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# JOURNAL OF SPACE LAW

A journal devoted to the legal problems arising  
out of human activities in outer space

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VOLUME 16

1988

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## CONTENTS

### ARTICLES

- Environmental Impact of Space Activities and Measures for  
International Protection (*He Qizhi*).....117
- Legal Problems Posed by the Commercialization of Data Collected  
by the European Remote Sensing Satellite ERS-1 (*Michel  
Bourély*) .....129
- Legal and Policy Issues of the Aerospace Plane (*Stephen  
Gorove*).....147

### SPECIAL FEATURES

- Events of Interest.....157-200
- A. Past Events.....157-200

#### *Reports*

- Review of the Work of the United Nations Concerning  
Outer Space in 1988 (*N. Jasentuliyana*)..... 157
- The 31st Colloquium on the Law of Outer Space, Bangalore,  
October 8-15, 1988 (*I.H.Ph. Diederiks-Verschoor*).....163

#### *Comments*

- The Central Role of Eugène Pépin in the Teaching and Research on  
Space Law: A Note in Memoriam (*Aldo Armando Cocca*)..171
- The U.S./International Space Station Agreement of September 29,  
1988: Some Legal Highlights (*Katherine M. Gorove*).....182
- The Commercial Space Launch Act Amendments of 1988:  
A Brief Overview (*Katherine M. Gorove*).....184

#### *Short Accounts*

- The Latin American Conference on International Air  
Transport and Outer Space Activities, Mexico City,

14-18 August 1988 ( <i>Pablo M. J. Mendes de Leon and Tanja L. Zwaan</i> ).....	185
Space Law Session at the Warsaw Conference of the International Law Association, August 22, 1988 ( <i>Stephen Gorove</i> ).....	188
The 5th Intercosmos Seminar, Berlin, September 26-October 1, 1988 ( <i>Ryszard Hara and Andrzej Jecewicz</i> ).....	190
International Academy of Astronautics Symposium on "Benefits to Society From Space Activities," Bangalore, India, October 12, 1988 ( <i>Stephen Gorove</i> ).....	192
International Colloquium on "Les Satellites de Télécommunications et le Droit International" (Telecommunications Satellites and International Law), Bruxelles, November 8, 1988 ( <i>Neri Sybesma-Knol</i> ) .....	193
Other Events.....	198
Brief News.....	198
 B. <i>Forthcoming Events</i> .....	200
 Book   Reviews/Notices.....	201-219
Von Welck, Stephan Frhr. and Renate Platzoder, Weltraumrecht - Law of Outer Space ( <i>Vladimir Kopal</i> ).....	201
V. Vereshchetin, E. Vasilevskaya and E. Kamenetskaya, Outer Space: Politics and Law ( <i>G. Silvestrov</i> ).....	203
Nicolaš M. Matte (ed.) Arms Control and Disarmament in Outer Space. Vol. II.....	205
Rita L. White and Harold M. White, Jr. The Law and Regulation of International Space Communication.....	207
Nathan C. Goldman, American Space Law - National and International.....	208
Donald Jansky and Michael Jeruchim, Communications Satellites in Geostationary Orbit.....	209
Tanja L. Zwaan <i>et al.</i> (eds.), Space Law: Views of the Future.....	209
Molly K. McCauley, Economics and Technology in U. S. Space Policy.....	210
Marika N. Taishkoff and Francis Pinter, State Responsibility and the Direct Broadcast Satellite.....	210
Bruce E. Elbert, Introduction of Satellite Communications.....	210
Allen M. Din, Arms and Artificial Intelligence: Weapons and Arms Control Applications of Advanced Computing.....	210
Frank White, The Overview Effect, Space Exploration and Human Evolution.....	211

**Recent Publications.....212-219**

Books.....	212
Articles.....	212
Reports.....	214
Comments.....	214
Book Reviews/Notices.....	214
Official Publications.....	215
Miscellaneous.....	219

**Current Document.....220-226**

Agreement Among the Government of the United States of America, Governments of Member States of the European Space Agency, the Government of Japan, and the Government of Canada on Cooperation in the Detailed Design, Development, Operation, and Utilization of the Permanently Manned Civil Space Station, Signed September 29, 1988 in Washington, D.C. (Excerpts).....	220
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**Index .....227-233**

## ENVIRONMENTAL IMPACT OF SPACE ACTIVITIES AND MEASURES FOR INTERNATIONAL PROTECTION

HE Qizhi\*

The rapid development of space technology has created opportunities for enormous benefits to mankind. However, problems involving environmental impacts of space activities and concern for the protection of space environment are growing and will continue to grow in the space community.

Space law already recognizes the rights of states to explore and use outer space, including the moon and other celestial bodies. Since outer space activities are carried on from the earth's surface to outer space through the air space, they are a source of potential harm to the environment on earth's surface, in the air space and outer space. In approaching the subject of environmental protection, it must be remembered that the whole vertical space is indivisible, independent of disputes over the boundary between the air space and outer space.<sup>1</sup> Space activities have brought about different environmental impacts. In some cases the consequences are insignificant, while in others they may be serious. The existing space law though containing some general principles and certain specific rules regarding the prevention of environmental hazards, does not provide for adequate protection. It seems appropriate to make an overall examination in order to ascertain whether or what kind of measures should be taken to cope with the risks and harms brought by space activities.

### *Environmental Pollution*

Since space activities must utilize existing elements in and release undesirable elements to the environment, they cause pollution-contamination in various degrees in different parts of the space environment. The term "pollution-contamination" here is used to denote an excessive presence of elements, substances and manmade events

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The views expressed in this paper are those of the author and do not necessarily represent those of any organization with which he is concerned.

1. Gal, *Indivisibility of Environmental Protection in Vertical Space*, PROC. 27TH COLLOQ. L. OUTER SPACE 388-389 (1985).

resulting in adverse effects and detriment to space activities and the environment. Such adverse effects may be physical and tangible, or they may be nonphysical and intangible.

### *1. Chemical Pollution.*

A spacecraft, while launching, produces a so-called "ground cloud" consisting of exhaust gases, cooling water, sand and dust, etc. At the present levels of launching, the resulting air and ground pollution pose no grave danger. But if launching activities increase greatly--for instance, if solar power satellite systems consisting of tens of satellites were developed--they would pollute the air and water around the launching site in a short period of time.<sup>2</sup>

The most affected part of space environment is the upper atmosphere where only very rarefied natural gas exists. It would be very difficult to mix up and dilute even a small amount of released exhaust gases and substances which could stay for a long time and spread horizontally over a large area. The chemical releases from spacecraft are mainly composed of nitrogen oxide, carbon dioxide, chlorine and hydrogen chloride, the latter two having a depleting effect on the ozone layer, which is situated about 16 to 48 km. above the earth. The ozone layer, by absorbing the sun's harmful ultraviolet rays, constitutes a very important protective ring around the earth. In an attempt to protect the ozone layer from depletion by the chlorine of chemical industries, the Vienna Convention for Protection of the Ozone Layer of March, 1985 by 20 countries<sup>3</sup> and the Montreal Agreement Protecting the Ozone Layer from Chlorofluorocarbons of September, 1987 by 46 countries<sup>4</sup> were successively concluded. As there are a number of natural and manmade events affecting the ozone layer, the issue must be studied further so as to determine to what extent the flight of spacecraft is an influencing factor.

The above mentioned chemicals and operational water releases may affect the ionosphere situated 80 km. above the earth. By reducing the density of the electrons therein, these elements may change the radiowave-reflecting properties of the ionosphere, thus distorting radio communications. As the atmosphere has a strong tendency to return to normal conditions after disturbances, it would be advisable to find a tolerable limit for each of the impacts on the environment.

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2. Impact of Space Activities on Earth and Space Environment, U.N. Doc. A/CONF.101/BP/4 (1981).

3. U.N. Information Service., Doc. UNIS/912 (1985).

4. *Ten Outstanding World News in the Scientific and Technological Field in 1987* People's Daily, December 17, 1987.



Satellites generally disintegrate upon re-entry due to the high temperature from air resistance. The resulting production of metal vapors can also influence ionospheric conditions affecting radio communication. But the present level of re-entry activities appears to be less than that of meteorites<sup>5</sup> and is not now of critical concern. In the future, if large numbers of satellites would be burned out on re-entry, the contamination of the upper atmosphere might be important. In this case, the introduction of reusable surface-space-surface vehicles would be helpful.

## 2. *Biological Pollution*

There are two kinds of biological contamination due to space activities:

(1) The risk that terrestrial micro-organisms carried by spacecraft might contaminate space, known as forward contamination.

(2) The risk that extraterrestrial micro-organisms might contaminate the earth. This is known as backward contamination.

In the beginning of the space age, these two kinds of biological contamination were matters of serious concern. Since it appears that the conditions for existence of micro-organisms do not exist on other planets, these dangers are of little immediate concern. NASA, after the Apollo Programme came to the conclusion that there are no infectious substances on objects recovered from the moon, decided to stop further disinfection and quarantine of the crew, spacecraft and lunar materials. However, Soviet space lawyers held the view that this decision should be made only after international consultation with other states possessing appropriate experience and adequate information on space exploration.<sup>6</sup> There is also the fear that biological researchers working with infectious diseases in space may be engaged in an activity which will result in forward contamination.<sup>7</sup> Biological pollution can not be completely excluded in the course of developing space activities.

## 3. *Radiological Pollution.*

Radiological pollution occurs from emissions of radioactive materials of electromagnetic waves. Since the 1978 incident of the Soviet

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5. The total meteoric mass entering the atmosphere is estimated at 10,000 kg./day. *See supra* note 2, at 8.

6. S.Vinogradov, *Space Activity and Environmental Protection*, in *SPACE AND LAW* 165-169 (1985).

7. McGarrigle, *Hazardous Biological Activities in Outer Space*. 18 AKRON L. REV. 103 (1984).

nuclear powered satellite, COSMOS-954, the issue of the use of nuclear power sources in outer space has raised worldwide concern. The launching failure or disintegration of nuclear power sources produces radiological pollution, and several such incidents have already occurred. To prevent or at least reduce the dangers brought about by such incidents, a set of legal control measures assuring security will be elaborated by the Legal Sub-Committee of COPUOS.<sup>8</sup>

Nuclear explosion in the upper atmosphere or outer space will play havoc with the space environment. The radioactive fallout will travel over long distances, not only changing the structure of the space environment, but also killing the electronic devices of operating satellites.

The electromagnetic waves produced by high-powered radio transmitters on earth or by satellites in space will generate electric and magnetic fields over large areas which disturb telecommunication of other satellites and adversely affect radio astronomy. Exhaust gas and chemical releases interfere with infra-red astronomy. All these issues are matters of great concern and are being dealt with by ITU.

Finally, laser beams generated from space or earth will also have great impact on the space environment and activities. With intensified militarization of outer space, the development of high energy laser and particle beam weapons will constitute serious threats to the peaceful uses of outer space.

#### *Harms to Space Activities*

The greatest threat to space activities has been recognized to be the hazards coming from man-made debris of spacecraft. As early as 1965, a space lawyer pointed out the potential danger of space debris.<sup>9</sup> Since then the space debris accumulated in earth orbits have greatly increased, presenting larger risks of collision between spacecraft and debris.

