of Maps and Spatial Databases in Europe and the United States by Copyright and the Sui Generis Right*, 24 J. MARSHALL J. COMPUTER & INFO. L. 195, 215 (2006).

It is important to note that while the directive does not define what a "substantial investment" entails, the European Court of Justice (ECJ) established a clear distinction between obtained and created data. In short, per the ECJ, regardless of the nature of the investment, be it human, material or financial, investments made for the creation of data are discounted in considerations regarding the *sui generis* protection.[142] In other words, any investment made by the producer of the database for purposes unrelated to the compilation of such information shall be actively disregarded in the analysis of whether the creation of the database required a substantial investment. Thus, "compilations that are generated quasi 'automatically' as byproducts of other activities" should not be granted protection.[143]

This regulation finds no equal in the US, where the landmark case of *Feist Publications Inc., v. Rural Telephone Service Co.*, established that the underlying facts present in datasets (comparable to raw data in EO activities) are non-copyrightable and that for a compilation to be protected it requires originality and a level of creativity.[144] The US Supreme Court judged that originality rather than effort is rewarded by copyright and that "there is nothing remotely creative about arranging names alphabetically in a white pages directory."[145] A number of States with developing space-based capabilities follow a similar approach. For instance, Australian national law has no specific legislation protecting databases outside of the scope of copyright, as the criterion of creativity has been established and upheld as a defining characteristic.[146]

---

[142] This interpretation arose from four rulings by the ECJ in November 2004. See *Fixtures Marketing v Veikkaus,* Case C-46/02, https://curia.europa.eu/juris/documents.jsf?num=C-46/02, *Fixtures Marketing v OPAP,* Case C-444/02, https://curia.europa.eu/juris/documents.jsf?num=C-444/02, *Fixtures Marketing v Svneska Spel*, Case C-338/02, https://curia.europa.eu/juris/documents.jsf?num=C-338/02, *The British Horseracing Board v William Hill*, Case C-203/02, https://curia.europa.eu/juris/liste.jsf?num=C-203/02. *See* Estelle Derclaye, *Database Sui Generis Right: What is a Substantial Investment? A Tentative Definition*, 3 INT' REV. INTELLECTUAL PROP. & COMPETITION L. 1 (2005).

[143] Stephen M. Maurer, Paul B. Hugenholtz &Harlan J. Onsrud, *Europe's Database Experiment*, 294 SCIENCE 789, 790 (2001).

[144] *See* Feist Publ'ns, Inc. v. Rural Tel. Serv. Co., 499 U.S. 340 (1991).

[145] *Id.* at 363.

[146] *See IceTV Pty Ltd. v Nine Network Australia Pty Ltd.*, 2009 HCA 14. Australia's investments in space and EO activities in particular are set to rise, which might prompt

Furthermore, Brazilian legislation echoes its Australian counterpart precisely, as while database owners are granted rights for copying and distribution of databases, it establishes that the database must result from an intellectual creation requiring originality in order for the right to be recognized.[147]

These examples stand in stark contrast to the EU Database Directive, which establishes the right to "prevent extraction and/or re-utilization of the whole or of a substantial part […] of the contents of that database."[148] Moreover, as Doldirina noted, the interpretation of the Database Directive presents ambiguities which make "the actual object of the sui generis database protection even more difficult," as database contents are defined "through the term 'data,' which in its turn is defined through 'informative content.'"[149] These complications limit the agency of independent users in their derivation and integration activities. Not only is the copyrightability of information products and processed data dependent upon their degree of processing and the policy priorities of their jurisdictions, but raw data might also be covered by IPR should the database formed fulfill the criterion of substantial investment of the *sui generis* right within the EU.

The lack of uniform copyright regulations among many spacefaring countries and the *sui generis* protection afforded to compilations of otherwise non-copyrightable representation of facts significantly stifle the further developments of wide-ranging, interoperable open data practices for EO. The independent creation of derivative works and integration of multiple data sources are core principles of value- and knowledge-generation, especially for the purposes of climate action. The legal uncertainty related to copyright protection of processed data, information and datasets can thus jeopardize access to and reusability of data for users, who may be required to negotiate ambiguous definitions in contrasting national laws.

---

some regulatory developments. *See* Australian Earth Observation Community Plan 2026, AUSTRALIAN EARTH OBSERVATION COMMUNITY COORDINATING GRP., https://www.eoa.org.au/aeocp-the-plan (last visited Mar. 25, 2021).

[147] Lei dos Direitos Autorais: Lei nº 9.610, de 19 de Fevereiro de 1998, Feb. 19, 1998, LEI-9610-1998-02-19, http://www.planalto.gov.br/ccivil_03/Leis/L9610.htm.

[148] EU Database Directive, *supra* note 139, art. 7 (1).

[149] Catherine Doldirina, *A Rightly Balanced Intellectual Property Rights Regime as a Mechanism to Enhance Commercial Earth Observation Activities*, 52 PROC. INT'L INST. SPACE L. 301, 307 (2009).

VII. WAIVERS AND LICENSES AS CONDUITS FOR OPEN DATA

State policy concerning government-produced or -owned satellite data can favor the establishment of open data practices following the frameworks of initiatives such as GEOSS. With regards to data generated by private actors, waivers and standardized licenses establishing the rights and obligations between the licensor and licensee would couple State policy and serve to alleviate the obstacles posed by IPR on the furthering of open data. These would ensure that extractions from datasets or databases would not incur in "substantial liability exposure," which in the context of EO data is caused by the "violation, whether intended or unintended, of copyright, database legislation, and similar intellectual property protections."[150] However, the expectation that private enterprises investing large sums in EO should relinquish all or part of their rights to their products without remuneration is fanciful; public and international investments for specific EO data might thus promote a top-down approach for the establishment of best practices.

Waivers are by definition the more desirable option for initiatives such as GEOSS and the International Charter Space and Major Disasters. Through this mechanism, producers of EO data may choose to relinquish their rights over the subject matter, thus effectively placing it in the public domain without restrictions on re-use or re-dissemination. A standard practice of waivers would certainly help to achieve open data policies and ensure full legal interoperability. However, incentives for private investments into EO would have to be guaranteed through means other than the commercial value of the data produced. For instance, one possibility might be State subsidies for processed data and products monitoring established factors such as the Essential Climate Variables defined by the Global Climate Observing System.[151]

A more realistic scenario is presented by standard licenses, which would provide for an easily accessible and reliable mechanism to ensure a high degree of interoperability when authors are

---

[150] Harlan Onsrud, *Liability for Spatial Data Quality*, *in* Rodolphe Devillers and Helen Goodchild (eds.), SPATIAL DATA QUALITY: FROM PROCESS TO DECISIONS 189 (Rodolphe Devillers & Helen Goodchild eds., 2009).

[151] GLOBAL CLIMATE OBSERVING SYSTEM, SYSTEMATIC OBSERVATION REQUIREMENTS FOR SATELLITE-BASED DATA PRODUCTS FOR CLIMATE (Dec. 2011), https://library.wmo.int/doc_num.php?explnum_id=3710.

reticent to employ waivers should they wish to retain certain rights. For instance, Creative Commons licenses such as CC-BY 4.0 grant permission to "copy and redistribute the material in any medium or format" and "remix, transform, and build upon the material for any purpose, even commercially."[152] Under the terms of the license, only "appropriate credit" must be given to the original author, and any changes to the subject matter should be detailed.[153] This is the most accommodating Creative Commons license, allowing for the maximum dissemination of the licensed materials, though alternatives such as Attribution-ShareAlike (CC-BY-SA) can also serve to further open data principles. While allowing for the same uses as CC-BY 4.0, the ShareAlike license states that any derivative work produced by remixing, transforming, or building upon the licensed material must be distributed under the same license as the original.[154]

Standardization of licenses specific to climate data and information would yield long-term benefits for legal interoperability of data sharing regimes. Creative Commons licenses can be understood as excellent solutions for the short term. For instance, an example of the implementation of such licenses can be found in DigitalGlobe's release of EO imagery of Ecuador after the 7.8 magnitude earthquake of April 2016. Prompted by their collaboration with the humanitarian unit of OpenStreetMap, the private company made imagery freely available under the CC0 1.0 license.[155] As Clark noted, "the application of the Creative Commons frameworks by DigitalGlobe enabled responders on the ground to access and use high quality data in ways that may have otherwise not been possible."[156] However, different licenses were employed in other instances, pointing to an uncertainty as to the best approach and thus creating delays, which could be obviated through the

---

[152] *Attribution 4.0 International (CC BY 4.0),* CREATIVE COMMONS, https://creativecommons.org/licenses/by/4.0/deed.ast (last visited June 20, 2021).

[153] *Id.*

[154] *Attribution-ShareAlike 4.0 International (CC BY-SA 4.0)*, CREATIVE COMMONS, https://creativecommons.org/licenses/by-sa/4.0/ (last accessed June 20, 2021).

[155] Maxar Technologies, *Open Imagery and Data to Support Ecuador Earthquake Response*, MAXAR BLOG (Apr. 20, 2016), https://blog.maxar.com/open-data-program/2016/open-imagery-and-data-to-support-ecuador-earthquake-response.

[156] Clark, *supra* note 91, at 326.

standardization of licenses specific to data tackling climate change and especially environmental crises.[157]

Most private entities understandably seek to protect their competitive advantage through both domestic regulations and specific data policies, especially those obtaining high and very high spatial resolutions. However, "special arrangements" such as DigitalGlobe's with the humanitarian unit of OpenStreetMap have in the recent past become more common within the scope of disaster management.[158] A standardized and extensive use of licenses could help to generalize this trend to inform climate action and policies in all States. Standardized licenses would also serve to reduce the need to seek permission from all data contributors, investigate the legal status of the products as well as their terms of usage on a case-by-case basis.[159] This would be of particular value for developing countries without independent access to space-based observation. Licenses specific for EO activities tackling climate change and both sudden and incremental environmental crises must address several fundamental points, including of course use conditions and the degree of retention of ownership rights, as well as settling on definitions of key terms.

VIII. CONCLUSION

The challenges posed by the climate crisis will be most readily overcome through actions by States in concert with both the international arena and influential private entities. The space component has become fundamental in advancing knowledge of the causes and effects of the emergency, furthering the efficacy of mitigation strategies and monitoring developments over long periods of time. In order to exploit the advantages and unique opportunities of an extensive use of outer space to their fullest potential, the highest degree achievable of international collaboration is required. In practice, this translates to technical and legal interoperability of

---

[157] *See id.* Following Hurricane Matthew in the Caribbean, DigitalGlobe once again made imagery available through Creative Common license for use by OpenStreetMap, however, Digital Globe chose the less open CC BY-NC 4.0.

[158] ATSUYO ITO, LEGAL ASPECTS OF SATELLITE REMOTE SENSING 201 (Frans G. von der Dunk ed. 2011).

[159] Harlan Onsrud, James Campbell & Bastiaan van Loenen, *Towards Voluntary Interoperable Open Access Licenses for the Global Earth Observation System of Systems (GEOSS)*, 5 IJSDIR 187, 197 (2010).

the huge amounts of valuable data which spacefaring nations and their private entities generate and collect.

The initiatives discussed above have done well to steer the international arena towards an ever-deepening acceptance of open data principles and practices. In addition, bottom-up approaches driven by research institutions have coupled these efforts, becoming increasingly influential. However, the extent of these successes is somewhat limited due to unidentical definitions in national or regional legislations as well as diverging policy approaches to both open data for EO and data dissemination legislations in general. Furthermore, challenges such as shutter control and especially IPR continues to limit the access of independent users and restrict their work due to an uncertain legal status of datasets or parts thereof.

On the one hand, policies in international open data initiatives such as GEOSS and Copernicus foresee and allow exemptions on dissemination in the interests of national security, defense and international relations. These have been identified as amongst the most common reasons for restrictions to data dissemination and access. On the other, extensive implementation of shutter control has been partly thwarted by the commercialization of space and the rise of a multitude of new space actors, as well as the now established practices of non-discriminatory access to data espoused by, *inter alia*, the Remote Sensing Principles. The promotion of these factors may provide opportunities to further restrict the applicability of shutter control, thus favoring extensive data sharing regimes with fewest possible restrictions.

Moreover, IPR presents substantial obstacles to the establishment of full interoperability due to diverging national and regional policies governing copyright protection, significantly increasing legal uncertainty. In order to tackle the challenges posed by IPR, the implementation of standardized licenses should be pursued. Creative Commons licenses can be valuable in the short term, though EO-specific ones valid in a sufficiently large number of jurisdictions would help to significantly reduce the uncertainty of data and information sharing, especially concerning disaster management data where delays must be avoided.

The value of EO, both for the specific purposes of action against climate change and in various other socioeconomic sectors such as agriculture, urban planning or maritime research, lies in

the reusability of data, for which legal and technical interoperability are preconditions. In addition, collective action of both developed and developing States is needed in order to properly address the threats posed by the climate emergency. Thus, the furthering of full and open access to data and information will enhance the possibilities of developing States with no independent space capabilities to adapt their national policies as set forth in the UNFCCC, and ensure the creation of value-adding derivative and integrative works by multiple independent users.

TO THE MOON AND BACK: ON THE WAY TO A WELL-BALANCED LIABILITY FRAMEWORK FOR LUNAR AND CISLUNAR ACTIVITIES

Elina Morozova[*] & *Alena Laurenava*[**]

ABSTRACT

Lately, there has been much talk about planetary exploration. The Moon is of particular interest as a stopover for human deep-space missions and a base for continuing scientific research, with its natural resources available for extraction and utilization, space tourism opportunities and even potential permanent settlements. Such missions will obviously require extensive preliminary exploration conducted remotely with robotics, as well as reliable communication systems, meaning further Moon landings will be carried out and more objects will be launched into cislunar space. In the move from the realm of science fiction to practical reality, these

---

[*] Elina Morozova is Executive Director of the Intersputnik International Organization of Space Communications, an intergovernmental satellite telecommunication organization headquartered in Moscow, Russia. Elina earned two master's degrees in International Law and World Economy from the All-Russian Academy of Foreign Trade under the Ministry of Economic Development and Trade of the Russian Federation and holds an LL.M degree in International Business Law from the University of Manchester. She is Associate Editor and Core Expert of the McGill Manual on International Law Applicable to Military Uses of Outer Space (MILAMOS). She also serves as Director on the Board of the International Institute of Space Law (IISL). Elina has developed and teaches a course on international space and telecommunication law at the Faculty of Law of St Petersburg University (Russia), and is the author (co-author) of publications on these subjects in English and Russian.

[**] Alena Laurenava worked in the International and Legal Service of the Intersputnik International Organization of Space Communications and as a legal counsel in the sphere of telecommunication law. Alena graduated from the Belarusian State University, Faculty of International Relations, International Law Department. As a member of the team of the Belarusian State University, Alena was a European Champion of the Manfred Lachs Space Law Moot Court Competition 2018 and holds an award for best written memorials of the World Final of the Manfred Lachs Space Law Moot Court Competition 2018.

types of space activities increasingly give rise to the emergence of commercial projects. Moreover, such space activity has seen a general growth in private sector involvement: national laws which encourage private investment have begun to appear while more companies specializing in the commercial use of outer space are being established around the world. Sooner or later, at least some of these projects will be implemented, inevitably leading to an increase in space mishaps, including those on celestial bodies. Purely accidental occurrences may cause damage to expensive immovable planetary installations, lunar rovers, on-orbit satellites or the priceless life of an astronaut. The legal regime aimed at addressing such situations is called liability and, in the context of space activities, is enshrined in two United Nations space treaties—the Outer Space Treaty and the Liability Convention.

The liability regime of international space law, established many moons ago, is not equal to the various challenges posed by the inevitable future. In particular, it is not adequately prepared to regulate the far-reaching endeavors of space exploration and use. Shortfalls include: the scope of compensable damage; the criteria for assigning liability; the application of fault-based liability to incidents in space; the focus on liability of States; and the absence of any procedural or substantive rights of private actors. This article presents an analysis of existing problems, possible solutions, and methods for their implementation in light of specific features connected with international law making. As a rule, norms of international law are slow to emerge and difficult to establish. Yet, with the rapid development of commercial space exploitation, States are likely to require comprehensive and clear norms in governing such wildly expensive business.

I. INTRODUCTION

Law is a system of norms governing all spheres of human activity, which progressively changes along with scientific and technological advancement. Thus, as soon as humans begin to innovate, they begin elaborating on appropriate legal bases. Likewise, as certain fields of human activity evolve, legal norms are also updated. This practice was the case with the launch of the first artificial Earth satellite in 1957 and the adoption of legal norms on the exploration and use of outer space that continue evolving to this day.

Shortly after their establishment, the subsequent development of space activities led to a significant expansion and detailing of international space law's fundamental principles and norms. Importantly, among the fundamental principles is the concept of liability for damage caused by space objects, a concept that remains an integral component of contemporary international space law.

Established at the very beginning of the space age, the liability regime of international space law was shaped under the influence of the circumstances existing at that time. For example, there were only a handful of primary actors participating in space activities. When the space age began in the late 1950s, only two superpowers, the United States and the USSR, were active in space exploration. Such activity, being in its infancy, required advanced solutions of science and technology and huge costs inaccessible to the private sector, so it was conducted by governments. There was an assumption that the nature of exploration and use of space would continue to be largely governmental as launchers were presumed to be State-run in the long term.[1] More so, the Soviet Union originally proposed that all space activities must be carried out solely and exclusively by States.[2] Despite the fact that the compromise was the permission of private activities in outer space under the responsibility of States,[3] the Soviet approach to its national space activities remained unchanged and the government was the only space actor.

The scope of situations covered by the liability regime and the nature of the damage compensated for reflected the level of development of space technology at that time. Space activities primarily consisted of launching objects into space, operating them in orbit during their lifespan, and returning to the Earth in some cases. The current state of space activities has acquired much greater variability and will inevitably experience even more significant changes.

Today, we witness routine in-orbit maneuvers, rendezvous and proximity operations, on-orbit servicing and testing of active debris

---

[1] Michael Gerhard, *Article VI*, *in* 1 COLOGNE COMMENTARY ON SPACE LAW 103, at 106 (Hobe et al., eds. 2009)

[2] Union of Soviet Socialist Republics: Draft Declaration of the Basic Principles Governing the Activities of States Pertaining to the Exploration and Use of Outer Space, U.N. Doc. A/AC.105/C.2/L.2, at 2 (1962).

[3] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies, art. VI, Jan. 27, 1967, 610 U.N.T.S. 187 [hereinafter Outer Space Treaty].

removal technologies. A permanent human and extensive robotic presence on the Moon lay ahead. Questions arise about the adequacy of liability distribution among States when looking at all this from a legal perspective. Indeed, the interests of space actors seem insufficiently protected due to the lack of coverage for certain situations, the narrow scope of the compensated damage and convoluted conditions for obtaining compensation for damage under the current liability regime.

In addition to the substantive content of the current liability regime's existing rules, there are also questions in terms of their formulation. In some respects, the rules are worded in a very broad and general sense. Today, there exist neither State practice nor judicial decisions dealing with the application of the liability rules, which would help interpret and apply legal terms to modern space activities. Therefore, the development of lunar and cislunar activities, the focus of this article, will require changes in, or at least elaboration of, an up-to-date liability framework.

II. LEGAL FOUNDATION FOR LUNAR LIABILITY

In international space law, the liability regime is regulated by two of the five United Nations treaties on outer space.[4] Specifically, the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty)[5] and the 1972 Convention on International Liability for Damage Caused by Space Objects (Liability Convention).[6] Like other international treaties, these two are binding upon their parties.[7]

---

[4] The five United Treaties on outer space are: the Outer Space Treaty, *supra* note 3, the Liability Convention, *infra* note 6, the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter Rescue and Return Agreement], the Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention] and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Dec. 18, 1979, 1362 U.N.T.S. 3 [hereinafter Moon Agreement].

[5] Outer Space Treaty, *supra* note 3.

[6] Convention on International Liability for Damage Caused by Space Objects, Mar. 29, 1972, 961 U.N.T.S. 187 [hereinafter Liability Convention].

[7] Vienna Convention on the Law of Treaties, art. 26, May 23, 1969, 1155 U.N.T.S. 331 [hereinafter Vienna Convention].

As of the end of 2021, 111 States have ratified the Outer Space Treaty, and 98 have ratified the Liability Convention.[8] Note that not all the parties to the Liability Convention are simultaneously parties to the Outer Space Treaty and vice versa. This ratification means that upon evaluating a particular State's liability regime, its international obligations must be analyzed in conjunction with the liability regime as a whole. These obligations are determined by the State's participation in both, one, or none of these two space treaties. Consequently, States may have different scopes of liability when carrying out space activities.

In practice, the vast majority of States with launch capabilities or otherwise conducting space activities are parties to both the Outer Space Treaty and the Liability Convention, which are the core of the liability regime in international space law. Since an even smaller number of these States have the technical potential for lunar and cislunar activities, the damage caused in the course of lunar exploitation will generally be determined in accordance with these two space treaties.[9]

When the interrelation between the Outer Space Treaty and the Liability Convention is described, the Liability Convention is usually referred to as *lex specialis* to the Outer Space Treaty.[10] This means that the Liability Convention must be applied whenever it

---

[8] *Status of International Agreements Relating to Activities in Outer Space as at 1 January 2021,* U.N. OFF. OUTER SPACE AFF., https://www.unoosa.org/res/oosadoc/data/documents/2021/aac_105c_22021crp/aac_105c_22021crp_10_0_html/AC105_C2_2021_CRP10E.pdf (Additionally, 23 States have signed the Outer Space Treaty and 19 States have signed the Liability Convention without ratifying them). *Latest depositary notifications*, U.N. OFF. OUTER SPACE AFF., http://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html (As of the end of 2021, there were no new ratifications of the Outer Space Treaty and the Liability Convention).

[9] The United States, Russia, China, Japan, India, Israel, South Korea, Turkey and United Arab Emirates are among the nations that have announced, or have national nongovernmental entities that have announced potential lunar missions. Katherin Buchholz, *The Race for the Moon Continues,* Statista (Mar. 31, 2021), https://www.statista.com/chart/18698/planned-missions-to-the-moon/. All of the listed countries have ratified both the Outer Space Treaty and the Liability Convention. *See Status of International Agreements Relating to Activities in Outer Space, supra* note 8.

[10] Lesley Jane Smith & Armel Kerrest, *Article VII*, *in* 1 COLOGNE COMMENTARY ON SPACE LAW 126, at 142 (Hobe et al., eds. 2009); Lesley Jane Smith, *Legal Aspects of Satellite Navigation*, *in* HANDBOOK OF SPACE LAW 554, at 586 (F. von der Dunk & F. Tronchetti, eds. 2015).

provides for a relevant legal norm. The Outer Space Treaty regulates situations where the Liability Convention "is inapplicable or does not provide the optimum remedy for the victim."[11] In other words, it is necessary to distinguish between: 1) situations where the Liability Convention should apply since the simultaneous application of both treaties leads to a conflict of laws; and 2) situations where the Outer Space Treaty should apply since the Liability Convention does not contain any relevant rule. Additionally, if the Liability Convention contains a relevant rule, it should be applied instead of the Outer Space Treaty.[12]

These distinctions are important because, in certain aspects, the two treaties contain different rules that directly affect the possibility of obtaining compensation for damage. At the same time, there are two fundamental aspects that are common to both the Outer Space Treaty and the Liability Convention regarding compensable damage. The first aspect concerns how the damage is caused. The second is related to who is liable for such damage.

III. FAILURE HAPPENS

While only the damage caused by a space object or its component parts can be compensated for,[13] the variability of space activities implicates a broader risk. Classic examples of cases of damage caused by a space object would be the collision of satellites in lunar orbit or the collision of lunar rovers on the surface of the Moon. Conversely, an astronaut's damage caused to a lunar settlement is not the same as damage by a space object. Hence, this situation does not fall within the scope of the liability regime of international space law, and such damage cannot be compensated for under the rules of the space liability regime. Similar difficulties arise if the damage is caused by an object that cannot be identified as a space object or its component part. For example, the legal status of an object created entirely or partially from the resources of the Moon is not obvious. Is it a space object for purposes of the Outer Space

---

[11] Smith & Kerrest, *supra* note 10, at 135.

[12] *See also* Elina Morozova & Alena Laurenava, *International Liability for Commercial Space Activities and Related Issues of Debris*, Oxford Univ. Rsch. Encyclopaedia (2021).

[13] *See* Outer Space Treaty, *supra* note 3, art. I; Liability Convention, *supra* note 6, arts. II, III.

Treaty and the Liability Convention? Nor is it obvious that it is possible to compensate for damage caused by such an object within the liability regime.

The inability to apply the liability regime does not exclude the possibility of resorting to the responsibility regime. The latter encompasses rules of general international law on State responsibility for internationally wrongful acts and Article VI of the Outer Space Treaty on responsibility for national activities in outer space.[14] Although the application of both liability and responsibility regimes may ultimately lead to an obligation to compensate for damage, liability rules are more focused on the protection of the injured party and are easier to apply.

For example, within the responsibility regime, one of the two constituent elements for determining whether a State's conduct constitutes an internationally wrongful act is the breach of an international obligation of that State.[15] In contrast, liability may arise from acts not prohibited by international law. The very fact of causing damage is sufficient to invoke liability, which is clearly more convenient for the victim of damage in procedural terms.

In this regard, expanding the scope of the liability regime to cover damage caused as a result of space activities in general, would serve the purpose of protecting the interests of lunar and cislunar actors. Otherwise, the operation of space programs in a legal environment where compensable damage is limited to that caused by space objects can lead to situations where purely accidental damage is beyond the scope of liability.

When considering the possibility of a broader liability framework, it is important to establish who exactly will be liable. The current regime defines those who are liable for cases of damage caused by space objects and will be discussed below, but obviously cannot be applied to cases not related to space objects. For this reason, a possible solution could be found in the concept of national

---

[14] Article III of the Outer Space Treaty makes clear that international law applies to space activities. Outer Space Treaty, *supra* note 3, art. III. *See* Int'l Law Comm'n, Draft Articles on Responsibility of States for Internationally Wrongful Acts, with commentaries, Rep. on the Work of Its 53rd Session, U.N. Doc. A/56/10 (2001) [hereinafter State Responsibility]; Outer Space Treaty, *supra* note 3, art. IV.

[15] State Responsibility, *supra* note 14, art. 2.

activities in outer space, for which States are responsible under Article VI of the Outer Space Treaty.[16] If liability for damage is analogously linked with the national space activities of public and private actors, it is worth paying special attention to the legal status of the persons who cause damage. For example, there is no reason to doubt that damage caused by an astronaut or the crew of a spacecraft is considered damage caused in the course of national space activities. However, different opinions may exist regarding damage caused by space tourists in the course of lunar and cislunar trips undertaken for entertainment purposes. Questions include whether such a trip would be a national space activity and, if so, of which State exactly.

The approach to determining who is liable for damage may be unrelated to the concept of national activities in outer space. For example, liability for damage caused by space tourists can be assigned directly to space tourism operators, even if the latter is a private company. This approach to liability is already taking place in other areas of law. Since hazardous activities regulated by liability regimes are usually commercial, liability for accidental damage, as part of the business risk, is attributed to the direct operator who profits from such activities. For instance, such rules apply to damage caused in nuclear energy,[17] and damage resulting from oil spills carried as fuel in the bunkers of ships.[18] Similarly, space tourism operators could be held liable for damage caused in their commercial space activities.

IV. WHO PICKS UP THE TAB?

Under the Liability Convention, it is States that bear and invoke liability. In this respect, space activities are the only area of hazardous human activity in which liability is not assigned to the direct operators.[19] The reason is that, in the beginning of the space

---

[16] Outer Space Treaty, *supra* note 3, art. VI.

[17] Convention on Nuclear Third Party Liability in the Field of Nuclear Energy, July 29, 1960, 956 U.N.T.S. 251.

[18] International Convention on Civil Liability for Bunker Oil Pollution Damage, Mar. 23, 2001, https://www.imo.org/en/About/Conventions/Pages/International-Convention-on-Civil-Liability-for-Bunker-Oil-Pollution-Damage-(BUNKER).aspx

[19] *See* Michel Montjoie, *The Concept of Liability in the Absence of an Internationally Wrongful Act*, *in* THE LAW OF INTERNATIONAL RESPONSIBILITY 503-512 (James Crawford et al. eds., 2010).

era, space activities were carried out primarily by governments, in contrast to other areas subject to liability regimes.[20] The list of States that are liable for damage is set out exhaustively in Article VII of the Outer Space Treaty. These are States that launch or procure the launching of an object into outer space and States from whose territory or facility an object is launched.[21] The same list exists in Article I(c) of the Liability Convention, which refers to these States as the "launching States."[22]

States acquire the status of launching States at the very moment of the launch and maintain it throughout the whole lifespan of the space object regardless of what happens to it.[23] Even if a space object is sold in space and transferred to the technical management of another space actor, the seller State will remain liable for any damage it may cause.[24] This basic principle of the liability framework can be explained by the common phrase "once a launching State, always a launching State." At the same time, if the buyer State was not considered a launching State at the time of the launch, it will not become one later. This means that despite being directly involved in the operation of a space object, the buyer State is not liable for the damage caused during such operation in accordance with Article VII of the Outer Space Treaty and the Liability Convention.[25] In such cases, the seller and the buyer may enter into an agreement regulating the financial consequences of the seller's compensation for damage under the rules of international space law. The inconvenience for the seller is obvious: a compensation claim for damages, in any case, will be presented to and must be satisfied by the seller. The ability to formally transfer launching

---

[20] *See supra* section I, Introduction.

[21] Outer Space Treaty, *supra* note 3, art. VII.

[22] Liability Convention, *supra* note 6, art. I (c). Hereinafter the term "launching State" will be used to describe States liable in accordance with the Outer Space Treaty and States directly named as "launching" in the Liability Convention.

[23] Armel Kerrest, Effectiveness of Legal Regime for Responsibility and Liability of National Space Activities. Assessment of Gaps, 4 (Sep., 2016) (Presentation given at the 10th U.N. Workshop on Space Law: Contribution of Space Law and Policy to Space Governance and Space Security in the 21st Century).

[24] The Outer Space Treaty places liability on the launching State, regardless of the owner or operator. This liability is not negated through a transfer of ownership. Outer Space Treaty, *supra* note 3, arts. VII & VIII.

[25] *See* Outer Space Treaty, *supra* note 3, art. VII; *See generally* Liability Convention, *supra* note 6. Neither source references liability of the operator of a space object, focusing solely on the liability of the launching State.

State status along with a space object to a new owner could remove the third wheel from the relationship between the causer and the victim of damage.

The identification of the State which launches a space object and, hence, qualifies as a launching State is usually not a difficult task due to the clarity of the terms and the general availability of information. The interpretation of the procurement of the launching, which is another criterion for a State to qualify as a launching State, raises questions. A classic procurement case would be entering into a contract to provide launch services and delivery of a spacecraft on the Moon.

In practice, the State that procures the launch of an object into space often operates such a space object. Commonly, it is also the State that registers a space object, which means that, as provided for in Article VIII of the Outer Space Treaty, it exercises jurisdiction and control over such an object and the personnel on board it.[26] Considering all circumstances described above, it is obvious that this State is most closely associated with the space object and, it would seem, the consequences of its operation. However, for the purposes of liability for damage caused by such an object, this State may be one of several, or even many, launching States that are included in this list by virtue of three other criteria, such as providing the launch or the territory or facility for the launch.[27]

Launching States may conclude agreements among themselves in order to distribute financial consequences of liability. Yet, while such agreements regulate relations between the contracting parties, the injured State, the victim of damage, maintains the right to claim full compensation from any or all of the launching States. This right is based on Article V of the Liability Convention, according to which, if there are two or more launching States, they are jointly and severally liable for any damage caused.[28] However, there is no priority for filing claims against the launching States, leading to practical uncertainties and delays in the proceedings.

In this regard, if the liability regime for lunar and cislunar operations is revised, such a revision should concern the criteria

---

[26] Outer Space Treaty, *supra* note 3, art. VIII. *See* Registration Convention, *supra* note 4.

[27] Liability Convention, *supra* note 6, art. I.

[28] *Id*. at art. V.

which qualify launching States, that is, liable States. As soon as a space object reaches its destination, it might be reasonable to impute liability for damage caused by this space object on fewer States, which would be determined based on the intensity of the link between the State and the operation of the space object. Alternatively, or in addition to the above, the burden of liability among States that qualify as launching States may be distributed in such a way that the State most closely associated with the operation of a space object will be required to compensate for most of the damage inflicted by the space object. The priority of presenting claims against launching States, which are jointly and severally liable, might also depend on how closely the State is linked with the operation of the space object.