In space treaties, the term "debris" has not been defined. In general use, "debris" consists of spent space objects,<sup>10</sup> used rocket

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8. He, *Towards a New Legal Regime for the Use of Nuclear Power Sources in Outer Space*, 14 J. SPACE L. 195-212 (1986).

9. Hall, *Comments on Traffic Control*, 31 J. AIR L. & COMM. 1 (1965).

10. There is dispute over the issue whether "debris" covers spent objects. In terms of space law, the term "debris" may be safely assumed to cover spent space objects. But other experts, like Dr. L. Perek, hold that "debris" always implies "something broken up," or "only a part of the whole" and a complete satellite out of fuel and out of control should be called not a debris, but an inactive satellite. See Diederiks-Verschoor, *Harm Producing Events Caused by Fragments of Space Objects*, PROC. 25TH COLLOQ. L. OUTER SPACE 10 (1983).

stages, separation devices, shrouds, clamps, and all large and small fragments, including the particles remaining after disintegration of a space object. These are man-made products of space activities which, in certain earth orbits, have already exceeded the flux of natural meteoroids which is relatively constant.<sup>11</sup> As a result, the probability of collision between satellites and orbital man-made debris would be greater than for natural meteoroids.<sup>12</sup>

According to figures by the North American Aerospace Defense Command (NORAD), there were 6,746 objects in space orbit, 5,108 of which were debris.<sup>13</sup> The capability of NORAD to track earth orbiting objects is limited. Objects orbiting at 400 km. must have diameters of about 5 cm. to be tracked, while at 1000 km. objects must be at least 10 cm. in diameter to be seen.<sup>14</sup> So the total number of debris, including small unobserved fragments, is much bigger and the issue much more serious than is being shown in the NORAD catalogue.

The main sources of space debris are explosions and collisions of space objects. Both can occur accidentally or by intentional action. Most debris comes from accidental explosions resulting from failures of propulsion systems. Some U.S. rocket explosions known to be the worst satellite explosions occurred shortly after launch, while others occurred years after launch due to explosions of residual self-igniting propellants. Intentional explosions of satellites have occurred through military space activities, particularly the Anti-Satellite Tests (ASATS). The Soviet Union is reported to have conducted 20 tests of an ASAT system, while the U.S. has been carrying on its own tests of airborne ASAT systems.

Another main source of space debris is collision between orbiting objects. Collision and explosion are closely related, as debris ejected from explosion can collide with other objects, thus creating additional debris. Collisions between two space objects can generate hundreds of trackable debris and probably millions of untrackable particles. Thus, the continued testing of space weapons by collision constitute further serious threat to the space environment.

The existence of space debris in earth orbit poses grave danger to operating satellites and space transportation systems. According to one estimate, with about 10,000 trackable objects in space, a large satellite at an altitude where debris is concentrated may have a probability of

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11. See *supra* note 5.

12. Kessler, *Orbital Debris Issues* in 5 ADVANCES IN SPACE RESEARCH 3-10 (2nd ed. 1985).

13. NORAD Catalogue, July 30 1987.

14. Johnson, *History and Consequences of in Orbit Break-Ups* in 5 ADVANCES IN SPACE RESEARCH 11-19 (2d ed. 1985).

collision of 10% over its lifetime and with predicted increase of trackable objects to 20,000 by 1995, the probability of collision could increase to 20%.<sup>15</sup> Satellites which suddenly stop functioning for unknown reasons may have suffered from collisions with untrackable debris. A notable example is Challenger's window being hit by a tiny paint chip during its seventh mission in 1983. The window had to be replaced at considerable costs.<sup>16</sup> Such accidents have repeatedly occurred. Unless proper measures are taken in time, it may be too late to correct the situation in the future.

#### *Relevant Protection Provisions of Existing Treaties*

During the past years of use and exploration of outer space, a number of international agreements have been concluded, containing relevant provisions on the protection of the earth and space environment. First among these is the 1963 Partial Test Ban Treaty which prohibits nuclear explosions in the atmosphere and beyond its limits, including outer space.<sup>17</sup> This can be marked as an attempt concerned with prevention of environmental effects of specific human activities in space. The People's Republic of China, though not a party to the Treaty, did solemnly declare that it "had not undertaken nuclear tests in the atmosphere for many years, and will never undertake any more nuclear tests in the future."<sup>18</sup> This statement represents China's positive attitude towards the aim of banning nuclear testing, and avoiding radioactive contamination in space.

The 1967 Outer Space Treaty and 1979 Moon Agreement are two chief documents relating to environment protection. These two treaties protect the moon and other celestial bodies from the environmental impact of military activities by essentially demilitarizing them.<sup>19</sup> But these treaties only partially demilitarize the whole outer space, particularly the near earth space by merely banning the placement of nuclear weapons and "any other kinds of weapons of mass destruction" in earth orbit.<sup>20</sup> Thus they leave the following loopholes: (1) no ban on testing and deploying other space weapons, including ASAT weapons; (2) no ban on warheads carried by strategic missiles on trajectories

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15. Jasentuliyana, *Environmental Impact of Space Activities: An International Law Perspective*, PROC. 27TH COLLOQ. L. OUTER SPACE 390 (1985).

16. "Shuttle Hit by Man-Made Debris," Space World, March 1985.

17. For text of the Treaty, see 480 U.N. Treaty Ser. 43-49.

18. Statement by Chinese Premier Zhao Ziyang in *The Chinese People's Conference for Maintaining World Peace*, People's Daily, March 22, 1986.

19. Art. IV, para. 2 of the Outer Space Treaty; Art. III of the Moon Agreement.

20. Art. IV, para. 1 of the Outer Space Treaty.

travelling through outer space; (3) no definition of "weapons of mass destruction". In short, these treaties leave open the possibility of testing, deploying and utilizing space weapons other than nuclear weapons, enhancing the possibility of further worsening of the debris situation.

The 1976 Convention on the Prohibition of Military and Other Hostile Use of Environmental Modification Techniques also contributes to the protection of the environment, since such techniques include any means of modification of the motion, composition or structure of the earth or outer space, through intentional control of natural processes.<sup>21</sup>

After touching upon the military aspect, it is appropriate to focus on specific provisions of environmental protection. Article IX of the Outer Space Treaty obliges states parties to: (1) avoid harmful contamination of outer space or adverse changes in the environment of the earth resulting from the introduction of extraterrestrial matter and (2) enter international consultation if their activities would cause potential harmful interference with activities of other parties. It can be seen from the wording of the provision that it is of a rather limited character, since "harmful contamination" has to be related to outer space, whereas "adverse changes" only refer to effects on Earth's environment because of the introduction of extraterrestrial matter. With regard to consultation envisaged in the Article, this is a very important principle. However, there is a deficiency in that the consultation therein provided is not mandatory, nor is any procedure established or recommended. If the party concerned does not initiate consultation or refuses consultation demanded by other party, it does not constitute violation of the Treaty.

Article VII of the Moon Agreement makes an improvement on the general obligations contained in the Outer Space Treaty. It obliges states parties to: (1) take measures to prevent the disruption of the existing balance of the environment of the moon and other celestial bodies by introducing adverse changes, by harmful contamination or otherwise; (2) avoid harmful effects to the earth environment through the introduction of extraterrestrial matter or otherwise; (3) inform the United Nations of the measures being adopted to prevent the disruption of the existing balance of the environment of the moon and any plans to place any radioactive material on it. In this Article, the prevention of disruption of the existing balance of the environment of the moon is the key obligation of all states parties, and the insertion of "or otherwise" is intended to cover other sorts of contamination. As a whole, this provision of the Moon Agreement on environment protection makes up some of the deficiencies characteristic of the corresponding provision of the Outer Space Treaty.

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21. For text of the Convention, see G.A.Res. 31/72 of December 10, 1976.

The 1976 Registration Convention requires the registering of launchings with the United Nations, but it does not require notification of explosions or out-of-function space objects, nor registration of the type or amount of fuels or exhaust, chemical or radioactive substances, etc., which affect the space environment.

The ITU Convention and Radio Regulations prohibit harmful interferences of space communications and provide two procedures in this respect. The first is notification and registration of frequency assignment in the Master of Register, maintained by the International Frequency Registration Board (IFRB). The other is through coordination by various conferences.<sup>22</sup> But these procedures have been criticized for being inequitable and disadvantageous to developing countries.

The liability aspect of environmental protection had been partially dealt with by the 1972 Liability Convention, which established the launching state's absolute liability for all damages caused by its space object on earth or to aircraft in flight. It also covers damages caused by collision to another space object on condition that such collisions were caused by the fault or negligence of the launching state. According to the definition given in Article I of the Convention, "damage" could cover damage to the environment of the earth as far as this means the surface of the earth under jurisdiction of states. In dealing with the damage caused by the COSMOS-954 incident, Canada based its demands to the Soviet Union mainly on relevant provisions of the Liability Convention and it was settled accordingly by diplomatic negotiation between these two countries.<sup>23</sup> If damage consists of impairment of the environment of air space or outer space, or international public regions, such as high seas, Antarctica, etc., such damage does not seem to be covered by the Convention. This appears to be one of the lacunas which has to be filled by further elaboration.

#### *Strengthening International Protection Measures*

Space activities have brought with them impacts on the environment in various aspects, some of which should be more fully ascertained by further observation and study. It is now generally accepted that proper measures should be taken on the basis of a comprehensive and in-depth understanding of the situation. In recent

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22. Art. 35 of the International Telecommunication Convention (Nairobi, 1982); Arts. 11 and 13 of the Radio Regulations (1982).

23. *Supra* note 8, at 108-109.

years, discussion on this issue has been brisk<sup>24</sup> and space law circles are going to demand that space legislative bodies direct their attention to this issue for gradual improvement and perfection of a legal framework for protection of the space environment.

As space activities involve the whole space environment, including earth surface, air space and outer space, protection measures have to deal with the whole indivisible vertical space. On the other hand, in view of the fact that impacts on various parts of the space environment are different, the main thrust should be directed to the issue of space debris--the most harmful pollution and which is growing in seriousness. The existing international treaties, though containing some general principles in this respect, are neither complete, nor adequate to cope with the developing situation. For filling this gap, many proposals have been made. Among them, the suggestion of elaboration of a comprehensive international instrument placing emphasis on the issue of space debris to be discussed by both the Scientific and Technical and Legal Sub-Committees is a possible approach. For the envisaged set of rules, the following recommendations might be worthy of consideration.

1. *Definition of terminology.* In space treaties, legal terminology relating to environmental harms has been "harmful contamination", "adverse changes in the environment", "harmful interferences", etc.<sup>25</sup> But no definition was given, nor any standard or criteria established, thus easily giving rise to dispute over whether a particular activity contravenes the general obligation under the treaty. So, it would be necessary to define the key terminology, such as pollution-contamination and other related terms. Among them, the term "debris" should be interpreted to cover spent space objects as generally understood.<sup>26</sup>

2. *Ban on intentional destruction and fragmentation of space objects.* The testing and deployment of space weapons, including ASAT and ABM weapons and the flight of strategic missiles on trajectories in outer space would cause explosions and collisions of such weapons leading to an increase on an unprecedented scale of space debris, thus bringing havoc to normal space activities. In view of the welcome signs in the arms talks between the two super-powers, it seems to be time to strengthen this trend and search for some interim agreement for a stop or

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24. Space environment was among the topics of discussion in the 23rd (1981), 25th (1983), 27th (1985) and 29th (1987) IISL Colloquiums on the Law of Outer Space where a number of papers were presented. More recently, the Institute of Air and Space Law of Cologne University held an International Colloquium in connection with the 600th anniversary of the University, entitled "Environmental Risks Arising from Activities in Outer Space - State of the Law and Measures of Protection," attended by space law experts the world over.