V. INCLUSION OF PRIVATE ACTORS

Generally, States are liable for damage caused not only by their space objects but also by space objects of private actors. This is because neither Article VII of the Outer Space Treaty nor Article I(c) of the Liability Convention makes distinctions based on who actually owns and operates the space object.[29] If a State launches or procures the launching of a space object or provides its territory or a facility for its launch, it is liable for the damage caused by such a space object, regardless of whether it is launched in the interests of its governmental authority, a national private company, or a foreign customer.[30] The same approach of equal treatment, regardless of the form of ownership, can be found in the rules and State practice of registration of space objects: both governmental and privately operated objects are subject to registration.[31]

A more complex question is related to the reverse situation: whether States are liable for damage when it is not the State itself but its private actors that launch or procure the launching of a space object or provide their facility for the launch. In the doctrine,

---

[29] The criteria for designating a State as a "launching State" is independent of ownership of the object that is launched. *See* Outer Space Treaty, *supra* note 3, art. VII, Liability Convention, *supra* note 6, art. I(c).

[30] *Id*.

[31] Smith & Kerrest, *supra* note 10, at 137, 138.

one can find various arguments in support of both a positive and a negative answer to this question.[32]

Some examples of State practice can be used to assume that when a private actor meets any of the criteria which define a launching State, as specified in Article VII of the Outer Space Treaty and Article I(c) of the Liability Convention, the State responsible for the respective actor is considered liable for damage in accordance with the very essence of the concept of liability and other rules of international space law.[33]

Such other rules, which are interpreted as a link between the concept of liability and the conduct of private actors, are presumably set in Article VI of the Outer Space Treaty. Article VI establishes responsibility of States for national activities in outer space, which include activities of both governmental agencies and non-governmental entities.[34] Therefore, it is assumed that international liability under Article VII of the Outer Space Treaty also extends to national activities in outer space carried out by private actors.[35] These activities may include the launch of space objects and the provision of launch facilities.

The question is whether this assumption can be used in a situation where a private company procures the launching of a space object. The answer depends on the interpretation of the term "activities in outer space," which is not defined in the Outer Space Treaty. National laws, as an example of State practice, can be used as a means of interpretation.[36] In such laws, States may recognize different qualifications to procure launchings: as a space activity or as not a space activity. If it is shown that the procurement of a launch is not considered a space activity within the meaning of the

---

[32] Doctrine here refers to the general consensus beliefs by those in the space community. *See* Frans von der Dunk, *International Space Law*, *in* HANDBOOK OF SPACE LAW 29, at 83 (F. von der Dunk F. & F. Tronchetti, eds. 2015); Smith & Kerrest, *supra* note 10, at 137-138.

[33] *See also* State Responsibility, *supra* note 14, art. 5 (private launching of a space object may constitute conduct which is empowered by State authority and is considered a State activity under international law), von der Dunk, *supra* note 32, at 83, Smith & Kerrest, *supra* note 10, at 138.

[34] Outer Space Treaty, *supra* note 3, art. VI.

[35] Smith & Kerrest, *supra* note 10, at 136.

[36] Swedish Act on Space Activities (1982), section 1; United Kingdom Outer Space Act (1986), section 1; South African Space Affairs Act (1993), section 1; Belgian Law on the activities of launching, flight operations or guidance of space objects (2005), Art.1.

Outer Space Treaty, then it cannot constitute a national activity in outer space for which an appropriate State is responsible. Consequently, a potential link between responsibility for national space activities and liability for damage is lost. For this and other valid reasons, some argue that a State must not be liable in any case when its private entity procures a launch that is conducted by or from the territory or facility of another State or private launch service provider.[37]

The assumption that the mere procurement of a launch by a private entity is not necessarily a space activity seems convincing, especially considering the variety of entities that can purchase launches. Since space activities are expensive, attracting investment and obtaining bank loans are important for private companies. This is true for both start-ups in the initial stages of deployment and advanced space businesses completing specific projects. At the same time, to reduce their risks, investors and banks may prefer direct payment to a provider of launch services. It would be logically surprising if this meant that such banks and investors were engaged in space activities for which relevant States were responsible and, presumably, liable for damage caused by the space object which launch had been paid for.

Another controversial issue related to the attempt to explain State liability for private actors through Article VI of the Outer Space Treaty is the interpretation of the word "national." It is generally accepted that the activities of a non-governmental entity that has been authorized by the State are considered State's national space activities under Article VI for which that State is responsible.[38] It does not matter whether said non-governmental entity is a national legal entity of such State. Being an option of authorization, licensing establishes the link between the non-governmental entity and the appropriate State. On the other hand, in a case where a foreign company has been licensed, there exists a State of nationality where this company is registered. The State of nationality tends

---

[37] *See* Frans von der Dunk, *International Space Law*, *in* HANDBOOK OF SPACE LAW 29, 83 (Frans von der Dunk et al. eds., 2015).

[38] Outer Space Treaty, *supra* note 3, art. VI. Michael Gerhard, *Article VI*, *in* 1 COLOGNE COMMENTARY ON SPACE LAW 103, at 114-116 (Hobe et al., eds. 2009)

to be responsible for activities in outer space of its private companies, regardless of whether such activities have been licensed.[39] More so, the same company may also be associated with the State of permanent residence or business. In each case, the existence or absence of a legal link with the State is determined by national laws, some of which may treat the activities of that company as national activities.

When reflecting on the liability regime, it is important to consider whether all such States are liable for damage. Here, a fundamental difference between the institutions of responsibility and liability should be recalled, which does not support simply equating responsibility for private national activities in outer space with liability for private space actors. There may be a situation where, despite all reasonable measures and national regulations, a State is not aware of the existence of space activities for which it is recognized as liable. However, a situation akin to this must not affect the primary task of the liability regime, which is to ensure the prompt payment of a full and equitable measure of compensation to victims of damage caused by space objects.[40] Perhaps a balanced approach would be to consider a set of different factors to decide whether a State should be held liable in a particular case.

The number of private actors engaged in the exploration and use of outer space will inevitably increase in the coming years. The number of accidents involving the private space sector will also increase. Clear rules defining which States are liable for damage in which cases are crucial. In the new era of extensive commercial lunar and cislunar activities, such rules must duly consider the interests of all stakeholders.

VI. DETERMINING FAULT

The fundamental principle of international liability for damage is enshrined in Article VII of the Outer Space Treaty. In the sense of where the damage occurs, the scope of this principle can be described as all-encompassing. It covers the Earth, air space, and outer space, including the Moon and other celestial bodies.[41] Under

---

[39] Von der Dunk, *supra* note 37, at 515.
[40] Liability Convention, *supra* note 6, Preamble.
[41] Outer Space Treaty, *supra* note 3, art. VII.

Article VII, compensation for damage is not conditional on a specific legal assessment of the conduct that led to its infliction. According to this Article, the mere fact of causing damage entails liability.[42]

Similarly, Article II of the Liability Convention provides the legal basis for the so-called "absolute liability" for damage in certain cases.[43] However, these are not related to incidents on the Moon and in other parts of outer space. In the event of damage caused by a space object on the Earth's surface or to aircraft in flight, launching States are liable regardless of whether their conduct contains a degree of fault.[44]

In contrast to that, Article III of the Liability Convention establishes a fault-based liability regime which constitutes a peculiar liability feature in international space law.[45] There are no examples of similar liability rules in other areas of law, since the very nature of liability is associated with the purely accidental character of incidents and damage caused by them, which is the key difference between international responsibility and liability.[46] Still, according to Article III of the Liability Convention, in case of damage caused elsewhere than on the surface of the Earth by one space object to another space object or persons and property onboard, the liability of a State arises only through the fault of that State or persons for whom said the State is responsible.[47] Since Article III of the Liability Convention does not specify for whom a State is responsible, it is suggested in the doctrine that these should be the same persons according to Article VI of the Outer Space Treaty.[48]

In cases of lunar and cislunar damage involving space objects of different launching States, it is important to consider the treaties to which the injured States are parties. States that are parties to the Outer Space Treaty but are not parties to the Liability Convention have a more advantageous, namely a fault-free liability regime.

---

[42] *Id.*

[43] Liability Convention, *supra* note 6, art. II.

[44] *Id.*

[45] *Id.* at art. III.

[46] Int'l Law Comm'n, 3rd Rep. on Int'l Liability for Injurious Consequences Arising out of Acts not Prohibited by Int'l Law (Prevention of Transboundary Damage from Hazardous Activities), U.N. Doc. A/CN.4/510, at 121 (2000).

[47] Liability Convention, *supra* note 6, art. III.

[48] *Id.* Lesley Jane Smith & Armel Kerrest, *Article III (Fault Liability) LIAB*, *in* 2 COLOGNE COMMENTARY ON SPACE LAW 131, at 134-135 (Hobe et al., eds. 2013)

States that are parties to both treaties will then have to apply the provisions of the Liability Convention, Article III of which will be a prime example of a *lex specialis* rule.

An even more interesting situation would be a damage case between two space objects of the same launching State. In practice, such a situation may arise if, for example, a space object has changed its State of ownership, which does not affect the status of the launching States. This case does not fall within the scope of Article III of the Liability Convention, which is clearly intended for regulating in-space accidents involving different launching States. In contrast, Article VII of the Outer Space Treaty does not require that a damage case be considered between two different launching States. Any State that has suffered damage is entitled to compensation under Article VII.[49] The authors believe that since no conflict of laws exists between Article III of the Liability Convention and Article VII of the Outer Space Treaty, there are no legal obstacles to the application of the latter in this case. Otherwise, if Article VII of the Outer Space Treaty cannot be applied in this way, then the injured State will not be compensated for the damage due to its status as a launching State in respect of both objects involved in the accident. Such legal uncertainty can be resolved when the first such cases are considered or if it is directly explained at the level of international law.

The concept of fault in Article III of the Liability Convention raises questions regarding its exact legal meaning.[50] It is neither elaborated in the Liability Convention nor interpreted in the practice of its application that is absent up to date. The other four United Nations treaties on outer space are also silent on the notion of fault. Recourse to general international law is not particularly useful since fault is not a necessary element of an internationally wrongful act under the customary rules on State responsibility and is not, therefore, developed in the law of State responsibility.[51] Rare references to the word "fault" may be found in some doctrinal

---

[49] Outer Space Treaty, *supra* note 3, art. VII.

[50] Liability Convention, *supra* note 6, art. III.

[51] Int'l Law Comm'n, Draft Articles on Responsibility of States for Internationally Wrongful Acts, with commentaries, Rep. on the Work of Its 53rd Session, U.N. Doc. A/56/10 (2001), at 34 para 1-2, at 36 para 10; Smith & Kerrest, *supra* note 48, at 133.

sources,[52] especially those published before the concept of State responsibility was codified in the works of the United Nations International Law Commission.[53] Therefore, the word "fault" is often used by authors as the generally accepted language and not in any special legal sense.[54]

In the absence of a definition of fault, it is worth determining what can be useful in establishing fault. For starters, a State's breach of its international obligation implies that State's fault. In the doctrine, it is indeed noted that fault generally stands for the failure to adhere to a legal obligation.[55] Considering the norms most relevant to space activities, the violation of which may indicate fault, one can point to Article IX of the Outer Space Treaty. Specifically, State parties are obligated to carry out space activities with due regard to the corresponding interests of other States, be guided by the principle of cooperation and mutual assistance, and undertake appropriate international consultations in certain cases.[56] An assessment of compliance or noncompliance with the due diligence obligation established in general international law can also be useful in determining fault.

However, it is not clear whether it is appropriate to use such a breach-oriented approach in the context of interpreting fault to apply the liability regime, the very essence of which is the law-abiding nature of the actions causing damage. In any case, the determination of fault should not be confused with the determination of responsibility for the breach of an international obligation and compensation for the damage caused by it, in accordance with the rules of State responsibility for internationally wrongful acts and Article VI of the Outer Space Treaty in the form of responsibility for national activities in outer space.[57]

Deliberate noncompliance with the soft law existing in a particular field of space activities or industry standards can also be considered as a factor in establishing fault. Examples include Space

---

[52] *See* ANTONIO CASSESE, INTERNATIONAL LAW 51, 54, 58 (2001).

[53] State Responsibility, *supra* note 14, at 31-143.

[54] Frans von der Dunk, *Liability versus Responsibility in Space Law: Misconception or Misconstruction?*, in SPACE, CYBER, AND TELECOMMUNICATIONS LAW PROGRAM FACULTY PUBLICATIONS. 43, at 366 (1991).

[55] Smith & Kerrest, supra note 48, at 132.

[56] Outer Space Treaty, *supra* note 3, art. IX.

[57] *See* State Responsibility, *supra* note 14; Outer Space Treaty, *supra* note 3, art. VI.

Debris Mitigation Guidelines of the United Nations Committee on the Peaceful Uses of Outer Space[58] and Principles Relevant to the Use of Nuclear Power Sources in Outer Space.[59] Industry standards may relate to the rules for the operation of space objects, their maintenance, rendezvous and docking with other space objects, the accuracy of determining and holding the position and possible communication signal delays.

Fault may also be established through reference to various markers of reasonable behavior, which can be persuasive. An example of such a marker in activities on the Moon may be related to safety zones. On the one hand, the legality of the establishment of such zones in the light of Article II of the Outer Space Treaty raises debates.[60] On the other hand, if a dissenting party goes beyond legal discussions and demonstrates in practice its disagreement with a safety zone that another lunar actor declares, this may have consequences in terms of determining fault. If a collision occurs in the safety zone, it may be more difficult to identify the degree of fault of the "owner" of the zone than that of the actor that deliberately mapped out its vehicle's route through the safety zone of another.

All the above are theoretical assumptions of how the fault-based liability regime might work. Since international law is a legal system created and interpreted by States, not by theorists, it is hardly conceivable that these assumptions would be applied in practice by a judicial body considering a particular case. Therefore, a clarification within international space law of what constitutes fault and what factors should be assessed would be helpful in dealing with lunar and cislunar accidents in accordance with Article III of the Liability Convention. In providing such explanations, States may also wish to make changes to the current liability regime, which does not fully consider the specifics of upcoming diverse activities on the Moon.

A firm foothold on the Moon for its long-term exploitation and eventual use as a launchpad to Mars and beyond requires permanent lunar facilities. However, the construction and maintenance of

---

[58] U.N. Office for Outer Space Affairs, Space Debris Mitigation Guidelines of the U.N. Comm. on the Peaceful Uses of Outer Space (2010), https://www.unoosa.org/pdf/publications/st_space_49E.pdf.

[59] G.A. Res. 47/68 (Dec. 14, 1992).

[60] *See* Outer Space Treaty, *supra* note 3, art. II.

such facilities are organizationally and technically complex and costly, while the significance of their normal operations in terms of supporting space missions is priceless. Therefore, lunar facilities require special protection in the form of a reliable fault allocation regime.

Such facilities may, following the language of the Outer Space Treaty and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement), be non-military bases, installations, fortifications, crewed and uncrewed stations, structures connected with the surface or subsurface of the Moon.[61] From a legal point of view, these are space objects that are considered stationary by definition. If the damage is caused to a lunar facility by a movable object, such as a lunar rover or a manned vehicle, it can be assumed that such damage results from the vehicle operator's conduct, rather than the result of the facility operator's conduct. Yet, resolving this incident through Article III of the Liability Convention will require that the fault be established on the side of the operator of the movable object.

A possible alternative would be to establish absolute liability for damage caused to stationary objects on the Moon. This type of liability is currently applicable to damage caused by space objects on the surface of the Earth and to aircraft in flight, according to Article II of the Liability Convention.[62] Following the example of Article VI of the Liability Convention, an exemption from absolute liability may be granted if operators of lunar facilities fail to perform their respective duties.[63] These may include the registration of stationary space objects, information on the location of their space activities on the Moon,[64] and other obligations that may arise from bilateral and multilateral agreements between the participants of lunar and cislunar activities.

Presenting evidence of fault constitutes another practical issue for parties to space incidents. It is relatively easy to prove that an incident occurs, that damage is caused to space objects, and what parties are involved. Usually, no other proof is required to obtain

---

[61] *See* Outer Space Treaty, *supra* note 3, arts. IV, XII; Moon Agreement, *supra* note 4, arts. 9(1), 10(2), 11(3), 12(1), 15.

[62] Liability Convention, *supra* note 6, art. II.

[63] *Id.* at art. VI.

[64] *See* Outer Space Treaty, *supra* note 3, art. XI; Moon Agreement, *supra* note 4, art. 9 (reflecting the agreement of State Parties conducting activities in outer space).

compensation under liability regimes in other areas of law. Collection of evidence of fault may significantly complicate the process of applying the liability regime, especially when it comes to State liability for damage caused as a result of an incident between private companies.

States may also have different views on how to provide reliable data. Even today, we see these differences in the positions of States when discussing space situational awareness and space traffic management.[65] It is possible that one State will refuse to accept the evidence presented by a private company of another State. In this regard, agreements on procedural matters related to the implementation of the liability regime in practice would also be useful.

VII. THE CHALLENGE OF COMPENSATION

Another practical disadvantage of the current liability regime for the commercial space sector is its dependence on States and their political will. States have the right to make claims for compensation for damage suffered by their natural and legal persons;[66] however, they are not obliged to do so. There are many reasons that can influence a State's decision about whether or not to make a claim against another State, ranging from geopolitics to the costs of international proceedings.

In the event that such proceedings are initiated and the case is won, questions arise regarding the distribution of the compensation. There are no international rules concerning the mandatory transfer of compensation received, in full or in part, from the liable

---

[65] *See* Statement by the US representative to the Legal Subcommittee of the UN Committee on the Peaceful Uses of Outer Space on agenda item 12 "General Exchange of Views on the Legal Aspects of Space Traffic Management" (2021) https://www.unoosa.org/documents/pdf/copuos/lsc/2021/statements/item_12_USA_ver.1_1_June_PM.pdf (proposing the so-called Open Architecture Data Repository, which will allow domestic commercial and international civil and commercial operators to access a broader range of data and analyses from commercial, academic as well as governmental sources), Working Paper submitted by the Russian Federation, U.N. Doc. A/AC.105/2016/CRP.13 (2016) (Further ideas on a set of goals of achieving the Vienna Consensus on Space Security and the need for thorough reflection on the modalities of addressing the tangled issues associated with space traffic management and the justifiability of intense expectations of early decisions in this area" proposing the United Nations information platform as a single tool of information interaction between States).

[66] *See* Liability Convention, *supra* note 6, art. VIII.

State to the natural or legal persons of the claimant State who suffered the damage. This uncertainty threatens the security of investments and hinders the development of the commercial space sector. Commercial participation in lunar and cislunar activities will require changes in the liability framework.

To protect private interests, States should develop national legislation regulating the process of interaction between public authorities and space companies. This legislation may include establishing an authorized State body, procedural rules enabling private entities to initiate a compensation case, and rules for joint investigation and judicial proceedings. A convenient solution for the private sector would be the immediate payment by the State of full or partial compensation, followed by its recovery from the causer of the damage under the rules of international law. This puts a financial burden on States, but after all, businesses flock to the jurisdictions that provide appealing economic incentives. In this sense, the attraction of capital and new technologies linked with space activities may justify such a financial burden on the State.

VIII. FUTURE OUTLOOK FOR LUNAR AGREEMENTS

At the end of the golden age of international space law, a 20-year period from 1960 to 1980 during which all five United Nations treaties on outer space were adopted, it was expected that extensive enterprise would sweep over the Moon, prompting an adequate legal response. The language of the Moon Agreement suggests that such a response would imply detailed arrangements concerning liability for damage caused on the Moon.[67] Various international lawmaking procedures are available to reach and establish such arrangements. States are therefore free to choose the most appropriate option that reflects their interests.

An obvious option would be to modify the current liability regime by amending the existing treaties. Generally, an international treaty can be amended by agreement between the parties,[68] and both the Outer Space Treaty and the Liability Convention mention the possibility of adopting amendments.[69] It is possible by two

---

[67] Moon Agreement, *supra* note 4, art. 14(2).

[68] Vienna Convention, *supra* note 7, art. 39.

[69] Outer Space Treaty, *supra* note 3, art. XV; Liability Convention, *supra* note 6, art. XXIII(2), XXV.

methods, which differ in their purpose and type of State participation.

The first method involves amending a treaty between all its participants. Accordingly, all parties must be notified of the proposed amendment and maintain the right to choose whether they wish to participate in the negotiation and execution of such an amendment.[70] This method also implies that an amendment must be open to all parties to a treaty.[71] Additionally, any State entitled to become a party to the treaty must also have the right to accede to it as amended.[72] Both the Outer Space Treaty and the Liability Convention set out the procedure for the enactment of amendments.[73] Following their acceptance by a majority of the parties to the treaty concerned, the amendments enter into force for each accenting party.[74] Subsequently, the amendments enter into force for each remaining party on the date of their acceptance.[75]

A disadvantage of agreements aimed at amending a treaty between all its parties is that the amended wording must be agreed upon by all States that have expressed their will to participate in the negotiation process. Approving the wording of the amended agreement may take a long time, thereby delaying its opening for ratification. In the worst-case scenario, the amendment may remain ink on paper forever if it is impossible to reach unanimous agreement on its wording or if the agreed wording does not gain the necessary number of ratifications for the entry into force. States can make reservations to amendment agreements,[76] which allows for different regulation of certain aspects. However, the mechanism of reservations has certain limitations and is not sufficient to remedy the primary concerns with the liability regime.

The aforementioned procedural disadvantages of universal amending makes their conclusion unlikely. Practice confirms this. Over the past four decades, no international treaty of a universal nature has been adopted in the field of international space law.

---

[70] Vienna Convention, *supra* note 7, art. 40.

[71] *Id*.

[72] *Id*.

[73] Outer Space Treaty, *supra* note 3, art. XV; Liability Convention, *supra* note 6, art. XXV.

[74] *Id*.

[75] *Id*.

[76] Vienna Convention, *supra* note 7, art. 39(2)(2).

Therefore, it is impractical to rely on such a method of changing the existing liability regime.

It is worth noting that space related agreements are moving from traditional multilateral fora to bilateral or multilateral ones with limited participation. The Artemis Accords[77] which govern the conduct of space actors in NASA's lunar exploration program, albeit not an international agreement, are a recent example of how this move can be witnessed in practice. This type of international law-making provides an opportunity to effectively negotiate changes to the existing legal regime or establish a new one, even when such changes are not supported by the majority of States participating in multilateral fora. This is particularly relevant in international space law, as few States have the technical capacity to develop and deploy new space programs that may require regulatory changes. United by a common goal, such States are more likely to reach consensus on critical issues through negotiations among themselves. This is the second method to conclude amending agreements.

The second method implies that two or more parties to a multilateral treaty may agree to amend the treaty alone.[78] However, if the possibility of amending a treaty between a limited number of parties is not provided for by the treaty itself, then States that wish to amend the treaty only among themselves must consider two aspects. First, such amendment agreement cannot affect the rights and obligations of other parties to the treaty.[79] Second, the modifications cannot relate to a provision, derogation from which is incompatible with the effective implementation of the object and purpose of the treaty as a whole.[80] This is precisely the case with the Outer Space Treaty and the Liability Convention. Although it is debatable which provisions of the Outer Space Treaty and the Liability Convention are related to the overall object and purpose, it is clear that two or a handful of parties cannot make any significant modifications among themselves. Examples of such provisions would be the definition of the liable and launching States, exclusion

---

[77] The Artemis Accords: Principles for Cooperation in the Civil Exploration and Use of the Moon, Mars, Comets, and Asteroids for Peaceful Purposes, Oct. 13, 2020, https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf.

[78] Vienna Convention, *supra* note 7, art. 41.

[79] *Id*.

[80] *Id*.

of the concept of fault from Article III of the Liability Convention, and the establishment of absolute liability for damage to stationary space objects caused by movable ones.

Another option that would allow States to modify the existing liability framework is to conclude a new treaty establishing rules different from those set out in the Outer Space Treaty and the Liability Convention. The preamble or final provisions of such a new treaty should indicate that it prevails over existing treaties. To avoid difficulties of agreeing on a new treaty by a large number of States, this treaty can be drafted by a smaller number of States. For example, a treaty of this kind can be concluded between States with technical and financial capabilities to implement lunar and cislunar space programs.

Spacefaring nations might be interested in regulating space activities related to their ambitious and technically sophisticated programs in accordance with such a newly established regime. On the other hand, States that do not have the potential to innovate through regulation but want to participate in the development of their space sector, will have to join such a regime. That is why a new treaty, initially adopted by a small number of States, might significantly contribute to the liability regime of international space law.

IX. CONCLUSION

The development of any sphere of human activity requires a clear, comprehensive, sustainable, and adequate legal framework that equally meets the interests of all participants. This framework is particularly important when it comes to regulating technically complex, costly, and risky activities. Such are space missions today and lunar missions of tomorrow. There will soon be the extensive exploitation of the Moon and cislunar space by all kinds of actors. The purpose of the liability regime related to damage resulting from such activities is to distribute the burden fairly and reasonably among those who carry out and benefit from such activities.

The liability regime of international space law is well studied from a theoretical point of view regarding the historical prerequisites for its establishment. Nevertheless, problems arise when it comes to its implementation in practice, considering the significant changes that have already taken place in the space sector and the

factors that will affect its further development. One such factor is the increasing diversity of space activities and space actors, with a constantly growing share of private companies. Contrarily, the liability regime can be described as quite narrow and State-centric.

Some provisions of the liability regime are insufficient to protect the interests of space actors. First, the scope of damage covered by the liability rules is limited to damage caused by a space object. Not included within the scope of liability are situations otherwise related to implementing space activities in a broader sense. Second, the liability for damage caused by a space object lies with States, regardless of who is the actual operator of the space object. Additionally, liability is assigned to a pre-selected list of States, also known as "launching States," who may not be closely associated with the operation of a space object. For this reason, States that are not at all involved in the operation of a space object may be liable for damage for which they are not at fault. The opposite situation is also possible: a State directly operating a space object may escape liability due to formalities. Third, liability rules also create legal uncertainty regarding the extent to which States are liable for damage caused by the private space sector. The correct identification of those liable for damage is essential for an efficient and fair resolution of a liability case. Therefore, controversial issues are associated with liability based on fault, including the interpretation of the concept of fault and the process of collecting and presenting evidence. Finally, the absence of any substantive and procedural rights of private space actors under the international liability regime creates inconvenience and unpredictability with respect to the resolution of damage cases.

This list, although extensive, is still far from exhaustive. More so, the development of the space industry will certainly lead to an increase in situations that are inadequately or insufficiently regulated by the current liability regime of international space law. If we want to bear witness to the rapid and powerful progress in the exploration of the Moon and cislunar space by both nations and businesses, these issues must be addressed.

REQUEST AND RETURN: A LOOK AT THE RETRIEVAL OF UNITED STATES COMMERCIAL SPACE LAUNCH OBJECTS THAT RETURN TO EARTH

Charles Ellzey[*]

ABSTRACT

Today's space industry has generated an exponential increase in commercial launches, but what happens when a commercially launched item – now considered a space object – returns to Earth? Under international space law, the State which controls the territory where a space object lands has the ability to exclude entities, including the launching entity from the recovery process. Security concerns arise in respect of the presence of sensitive or controlled technologies in foreign lands; a lack of clearly established timelines for a space object recovery and return process exacerbates these underlying security concerns.

As the number of commercial spacecraft operators increases, there is also an exponential increase of both debris and reusable technology which fall back to Earth after a spacecraft or object is launched. International law only requires returning these objects to the "State Party on whose registry an object [is] launched into outer space" rather than the commercial operator itself.[1] A real quagmire arises when an object lands in the territory of a State who has not ratified any space treaties. Achieving broad consensus in the form of an international agreement regarding the recovery and retrieval of space objects could quell security concerns and help

---

[*] Chas Ellzey is partner and Chief Executive Officer of Ellzey & Finnegan Law Firm, PLLC.

[1] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies art. VIII, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S 205 [hereinafter Outer Space Treaty].

restore the cooperation and mutual understanding of the early space age.

I. INTRODUCTION

While commercial operators will undoubtedly seek to recover any reusable technology, such as engines, some may also argue they are obligated recover nonfunctional debris. If the entity desires, or is required, to retrieve the space object, this retrieval must be facilitated by the State in which the object landed.[2] Despite the provisions of the Outer Space Treaty, security concerns persist in the form of the damaged State's[3] ability to exclude the launching State from the recovery of the object from hostile nations or those who are not a party to the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and other Celestial Bodies[4] (Outer Space Treaty) or Convention on International Liability for Damage Caused by Space Objects[5] (Liability Convention). While precedent indicates no international obligation to recover a space object and its components, International Traffic in Arms Regulations[6] (ITAR) implications may exist for operators recovering reusable technology. The process for retrieving such objects is guided by Article VIII of the Outer Space Treaty and carried out by the "State Party" on whose national registry the object is filed.[7]

Under Article VI of the Outer Space Treaty, a State retains responsibility for its private space actors.[8] We see this responsibility continued in Article VIII, where a State retains jurisdiction and control over its space objects.[9] For example, the United States (US) as a sovereign entity is ultimately responsible for any damage caused by private space objects listed on the US registry. The US

---

[2] *Id*.

[3] For purposes of this article, the "damaged State" shall refer to the State upon whose territory the spacecraft or its components have landed regardless of whether this State has incurred any actual damage resulting from the return of these objects to Earth.

[4] Outer Space Treaty, *supra* note 1.

[5] Convention on International Liability for Damage Caused by Space Objects art. I(c), Nov. 9, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention].

[6] *See generally*, 22 U.S.C §2778, 22 C.F.R. §§ 120-30.

[7] Outer Space Treaty, *supra* note 1, art. VIII.

[8] *Id*. at art. VI.

[9] *Id*. at art. VIII.

could also be responsible for objects not on its registry should it, for example, be found a "launching state" of that object.[10] Article VII closed this potential loophole of avoiding liability by omitting on object from one's register. International obligations enumerated in Articles VI, VII and VIII of the Outer Space Treaty are why commercial launch activities must be regulated. In the US, commercial activities must be licensed by the Federal Aviation Administration (FAA)[11] and monitored by federal entities such as the US Air Force/US Space Force.[12] Given that ultimate responsibility is attributed to the US, the government itself must be the one to retrieve these fallen space objects rather than the non-governmental entity, should either party desire recovery. While some may argue there is an international obligation to retrieve fallen space debris or reusable technology,[13] the Cosmos 954 precedent indicates otherwise.

Simply put, "[t]he Soviets did not request the return of what was left of Cosmos 954."[14] Being a novel issue, Canada was left without precedent of how to dispose of foreign spacecraft that had fallen upon its territory. The USSR, shortly after the Cosmos 954 incident, expressed its belief that it was "duty-bound to participate in the search and recovery of the debris of the satellite."[15] However, it was the Canadian interpretation which prevailed, under which "the injured state is entitled to choose which country or countries

---

[10] While the term "launching state" was not yet defined at the time of the Outer Space Treaty, the principle was first introduced in Article VII, holding "each State Party from whose territory or facility an object is launched" internationally liable for damage caused by the object. Outer Space Treaty, *supra* note 1, at art. VII. "Launching State" was later formally defined in the Convention on Registration of Objects Launched into Outer Space art. 1, Nov. 15, 1976, 28 UST 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention].

[11] *See* 14 C.F.R. § 413.3 (who must obtain a license or permit). *See also* 14 C.F.R. § 415.23(a) ("The FAA reviews a license application to determine whether it presents any issues affecting U.S. national security or foreign policy interests, or international obligations of the United States.").

[12] Space Policy Directive 3 (June 18, 2018), https://trumpwhitehouse.archives.gov/presidential-actions/space-policy-directive-3-national-space-traffic-management-policy/ ("Already, the Department of Defense (DoD) tracks over 20,000 objects in space . . . .").

[13] Outer Space Treaty, *supra* note 1, art. IX (State Parties agree to "avoid harmful contamination").

[14] Dr. Peter P. C. Haanappel, *Some Observations on the Crash of Cosmos 954+*, 6 J. SPACE L. 147, 148 (1978).

[15] Alexander F. Cohen, Cosmos 954 and the International Law of Satellite Accidents, YALE J. OF INT'L L. 78, 84 (1984).

will carry out the cleanup."[16] Canada's decision to exclude the Soviets from recovery further eroded diplomatic relations between the two Cold War adversaries. "Indeed, the U.S.S.R. repeatedly expressed frustration at Canada's refusal to allow it to participate in the cleanup."[17]

The crash of Soviet satellite Cosmos 954 on January 24, 1978, one of the most notorious incidents of spacecraft retrieval, highlights the international importance of cooperation in fallen space object retrieval and indemnification by the launching State. Cosmos 954, designed as an ocean surveillance satellite, "carried a nuclear reactor using uranium enriched with [an] isotope of uranium-235."[18] This satellite's component parts disintegrated and "scattered radioactive debris over northwest Canada in an area the size of Austria."[19] This space object's wreck raised the novel issue of decontamination and cleanup of a fallen nuclear-powered space object. While there was some initial cooperation between Canada, the Soviet Union and the US in cleaning up the debris, issues arose concerning the timing of communication between the launching State (the Soviet Union.) and Canada.[20] These issues, and a perceived lack of information coming from the Soviet Union, ultimately led Canada to accept the US' offer, rather than the launching State's offer, to assist in the cleanup efforts.[21] Given the hostilities then existing between the Soviet Union and the US,[22] there was an evident national security concern for the Soviet Union because a relatively unfriendly nation had gained access to Soviet technology.