25. Art. IX. of the Outer Space Treaty; Art. 7 of the Moon Agreement.

26. *Supra* note 10.

moratorium on the development and testing of any kind of space weapons. Since this issue is of serious concern to all countries, bilateral negotiations between the two super space powers should be supplemented by multilateral negotiations which would encourage and support the bilateral negotiations for a greater achievement. The agreement reached would be the key to arrest the debris issue from becoming worse.

3. *Adoption by agreement of practical measures to minimize the production of debris.* These measures include: improved design of launch systems, thus limiting the number of loosely attached mechanisms; elimination of unspent fuels, thereby reducing the chance of self-explosion; controlled re-entry and total burn-up in the atmosphere of satellites after completing their function; the use of disposal orbits;<sup>27</sup> and possible "space salvage" or a "scavenging mission,"<sup>28</sup> etc. These measures could be helpful to alleviate the debris situation through concerted effort by space-faring countries and international space organizations.

4. *International Expert Group.* Such a Group will be composed of well qualified space scientists and technicians entrusted to review, assess and establish standards of environmental effects of space activities. The Group will be provided with necessary data and information before and after launch, concerning type and amount of fuels, radioactive payloads, exhaust gases and other chemicals released in all stages of flights of satellites, as well as explosions, collisions and other causes producing debris, so that after full examination, international standards and recommended practices may be established. The standards thus adopted can be mandatory and should be observed by all states except those having reservations, while recommended practices are intended for states to make best efforts to follow in the interest of protecting the space environment from contamination. Such standards and practices will be subject to review, amendment and updating, and will be annexed to the principal instrument.

5. *Further norms of liability.* In addition to liabilities as provided in the Liability Convention, the launching state should be held liable for damage to any part of the space environment, including earth surface, air space and outer space. Environmental damage should also cover damage to the common resources of mankind, such as Antarctica

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27. As regards disposal orbits, agreement could be made to use specific belts to dispose of spent satellites. Two such belts have been suggested: one between low earth orbit and geostationary orbit, i.e. somewhere above 17,000 km. from earth which is rarely used; the other is beyond the geostationary orbit. Cf. Perek, *Traffic Rules for Outer Space*, PROC. 27TH COLLOQ. L. OUTER SPACE 40-41 (1985); Jasentuliyana, *supra* note 15, at 392.

28. Schwetje, *Current U.S. Initiatives to Control Space Debris*, 29TH COLLOQ. L. OUTER SPACE 163 (1988).



and the high seas. Compensation thus paid may make it possible to restore the damaged environment to previously existing conditions.

6. *Establishing mandatory consultation regime.* The principle of holding consultation between states concerned before carrying on potentially dangerous activity must be regarded as an indispensable condition for environmental preservation from the harmful consequences of space activity. Article IX of the Outer Space Treaty provides such a principle but it is only of a very general nature. It is not mandatory, nor is any procedure established or recommended. Today, the obligation of holding consultation before carrying on an activity affecting the interests of other states, is in the formation stage in some branches of international law.<sup>29</sup> The envisaged instrument should incorporate the principle of consultation as mandatory. This would have important constraining influences though it might not lead to an agreement.

7. *Strengthening international cooperation.* Article IX of the Outer Space Treaty stipulates: "States Parties to the Treaty shall be guided by the principle of cooperation and mutual assistance, and shall conduct all their activities in outer space, including the moon and other celestial bodies, with due regard to the corresponding interests of all other States Parties to the Treaty." This means all states, particularly the major space powers, should exert their efforts by taking effective measures in the task of protecting the space environment from contamination by space activities. Further embodiment and specification of this principle is of vital importance.

The issue of protecting the environment from contamination from space activities has been put on the order of the day. Because of complicated political and other factors, it has not yet been on the agenda of the Legal Sub-Committee of COPUOS. But the trend in this direction is gaining ground. It has been increasingly recognized that only by taking concerted and effective measures in time will mankind have a reasonable chance to guarantee adequate protection against the hazards brought by space activities.

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29. For instance, Art. V. of the 1982 London Convention on Prevention of Marine Pollution by Dumping of Waste and other Matter, obliges a country, before special permit is issued for discharging certain harmful substances, to consult with both the affected countries and the appropriate international organizations..

**LEGAL PROBLEMS POSED BY THE COMMERCIALIZATION  
OF DATA COLLECTED BY THE EUROPEAN REMOTE SENSING  
SATELLITE  
ERS-1**

*Michel Bourély \**

Satellite remote sensing is one of the oldest and most widely used space applications. Like meteorology, it pertains to Earth observation activities which include the study of the globe (soil, subsoil, oceans) and its resources (ores, hydrocarbons, agriculture, forests, fishing). It calls forth several scientific disciplines (geodesy, geology, hydrology, climatology). It has very extensive spin-offs in every field (political, economic and military).

Like other space activities, satellite remote sensing ignores the natural and artificial frontiers of the different States. This entails consequences particularly important, because the States can be observed unknowingly and against their will. Furthermore, the so-collected information can be used or disseminated without their knowledge and thus benefit the observing State as well as third States without the observed States being able to benefit by this information. This situation is aggravated by the fact that the data collected by satellites can be used only after undergoing a complex processing on the ground which requires specialized equipment and technical training not easily accessible to all countries.

In legal terms, this means that satellite remote sensing is, like radio broadcast from space, an activity which poses the difficult problem of reconciling the principle of free exploration and use of outer space with the principle of the States' sovereignty over their territory and natural resources.

The problem is still more complicated by the tendency, which develops continuously in certain States, to give up performing satellite remote sensing activities by themselves and leave them, either as a whole or only in part, to the initiative of nongovernmental organizations or entities. This process is sometimes referred to as "commercialization".

Commercialization is already in existence in several countries:

- in the United States, the "Land Remote Sensing Commercialization Act" dated 17 July 1984 provided for the constitution of a private remote sensing system and the Eosat company was subsequently granted a license for operating Landsat satellites;

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- in France, the Spot-Image company was established in late 1981 with a view to using the data collected by the Spot satellite and selling them to the public, an activity which it has pursued since 6 May 1986. A Spot-Image subsidiary was established in the United States under the name of Spot-Image Corp (SI Corp.);

- in the USSR, the Soyuzcarta Company broadcasts the products of Soviet satellites, to an area including select Western countries (Europe, Australia, United States).

Harsh competition opposes these various companies, particularly as regards the photograph definition. This varies from 30 m with the Americans, 10 m with the French, to 5 m with the Soviets. In order to take these differences into account, the United States has just decided to put satellite photographs of "military quality" at the disposal of the public - except where otherwise justified for national security reasons.

Lastly, we must also mention the existence of a project for an Earth observation satellite to be developed jointly by China and Brazil which must be viewed as a commercial rival of the above-mentioned satellites.

In an attempt to find a solution to this difficult and multi-faceted problem, the United Nations Organization has, for more than ten years, made considerable efforts which resulted, not without great difficulties, in the adoption in December 1986 of a Resolution on the principles which should henceforth govern satellite remote sensing activities.

As pointed out before, these activities were first performed by the different States in fulfilling objectives of their own, which were part of their mission to protect the interests of all their nationals.

At present time, remote sensing satellites are built, launched and used in orbit by the States themselves, but in some of these States the data collected by these satellites are processed and disseminated by nongovernmental organizations or entities. The development of "commercialization" will result in all such activities, whether in space or on ground, being performed by such organizations or entities.

It is within this framework that the Programme called "ERS-1" (European Remote Sensing Satellite N 1) must be placed. This Programme is the first in the field to be undertaken by several European countries (joined by Canada). The consequences of the association of several States for this undertaking increases the difficulty of the political and legal problems we have mentioned.

This is why it seems appropriate to study, from a legal viewpoint, the conditions for the consequences of the "commercialization" of data collected by the European Remote Sensing Satellite ERS-1.

To this end, it is advisable to discuss initially the general legal aspects of the problem, before describing those specific to the ERS-1 programme.

## I. GENERAL LEGAL ASPECTS

The general legal aspects of the problem posed by the commercialization of data collected by the European satellite ERS-1 are, first of all, those applicable to every remote-sensing programme, *i.e.* the compliance with the general principles which govern remote-sensing activities. It is also advisable to consider the principles applicable to the commercialization of space activities.

### *A. General principles of remote-sensing activities*

The first principles governing the execution of remote sensing activities were laid down in international law by the agreement signed in Moscow on 19 May 1978 on the transfer and use of data resulting from Earth remote-observation from Outer Space.<sup>1</sup>

This agreement binds the members of Intercosmos, an agency for scientific co-operation among Eastern countries, the aim of which is, in particular "to study the natural environment (of the Earth) through the use of space objects." However, it binds only those who are parties and tends to settle only the situations created within the framework of co-operation organized among Intercosmos members.

The general problem concerning the activities of Earth remote observation from Outer Space could be solved only within the largest existing framework, namely that of the United Nations. As mentioned earlier, it took more than ten years of discussions within the Space Committee before the General Assembly of the United Nations could adopt on 4 December 1986, Resolution 441/65 which sets forth these principles.

In fact, the Resolution uses the term "remote-observation" only in its title while, in the text itself, it uses the term "remote-sensing" which is defined in Principle I(a) as "[t]he observation of the Earth surface from space, using the properties of electromagnetic waves emitted, reflected or diffracted by the observed bodies, for the purpose of improving the management of natural resources, parcelling out the territory and protecting the environment." Sub-paragraph (e) of the same Principle defines remote-sensing activities as "[t]he activities consisting in operating remote-sensing satellites, primary data receiving and filing stations as well as the data processing and processed data interpreting activities." These technical expressions "primary data", "processed data", as well as the term "analyzed information" are also defined in subparagraphs b, c and d of Principle I of the Resolution. This would

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1. The following countries are parties to the Moscow Convention of 19 May 1978: the German Democratic Republic, Cuba, Mongolia, Poland, Rumania, Czechoslovakia and the USSR. Gál, *Legal Principles of Remote Sensing in the Moscow Convention of May 1978*, in PROC. 38TH COLL. L. OUTER SPACE 2 (1987).

indicate that the authors of the text were very anxious to set the Principles on a strong and realistic technical basis, not on theoretical considerations of a political or legal nature. On the other hand, it should be noted that the scope of the Resolution does not cover only the "outer space" part of remote-sensing activities, but also their "ground" part which, incidentally, seems to strengthen the point of view of those who are in favour of a "functional" instead of "physical" definition of outer space.

This article is not intended to comment on the fourteen other Principles included in the Resolution, the aim of which is, if not to resolve the conflict between the notion of freedom and that of sovereignty, at least to propose a compromise as regards their application.<sup>2</sup>

However, it must be kept in mind that a United Nations' Resolution cannot be considered as affording a final solution to this conflict since the legal value and the mandatory character of such texts are, at least, controverted.