While the Cosmos 954 incident did not involve a *commercial* space object, its lessons are still instructive to the recovery of

---

[16] *Id*. at 85.

[17] *Id*.

[18] Eilene Galloway, *Nuclear Powered Satellites: The U.S.S.R. Cosmos 954 and the Canadian Claim*, 12 AKRON L. REV. 401, 402 (1979).

[19] *Id*. at 401.

[20] *Id*. at 407-08.

[21] *Id*.

[22] On April 28, 1978, Communist soldiers assaulted the Afghani presidential palace, executing its occupants. "In Washington, this Communist revolution was met with alarm." The Carter administration recognized Afghanistan's new leader would undo previous "attempts to steer Afghanistan away from Moscow, and it debated whether to cut ties with Afghanistan or recognize Taraki in the hopes that Soviet influence could be contained." OFFICE OF THE HISTORIAN, THE SOVIET INVASION OF AFGHANISTAN AND THE U.S. RESPONSE, 1978–1980, https://history.state.gov/milestones/1977-1980/soviet-invasion-afghanistan (last visited Sept. 17, 2021).

commercial space launch objects and debris. First and foremost, separate from liability and compensation, the Cosmos 954 event suggests an apparent lack of any international obligation for either the State Party or a non-governmental operator to recover space objects that have returned to Earth. The State Party to the treaties, rather than the non-governmental entity itself, must request and retrieve any fallen commercial object. Consequently, the issues experienced by Canada and the Soviet Union are ever relevant to commercial entities who must involve their State governments in the retrieval process. Issues such as the timing of notice and offers of assistance have a clear impact on any State damaged by the touchdown of commercially launched space objects. Additionally, the issues experienced by the Soviet Union, namely impeded access to the space object over which they retain "jurisdiction and control,"[23] are especially relevant to commercial actors who seek to recover proprietary or export-controlled technologies.

Given that space object retrieval is such a complex interaction amongst four multilateral treaties, it would be beneficial to clarify the process in a new multilateral agreement regarding spacecraft retrieval. The newly proposed Artemis Accords of the US is a framework within which such an agreement could be negotiated. While the Artemis Accords address space object registration and orbital debris mitigation, they fail to mention any specifics on space object retrieval.[24] This article details what issues any such proposed agreement on space object retrieval would need to address.

II. EXISTING LAW ON SPACE OBJECT RETRIEVAL

Today's existing laws on space object request, return, and retrieval are found, for US operators, in five places: (a) the Outer Space Treaty;[25] (b) the Liability Convention;[26] (c) the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return

---

[23] Outer Space Treaty, *supra* note 1, art. VIII

[24] *See* NATIONAL AERONAUTICS AND SPACE ADMINISTRATION, THE ARTEMIS ACCORDS, (Oct. 13, 2020), https://www.nasa.gov/specials/artemis-accords/img/Artemis-Accords-signed-13Oct2020.pdf [https://perma.cc/36DT-QEHR] [hereinafter Artemis Accords].

[25] Outer Space Treaty, *supra* note 1, arts. VI, VII, VIII.

[26] Liability Convention, *supra* note 5.

of Objects Launched into Outer Space[27] (Rescue Agreement); (d) the Convention on Registration of Objects Launched into Outer Space[28] (Registration Convention); and (e) US ITAR legislation.[29] This section will outline the current law on the guiding the retrieval of space objects, emphasizing implications for commercial space operators in the US.

A. The Outer Space Treaty Articles VI, VII and VIII

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies, lays the foundation for modern space law.[30] The Outer Space Treaty occurred at the height of Cold War tensions. Nevertheless, the two biggest adversaries of the day (USSR and the US) eventually reached a consensus on the fundamental principles that should govern activities in outer space.[31] Despite these two nations being embroiled in hostilities, they and the rest of the world agreed that space exploration needed to be carried out in a manner that fostered cooperation rather than conflict.[32] Knowing conflict in space was inevitable, the Outer Space Treaty laid down a framework for international liability and jurisdiction over fallen space objects.

Outer Space Treaty Article VI mandates that State Parties "shall bear international responsibility for national activities in outer space. . . whether such activities are carried on by

---

[27] Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, Nov. 3, 1967, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter Rescue Agreement].

[28] Registration Convention, *supra* note 10.

[29] 22 C.F.R. §§ 120-30.

[30] Outer Space Treaty, *supra* note 1.

[31] Christopher Daniel Johnson, *The Outer Space Treaty*, OXFORD RES. ENCYCLOPEDIA (Jan. 24, 2018), https://doi.org/10.1093/acrefore/9780190647926.013.43 ("Negotiated and drafted during the Cold War era of heightened political tensions, the Outer Space Treaty is largely the product of efforts by the United States and the USSR to agree on certain minimum standards and obligations to govern their competition in 'conquering' space.").

[32] "*Desiring* to contribute to broad international cooperation in the scientific as well as the legal aspects of the exploration and use of outer space for peaceful purposes, *Believing* that such cooperation will contribute to the development of mutual understanding and to the strengthening of friendly relations between States and peoples . . . ." Outer Space Treaty, *supra* note 1, Preamble.

governmental agencies or by non-governmental entities."[33] The provision holds a State Party to the treaty, such as the US, internationally responsible for its governmental space operators' actions and the actions of domestically-based private entities. Article VI also imposes an obligation on the State Parties to "assu[re] that national activities are carried out in conformity with the provisions set forth" in the Outer Space Treaty.[34] Concerning "non-governmental entities," State Parties must both authorize and continually supervise the actions of any non-governmental entities in space to ensure consistently with the country's obligations under the Outer Space Treaty.[35] The treaty then expands upon this concept of international liability by explicitly assigning international responsibility for damages.

Article VII of the Outer Space Treaty attributes international liability for "damage to another State Party" to the State Party who "launches or procures the launching of an object into outer space."[36] It is important to note that the object need not be launched from the State Party's territory in order for that State to be liable for the actions of the object.[37] This initial assignment of liability is further expanded upon by the Liability Convention, detailed later in this section.[38]

Finally, Article VIII of the Outer Space Treaty indicates that a State Party "in whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object."[39] Such jurisdiction and control are crucial in enforcing the above-mentioned liability provisions. The State's retained control over the object is also unaffected by the object being located or manufactured in outer space or on another celestial body, or by the object's return to Earth – so long as the object has been "carried" on that State's registry.[40] Article VIII concludes by mandating that "[s]uch objects

---

[33] *Id*. at art. VI.

[34] *Id*.

[35] *Id*.

[36] *Id*. at art. VII.

[37] Manal Cheema, *Ubers of Space*, 44 J. SPACE L. 171, 174 (2020). The term launching state means: (i) a State which launches or procures the launching of a space object; or (ii) a State from whose territory or facility a space object is launched. Liability Convention, *supra* note 5, at art. I(c).

[38] Liability Convention, *supra* note 5.

[39] Outer Space Treaty, *supra* note 1, art. VIII.

[40] *Id*.

or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return."[41] A critical distinction here is that the damaged State on whose territory the object crash-lands must only *make possible* the other State Party's object's return should it be requested.[42] Moreover, the State Party on whose registry the object appears has no international obligation to retrieve the object.[43]

In short, the Outer Space Treaty neither imposes an international obligation on the launching State to recover the object nor an obligation on the damaged State Party to return the object. The optional nature of the request and return process is further clarified in the Rescue Agreement, discussed in the following subsection. Under the Outer Space Treaty, the damaged State effectively holds all the power as there are no defined timelines within which it must return an object. The Outer Space Treaty leaves additional gaps within which security concerns can fester in the form of undefined timelines for: providing assistance; proffering identifying information; and physically returning the space object. Further, any State that has not ratified the Outer Space Treaty is wholly unbound by these rules unless the rules are held to be customary international law.[44] So far, customary international law only appears to dictate the State upon which the object lands make return of it

---

[41] *Id*.

[42] *See* Rescue Agreement, *supra* note 27, art. 5.

[43] The lack of any international obligation for a State Party to the Outer Space Treaty and its progeny to recover downed spacecraft and their components was solidified by the Cosmos 954 incident. In the Settlement of Claims, Canada did not assert the Soviet Union. had any obligation to come into Canada and recover the objects itself, rather quite the opposite – Canada asserted its right to clean up the crash as it felt was best, even if that was to the exclusion of the U.S.S.R. SETTLEMENT OF CLAIM BETWEEN CANADA AND THE UNION OF SOVIET SOCIALIST REPUBLICS FOR DAMAGE CAUSED BY "COSMOS 954" ¶ 22 (Apr. 2, 1981) [hereinafter SETTLEMENT OF CLAIM].

[44] "Customary international law refers to international obligations arising from established international practices, as opposed to obligations arising from formal written conventions and treaties. Customary international law results from a general and consistent practice of states that they follow from a sense of legal obligation." CUSTOMARY INTERNATIONAL LAW, CORNELL LAW SCHOOL LEGAL INFORMATION INSTITUTE, https://www.law.cornell.edu/wex/customary_international_law#:~:text=Customary%20international%20law%20refers%20to%20international%20obligations%20arising,they%20follow%20from%20a%20sense%20of%20legal%20obligation. (last visited Sept. 17, 2021).

possible should the launching State so request.[45] Despite decades passing since its creation in 1967, this request and return process has yet to be clarified or expanded upon. As such, it is something the Artemis parties must consider as they move forward with the multilateral agreement process.

B. Rescue Agreement

The second treaty to address the space object retrieval process, the Rescue Agreement,[46] builds upon the Outer Space Treaty mandates laid down in Articles VI, VII and VIII.[47] Most importantly, the Rescue Agreement clarifies how much control the damaged State has over the request and return process. Article 5 of the Rescue Agreement is particularly important to the request and return process, as demonstrated by the Cosmos 954 situation. It requires that each Party that discovers a fallen space object in territory under its jurisdiction "shall notify the launching authority and the Secretary-General" of the United Nations.[48] As such, the damaged State's *first* obligation after an object has crashed in its territory is to report the incident to the United Nations, which effectively identifies the launching State.[49] This notice requirement is the only obligation, aside from the Outer Space Treaty's obligation to *make possible* the object's return, which is triggered without any further action on the part of the launching State. However, the State's obligation under the Outer Space Treaty obligation is more of a passive willingness than a deliberate action such as the Rescue Agreement's notice provision.

Once notice has been given, the damaged State "shall, upon the request of the launching authority and with assistance from that authority if requested, take such steps as it finds practicable

---

[45] Cohen, *supra* note 15, at 86.

[46] Rescue Agreement, *supra* note 27.

[47] *Id.* at Preamble ("*Noting* the great importance of [the Outer Space Treaty], which calls for the rendering of all possible assistance to astronauts in the event of accident, distress or emergency landing, the prompt and safe return of astronauts, and the return of objects launched into outer space . . . .").

[48] *Id.* at art. 5(1).

[49] Should it be unclear who the launching authority is, the State whose territory the object landed in may request "identifying data" prior to the object's return. Under the Outer Space Treaty, the launching authority "shall provide" this information upon request. Outer Space Treaty, *supra* note 1, at art. VIII.

to recover the object or component parts."[50] There are two very critical points to this provision. First, the "upon request of the launching authority" language signifies that the damaged State has no obligation to even recover the object absent the launching State's request. Second, the "with assistance from that authority if requested" language clarifies that the damaged State is not obliged to include the launching State in the recovery efforts.[51] In effect, the Rescue Agreement places complete control of the recovery and return process in the control of the damaged State, thus exacerbating security concerns arising from the Outer Space Treaty.

The Rescue Agreement clarifies that the damaged State's obligation to return the space object and its components is only triggered once the launching State requests said object's return. Upon the launching State's request, the object and its components "shall be returned to or held at the disposal of representatives of the launching authority, which shall, upon request, furnish identifying data prior to their return."[52] Should a launching State not request the return of the object(s), then the Rescue Agreement does not apply, and the damaged State is free to dispose of the items as they wish – just as Canada did with the remnants of Cosmos 954. While not pertinent to Cosmos 954, an evident security concern exists should the space object contain classified data or military technologies, although it seems probable that any reasonable launching State would request the return of any space object containing such technology or data.

Lastly, the Rescue Agreement contains a special provision regarding objects of a "hazardous or deleterious nature." The damaged State "may so notify the launching authority, which shall immediately take effective steps, under the direction and control of the said Contracting Party, to eliminate possible danger of harm."[53] This provision represents the pinnacle of the damaged State's control over the request and return process. Even when the fallen space object contains hazardous or radioactive materials, the launching State may only attempt to rectify the situation "under the direction

---

[50] *Id*. at art. 5(2).

[51] *Id*. at art. 2 ("Such operations shall be subject to the direction and control of the Contracting Party, which shall act in close and continuing consultation with the launching authority.").

[52] *Id*. at art. 5(3).

[53] *Id*. at art. 5(4).

and control of" the damaged State. As such, the Rescue Agreement frames the security issue of only retrieving a State's own downed space object once permitted by another foreign State. In this way, the damaged State's ability to exclude the launching State seems in contrast to the "jurisdiction and control" maintained by the launching State over its object under the Outer Space Treaty.

C. Liability Convention

The third treaty, the Liability Convention,[54] begins by recalling the Outer Space Treaty and recognizing the "need to elaborate effective international rules and procedures concerning liability for damage caused by space objects."[55] The Liability Convention is primarily addressed here to give the reader a sense of how liability would be imputed including apportionment of, or potential absolution from, damages resulting from any fallen space object subject to the request and return process. However, the Liability Convention often does not apply at all to a downed objects like Cosmos 954, which result in very little damage.

The Convention begins by defining "launching state" as: "(i) A State which launches or procures the launching of a space object; [or] (ii) A State from whose territory or facility a space object is launched."[56] This definition was effectively lifted straight from Article VII of the Outer Space Treaty, with the only real change being the inclusion of its formal definition in the Liability Convention.[57] The formal definition failed to define what it meant to "procure a launch" under Outer Space Treaty Article VII, leaving the notion of a "launching state" still somewhat murky.

Articles II and III then assign liability to State Parties, based on the location of the damage caused by a space object. Article II

---

[54] Liability Convention, *supra* note 5.

[55] *Id.* at Preamble.

[56] *Id.* at art. II.

[57] The Outer Space Treaty's Article VII reads:

> Each State Party to the Treaty that launches or procures the launching of an object into outer space, including the moon and other celestial bodies, and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object or its component parts on the Earth, in air or in outer space, including the moon and other celestial bodies.

Outer Space Treaty, *supra* note 1, at art. VII.

mandates absolute liability under which a State must pay compensation for "damage caused by its space object on the surface of the Earth or to aircraft in flight" regardless of fault.[58] However, these provisions actually end up sidelining the Convention due to its narrow definition of "damage." The Convention defines damage as "loss of life, personal injury or other impairment of health; or loss of or damage to property of States or of persons, natural or juridical, or property of international intergovernmental organization."[59] Given the scattered nature of Cosmos 954's debris, "[t]his definition can by no stretch of the imagination cover the costs incurred by Canada in preventing potential damage, where actual damage never occurred or remains unmeasurable (such as general damage to the environment).[60] Instead, absolute liability for damage to the Earth's surface caused by "activities involving the use of nuclear energy" was recognized by both Canada and the Soviet Union as a "general principle of international law" in their agreed settlement of the Cosmos 954 claim.[61] The Soviets and Canadians unwittingly solidified the inapplicability of the Liability Convention to the Cosmos 954 incident, and subsequent similar events, by relying on "uncodified principles of international law . . . but *not* on the Rescue and Return Agreement or on the Liability Convention."[62]

The Convention then continues with Article III, which, unlike liability for damage on Earth, imputes fault-based liability for damage caused "elsewhere than on the surface of the Earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State."[63]

Articles IV and V address joint liability when the objects of two or more launching States impact a third State. Regarding damage caused elsewhere than on the surface of Earth to a space object or its crew or cargo, the two launching States responsible for the object "shall be jointly and severally liable to the third State."[64] This provision is particularly relevant should two objects collide in space and create debris that damages a third State's object. Should these

---

[58] *Id*.
[59] Outer Space Treaty, *supra* note 1, at art. I(a).
[60] Haanappel, *supra* note 14, at 148-49.
[61] SETTLEMENT OF CLAIM, *supra* note 43, ¶ 22.
[62] Haanappel, *supra* note 14, at 149.
[63] Liability Convention, *supra* note 5, art. III.
[64] *Id*. at art. IV(1).

objects cause damage to the third State on the surface of Earth or aircraft in flight, the two launching States' liability "shall be absolute."[65] Similarly to Article III, liability for damage caused to a space object of a third State, or its crew or cargo, is apportioned between the two launching States "based on the fault of either of the first two States or on the fault of persons for whom either is responsible."[66] In all cases of joint and several liability mentioned above, "the burden of compensation for the damage shall be apportioned between the first two States with the extent to which they were at fault."[67] In a case in which the extent of the fault of each of the two launching States cannot be determined, "the burden of compensation shall be apportioned equally between them."[68] Under Article V, should one launching State unilaterally pay compensation, that State "shall have the right to present a claim for indemnification to other participants in the joint launching."[69] It is important to note that a State from whose territory or facility an object is launched "shall be regarded as a participant in a joint launching."[70]

Article VI addresses exoneration under the above liability schemes. A State may only escape absolute liability if it "established that the damage [had] resulted either wholly or partially from gross negligence or from an act or omission done with intent to cause damage on the part of a claimant State" or its persons.[71] However, exoneration is not available to launching States whose activities "are not in conformity with international law."[72]

Lastly, Article XXI is relevant to incidents such as Cosmos 954, given its nuclear power source. Should a space object "present[] a large-scale danger to human life or seriously interfere[] with the living conditions of the population or the function of vital centres," the launching State is to consider "rendering appropriate and rapid assistance [to the damaged State,] when it so requests."[73] The "when it so requests" language echoes the language previously

---

[65] *Id*. at art. IV(1)(a).
[66] *Id*. at art. IV(1)(b).
[67] *Id*. at art. IV(2).
[68] Liability Convention, *supra* note 5, art. IV(2).
[69] *Id*. at art. V(2).
[70] *Id*. at art. V(3).
[71] *Id*. at art. VI(1).
[72] *Id*. at art. VI(2).
[73] *Id*. at art. XXI.

discussed in the Outer Space Treaty and the Rescue Agreement giving the damaged State absolute control over the recovery process. Again, under the Liability Convention, the launching State cannot take any action to recover even hazardous objects without the request of the damaged State. This language arguably allows the damaged State to skirt the "jurisdiction and control" of the launching State retained under the Outer Space Treaty just as Canada did with Cosmos 954.