Moreover, we know that recourse to the entry of "Principles" in a Resolution occurs only as a last resort where members of the UN Outer Space Committee have not been able to agree on the idea of preparing a Treaty.

However that may be, it is obvious that the Principles entered in the Resolution - which was adopted unanimously by the General Assembly - should be applied by every State, since they have become an integral part of the international law which Article III of the Treaty dated 27 January 1967 compels these States to observe. There must be no doubt about that as regards the States participating in the ESA, ERS-1 programme, which are all Parties to the Outer Space Treaty.

#### *B. General principles on commercialization*

One of the fundamental rules laid down by the Outer Space Treaty is the affirmation of the States' international responsibility for the fulfilment of space activities, whether these activities are undertaken "by governmental agencies or by non-governmental entities". Under Article VI of the Treaty, such activities must be authorized and continuously supervised by the appropriate State party to the Treaty. This article thus acknowledges the lawfulness of the space activities undertaken by non-governmental entities or organizations - activities usually referred to as

2. The United Nations' Resolution 41/65 of 4 December 1986 contains 15 Principles. Principle I gives a definition of Remote Sensing activities. Principles II, III and IV lay down the general principles of international law which must be used as a basis by the States which carry out Remote Sensing activities. Principles V to IX contain an incitement to international co-operation. Principles X and XI aim at protecting the environment and preventing natural disasters. Principles XII and XIII relate to the rights of the observed States. Principle XIV affirms the international responsibility of the States and Principle XV deals with the conciliatory settlement of disputes.

"commercial activities." But these activities are subject to the authorization and continuous supervision of the State to which the entity or organization in question is answerable. The State must ensure that "national activities are carried out in conformity with the provisions" of the Treaty, thus stating its international responsibility.

Last, it must be kept in mind that Article VI stipulates that in case of activities carried out by an international organization, the responsibility for compliance with the provisions of the Treaty will rest with this international organization and the States parties to the Treaty which belong to the aforesaid organization.

Thus, for the above-mentioned reasons, all remote-sensing activities which can be referred to as "commercial activities" must be fulfilled in compliance with the principles laid down in the United Nations Resolution dated 4 December 1986.

It should be noted that this is true whatever the nature of these activities, *i.e.* whether they take place in space or on earth. This is true whether these activities are carried out directly by a State or an inter-governmental organization, or by a nongovernmental organization or entity under responsibility of the appropriate State.

## II. LEGAL BASES OF THE ERS-1 PROGRAMME

The ERS-1 is a European Space Agency programme which allows the satellite it intends to build and operate to be called a "European" satellite. But this term must not be given a strictly geographical meaning. It is used only because the programme is carried out under the conditions specified in the Convention providing for the establishment of a European Space Agency.<sup>3</sup>

One of the characteristics of this Convention is that it makes it possible for the Member States - which must mandatorily participate in a scientific programme - to carry out, jointly and within the framework of the Agency, optional programmes in the field of space applications. These optional programmes are carried out according to the rules laid down by the Convention itself in their main lines, but likely to be adapted to particular circumstances.<sup>4</sup>

3. The Convention establishing a European Space Agency was signed on 30 May 1975. It came into force on 30 October 1980.

At the present time, the European Space Agency (ESA) includes 13 Member States: the Federal Republic of Germany, Austria, Belgium, Denmark, Spain, France, Ireland, Italy, Norway, the Netherlands, the United-Kingdom, Sweden and Switzerland, and well as an Associated State, Finland. Canada is bound to ESA by a co-operation agreement and participates in several optional programmes.

4. Article V.1 (b) and Annex III of the Convention establishing the European Space Agency. For more detailed information about the optional ESA programmes, see Bourély, *Institutional Arrangements for Space Cooperation in Europe*, in PROC. 24TH COLL. L. OUTER SPACE 159 (1981).

Such is the case with the development of the ERS-1 satellite. It is advisable to outline the technical aspect of this optional programme before discussing the legal rules with which it must comply. We will initially consider only the "R & D" aspect of the programme, since the use of data collected by the satellite falls under different rules which will be discussed in the third and fourth parts of this Article.

#### *A. General framework for optional programmes of ESA*

The system dealt with by the Convention is based on the fundamental idea that optional programmes are programmes specific to the Agency itself. Thus, the Agency supplies the framework in which they are implemented, using the necessary personnel and facilities (establishments and general-purpose installations). On the other hand, these programmes are financed only by those member States desirous of doing so. These are called the "Participants". Hence it follows that only the latter will have a say in the decision-making process concerning these programmes.

To implement this dual principle, the Convention provides for the involvement of three legal instruments:

(a) A *Resolution of the Council* (called "Empowering Resolution" by which the Board agrees that the planned optional programme will be implemented "within the framework of the Agency");

(b) A *Declaration* subscribed by the ESA member States desirous of undertaking the framework of an optional programme jointly and within the Agency. The draftsmen of the Convention proposed to encourage such programmes by stipulating that each member State is to participate in each optional programme, unless it has positively specified that it is not interested. Each Declaration contains a number of articles describing the Participants' commitments. It is complemented by two appendices, a technical one giving a more or less detailed description of the programme, its objectives, its timescale, its phases, etc., and a financial one fixing a budget allocation for the implementation of the whole programme and determining the scale of contributions. In this respect, two important points must be made:

- the budget allocation is an estimation, but it is binding on the Participants. However, the Participants agree that it can be increased by 20% without the programme being questioned. If the possible overdraft is to be greater than 20%, each Participant will have a right to withdraw from the programme;

- on principle, contributions are calculated on the basis of the Participants' national income, but the Participants are entitled to agree to any other scale for the saving of expenses.

(c) *Implementing Rules* adopted by the Participants, containing the detailed methods agreed to by the Participants for implementing the programme. In particular, the necessary decision-making procedures

(appointment of the competent deliberative body, voting rules), as well as the application - subject to express exceptions - of ESA rules to contractual, financial and other matters. These Rules stipulate the conditions under which some non-member States may be allowed to join the Participants with a view to implementing the programme in question.

It should be pointed out that the Empowering Resolution is voted by the Council (by a simple majority of votes) *i.e.*, by all member States, whereas the Declaration - which is prepared and subscribed unanimously by all Participants - is submitted to the Council only for information. As regards the Implementing Rules, also prepared by the Participants, they must be submitted for approval to the Council whose decision is made by a simple majority of votes.

#### *B. Technical aspect of the ERS-1 programme*

Until quite recently, the European Space Agency had not had a remote-sensing satellite of its own and had merely been acquainted with this field by collecting and disseminating in Europe the data supplied by US satellites, particularly Landsats, through its "Earthnet" network.

In March 1982, ESA was authorized to initiate its first programme intended to develop and build remote-sensing satellites called "Earth Resources Satellites" (ERS). These will constitute the third generation of satellites of this kind in the Western World. They will complement Landsat (US) and Spot (France) satellites and will contribute to a better monitoring of the environment of the Earth and the exploitation of its resources. They will have an advantage over their predecessors in that they will be equipped with a system of ensuring a quick transmission of data whose processing and delivery will be guaranteed within three hours.

The objectives selected for ERS-1, the first satellite of a series, tend mainly to facilitate the exploitation of coastal oceanic areas (particularly the ice-packed areas), on the one hand, and the development of an improved meteorological information system at the earth scale, through the collection of data on weather conditions above the oceans, on the other. Lastly, ground objectives will be studied by means of an active VHF instrument (AMI) with two operating modes: either in the wind diffusion-metering mode or in the synthetic aperture radar (SAR) mode permitting to scan obliquely a 100-km wide strip of the satellite trace on the ground.

Two other instruments, provided by several participant States, will be added to those provided by the space agency: first, the most accurate scanning radiometer along the path (ATSR), presently available, providing sea surface temperatures, and measuring equipment for distance and speed (PRAREA). The States providing these instruments are financing the associated costs.

Owing to its remote-sensing systems, ERS-1 will enable scientists to follow the movement of oil slicks and icebergs, to study the effect of



acid rains on forests and lakes, the influence of ground erosion on farmlands and, also, to detect areas of geological faults in order to locate places at risk of earthquake. With the use of the data transmitted to the ground, it will be possible to locate continental - and to some extent submarine - ore deposits with accuracy. It will also be possible to locate spawning areas and to follow the growth of cultures.

The economic interest of these various applications is thus obvious and it will be increased to a great extent by the presence of quick data transmission systems on board the satellite.

ERS-1 is currently under construction by the European industry. Its launch by Ariane is scheduled to take place in early 1990 and it will have a two-year life expectancy. The construction of a second satellite, ERS-2, is envisioned and a launch in 1993 is planned.

Lastly, it is worth mentioning that the total cost upon completion of the ERS-1 programme (including launch costs) was estimated to be about 373 million European Currency Units (1 ECU = 1 US dollar) in 1982.

#### *C. Legal instruments constituting the ERS-1 programme*

All ESA optional programmes comply with general rules laid down by the Convention and complemented by specific provisions. Thus, the ERS-1 programme fits quite naturally with this general framework, within which some adaptations have been made.

The adoption of the various legal instruments relating to the ERS-1 programme took place in successive steps.

At a meeting of the Agency Council, held at ministerial level in February 1977, a Resolution was adopted, placing emphasis on the interest of Europe to engage in a preparatory remote-sensing programme.

By a Resolution of 28 October 1981, the Council agreed to the implementation of a European remote-sensing satellite (ERS-1) programme with the Agency.

The Declaration relating to this programme was made out by the Participant States on 24 March 1982, updated on 16 June 1982 and amended on 19 July 1983. It was complemented by Implementing Rules established July 28, 1983, and approved on 27 May 1982 and amended in October 1983.

The following States have adopted the Declaration and are therefore Participants in the ERS-1 programme: the Federal Republic of Germany, Belgium, Denmark, Spain, France, Italy, Norway, the Netherlands, the United Kingdom, Sweden and Switzerland. Furthermore, Canada, although not an ESA member State, is a Participant in the programme.

The successive steps gone through by these legal instruments resulted from the fact that the Participants wished initially to commit themselves only for a definition phase (Phase B). An additional Declaration dated 11 July 1984, made by the Participants themselves

within the framework of a "Programme Board" allowed the next phases to be initiated (Phases C-D: system development and validation; phase E: preparation and execution of system operation).

Two annexes (A and B) are attached to this Declaration. They update the Technical and Financial Annexes of the initial Declaration. The additional Declaration contains also an Annex C which incorporates the principles agreed by the Participating States in respect to access to the ERS-1 System and of distribution of the resulting data and products. This additional Declaration was updated on 18 September 1985.

At a meeting held in Rome on 31 January 1985, the Ministers decided to "carry on ESA activities sturdily in the field of Earth observation," focusing them on the already-approved ERS-1 project and on future elements, namely, further missions of ERS-1 oceanographic and meteorological applications, a ground application project, the participation in the development of a second-generation meteorological satellite, and mission studies of solid globe physics, the atmosphere and climatology.