D. Registration Convention

The fourth and final treaty, the Registration Convention,[74] is of particular importance to space object retrieval. The presence of an object on a State's domestic registry allows that State Party to maintain jurisdiction and control over that object.[75] The Convention mandates that a State "register the space object by means of an entry in an appropriate registry which it shall maintain."[76] This provision is critical to implementing Outer Space Treaty Article VIII by mandating that States maintain a domestic registry of space objects as required to retain "jurisdiction and control" over the object.

The other provision of the Registration Convention relevant to space object retrieval is Article IV which mandates that the launching State to notify the United Nations Secretary-General of space objects already registered but no longer in Earth orbit.[77] The General Assembly expanded upon this requirement in the wake of the Cosmos 954 incident via its November 10, 1978 resolution on International Co-operation in the Peaceful Uses of Outer Space (the 1978 Resolution) requiring the launching State to give notice when a nuclear-powered object runs a risk of reentry.[78]

---

[74] Registration Convention, *supra* note 10.

[75] Outer Space Treaty, *supra* note 1, art. VIII.

[76] Registration Convention, *supra* note 10, art. II(1).

[77] *Id*. at art. IV. *See also* Galloway, *supra* note 18, at 412.

[78] The General Assembly stated "it is essential that Member States pay more attention to the problem of the gradually increasing probability of collisions of space objects, especially those with nuclear power sources…." G.A. Res. 33/16 (Nov. 10, 1978).

E. International Traffic in Arms Regulations (ITAR) Implications for US Operators

While the launch of a space object itself is not considered an "export," non-governmental operators in the US must also be aware of ITAR implications created by retrieving reusable technology, such as engines, returning to Earth. Retrieval of the space object itself is not required, however, when retrieving reusable technology such as engines, the retrieval must be done in accordance with ITAR.[79] US exports of space technologies are controlled through either: 1) the International Traffic in Arms Regulations (ITAR);[80] or 2) the Export Administration Regulations (EAR).[81] ITAR restrictions are "of the highest order within US export controls, and represent the most closely guarded technologies."[82] Only objects deemed "scrap" will not be subject to the State Department's control via ITAR.[83] However, these scrap items are still subject to the Department of Commerce's jurisdiction.[84]

First and foremost, no ITAR violation occurs when a non-governmental US operator's space object returns to Earth in another country's territory.[85] The relevant portion of the US Code states:

> A launch vehicle, reentry vehicle, or payload that is launched or reentered is not, because of the launch or reentry, an export or import, respectively, for purposes of a law controlling exports or imports, except that payloads launched pursuant to foreign trade zone procedures as provided for under the

---

[79] *See* 22 C.F.R. §§ 123.1.

[80] *Id*.

[81] 15 C.F.R. §§ 730-74 (2019).

[82] Charles H. Ellzey, Promoting Globalization in Space Policy: A Look at United States Export Controls, 44 J. Space L. 278, 292 (2020). The USML controls the "export of goods and technical data that are principally used in military or intelligence applications, including critical defense articles, services, and technologies." The EAR controls dual-use "goods and technologies that have civil, commercial, military, and intelligence applications." Juan Santos, Pre-Proposal Conference (PPC) for APD SMEX & MO, NASA 1, 3 (May 2, 2019), https://explorers.larc.nasa.gov/2019APSMEX/pdf_files/7_APD_SMEX_MO_Preproposal-Export_Control_2_May_2019_v2.pdf.

[83] 15 C.F.R. § 770.2(g)(3). *See also United States v. Sun*, 278 F.3d 302, 310 (2002).

[84] *Id*.

[85] Laura Montgomery, *ITAR and the FAA's Exclusive Licensing Jurisdiction*, GROUND BASED SPACE MATTERS (Mar. 30, 2020), https://groundbasedspacematters.com/index.php/2020/03/30/itar-and-the-faas-exclusive-licensing-jurisdiction/ [https://perma.cc/SJ8J-V3H9].

> Foreign Trade Zones Act (19 U.S.C. 81a-81u) shall be considered exports with regard to customs entry.[86]

"In short, a launch or reentry vehicle, or a payload, is not an export 'for purposes of a law controlling exports;' and the law controlling exports at issue here is ITAR."[87]

While commercial operators need not worry about an ITAR violation due to their vehicle's reentry in foreign territory, they must be aware of ITAR implications with respect to the decision to retrieve reusable technologies that have returned to Earth. While federal law states the reentry is not an "import," the argument could be made that subsequently giving the item to a foreign person after reentry – by either failing to retrieve it or hiring a foreign recovery team– *is* an "export."[88] Most notably, exports of engines and other components enumerated in the US Munitions List (USML)[89] require a license.

While the launch itself is not an export, intending for a foreign person to recover the reusable object might be construed as an export as it transfers control to the recovering individual.[90] The State Department is unlikely to prosecute for inaction alone after reentry;[91] however, the same cannot be so easily said for those who intentionally have their item recovered by a foreign entity. Thus, to avoid any possibility of such breaches of federal law, a US commercial entity should ideally have its items recovered by a team of US persons, or if recovered from the water, a US flagged vessel with no foreign persons serving on its crew.[92]

---

[86] 51 U.S.C. § 50919(f).

[87] Montgomery, *supra* note 85.

[88] *See* 22 C.F.R. § 120.17(a)(3) (export includes "[t]ransferring registration, control, or ownership of any aircraft, vessel, or satellite subject to the ITAR by a United States person to a foreign person.").

[89] *Id*. § 121.1. "ITAR controls the export of goods and technical data that are principally used in military or intelligence applications, including critical defense articles, services, and technologies. These items are identified on the United States Munitions List (USML), and include certain items listed in the Missile Technology Control Regime (MTCR) Annex." Santos, *supra* note 82, at 3.

[90] *Id*. § 120.17(a)(3).

[91] 51 U.S.C. § 50919(f).

[92] The recovered, reusable technology would be subject to 22 C.F.R. §121.1, Category IV(d) and 22 C.F.R. § 121.16 Missile Technology Control Regime, Item 2, Category I(c). Therefore, these items cannot be exported to foreign persons without a license. 22 C.F.R.

Concerning such reusable technologies, the State Department has established that simply because an object is inoperable does not mean it is no longer subject to ITAR regulations.[93] Only when the object is deemed "scrap" can it escape the ITAR export controls and be subject to more relaxed Department of Commerce controls.[94] The relevant federal regulation states:

> Other commodities that may have been on the U.S. Munitions List are "scrap", and therefore under the jurisdiction of the Department of Commerce, if they have been rendered useless beyond the possibility of restoration to their original identity only by means of mangling, crushing, or cutting. When in doubt as to whether a commodity covered by the Munitions List has been rendered useless, exporters should consult the Directorate of Defense Trade Controls, U.S. Department of State, Washington, DC 20520, or the Exporter Counseling Division, Office of Exporter Services, Room 1099A, U.S. Department of Commerce, Washington, DC 20230, before reporting a shipment as metal scrap.[95]

The language of this provision indicates that the State Department will not hold commercial operators accountable for the recovery of every object that returns to Earth, if the US has deemed the item to no longer require sensitive ITAR export controls. It is important to note that operators *should* consult for federal interpretation of "scrap," likely indicating the government's inclination to rule

---

§ 123.1(a). While this allows for export exceptions, those must be conducted under preestablished authority which would not be feasible given the lack of control over falling objects and the fact that export licenses are not usually obtained in anticipation of commercial space launches. It would be prudent for commercial entities to not include any "foreign persons" in the recovery operation in order to completely insulate themselves from ITAR liability. For purposes of this section, foreign person means any natural person who is not a lawful permanent resident as defined by 8 U.S.C. 1101(a)(20) or who is not a protected individual as defined by 8 U.S.C. 1324b(a)(3). It also means any foreign corporation, business association, partnership, trust, society or any other entity or group that is not incorporated or organized to do business in the United States, as well as international organizations, foreign governments and any agency or subdivision of foreign governments (e.g., diplomatic missions).
Id. § 120.16 (2006).

[93] 22 C.F.R. §121.1

[94] 15 C.F.R. § 770.2(g)(3).

[95] *Id*.

against removing export controls on an item that questionably has been rendered useless.

Space object operators often have little control over where their debris falls. Therefore, the launch or reentry of a space object is not, in itself, considered a disclosure. While non-governmental operators need not worry about violating ITAR when their objects return to Earth in foreign territory, they must keep in mind the typical ITAR regulations when retrieving any reusable technology. The most prudent course of action for these operators would be to ensure no "foreign persons" participate in the object's recovery.[96] That way, even if the State Department deems the change of control over the object to be an "export," there will not be an ITAR violation.

However, it may be impossible not to involve a foreign individual under the current regime of spacecraft retrieval given the launching State being at the liberty of the damaged State. Under the Canadian Cosmos 954 precedent, "the injured state is entitled to choose which country or countries will carry out the cleanup."[97] Thus, commercial operators might be shut out of the retrieval process concerning their own objects. Should this situation arise, commercial operators should ensure the only foreign nationals involved are those involved at the behest of the launching State. The State Department will struggle to prosecute an entity for dealing with foreign nationals it required such an entity to interact with.

III. CURRENT PROCESSES FOR SPACE OBJECT RETRIEVAL

Currently, the process for retrieving space objects launched by the State, and those launched by non-governmental entities, which have returned to Earth is practically identical. Internationally speaking, the abandonment of space objects which return to Earth is not prohibited under the Outer Space Treaty or its progeny. While there is no obligation to request the recovery of the fallen object, the launching State may have an interest in facilitating retrieval on the commercial entities' behalf. Given that States, rather than the commercial entities themselves, are the parties to the

---

[96] *See* discussion of "foreign persons" under ITAR, *supra* note 92.

[97] Cohen, *supra* note 15, at 85.

treaty, the State must be the one to request the return of space objects from another territory or jurisdiction.[98]

A. Retrieval of Space Objects and Their Components Must be Carried Out Through the State

The commercial entity's ability to retrieve space object components and the whole space object that return to Earth is governed by international law. It is important to recall that State Parties retain "jurisdiction and control" over a space object so long as that object appears on the State's national registry.[99] Thus, it is of critical importance that non-governmental entities assure their space objects are included on the national registry of their home country.[100] Such registration ensures the home, launching State's ability to exercise jurisdiction over the object.[101] A State retains this control over the components of space objects which reenter Earth's atmosphere, and can request the return of mere components, as well as "whole" space objects.[102] Recall that any request and return process under Article VIII of the Outer Space Treaty must be carried out via the State. Therefore, a commercial entity cannot simply retrieve their fallen material unilaterally.

A foreign signatory to the Outer Space Treaty and its progeny must return space objects and their components to the launching *State*, rather than the *non-governmental entity*, upon request.[103] Before returning the object or components, the State in whose territory the object has fallen may request identifying information on the space object.[104] Such request for information can be the source of tensions between the launching State and the damaged State, as

---

[98] *See generally* Outer Space Treaty, *supra* note 1.

[99] *Id*. at art. VIII.

[100] United States operators, for example, must comply with 14 C.F.R. § 417.19 in registering their objects with the Federal Aviation Administration. Within 30 days after a licensed launch, "an operator must file the following information: (1) The international designator of the space object(s); (2) Date and location of launch; (3) General function of the space object; and (4) Final orbital parameters, including: (i) Nodal period; (ii) Inclination; (iii) Apogee; and (iv) Perigee." *Id*. at (b).

[101] Outer Space Treaty, *supra* note 1, art. VIII.

[102] Registration Convention, *supra* note 10, art. I(b) ("The term 'space object' includes component parts of a space object as well as its launch vehicle and parts thereof.").

[103] Outer Space Treaty, *supra* note 1, art. VIII.

[104] *Id*.

discussed in Section IV[105] hereof. With these issues in mind, the State Parties may allow the commercial entity to do the brunt of the effort in retrieving the items. However, any such efforts *must be* undertaken through and with the authority of the launching State.[106]

While the retrieval of such items from most countries is not a major obstacle, if an object were to fall into the hands of a potentially hostile State, (consider contemporary relations between the US and China, North Korea, or Iran) the situation becomes much more problematic. A launching State, such as the US, would be much more hesitant to reveal identifying information under such circumstances. In such a scenario, a considerable national security risk arises from the regulatory gaps created by the Outer Space Treaty and its progeny concerning the timing of such requests and return of the object and its components. The absence of individual agreements between federal entities, such as NASA, and hostile nations exacerbates this security risk. Even in such a situation where the US object fell in Russian territory, there exists established agreements, such as the Memorandum of Understanding[107] between Roscosmos and NASA accompanying the ISS Intergovernmental Agreement,[108] which have further solidified each State's obligations under the Outer Space Treaty.[109]

B. No Obligation to Recover Fallen Objects

The Outer Space Treaty holds State Parties responsible "for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty."[110] State Parties

---

[105] *Id*. at art. IV.

[106] *Id*. at art. VIII; Rescue Agreement, *supra* note 27, art. 5.

[107] The MOU has a stated objective "to provide the basis for cooperation between NASA and RSA in the detailed design, development, operation and utilization of the permanently inhabited civil international Space Station for peaceful purposes, in accordance with international law." Memorandum of Understanding Between the National Aeronautics and Space Administration of the United States of America and the Russian Space Agency Concerning Cooperation on the Civil International Space Station, Jan. 29, 1998 [https://perma.cc/VEP2-WRHA] [hereinafter Roscosmos MOU].

[108] Agreement Concerning Cooperation on the Civil International Space Station, Jan.29, 1998, 1998 U.S.T. 212 [hereinafter IGA].

[109] Roscosmos MOU, *supra* note 107.

[110] Outer Space Treaty, *supra* note 1, art. VI.

must do so in good faith, as with any agreement.[111] Article IX of the Outer Space Treaty further requires States to avoid causing "adverse changes in the environment of the Earth."[112] However, precedent would suggest the State Party's obligation to "avoid harmful contamination"[113] is not synonymous with an international obligation for State Parties, or their non-governmental entities, to recover their own space objects every time they return to Earth. Given these requirements, one might argue a State Party would violate the Outer Space Treaty if it allowed commercial entities to simply abandon space objects which return to Earth after their lifespan in orbit. However, case precedent stands in the face of this assertion – the Soviet Union was never forced to recover and properly dispose of the remnants of Cosmos 954.[114]

The Soviet Union did not recover any of the remnants of Cosmos 954, nor did Canada allege that the Soviets should have been forced to do so.[115] In fact, Canada asserted that its own government had the right to conduct the cleanup as it saw fit, since Cosmos 954 landed in Canadian territory.[116] Cosmos 954 exposed several inadequacies of international space law concerning recovery and return of downed space objects. However, it made two things clear: (1) absent the damaged State's request to do so, no State Party is obligated to recover its own space objects from foreign territory; and (2) the damaged State is free to conduct the recovery however it wishes, even to the exclusion of the launching State. If the international community were to ever insist on such an obligation, it would likely have been for Cosmos 954 due to its radioactivity. As the damaged State, after giving notice of the Cosmos 954 incident, Canada's only requirement was to make the items' return *possible*, which the Soviet Union never requested.[117]

---

[111] Vienna Convention on the Law of Treaties art. 26, May 23, 1969, 1155 U.N.T.S. 331 [hereinafter Vienna Convention] ("Every treaty in force is binding upon the parties to it and must be performed by them in good faith.").