These directives were confirmed by the Ministers at a new meeting at The Hague on 9-10 November 1987. They affirmed the objective consisting of: "anticipating a substantial contribution of space and ground techniques to the Earth observation sciences and their applications and preparing, to the extent that it may be required, the setting-up of operational systems and organizations centered on the users for the operation of these systems. The Ministers have therefore stressed the interest for Europe of realizing a fair balance between infrastructure programmes (Ariane 5, Hermes, Columbus, Data Relay Satellite) and utilization programmes, in particular the observation of Earth resources. Moreover, the Ministers considered that the efforts currently made by Europe were: "a source of new possibilities for the private sector which should be encouraged to use the available potential, to participate in investments and assume responsibilities for the operation of such systems."

### III. LEGAL ASPECTS OF THE OPERATIONAL PHASE OF THE ERS-1 PROGRAMME

Without elaborating any further on the characteristics of the ERS-1 programme as an optional development programme of the European Space Agency, it is now necessary to consider the legal problems posed by the operational phase of this satellite and to set forth the specific rules agreed to by the States participating in the programme. Additionally, the answer the States have given to the question of intellectual property is touched upon.

*A. Specific rules laid down within the framework of the ERS-1 programme*

As stated in the initial Declaration, the ERS-1 programme includes a so-called "operational" final phase (phase E) the nominal duration of which is two years. As a result, unlike other ESA programmes in which the developed equipment becomes the responsibility of a user organization once the programme is completed, the Agency itself will at least at the beginning, assume responsibility for the operation of the satellite and the dissemination of its data.<sup>5</sup>

Conscious of the problems that might be raised by this situation, the States participating in the programme have laid down special provisions for the operational phase (phase E). As in the other phases of the ERS-1 programme, the Declaration details the respective tasks and responsibilities of the Agency, and the participating States during this phase.

*1. Role of the Agency during the operational phase*

As regards the operational phase of the programme, Article 2 of the Implementing Rules stipulates that the Agency "fulfills or coordinates" the following tasks:

- raw data recording;
- data pre-processing and processing in quasi-real time, mainly for mission control and management purposes;
- data archiving, preparation and keeping of catalogues;
- elaboration of thematic products in real time;

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5. The transmission of equipment developed by the European Space Agency to organizations in charge of its commercial use takes place at the present time in the following file:

- Launch vehicles for the benefit of Arianespace, a "commercial" company under the French law;
- Telecommunication satellites, for the benefit of Eutelsat, and inter-governmental organization;
- Meteorological satellites, for the benefit of Eumetsat, and inter-governmental organizations.

Moreover, in the field of Remote Sensing, the dissemination of data from American satellites (Landsat), connected as part of the Earthnet programme, has been entrusted since 1 January 1987 to a European group of manufacturers, in Eurimage. The establishment of these various organizations intended to assume responsibility for operational activities was agreed to jointly with ESA. However, the ESA Convention (Art. V.2(c)) enables ESA to perform "operational activities" itself such as the operation of the equipment developed by ESA, if the users ask it to do so, which is the case with the ERS.1 operational phase.

- data and product transmission and dissemination;
- mission control and management;
- demonstration of applications.

Moreover, "the Agency remains in contact with national Centres having a thorough knowledge in the field of remote sensing, particularly as regards the elaboration of thematic products in quasi-real time and the demonstration of applications."

Article 4 stipulates that the Agency:

- provides for the installation of the ground sector of the programme;
- determines the methods of data dissemination in quasi-real time to the main user centres of the participating States;
- coordinates the use of the Satellite by all acquisition stations which have access to the ERS satellite as well as the processing of acquired data;
- make necessary arrangements with the participating States as regards the use of their data processing facilities, on common bases ensuring similar conditions for all the participating States.

Lastly, Article 6 of the Regulation entrusts the Agency with the task of placing the contracts necessary for the implementation of the programme.

The institutional organization set up for the operational phase thus duplicates that of the development phase to the extent that the Agency is charged by the participating States to fulfill, on their behalf, a number of functions which would normally be incumbent on them.

As regards the operational phase of the ERS-1 programme, the Agency has designed the architecture of the data processing and the data archiving in a manner that will satisfy the exigencies of a vast community of users, from operators in real time to research groups.

The configuration kept for the ground sector revolves around a central installation set upon the ESA establishment in Italy (ESRIN) where the starting point of the Earthnet network is found. It includes, Processing and Archiving Facilities, or PAF, established in the Federal Republic of Germany, France, Italy and the U.K.

The principal functions of the PAF are:

- long-term archiving and processing of raw data and some ERS-1 subsidiary information;
- the creation of geophysical products and autonomous precision, as well as their dissemination;
- the support for the evaluation of long term performances of remote sensors, the calibration and geophysical validation of remote sensors, the demonstration campaign, and pilot projects;
- the interface with the ERS-1 central installation of ERSIN which will be charged with the coordination of the ensemble of PAF installations.

## *2. The Role of Participating States in the Operational Phase*

As a counterpart of the missions they ask the Agency to effect on their behalf, the Participating States take on the commitment to contribute to the financing of the different phases of the program and, in particular, of the operational phase, according to specific rules (Art. 5.2). They also agree to support the financial cost of all obligations that the Agency should incur as a consequence of its international responsibility (Art. 9.1).

However, the Participants reserve the right to exercise a number of prerogatives which are valid for the whole programme:

- the general rules of the Agency in terms of geographic return must be complied with (Art. 6);
- the rights of intellectual property, including access, communication and utilization rights deriving from inventions and technical data resulting from contracts and sub-contracts placed by the Agency for the implementation of the programme, are reserved for the benefit of the participating States and for the benefit of the Agency (Art. 7.1);
- the goods produced within the framework of the programme, as well as the facilities and equipment purchased for its implementation, are the property of the Participants, through the medium of the Agency (Art. 8).

## *B. Rules applicable to the intellectual property regime*

### *1. General aspect of the problem*

As we know, the regime of intellectual property applicable to the data collected by Remote-Sensing Satellites poses very specific problems. First of all, can we really say that the data collected by such satellites can be protected as being subject to the various intellectual property regimes existing throughout the world? If so, which system must be referred to? The regime of the State which launched the satellite, or that of the State where raw data is collected by a receiving station? But as raw data can be used only insofar as it has been processed more or less extensively, what sort of protection must be granted to it?

These questions, which are much discussed in the doctrine, find no answer in the United Nations' Resolution 41/654, the aim of which is only to lay down principles on how to carry out Remote-Sensing activities, and not to solve these kinds of difficulties.

International agreements on the protection of copyrights and the few national laws in existence do not enable us to meet fully and satisfactorily the necessity of properly protecting the legitimate interests of those who receive and process remote-sensing data with a view to

commercializing it. Thus, sooner or later, it will be necessary to work out an international agreement on that subject.<sup>6</sup>

## *2. Principles adopted within the framework of ERS-1 programme*

The states participating in the ERS-1 programme did not pretend to solve the problem as a whole but they have adopted, in the Implementing Rules and for the needs of this programme, some provisions which deserve to be mentioned.

(a) First of all, Article 7.1 deals with intellectual property concerning the programme proper. This text stipulates that "when placing contracts and sub-contracts for the implementation of the programme, the Agency reserves, for its own needs and those of the participating States, as regards the resulting inventions and technical data, the intellectual property rights, including the rights of access to and communication and use of technical data."

- Second, "the intellectual property rights resulting from experiments financed by virtue of the programme are reserved for the participating States. However, the Agency, acting on behalf of the participating States, is the owner of these rights." (Art. 7.2).

- Third, "the results of experiments conducted in the course of the programme are communicated according to the rules laid down by the Agency concerning the scientific and technical information." This clause, which exists also in the ESA

programmes of a scientific nature, is yet subject to a restriction as regards ERS-1, namely: the participating States or the national organizations answerable to them reserve the exclusive right to publish the results concerning the operation of the instruments supplied by them and of their experiments for a period varying from 6 to 18 months. (Art. 7.3). Moreover, no result concerning the in-flight operation of an instrument can be published without the express agreement of the State or organization that has financed it. (Art. 7.3b and c).

- Fourth, "the intellectual property rights resulting from the use of additional instruments belong to the organizations that have financed these instruments. Nevertheless, the Agency is entitled to use them free of charge for all its activities and programmes." (Art. 7.4).

(b) The above clauses relate to the results of the ERS-1 programme development phases. As regards the data collected during the satellite operations phase - a question which is directly linked to that of commercialization - Article 7.4 reads: "Also reserved to

6. The protection of Remote Sensing data was alluded to in several recent IISL colloquia. See, in particular, R. Oosterlink, *Legal Protection of Remote Sensing Data* in PROC. 27TH COLL. L. OUTER SPACE 112 (1985).

the participating States are the access to technical information, raw data and thematic products obtained during the operational phase of the programme, and the right to use it for the needs specific to the participating States." Thus, this wording, which sets the notion of "access" against that of "use," does not mean that the participating States do not wish to take it upon themselves to disseminate the data in its various forms. In fact, and as it is pointed out in the continuation of Article 7.4, "the Agency is in charge of co-ordinating the dissemination and management of the ERS-1 elaborated products in accordance with the data dissemination policy laid down by the programme Steering Board."

When we read the above text, two observations come to mind: the first one is that the Agency is thus entrusted with an additional mission in a field where it must substitute itself - at least temporarily - for the users' community. The second is that the programme Steering Board must lay down the data dissemination policy, a task which it has not yet fulfilled and which should be the subject of an addendum to the programme Implementing Rules.

#### IV. ERS-1 DATA DISSEMINATION

As pointed out earlier, Appendix C to the additional Declaration of 11 July 1984 lays down the principles governing access to the ERS-1 system as well as data and product dissemination. These principles are implemented as stipulated in the programme Implementing Rules.

As a number of questions still remain to be settled among the Participants, particularly the price policy, we will limit ourselves to a brief description of the structure that will be used for the dissemination of ERS-1 data and products. This structure will include three levels:

1. The first level is that of ground reception stations. These are, first of all, the stations belonging to the national organizations of the participating States. Article 4 of the programme Implementing Rules provides that "the Agency determines the methods to be used for data dissemination in quasi-real time to the main user Centres of the participating States." It "co-ordinates the use of the satellite by every acquisition station having access to the ERS satellite as well as the processing of the acquired data." Lastly, "the Agency makes arrangements with the participating States for the use of their data processing facilities on common bases ensuring similar conditions for all participating States." (Art. 4.4).

There may also be some reception stations which do not belong to the participating States, particularly those designed for receiving ERS-1/SAR data. They will be invited to sign an agreement with ESA on "direct reception, archiving and dissemination of ERS-1/SAR data." This

agreement will bear on the definition of the clauses and conditions applicable to:

- the direct access to ERS-1/SAR data by the ground station;
- the putting of the ERS-1 data acquired by the ground station at the disposal of the users' community;
- the supply of LBR data to ESA for acquisition in real time in case of failure of ERS-1 on-board tape recorders.

The agreement will also contain an article acknowledging ESA's right to the property of all ERS-1/SAR data, on the one hand and ESA's copyright on the ERS-1/SAR data, on the other hand and consequently the ESA's rights to this data. A license will be granted to the station by the Agency but, as a reciprocal measure, ESA will have the right to look into the dissemination and sale contracts placed by the station and will have a right to payment of a royalty.

An agreement of this type was signed as early as 1986 between ESA and NASA in order to allow the latter to receive the SAR data at its station in Fairbanks, Alaska. Two other agreements are being discussed between ESA and Australia, and Ecuador.