[112] Outer Space Treaty, *supra* note 1, art. IX.

[113] Outer Space Treaty, *supra* note 1, art. IX (State Parties agree to "avoid harmful contamination").

[114] Haanappel, *supra* note 14, at 148.

[115] *Id*.

[116] *See* Galloway, *supra* note 18, at 407.

[117] Haanappel, *supra* note 14, at 148.

IV. CURRENT ISSUES WITH EXISTING PROCESS

The crash of Cosmos 954 on Canadian soil provides an in-depth look at some of the multi-jurisdictional legal and security issues surrounding space object retrieval, primarily the lack of defined timeframes under which such actions occur.[118] According to the Outer Space Treaty, the Soviet Union retained "jurisdiction and control" over Cosmos 954, despite its falling to Earth within Canadian territorial boundaries.[119] Article VIII mandates that "[s]uch objects or component parts found beyond the limits of the State Party to the Treaty on whose registry they are carried shall be returned to that State Party, which shall, upon request, furnish identifying data prior to their return."[120] While the provision sounds relatively simple, its implementation is much more complicated. The treaty's silence on timing led to differing interpretations among the parties involved, leading to limited cooperation between Canada and the Soviet Union.[121]

It is highly likely Soviet security concerns regarding providing information on a classified technology to an ally of the US likely played a prime role in delaying information exchange. This security concern is still very prevalent today when a space object lands in unfriendly territory. The issue of space object retrieval persists even when both countries are State Parties to the Outer Space Treaty and its progeny. However, this security issue is multiplied exponentially when such an object lands in the unfriendly territory of a State who *is not* a State Party to the Outer Space Treaty and its progeny.

A. Lack of Defined Timelines

Cosmos 954 highlighted the specific issue of undefined timelines within the Outer Space Treaty and its progeny. Timing

---

[118] SETTLEMENT OF CLAIM, *supra* note 43, ¶ 16.

The Government of the Union of Soviet Socialist Republics failed to give the Government of Canada prior notification of the imminent re-entry of the nuclear powered satellite and failed to provide timely and complete answers to the Canadian questions of January 24, 1978 concerning the satellite. It thus failed to minimize the deleterious results of the intrusion of the satellite into Canadian air space.

[119] Outer Space Treaty, *supra* note 1, art. VIII.

[120] *Id*.

[121] Cohen, *supra* note 15, at 84-85.

concerning notice of the deorbiting object to the States which it might damage became a large issue for Canada in refusing the Soviet Union's help. Similarly, the timeframe in which the Soviets were to respond to the Canadian request for information was a source of further conflict. While the Soviet Union felt it offered "rapid assistance,"[122] the Canadian government disagreed, finding the US offer, which came minutes after the object entered Canadian airspace, to be more suitable "rapid assistance."[123] Lastly, had the Soviet Union requested the return of Cosmos 954, the undefined timeframe in which Canada would be required to return the object and its components had the potential to become of paramount importance as one would assume that the launching State would want its objects returned without the opportunity for deep analysis by the damaged State..

i. Timelines Concerning Requested Information, Notice and "Rapid Assistance"

Despite the Soviet Union being liable for the damage caused under the Outer Space Treaty and the Liability Convention, the procedure surrounding the request and return of the Cosmos 954 spacecraft remained at issue. Given the presence of Cosmos 954 on the Soviet registry, the Soviet Union was required to provide identifying data before the spacecraft's return.[124] However, without clear guidelines on exactly what information was to be disclosed and when, a disconnect occurred between the damaged State and the launching State, which hampered cooperation between the two nations.[125] The main disagreement turned on whether an offer of assistance should have been given before impact. The Government of Canada requested identifying information on January 24,

---

[122] Galloway, *supra* note 18, at 402, 405-08.

[123] *Id*.

[124] Outer Space Treaty, *supra* note 1, art. VIII.

[125] *Compare* Galloway, *supra* note 18, at 408 (Erik B. Wang, Director of the Legal Operations Division of the Department of External Affairs and Canadian delegate to the United Nations Special Political Committee following the Cosmos 954 event, stating the Canadian viewpoint that "some of the necessary information on the satellite had been obtained from the Soviet authorities but not enough was received and the transmittal of some data had been delayed."), *with* Galloway, *supra* note 18, at 407 (Boris Maiorski, Soviet Union delegate, stating the Soviet viewpoint that when Cosmos 954 "came to an end over the territory of Canada, the Soviet Government offered immediate assistance to the Government of Canada.").

February 8, February 28, and April 13, 1978.[126] The Soviet Union "ultimately provided some information in the Notes of the Embassy dated March 21, 1978 and May 31, 1978."[127] Unfortunately, the Outer Space Treaty's silence on the time at which such information should be produced allowed conflict between the two States, likely pushing Canada to reject the Soviet offer of assistance.

The Canadians felt the Soviet response to the incident was too little, too late, ultimately leading Canada to accept the US' offer instead.[128] Canada also expressed concern that the Soviet Union "failed to give Canada notice of the possible re-entry of the satellite into the Earth's atmosphere in the region of Canada."[129] Given Cosmos 954's nuclear payload, the Soviet Union was to "examine the possibility of rendering appropriate and rapid assistance" to Canada in cleaning up the contaminated debris.[130] However, just as the Outer Space Treaty was silent as to the timing of providing information, the Liability Convention did not define a timeline for "rapid assistance." The Soviet Union knew of the imminent crash in the time leading up to Cosmos 954's actual touchdown on Canadian territory, as President Carter personally contacted the Soviets on January 12, 1978, and offered assistance in predicting where the satellite might fall.[131]

Rather than accept such assistance, the Soviet Union instead asserted the satellite was designed to destruct upon reentry and could not possibly produce an explosion.[132] While this belief might have been genuine, the Soviet Union wholly disregarded the possibility and severity of radioactive contamination as the debris returned to Earth.[133] As a result, the Soviet Union did not warn

---

[126] SETTLEMENT OF CLAIM, *supra* note 43, ¶ 7.

[127] *Id*.

[128] *Id*. ¶ 3 (Canadian Government stating the United States's offer of aid was made "[w]ithin minutes of the re-entry and the intrusion of the satellite into Canadian air space.").

[129] *Id*. ¶ 4.

[130] Liability Convention, *supra* note 5, art. XXI.

[131] Galloway, *supra* note 18, at 402.

[132] *Id*.

[133] SETTLEMENT OF CLAIMS, *supra* note 43, ¶ 5. On January 24, 1978, "[t]he [Soviet] Ambassador asserted that there should not be any sizeable hazard and that in places of impact there could only be insignificant local pollution requiring very limited measures of disactivation."

Canada or offer its assistance until well after Cosmos 954 crashed.[134] The Soviet assertion was wholly incorrect as "Canadian authorities determined that all but two of the fragments recovered were radioactive [with some fragments proving] to be of lethal radioactivity."[135] The Soviet claim that only "very limited measures of disactivation [*sic*]" would be required was also false.[136]

Canada and other States likely felt these actions were not in the spirit of "cooperation and mutual assistance," as highlighted in the Outer Space Treaty.[137] In contrast, President Carter called Canada to offer US assistance "[a] few minutes after Cosmos 954 entered Canadian airspace."[138] The US "furnished experts and specialized equipment in radiation detection for the search and recovery operation."[139] These differing interpretations of "rapid assistance" led Canada to seek immediate assistance from the US, rather than the later offer from the Soviet Union.[140] It is likely that the Soviet Union's delayed response further hampered cooperation between two countries already on opposite sides of the Iron Curtain. Canada was not the only State to hold this view, as the 1978 Resolution included the following provision: "*Requests* launching States to inform States concerned in the event that a space object equipped with nuclear power sources on board is malfunctioning with a risk of re-entry of radioactive materials to the Earth."[141]

The presence of this provision in the Resolution signaled the widespread belief that a launching State, in the spirit of

---

[134] Galloway, *supra* note 18, at 407 (Boris Maiorski, Soviet Union delegate United Nations Special Political Committee, stating the Soviet viewpoint that "as soon as the existence of the satellite Cosmos 954 came to an end over the territory of Canada, the Soviet Government offered immediate assistance to the Government of Canada in eliminating the consequences of that incident.").

[135] SETTLEMENT OF CLAIMS, *supra* note 43, ¶ 10.

[136] *Id*. ¶ 8. Canadian cleanup of Cosmos 954 occurred in two stages: (1) Phase I, from January 24-April 20, 1978 at a cost of $12,048,239.11; and (2) Phase II, from April 21-October 15, 1978 at a cost of $4,414,346.86.

[137] Outer Space Treaty, *supra* note 1, art. IX.

[138] Galloway, *supra* note 18, at 402.

[139] *Id*.

[140] *Id*. at 407. Erik B. Wang, Director of the Legal Operations Division of the Department of External Affairs and Canadian delegate to the United Nations Special Political Committee following the Cosmos 954 event, stated the Canadian viewpoint that the Soviet Union's offer was comparatively tardy to the same-day United States offer and, more importantly, it "had come after the search operation had been started by the Canadian armed forces and other agencies . . . ."

[141] G.A. Res. 33/16 (Nov. 10, 1978); Galloway, *supra* note 18, at 409.

"cooperation and mutual assistance," should give timely notice to any State Parties who might be affected in such a way as Canada was by the Cosmos 954 crash. "Timely notice" can be inferred from the "risk of re-entry" language, as the time at which a risk would arise is certainly well before reentry itself. Such a time frame is necessary for the launching State to adequately "examine the possibility of rendering appropriate and rapid assistance" to any damaged State.[142] Additionally, this refers to risk of reentry in foreign territory whatsoever, as there is no requirement for potential damage to trigger this notification. As such, it can be inferred the General Assembly intended notice be timely so that the other State can adequately prepare for reentry.

While the Canadians blamed the delayed Soviet response for their acceptance of the US' offer, the Soviets blamed Canadian sovereignty. As noted above, the Soviets considered their offer of assistance "immediate" despite the delay.[143] The Soviet offer for assistance was admittedly only extended once the object had already crashed.[144] In speaking to the UN Special Political Committee, the Soviet delegate noted that while the Soviet Union had offered its "immediate assistance … [t]he question of how that aid was used relates to an area in which every Government makes an independent sovereign decision."[145] It is important to note, to the Soviet Union's credit, the Outer Space Treaty, and each subsequent treaty, conditions the assistance of the launching State on the request of the damaged State.[146] Even if the Soviet Union were fully willing and able to help on January 24, 1978, the day that the space object impacted Canadian territory, Canada would still have the right to refuse its assistance by not making any such requests. While such refusal would likely be outside the spirit of "cooperation and mutual assistance" highlighted in the Outer Space Treaty, Canada would

---

[142] Liability Convention, *supra* note 5, at art. XXI.

[143] Galloway, *supra* note 18, at 407.

[144] *See generally id.*

[145] *Id.*

[146] *See* Outer Space Treaty, *supra* note 1, art. VIII (mandating the launching State must provide, upon request, identifying data of the object prior to the object's return by the damaged State); Rescue Agreement, *supra* note 27, art. 5, ¶ 2 (stating the launching State has the right to assist in the recovery, but this right is conditioned upon the request for help by the damaged State); Liability Convention, *supra* note 5, art. XXI ("[T]he launching State, shall examine the possibility of rendering appropriate and rapid assistance to the State which has suffered the damage, when it so requests.").

still be compliant with international obligations. This right to refuse assistance under the Outer Space Treaty highlights the security issue between the launching State and the damaged State.

ii. Timelines Concerning the Return of Space Objects and Component Parts

In refusing such assistance, yet another unenumerated timeline comes into play. Article VIII of the Outer Space Treaty makes no mention of the timeframe in which a space object or its components must be returned to the launching State.[147] As such, a damaged State is free to return the object or components at its leisure. A foreseeable concern might arise regarding sensitive technologies in another county for an undefined period. During this time, the damaged State would essentially have complete control over the object such that they could run tests on any materials which have fallen back to Earth. Canada did study the remnants of Cosmos 954 after the crash, and while they did so for purposes of assessing the object's radioactivity,[148] there is no safeguard preventing them from studying the object for reverse engineering purposes. As such, the period during which an object may remain in the damaged State, after a request for return by the launching State, is of particular concern.

While the Soviet Union did not request the spacecraft's return,[149] the issue still looms concerning future incidents. Consider the possibility that the Soviets had requested the return of the object, and Canada had in turn refused or delayed its return. While Canada's outright refusal would violate both the Outer Space Treaty and the Rescue Agreement,[150] a delay would still be within its rights under international law. Canada need not even explain any delay in returning the objects under the treaties. As such, this undefined timeline for space object return creates a severe security issue, which will be discussed in the next sub-section.

---

[147] Outer Space Treaty, *supra* note 1, art. VIII.

[148] SETTLEMENT OF CLAIM, *supra* note 43, ¶ 10.

[149] Haanappel, *supra* note 14, at 148 (discussing the complex legal situation of no notice, but also no damage to Canadian citizens or property, nor measurable environmental impact).

[150] Outer Space Treaty, *supra* note 1, art. VIII; Rescue Agreement, *supra* note 27, art. 5(3).

While it seems obvious the international community should require the launching State to give notice of a potential reentry by a nuclear-powered space object, perhaps this notice requirement should be extended to *all* reentering space objects. Such notice seems in line with the "cooperation and mutual assistance" principle outlined in Outer Space Treaty Article IX. Enumerated timelines during which the launching State must provide the identifying information required under the Outer Space Treaty would also assist in furthering cooperation between the launching State and the damaged State. Establishing timelines for the actual return of the space object and its components can avoid escalating tensions, especially between unfriendly States. Should some of these timelines become established, many of the security concerns addressed below may become avoidable.

B. Security Concerns Regarding Downed Objects in Unfriendly Nations

Given the political climate of 1978, there were numerous security concerns as discussed previously. The Soviet concerns with providing identifying information about the Cosmos 954 satellite to a Cold War adversary were not unfounded. Nor were the concerns that the US military, both directly and through the Government of Canada, would have access to the satellite components over which the Soviet Union still retained "jurisdiction and control" per the Outer Space Treaty.[151]

i. Security Concerns Regarding Sharing of Identifying Information

States have a valid concern in providing identifying information, as required under the Outer Space Treaty, to unfriendly States in the event an object returns to Earth. Soviet hesitance to provide the information requested by Canada likely stemmed from security concerns about sharing such classified information with a Cold War adversary. As one author remarked, "[i]n fact, no Soviet-Canadian cooperation occurred. Under the world's political realities, it was the US and Canada which cooperated in the search and

[151] Outer Space Treaty, *supra* note 1, art. VIII.

rescue of Cosmos' debris."[152] Expecting such political realities to not influence exchange of information between unfriendly States is not practical. Given the international treaties do not specify precisely what information is to be provided and when, conflict arises between the launching States and the damaged State.

ii. Security Concerns Regarding Damaged State's Ability to Exclude Launching State

Under the Outer Space Treaty, the Soviet Union retained "jurisdiction and control" over the Cosmos 954 spacecraft and its "component part[s]" despite these objects being "found beyond the limits of the State Party."[153] Despite this, the Soviet Union was not allowed by Canada to participate in the Cosmos 954 cleanup. A Canadian Delegate remarked to the United Nations Special Political Committee that "the Canadian government appreciated the Soviet Union's offer to assist," but cited that offer coming "after the search operation had been started" as a reason for accepting the US' offer.[154] The delegate only stated "there might be an opportunity" for the Soviet Union to cooperate with Canada in the "disposal, outside of Canada, of the accumulated radioactive materials."[155] Given this position, Canada effectively denied the Soviet Union the ability to assist in the Cosmos 954 incident's cleanup, as was the damaged State's right under the Outer Space Treaty and the Rescue Agreement.[156]

Being excluded from the cleanup efforts posed a serious security concern for the Soviet Union, as pieces of the government's sensitive technology were allowed to be studied by a Cold War adversary, with the potential for reverse-engineering.[157] "The debris recovered was sent to the Canadian Government's Whiteshell Nuclear Research Establishment," where tests were carried out on the

---

[152] Haanappel, *supra* note 14, at 149.