2. The second level of dissemination is the use of the facilities of ESA's Earthnet programme. Established at ESRIN, Italy since 1978, the Earthnet Programme Office (EPO) is in charge of acquiring, pre-processing, archiving and disseminating satellite remote-sensing data. Until now, EPO has worked for the benefit of American and Japanese satellites prior to being used for ERS-1. EPO resorts to a network of ground stations located in Sweden, Norway, Italy and the Canary Islands. Data supplied by orbiting satellites is picked up in numerical form by any one of these stations, where it is immediately pre-processed prior to being transmitted to the users.

Earthnet has entrusted the Eurimage consortium with the responsibility for the final dissemination, i.e. the so-called "commercialization" of the data supplied by American Satellites. For implementing the ERS-1 programme, EPO will use the central technical facilities at ESRIN and co-ordinate the pre-processing and archiving facilities of the stations. Thus, EPO will be the central interface between programme and users and will thus constitute one of the main elements of the ground sector.

3. The third level of the ERS-1 programme consists of all the users, either individual or collective, who will have access to pre-processed or analyzed data. The Agency does not pretend to itself perform and direct the various stages of data transfer to the users; a transfer will be performed either through the national Centres in the participating States, if any, or through a specialized European group.



In this respect, ESA is now studying the possible creation of an "economic interest group" (EIG) constituted according to French law. This group would incorporate industrial and commercial companies belonging to several European countries interested in the dissemination of remote-sensing data for commercial purposes.

No final decision has yet been made and it may be envisaged that Eurimage will be given the task of disseminating and selling the ERS-1 satellite data to the users, in addition to its current tasks.

The fact that there are, at the moment in the participating States, a number of firms capable of creating some "added value" from the pre-processed data, is a factor which must be taken into account so as to be able to determine whether it is desirable that the European Space Agency should favour the arrival of new organizations on the market and whether these organizations should be granted sole rights for ERS-1 products.

Another theme of these studies is the search for a "price policy," reconciling the cost-effectiveness of the ERS-1 operation with the rivalry of the products supplied by other satellites.

Lastly, from a legal point of view, the States participating in the ERS-1 programme will have to make sure that the technical, financial and commercial conditions under which they will decide if the products of the ERS-1 satellite are to be supplied to the public are in conformity with the principles laid down in the United Nations' Resolution 41/65 of 4 December 1986. This question deserves particular attention. As a matter of fact, all of the participating States agreed to these principles and not abiding by them would be likely to require an assertion of the international responsibility of the Agency to remind the States as to their own responsibility.

### CONCLUSION

The "commercialization" of remote sensing data must be considered as an irreversible, though recent, characteristic of space activities throughout the world. It appears to be a logical consequence of the attitude adopted by the United States as soon as it entered the remote-sensing field, as it claimed to be in favour of the "open sky policy" so as to widely disseminate the data collected by its satellites - other than the military ones, of course. Urged by competition considerations, the Soviet Union is trying to attract customers by offering images with a better resolution than the US ones. The newcomers in this field cannot do less from now on and they must propose products of a still higher quality, with even more advantageous financial and other conditions.

This situation explains why the European Space Agency, when embarking on its development of a remote-sensing satellite, had to consider its operation - including data dissemination - from a "commercial" viewpoint.

Actually, the various activities that can be classified in the category of "remote-sensing activities" are not necessarily "commercial" activities. They could be perfectly carried out partly by a State, on its own behalf, the remaining part being the responsibility of a non-governmental firm.

Thus, the United States would like from now on to entrust the research and development phase as well as the construction to Eosat, the private company which is already responsible for data processing and dissemination.

On the other hand, the French Spot-Image company, which was established to carry out activities in connection with data processing, seems to have limited its action to such activities.<sup>7</sup>

It is, as we have put it before, the fact that the Agency is entrusted with activities in connection with the operational phase which constitutes the most striking feature of the legal construction on which the ERS-1 programme has been built as an ESA optional programme.

This construction should be complemented, as stipulated in the Implementing Rules, by the adoption of additional rules concerning, in particular, the "data dissemination policy." Given that this task has not yet been accomplished as of the time of this article, we must limit ourselves to the following comments on this subject:

1. The "data dissemination policy" must be consistent with the principles stated in the United Nations' Resolution 41/65 of 1986. Some of these principles are purely political since they refer to objectives which should be those of the States which carry out remote-sensing activities. Others are more practical and refer to the conditions in which remote-sensing activities must take place. Others aim at compliance with the rights of the observed States. It seems that the principles classified in the last two categories should be specially taken into consideration in the definition and implementation of the policy to be applied in the dissemination of ERS-1 data.

2. The participating States must also ensure the strict implementation of measures intended for the protection of their own interests and those of ESA in terms of intellectual property. For that purpose, they must take into account the principles already stated in Article 7 of the Implementing Rules and add all other principles they would deem necessary.

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7. The development and launch of ERS-2 is provided for in the initial Declaration of 24 March 1982. Recognizing the necessity of insuring the continuity of service for the benefit of users, the participants had come to an agreement on the mission of the 2nd flight model and on its characteristics with a view to its launch by Ariane in 1993. However, we learned in early 1988, that both France and the United Kingdom had decided not to participate in the extension of the ERS-1 programme. As it was not possible to gather sufficient funds in the absence of those two countries, no decision can be made at the present time on the extension of the programme.

3. It is also necessary to take into account the national laws governing space activities, which exist currently in the participating States and particularly those of the territory on which the activities of the entity in charge of data dissemination will be carried out.<sup>8</sup>

4. Lastly, the so-defined policy must be effectively implemented by the entity in charge of data dissemination. Thus, this entity must undertake to see that the policy will be implemented in accordance with the license contract or agreement under which ESA will entrust it with this task, and to transfer it to each final user. For its part, the Agency must provide itself with the necessary means to check that this commitment is complied with.

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8. Apart from the United States, the only countries having a proper "national Space legislation" are the United Kingdom and Sweden.

## LEGAL AND POLICY ISSUES OF THE AEROSPACE PLANE<sup>+</sup>

Stephen Gorove\*

### *Introduction*

In recent years increasing attention has been focused on the development of a new versatile vehicle which is becoming known as the aerospace plane.<sup>1</sup> In addition to research efforts in the United States, research organizations in the Federal Republic of Germany, France, Japan, the Soviet Union and the United Kingdom have been conducting development and design studies. In a way, the aerospace plane will be a natural offspring of the space era. Following closely on the heels of the space shuttle, it will attempt to bridge the gap and provide transition between air flight and space flight.

### *General Characteristics*

The development and eventual realization of the aerospace plane is expected to revolutionize long distance intercontinental travel and transportation by substantially cutting down on the time presently required to reach far-away destinations. A flight from New York to Tokyo may take only a couple of hours compared to the currently required time of 16 hours or more.

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+ This article is an elaboration of the author's address on October 14, 1988 at the IAF Congress in Bangalore, India.

1. As of the early fall of 1988, no law journal articles appear to have been published in the United States dealing with the legal and policy issues presented by the aerospace plane. For a recent book on the technical aspects, see T. A. HEPPENHEIMER, *THE NATIONAL AEROSPACE PLANE* (Pasha Inmarket Intelligence, 1988). See also Albers and others, *Evolution of Air-Breathing Propulsion Concepts Related to the Sanger Space Plane*. Paper prepared for the 39th I.A.F. Congress in Bangalore, India (I.A.F. No.-88-247); Gopalaswami and others, *Concept Definition and Design of a Single-Stage-to-Orbit Launch Vehicle - Hyperplane*. Paper prepared for the 39th I.A.F. Congress in Bangalore, India (I.A.F. No. 88-194).

The aerospace plane is expected to herald the introduction of an advanced space transportation system consisting of a vehicle which would be capable of taking off horizontally and proceeding directly single stage into outer space. It would have the potential of spawning a new generation of commercial aircraft with the ability to span intercontinental ranges in a matter of minutes.<sup>2</sup>

The program relating to the development of the aerospace plane reflects a combination of aeronautical and space technologies. In the United States the program began with the Copper Canyon Program, the purpose of which was to determine its feasibility and whether its critical components could be built. The utility associated with the aerospace plane technologies could be gauged from the vehicle's capability of global unrefueled operation and of reaching any point on the earth in two hours or less. In addition, future versions of the craft could provide routine on-demand access to near space from a large number of bases, not limited to the coastal launch facilities currently in use in the United States. It could also reduce payload to orbit costs for manned operations, and would be capable of a flexibly based rapid response take-off.<sup>3</sup>

#### *Purpose of Inquiry*

The purpose of this inquiry is to attempt to shed light on some of the legal and policy issues which are likely to face legal technicians and policy makers when the early prototype of the aerospace plane will make its debut. While at this stage of scientific research, it is not possible to determine with certainty the configuration and eventual capabilities of future aerospace planes, for purposes of our analysis, it will be assumed that early versions of the plane under discussion will be used as a terrestrial transportation device which has the capability to take off from a point on earth, fly at will in the airspace and traverse through the fringes of outer space for the sole purpose of reaching another point on earth.

#### *From the Space Shuttle to the Aerospace Plane - Legal and Policy Alternatives*

There are many legal and policy issues which arise in the wake of the development of the aerospace plane. The central policy issues will be to determine what laws, domestic and international, should be applied to

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2. See The National Aerospace Plane Program, Joint Hearing Before the Subcommittee on Transportation, Aviation and Materials of the Committee on Science, Space and Technology, and the Subcommittee on Research and Development of the Committee on Armed Services, U.S. House of Representatives, 100th Cong., 1st Sess. (March 11, 1987), p. 22.

3. *Id.*

this versatile vehicle if it is used to speed up point-to-point earth transportation.

The issue of whether rules of air law or space law should be applied in connection with a technological innovation is not entirely new. At the time when the space shuttle was born, lawyers and policy makers were already faced with a similarly vexing issue which arose because the shuttle ascends into outer space with the assistance of rockets just as does a conventional spacecraft and descends from outer space in a manner reminiscent of the landing of an aircraft by gliding through the atmosphere and touching down on a runway.

In an earlier study, this writer, after a review of the Federal Aviation Act of 1958, the National Aeronautics and Space Act of 1958, the underlying Congressional intent, the relevant legislative history as well as NASA practice and an authoritative statement of the Chief Counsel of the Federal Aeronautics Administration, came to the now well accepted conclusion that space law had to be applied to the shuttle.<sup>4</sup> This determination was in line both with international air law incorporated in the Paris Convention of 1919 and the Chicago Convention of 1944, as well as with international space law embodied in the Outer Space Treaty of 1967 and the subsequent major international conventions dealing with space law. The conclusion was also reinforced by the overall purpose and functions of the shuttle.<sup>5</sup>

While the policy choice to regard the shuttle as a spacecraft appeared inescapable on the basis of the indicated analysis, the aforementioned study cautioned about a "state of the art" caveat suggesting that if future technological developments were to create an aerospace vehicle capable of moving freely in the air like an aircraft and also moving at will in outer space, the whole range of variables distinguishing air law from space law and the applicability of these laws to given situations may have to be re-examined. The same study also suggested that consideration of new laws, both domestic and international, may become necessary in order to adjust legal regulations to the latest scientific and technological innovations.<sup>6</sup>

The overall issue of the applicability or inapplicability of the rules of air law or space law or perhaps both as well as a determination of whether new laws are necessary can only be properly undertaken after a careful analysis of the relevant policy issues with respect to the novel situations ushered in by the aerospace plane.