[153] Outer Space Treaty, *supra* note 1, art. VIII. Applied to this instance, this article clarifies that the Soviet Union's ownership is not infringed by the satellite's return to Earth or its return location being outside the borders of the country.

[154] Galloway, *supra* note 18, at 407.

[155] *Id*. at 408.

[156] Outer Space Treaty, *supra* note 1, art. VIII (stating that the launching State "shall, upon request, furnish identifying data prior to the return" without further detail on what data is sufficient). *See also* Rescue Agreement, *supra* note 27, art. 5.

[157] Cohen, *supra* note 15, at 85; Galloway *supra* note 18, at 407.

debris.[158] From a Soviet perspective, Canada's ability to exclude the launching State from the cleanup efforts, coupled with its ability to retain those objects for an unspecified amount of time, posed a real security risk. Essentially, the Soviet "jurisdiction and control" over the object and its components was useless given Canada's power to exclude.

While Canada was obliged to return the Soviet Cosmos 954 and its components upon the Soviet Union's request, it was not obliged to do so in any given amount of time, as noted previously. Thus, the Soviets had virtually no control over what was done with the object during the time between Canada's retrieval and its eventual return. As such, a clear issue emerged regarding Canadian, and likely American, access to the sensitive technology on board. The inability to protect technologies which may return to Earth becomes exponentially more problematic if the damaged State is *not* a State Party to the Outer Space Treaty and its progeny.

iii. Security Concerns Regarding Downed Objects in States Not a Party to the Outer Space Treaty

Should a space object land in the territory of a State who is not party to the Outer Space Treaty and its progeny, the launching State will likely encounter even graver security concerns. In such a scenario, the damaged State would have absolutely no obligation to return the space object upon request of the launching State. Such a situation would become exponentially worse if the two countries were at odds. For example, if a US entity launched an object carrying a classified government payload, and that object then landed in a State such as Sudan, Zimbabwe or Liberia, there would be an immediate and persistent security concern for the US until the object and its components were retrieved. Normal security concerns regarding information in the hands of hostile nations, such as those listed above, would be exacerbated by the fact these States have not yet ratified the Outer Space Treaty.[159] Thus, they would likely be free to do whatever they wish with the object and its components.

---

[158] SETTLEMENT OF CLAIM, *supra* note 43, ¶ 10.

[159] UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, STATUS OF INTERNATIONAL AGREEMENTS RELATING TO ACTIVITIES IN OUTER SPACE 5-10 (Jan. 1, 2020), http://css.unoosa.org/documents/pdf/spacelaw/treatystatus/TreatiesStatus-2020E.pdf [https://perma.cc/7QTV-4JKS].

The only potential solution at this moment, would be to assert the request and return process has become customary international law and thus, applies to all States.

V. RECOMMENDATIONS FOR SPACE OBJECT RETRIEVAL CLARIFICATION IN THE ARTEMIS ACCORDS

Recently, the US and seven other partner States released the Artemis Accords, a new international framework intended to build upon the principles laid down by the Outer Space Treaty and its progeny.[160] While the Artemis Accords require that the Parties must agree to abide by the Outer Space Treaty and its progeny,[161] there have been no specific instructions regarding space object retrieval. As State Parties to the Artemis Accords refine the details of their obligations under the agreement, they should also address space object release and recovery. There have been some elaborations by the United Nations, such as the previously mentioned 1978 Resolution;[162] however, the precedent for space object retrieval remains unclear because incidents such as Cosmos 954 have rarely occurred. Enumerating specific timelines would facilitate cooperation between the launching State and the damaged State and ease tensions. Since no solution exists for a non-signatory to the Outer Space Treaty, the Artemis Accords would undoubtedly benefit from an agreement negotiated within its framework facilitating standardized, international procedures for spacecraft retrieval. Such an agreement could even go as far as facilitating these interactions between State parties. In the presence of such an agreement, an established, neutral United Nations team could work to recover objects between hostile or unfriendly nations so that the concerns of all are addressed. Specifically, the team could handle cases involving a State which is not a State Party to the Outer Space Treaty.

A. Specific Timelines

While the notice timeline has been elaborated on more than the other timelines mentioned herein, uncertainty still exists

---

[160] Artemis Accords, *supra* note 24 (Australia, Canada, Italy, Japan, Luxembourg, the United Arab Emirates, and the United Kingdom). As of this writing, Brazil, South Korea, New Zealand, and Ukraine have also signed. *Id.*

[161] *Id.*

[162] *See* G.A. Res. 33/16 (Nov. 10, 1978).

surrounding exactly when notice of potential damage must occur. Recall, the November 1978 resolution *requested* notice "in the event that a space object equipped with nuclear power sources on board is malfunctioning with a risk of re-entry of radioactive materials to the Earth."[163] It is clear from the passage that the notice should occur before the object's reentry, given the "risk of re-entry" language. However, it remains unclear when, after discovering the malfunction, a State should report to others.

Similarly, the Registration Convention requires the launching State to notify the Secretary-General of the United Nations "to the greatest extent feasible and as soon as practicable" when an object is no longer in Earth orbit.[164] While this sounds clear, there are still prominent, differing interpretations of this obligation. For example, the Soviet Union likely believed they were compliant with their obligations despite knowing about Cosmos 954's reentry long before it notified anybody of the satellite's condition.[165] An additional agreement negotiated within the Artemis Accords framework could serve to clarify exactly when this notice is to be given. Expanding such notice to all objects that might cause damage rather than just those with a nuclear payload would significantly reduce tensions between launching States and damaged States.

The hypothetical spacecraft return agreement, negotiated under the Artemis Accords, should also clarify the timeline for provision of requested identifying information, given the Soviet Union took two months to provide requested information to Canada. Canada cited the Soviets' delayed response as a primary reason for accepting the US' offer for assistance. A clear international requirement to disclose identifying information accompanied by a definite timeline would likely have eliminated this discrepancy. Had the Soviet Union been required to give this information immediately, the Canadians may well have accepted their offer for assistance.

Finally, the timeframe during which a space object and its components are to be returned to the launching State, after proper request, is in desperate need of clarification. A State should not be

---

[163] *Id*.

[164] Registration Convention, *supra* note 10, art. IV(3).

[165] The Soviet representative to the UN stated: "We should like to recall that as soon as the existence of the satellite Cosmos 954 came to an end over the territory of Canada, the Soviet Government offered immediate assistance to the Government of Canada in eliminating the consequences of that incident." Galloway, *supra* note 18, at 406-07.

allowed to possess another State's technology for an unspecified amount of time, as that poses obvious security issues. Specifying such a timeframe would undoubtedly lessen the damaged State's ability to circumvent the launching State's "jurisdiction and control" over the object by retaining it for a long period before return. Should States feel that their technology is more adequately protected in this way, they may be more willing to share the identifying information upfront, rather than delay as the Soviet Union did. Establishing the above timelines would remove international legal uncertainty and ease hostilities between damaged States and launching States.

B. The Space Object Request and Return Process and Customary International Law

One of the primary issues with the Outer Space Treaty and its progeny is that their terms do not bind non-Party States. While this is a concern with every treaty, it is especially relevant to space since the launching State has no control over where an object might return to Earth. Thus, interactions with a non-Party State could be problematic. Unlike many other issues, a non-Party State need not take any affirmative action to be embroiled in a dispute concerning fallen space objects. However, if sensitive technology landed in such a non-Party State, they arguably are unbound by rules and regulations in previously mentioned treaties. An agreement negotiated under the Artemis Accords, formalizing the request and return process would achieve a broad international consensus on the issue. The more State Parties who can be convinced to sign such an agreement, the more likely the process is deemed customary international law, thus binding non-Party States.

A widely accepted view of customary international law, recognized by the United Nations, states that:

> [T]he United Nations has acknowledged that '[t]o determine the existence of a rule of customary international law and its content, it is necessary to ascertain whether there is a general practice accepted as law.' These two elements—(1) a general and consistent State practice that is (2) widely accepted as law

> (*opinion juris*)—constitute the basis for determining whether customary international law exists.[166]

Given the lack of precedent, State Parties can argue Cosmos 954 is an instance of "general practice," given that Canada and the USSR agreed the Outer Space Treaty rules applied.[167] Further, subsequent acceptance of these practices by other States in various resolutions, following Cosmos 954, could be used to show the practice is widely accepted among State Parties to the Outer Space Treaty. So long as the request and return process can satisfy the first element, it is likely to be considered customary international law. This would be especially true in light of a widely ratified agreement within the Artemis Accords framework formalizing the request and return process. However, the Accords undoubtedly need more signatories to achieve the second, "widely accepted as law" element.

Should a significant number of States adhere to this new agreement, customary international law's "widely accepted" requirement would arguably be satisfied. That provision could then, in turn, potentially be applied to non-Party States based on customary international law. The Vienna Convention provides that "[n]othing … precludes a rule set forth in a treaty from becoming binding upon a third State as a customary rule of international law, recognized as such."[168] Therefore, the spacecraft retrieval agreement negotiated under the Artemis Accords could potentially establish customary international law, which might in turn be applied to all States.

If the process can be established as customary international law, there will no longer be tensions between Party States and non-Party States regarding return of objects and components. However, there would still undoubtedly be tensions between the launching State and the damaged State, mostly if those nations were not on good terms. To advance the principles of "cooperation and mutual understanding," it would be beneficial to establish an impartial recovery team to handle high-tension situations between the

---

[166] Abigail D. Pershing, *Interpreting the Outer Space Treaty's Non-Appropriation Principle: Customary International Law from 1967 to Today*, 44 YALE J. INT'L L. 149, 160-61 (2019)(citations omitted).

[167] *See* SETTLEMENT OF CLAIMS, *supra* note 43.

[168] Vienna Convention, *supra* note 111, art. 38.

damaged State and the launching State. Such a team would also undoubtedly involve a go a long way in establishing customary international law.

C. Proposal for a United Nations Team to Recover Objects of Conflicting States

An impartial United Nations (UN) based team should be created to facilitate the recovery of fallen objects. This team would primarily be used when the launching State and the damaged State are unfriendly towards one another and could facilitate the process, so both sides felt their concerns were addressed. However, it could facilitate any and all spacecraft retrieval, including that between both State Parties and non-State Parties. As previously indicated, there is no such process for retrieval from non-State parties to the Outer Space Treaty. Establishment of a recovery team would allow the United Nations to both reduce tension between launching and damages States and better support the argument of customary international law.

The UN recovery team would be composed of member-appointed representatives and could include a provision by which representatives from the damaged and launchings States must recuse themselves. Thus, both sides would feel the team would undertake the operation with an impartial mindset. Having an impartial team could increase the efficiency of the process and reduce the tensions concerning launching State's team members' motivations when entering the damaged State's territory. The UN team could also enforce any enumerated timelines mentioned above from an unbiased perspective. Such a team's usage would be particularly beneficial when the damaged State is not a State Party to the Outer Space Treaty. Issues arising from the request and return of a fallen space object are most severe when the damaged State is not a State Party to the Outer Space Treaty and its progeny. The UN could fill this gap by establishing this retrieval team as suggested above.

Not only would the UN team be well equipped to handle non-State party interactions, but it would also assist in solidifying the process as customary international law. With both the spacecraft retrieval agreement under the Artemis framework and the establishment of a UN team, customary international law would likely be satisfied. The UN team would certainly establish "a general and

consistent State practice that is … widely accepted as law" thus constituting customary international law.[169] States both a party to the agreement and not would likely support such a team given its impartiality. The team would protect the launching State's sensitive information by rapidly deploying to the crash site and protecting the sovereignty of the damaged State by assessing damages in an unbiased manner. Having an impartial third party on the scene, rather than an agitated launching State team, would go a long way to reducing tensions and preventing either side from taking advantage of the situation. As States continued to utilize this process, it would soon become hard to argue against its status as customary international law.

VI. CONCLUSION

Under international law, the Outer Space Treaty and the Rescue Agreement form the basis for the request and return process for fallen space objects. The Registration Convention outlines the national registry a State must maintain to retain its "jurisdiction and control" over a space object. The only clear obligations a State Party has once another State's object crashes in its territory are: (1) to give notice to the launching State and the United Nations; and (2) to *make possible* the return of the space object and its components should the launching State, not the non-governmental entity, so request. The launching State has no obligation to recover and properly dispose of the fallen materials, even if radioactive. Similarly, the damaged State has no obligation to include the launching State in the recovery process. This complete control of the process by the damaged State may cause security concerns. It also works to undermine the launching State's "jurisdiction and control" over the object by denying launching State access and retaining control of the space object for an undefined period in foreign territory.

Should either the State Party or its non-governmental entity wish to recover the object or its components, the request and retrieval must be undertaken by the State. There have been very few precedent-setting events, such as Cosmos 954, which provide additional insight into the proper procedure for such commercial retrieval. However, that incident did make it abundantly clear that

---

[169] Pershing, *supra* note 166, at 160-61.

the launching State has no obligation to recover its fallen space objects, even if they cause damages to the surrounding area. US operators, however, must observe ITAR when retrieving reusable technologies with foreign personnel, but the launch and reentry itself are not considered an "export."

The primary issues with the current space object retrieval system are the lack of defined timelines and the outstanding security concerns surrounding these regulatory gaps. International law fails to define what identifying information should be produced, when notice of a falling space object should be given, and the definition of "rapid assistance." Additionally, the undefined timeframe within which the damaged State must return an object after the request is cause for concern. These timeline concerns quickly become security concerns when the launching State is required to share potentially classified identifying information with an unfriendly nation. The damaged State's ability to exclude the launching State from the recovery effort also plays into the timing concerns because sensitive technology would remain unprotected in foreign lands for some time. This concern around unprotected technologies is exacerbated if the damaged State is not a State Party to the Outer Space Treaty and its progeny. Given the regulatory uncertainty of commercial spacecraft retrieval and the national security concerns of launching States arising from delays in reacquiring their technology, the international community would greatly benefit from a multilateral agreement and UN team specifically addressing this issue. The agreement would need to address these issues by providing specific details regarding the recovery process and relevant timelines.

Four crucial timelines must be elaborated on in order to prevent further hostilities: (1) the timeline for providing notice of potential damage from a space object; (2) the timeline for furnishing identifying information; (3) the timeline for "rapid assistance;" and (4) the timeline for the actual return of the space object to the launching State. The international community would greatly benefit from a clear-cut rule regarding when a launching State must notify others, particularly the States who might suffer damage due to a deorbiting object. Timelines regarding furnishing the identifying information required under both the Outer Space Treaty and the Rescue Agreement would also help avoid conflict between nations. Should States be required to provide "rapid assistance"

immediately upon receiving knowledge that a space object may return to Earth in another State, this would eliminate the possibility for another Cosmos 954 situation where the damaged State had reason to accept assistance from a third-party State. Lastly, timelines for return should be clarified to prevent the circumvention of the launching State's "jurisdiction and control" over the object once it lands in a foreign territory.

The final element of the proposed solution requires a United Nations-based team to handle uniquely challenging situations of request and return between two States who are at odds. Such a team could facilitate the process with an unbiased eye, catalog damages, and address other issues appropriately without fear or partiality. The team could also address all States' concerns and provide a neutral recovery party that would retrieve the space object, thus deescalating tensions between the launching State and the damaged State. The UN team would also be instrumental in ensuring adherence to the new, clarified process so that the security concerns of both States were satisfied. Should many States sign this new spacecraft retrieval agreement, the request and return process would be well on its way to customary international law as well.

THE UNIVERSITY of MISSISSIPPI SCHOOL OF LAW

CENTER FOR AIR & SPACE LAW

AIR AND SPACE LAW

J.D. Concentration
For currently enrolled law students, our concentration in Air and Space Law provides a comprehensive understanding of the law regulating domestic and international aerospace activities.

LL.M. in Air and Space Law
The only LL.M. program in the U.S. that offers a combined air and space law postgraduate law degree at an ABA accredited law school. It is designed for U.S. and non-U.S. law students and lawyers seeking rigorous legal education in U.S., international and comparative air and space law.

Joint J.D./LL.M. in Air and Space Law
The LL.M. program offers early acceptance to exceptional J.D. candidates who can earn both their J.D. and LL.M. degrees in just seven semesters. Non-University of Mississippi J.D. candidates may also apply to the joint degree program in their second year of law school.

Graduate Certificate in Air and Space Law
Designed for non-lawyer professionals seeking knowledge of legal, policy and regulatory issues affecting the aviation and space industries.

airandspacelaw.olemiss.edu
airandspace@olemiss.edu
Follow us on Facebook, LinkedIn and Twitter