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4. THE SPACE SHUTTLE AND THE LAW 2-3 (S. GOROVE ed. 1980).

5. *Id.* at 3-5.

6. *Id.* at 5.

*Issues of the Delimitation of Airspace and Outer Space*

The aerospace plane's capability to fly much as a conventional aircraft through the airspace at different altitudes is likely to revive the hitherto unresolved issue of the delimitation of airspace from outer space. As international customary law stands today, earth-orbiting satellites are regarded to be moving in outer space. While this rule establishes a guideline for the determination of the lowest functional boundary line of outer space, it does not necessarily clarify the legal status of the adjacent underlying area and does not *ipso facto* dispose of the issue of the upward extent of national sovereignty.

The principle of the freedom of exploration and use of outer space, a cardinal principle of the 1967 Outer Space Treaty,<sup>7</sup> in a sense implies the freedom to go into outer space and also the freedom to return to earth from outer space. Because of the very limited number of space flights that might have traversed through the airspace of a foreign state, the exact nature and scope of this freedom has so far not been determined by international customary law. Attempts in the United Nations aimed at establishing a boundary line between airspace and outer space at a height of 100-110 kilometers and according space-faring nations the right of innocent passage through the underlying airspace above the territories of other countries have to date not received sufficient support.<sup>8</sup> As a result, the legal status of the area immediately underlying outer space remains in doubt together with the issue of the upward extent of territorial sovereignty. It may be expected that the development of the aerospace plane will focus on this unresolved issue since the plane will likely traverse over foreign airspace at lower altitudes and on more frequent occasions than has been the case with conventional spacecraft.

Among the policy choices to be considered will be the question of whether to set the upward limit of national sovereignty at a specific height anywhere between the area where satellites can orbit the earth and where aircraft can fly and, at the same time, not require special permission from the underlying state to traverse space above this height on the way to and from outer space, or, alternatively, to give space-faring nations the right of innocent passage through this area while ascending to or descending from outer space. The problem with innocent passage is that disputes can arise out of the interpretation of what constitutes innocent passage and also from the determination as to whose interpretation will prevail.

7. The Treaty on Principles Governing the Activities of States on the Moon and Other Celestial Bodies, signed on Jan. 27, 1967 and entered into force Oct. 10, 1967, 19 U.S.T. 2410, T.I.A.S. 6347 (herein referred to as the "Outer Space Treaty").

8. U.N. Doc. A/AC 195/C.2/L.139.

*The Status of Astronauts*

The aerospace plane may only spend a relatively short time in outer space in the course of a routine flight connecting two distant points on earth. The policy issue to be determined will be whether to regard the personnel of such plane as astronauts. If so, under the Outer Space Treaty of 1967, they would be regarded as envoys of mankind<sup>9</sup> to whom the special privileges extended by the Agreement on the Rescue and Return of Astronauts and Return of Space Objects would be applicable.<sup>10</sup>

The very limited amount of time that people would spend in outer space while flying from one place on earth to another on an aerospace plane would likely militate against the idea of giving them special status similar to that accorded to astronauts under the Rescue Agreement.<sup>11</sup> It is not very likely that states would be willing to grant privileges and immunities on such an aerospace plane to personnel and travelers who have made an emergency landing on the territory of a foreign state.

The law embodied in the texts of the space treaties does not make it clear whether personnel of a space object is to be taken to include not only the crew but also the passengers of a spacecraft. In its general use, the term "personnel" refers to people who are "employed" in some capacity and would not include passengers. While the space treaties do not define the word "personnel," it could be argued and quite correctly that article VIII of the Outer Space Treaty was not intended to take passengers and other non-crew persons out of the jurisdiction and control of the state of registry while they were in outer space. Similarly, the Rescue Agreement's reference to "personnel" was clearly intended to apply to all "astronauts," a term which appears in the title of the agreement. Admittedly, the issue of the status of passengers was not a burning issue at a time when only professional astronauts or cosmonauts were involved in space flights but the advent of the aerospace plane will likely refocus attention on this matter. Additionally, it may rekindle the issue whether apart from the safe and prompt return requirement certain other privileges and immunities should be accorded to astronauts.

*Liability Issues*

In case of damage resulting from the crash or collision of an aerospace plane, policy makers will have to come to grips with the issue whether strict liability should apply in such situations. The Liability Convention provides for strict liability of the launching state if the space object causes damage on the surface of the earth or to conventional aircraft

9. Outer Space Treaty, art. V.

10. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, April 22, 1968, 19 U.S.T. 7570, T.I.A.S. 65559, 672 U.N.T.S. 119 (herein referred to as the "Rescue Agreement").

11. *Id.* at arts. 2-4.



in flight. In case the damage is caused elsewhere than on the surface of the earth to a space object of one launching state by a space object of another launching state, the latter is liable only if the damage is due to its fault.<sup>12</sup>

It is conceivable that the policy choice will be to preclude the applicability of the Liability Convention to damage caused by the crash or collision of an aerospace plane, especially since the Liability Convention, much like the Outer Space Treaty, makes the launching state liable for damage caused by the launched object,<sup>13</sup> and there may be no launch of the aerospace plane in the conventional sense of the word. Clear as this observation may be, policy issues regarding liability may still require further consideration.

A possible policy choice would be to disregard the manner in which the aerospace plane ascended whether by launch or in a way a conventional aircraft takes off and make the determination of applicable law irrespective of it. It may be recalled that the determination that space law should apply to the shuttle was also made notwithstanding the fact that the shuttle landed on a runway much like a conventional aircraft.

Among the several possible scenarios involving damage caused by an aerospace plane the following may be considered. If the damage is caused by the aerospace plane to a space object in outer space, the choice may well be to apply the Liability Convention in such a situation and predicate liability on fault. The same rule may also be applied if the damage is caused to another aerospace plane in outer space. The supporting argument for such policy choice may well be that the damage occurred in outer space, a fact that would militate against the application of air law in such a situation. A counter argument against the application of the Liability Convention may be the functional one if in fact the aerospace plane is used solely for speeding up point-to-point transportation on earth and its operation in space is only incidental to this effort.

Unlike issues of liability, those pertaining to international responsibility are not tied to the launching state. Under the Outer Space Treaty states are internationally responsible for national activities in outer space irrespective of whether they are carried out by governmental or nongovernmental entities.<sup>14</sup> Also, the activities of nongovernmental entities in outer space require authorization and continuing supervision by the appropriate state party.<sup>15</sup> It would be hard to see how a state could escape its responsibility in connection with the operation of an aerospace plane while in outer space. It could also be argued, though

12. See arts. II and III of the Convention on International Liability for Damage Caused by Space Objects. March 29, 1972, 24 U.S.T. 2389, T.I.A.S. 7762 (herein referred to as the "Liability Convention").

13. *Id.* and art. VII of the Outer Space Treaty.

14. Art VI.

15. *Id.*

admittedly not with equal force, that the international responsibility provision of the Outer Space Treaty should also apply to activities connected with the aerospace plane during its flight in the air when it is on its way to or from outer space.

### *Issues of Registration*

Under the Registration Convention when a space object is launched into earth orbit and beyond, the launching state is required to register the object.<sup>16</sup> Each state of registry must also provide information to the Secretary General of the United Nations about the launched space object.<sup>17</sup>

The issue that arises in connection with the aerospace plane is whether it would fall under the requirements of the Registration Convention. Under a strict interpretation of the Convention, it could be argued that the aerospace plane is not launched into outer space so long as it takes off as a conventional aircraft and if there is no launching in the course of its flight. Apart from the difficulty associated with the requirement of launching, it may be debatable whether the aerospace plane may in all situations qualify as an object placed into orbit.<sup>18</sup>

Aside from the textual interpretation, it is also questionable whether the purposes of the Registration Convention would be served by subjecting a device used for terrestrial transportation to the requirements of the Convention. The general thrust of the Convention is directed toward the registration of objects which are to remain in earth orbit or beyond.<sup>19</sup> This is apparent, *inter alia*, from a reading of article IV of the Convention which requires the state of registry to furnish information to the U.N. Secretary General on the space object's basic orbital parameters, including nodal period, inclination, apogee and perigee. Also, the provision which enables a state to provide from time to time additional information concerning the space object,<sup>20</sup> and the requirement to notify the Secretary General to the greatest extent feasible and as soon as practicable of space objects which have been but are no longer in earth orbit,<sup>21</sup> suggests that it would be unwise to apply the Convention to an aerospace plane whose primary purpose is to speed up global transportation on earth, and whose stay in space is only incidental to this effort and of a very short duration.

To the foregoing line of reasoning one may also add that a basic purpose of the Registration Convention has been to facilitate

16. Arts. II and IV of the Convention on Registration of Objects Launched into Outer Space, Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S. 8489 (herein referred to as the "Registration Convention").

17. *Id.* at art. IV, para. 1.

18. Emphasis added.

19. *Cf.* art. II

20. Art. IV, para. 2.

21. Art. IV, para. 3.

identification of space objects which have caused damage or which have been of a hazardous or deleterious nature.<sup>22</sup> The identification of an aerospace plane, if engaged in terrestrial transportation, is not likely to create any difficulties in case of an accident and may not require the assistance of other states possessing space monitoring and tracking facilities.

While there may be little or no need to register the aerospace plane under the Registration Convention used for terrestrial transport, it should be subject to the operational requirements imposed upon conventional aircraft by domestic law and international agreement.

In arriving at the foregoing conclusions one should not lose sight of the possibility of technological advances which may necessitate a reexamination of the issues associated with the aerospace plane. Such an eventuality could take place if the aerospace plane of the future would be capable of staying in outer space for longer periods of time and could be used for both earth and space transportation and other dual purposes.

#### *Issue of Space Object*

From the preceding discussion of the Liability and Registrations Conventions, it would appear that the policy choice may result in characterizing the aerospace plane in some cases as a space object and in others as not a space object. This would reflect a lack of consistency and perhaps also that of logic which are hardly the hallmarks of a solid legal foundation. However, upon a closer scrutiny, it would seem that the policy choice may not entirely be inconsistent with similar, already existing differentiations.

To be sure, in current international space law there is no full-fledged, authoritative definition of a space object. Only a partial definition is given in the Liability and Registration Conventions to the effect that a space object includes its component parts as well as its launch vehicle and parts thereof.<sup>23</sup> While the launch vehicle after its launch would be regarded as a space object and the Liability Convention would be applicable to any damage caused by it, a similar conclusion may not likely be reached if the damage occurs while the vehicle is still in the manufacturing plant or on its way to the launching pad. Similarly, the characterization of a space object as such an object will also change following its return to earth. This may occur immediately or in some cases at a later point in time, as exemplified by harmful radiation emanating from the debris of a nuclear power source after its crash on the earth. Also, it is not inconceivable that a space object will no longer be regarded as a space object following its landing and stay on the moon or on another celestial body or that different rules will be devised for such an object.

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22. Art. VI.

23. Art. 1(d) of the Liability Convention and art. 1(b) of the Registration Convention.

The preceding observations suggest that what may have appeared inconsistent or illogical at first sight, may not necessarily be so. Thus there may be nothing wrong with a policy choice that would necessitate the characterization of the aerospace plane in some cases as a space object while in other circumstances not as a space object within the context of the applicability of a particular space treaty. What is important is that the policy choice should be weighed after a careful evaluation of the attendant factual circumstances of the case at hand. For instance, if an aerospace plane collides with another plane while on an air flight from New York City to Washington, D.C. to pick up passengers before a subsequent flight to Hongkong which would pass through the fringes of outer space, it would seem that the policy choice may well be not to apply the Liability Convention's provisions to such an accident. Should the collision occur during the flight from Washington, D.C. to Hongkong the policy choice may be just the opposite.

#### *Other Issues and a Concluding Thought*

Undoubtedly there are many more issues which may have to be addressed following the advent of the aerospace plane. As to jurisdiction, under the Outer Space Treaty the state of registry is to "retain" it with respect to a space object while in outer space.<sup>24</sup> The use of the word "retain" in the aforementioned sentence suggests that the state of registry would also have jurisdiction over the object prior to its reaching outer space. While the principle of the freedom of exploration and use of outer space certainly implies both the freedom to go into outer space as well as the freedom to return to earth, the dearth of relevant international practice to date suggests some caution in drawing the conclusion that the state of registry would retain exclusive jurisdiction during the space object's transit through foreign airspace. However, this may not be the case with the aerospace plane not only during its air flight between two different countries, *e. g.* when flying from New York to Montreal but also during its temporary space flight from Montreal to Singapore while the plane is passing through the airspace of a foreign state. In other words, in both cases the underlying state's consent to the aerospace plane's transit through its airspace may be necessary. At the same time, there is no reason to assume that policy considerations for the aerospace plane would require a rule different from that applicable to a space object while in outer space.

The conclusion that emerges from the preceding lines of reasoning appears to underscore that all relevant international agreements should be closely scrutinized to determine in what way or under what circumstances they would or would not apply to the aerospace plane. The same holds equally true for domestic laws and regulations.

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24. Art. VIII.

If the aerospace plane is used as a transportation device on earth, strictly speaking, from a functional viewpoint, it would seem more logical to let it be governed by air law regulations. While in the final analysis this proposition appears to be sound, because of the operation of the aerospace plane in outer space - brief as the latter may be - lawyers and policy makers should not avoid giving thoughtful consideration to the various issues presented by the aerospace plane. Should the policy choice reasonably necessitate the adoption of new rules governing the aerospace plane, special care will have to be exercised to circumscribe the physical attributes and intended operational area of the aerospace plane in the context of which the new rules would apply. Otherwise, the rules may inadvertently be applied in the future to aerospace planes with far different capabilities, functions and purposes from the initial ones to which they may have been intended to apply.

## EVENTS OF INTEREST

### A. PAST EVENTS

#### *Reports*

#### *Review of the Work of the United Nations Concerning Outer Space in 1988 \**

The work of the United Nations concerning outer space in 1988 concluded with the adoption by the forty-third session of the General Assembly of two resolutions (43/70 and 43/56), dealing with the prevention of an arms race in outer space and the promotion of international co-operation in the peaceful uses of outer space, respectively. Consideration of matters relating to outer space was carried out in 1988 in a businesslike and co-operative atmosphere, reflecting the improved international climate since the signing of the INF Treaty in December 1987.

#### A. Prevention of an arms race in outer space

The General Assembly, in its resolution 43/70, which was adopted by a vote of one hundred fifty-four to one (United States), reaffirmed that general and complete disarmament under effective international control warranted that outer space would be used exclusively for peaceful purposes and that it would not become an arena for an arms race, recognized the need to consolidate, reinforce and enhance the legal regime applicable to outer space as well as the importance of strictly complying with existing bilateral and multilateral agreements, and emphasized the need for further measures with appropriate and effective provisions for verification to prevent an arms race in outer space.

In addition, the Assembly reiterated that the Conference on Disarmament had the primary role in the negotiation of multilateral agreements on the prevention of an arms race in outer space and called on the Conference to intensify its consideration of the question in all its aspects, urged the Soviet Union and the United States to pursue intensively their bilateral negotiations in a constructive spirit aimed at reaching early agreement for preventing an arms race in outer space, and asked all States, especially those with major space capabilities, to refrain from acting contrary to the observance of the relevant existing treaties.

The Assembly's recommendations were based on the work of the Conference on Disarmament, which at its 1988 session discussed the question of the prevention of an arms race in outer space through its Ad Hoc Committee on the Prevention of an Arms Race in Outer Space. There was general recognition in the Ad Hoc Committee of the importance and urgency of preventing an arms race in outer space and readiness to contribute to that common objective. In advancing and developing further

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\*The views herein are those of the author and not necessarily those of the U.N.

the examination and identification of various issues relevant to the prevention of an arms race in outer space, the *Ad Hoc* Committee recognized that: the legal regime applicable to outer space, by itself, did not guarantee the prevention of an arms race in outer space; the role that the legal regime applicable to outer space played in the prevention of an arms race in that environment was a significant one; there was a need to consolidate and reinforce that regime and enhance its effectiveness; and that strict compliance with existing agreements, both bilateral and multilateral, was important. Preliminary consideration was given to a number of proposals and initiatives aimed at preventing an arms race in outer space and ensuring that its exploration and use would be carried out exclusively for peaceful purposes. These included the proposed amendments to the Outer Space Treaty submitted by Venezuela (CD/851), proposals for strengthening State practice under the Registration Convention submitted by Australia and Canada (CD/OS/WP.25) and proposals concerning certain terms relating to arms control in outer space submitted by Canada (CD/OS/WP.27). The report of the Conference on Disarmament is to be found in United Nations document A/43/27.

The recommendations of the Assembly in resolution 43/56 were based on the work of the Committee on the Peaceful Uses of Outer Space (COPUOS). This resolution urged all States, in particular those with major space capabilities, to contribute actively to the goal of preventing an arms race in outer space as an essential condition for the promotion of international co-operation in the exploration and use of outer space for peaceful purposes. It also requested COPUOS to continue to consider, as a matter of priority, ways and means of maintaining outer space for peaceful purposes and to report thereon to the 1989 session of the General Assembly.

During the 1988 session of COPUOS, the Committee agreed that an effective way to maintain outer space for peaceful purposes was to strengthen international co-operation in the exploration and peaceful uses of outer space. This could be done through multilateral, regional and bilateral co-operative activities and through the promotion of specific projects to assist all countries. The Soviet Union and Eastern European countries drew attention to the proposals that had been made for the establishment of a world space organization (WSO), for the creation of an international centre for joint research and technology for the benefit of developing countries, and for a comprehensive programme of joint practical activities by States on the peaceful exploration and exploitation of outer space up to the year 2000 (A/AC.105/407). In this connection, a working paper (A/AC.105/L.171) was submitted setting forth basic provisions of the charter of a WSO, such as its aims, functions, structure and financing. During the debate in the General Assembly, the Soviet Union further expanded on its idea of the WSO and stated that the international space research centre be based on the Krasnoyarsk radar site. It also emphasized institutionalized verification and supported France's idea of establishing an International Satellite Monitoring Agency (ISMA) (A/AC.206/14). On the other hand, most Western countries

repeated their view that the existing mechanisms should be further developed instead of setting up a new organization. Among the Western countries, Australia alone observed that a concept such as the proposed WSO merited serious consideration.

B. International co-operation in the peaceful uses of outer space

On questions relating to peaceful uses of outer space the General Assembly acted on the basis of considerations and recommendations of COPUOS, its Scientific and Technical Sub-Committee and its Legal Sub-Committee. The reports of these bodies are to be found in U.N. documents A/43/20, A/AC.105/409 and Corr.1, and A/AC.105/411, respectively. The important discussions and recommendations are summarized below.

(a) Use of nuclear power sources in space

The Legal Sub-Committee, through its working group, continued consideration of the elaboration of draft principles relevant to the use of nuclear power sources (NPS), and the discussions were again based on a paper submitted by Canada (A/AC.105/C.2/L.154/Rev.3) containing drafts of several principles on safety assessment and notification, guidelines and criteria for safe use, notification of re-entry, assistance to States, applicability of international law and compensation. It also had before it two working papers submitted by China (A/AC.105/C.2/L.164 and L.165) concerning relations with other international treaties and settlement of disputes. No final texts emerged from the discussions and considerations will continue at its 1989 session.

Meanwhile, a working group of the Scientific and Technical Sub-Committee considered the technical aspects of the matter. Among the conclusions was that the option of the uses of the complete dispersal (burn-up) of the fuel of a nuclear reactor or the intact re-entry of the nuclear reactor should be considered. Further, the possible collision of a space object carrying a nuclear power source on board, either in operation or in disposal orbit after operation, with a particle of space debris should also be considered. The probability of such collision might become considerable in view of the long orbital lifetime of nuclear power sources. The Sub-Committee encouraged national studies on that issue and invited countries to present related results to the Sub-Committee. To more precisely assess the risk involved, some delegations said States should include specific information as to the presence of nuclear power sources on board space objects, in particular, their generic classification, when notifying the United Nations pursuant to Article 4 of the Registration Convention.

The discussions on this item in COPUOS gained an added urgency in view of the malfunctioning of COSMOS 1900 on which the United Nations had received seven notifications (ST/SG/SER.E/176 and Add.1-6) containing information concerning the malfunctioning spacecraft with an



NPS onboard. The Committee requested the two Sub-Committees to continue their consideration of the item in 1989.

(b) Definition of outer space, geostationary orbit

The Legal Sub-Committee has been considering questions related to the definition of outer space since 1968 and the geostationary orbit since 1978. While the Sub-Committee was unable to adopt any recommendations, it held extensive discussions on the matters before it.

In their discussions this year, some representatives, particularly from Eastern Europe, reiterating views expressed at earlier sessions of the Sub-Committee, stated that the definition and delimitation of outer space was a practical and legal necessity in order to achieve a clear distinction between the legal regime of air space, with its inherent features of State sovereignty, territorial integrity and security, and the legal regime of outer space, which provided for the free exploration and use of outer space by all mankind. They considered the working paper submitted by the delegation of the Soviet Union to the Sub-Committee at its twenty-second session in 1983 to be a good basis for a solution to the question under discussion.

Other representatives, particularly from Western countries, reiterating their position expressed at earlier sessions of the Sub-Committee, stated that there was no present need for the definition and delimitation of outer space. They expressed the view that the lack of such definition or delimitation had not led to any practical problems in the peaceful exploration of outer space, and that the utmost freedom of action was required for such peaceful exploration for the benefit of all countries.

In discussing the question of the geostationary orbit, some representatives, particularly from the equatorial countries, stated that the geostationary orbit was a limited natural resource to be shared rationally and equitably by all mankind, having regard to the interests of the developing countries. Therefore, there was a need to establish a *sui generis* legal regime, additional to the existing space law, to regulate the geostationary orbit.

Some representatives, particularly from Western countries considered that the geostationary orbit formed an integral part of outer space and was subject to the 1967 Outer Space Treaty. Accordingly, it was not subject to national appropriation by claim of sovereignty, by means of use or occupation or by any other means, and all States enjoyed equal rights in its utilization.

Others, particularly from Eastern Europe, maintained that provisions regarding a legal regime should be formulated in order to acknowledge the rational and equitable utilization of the geostationary orbit, not as a *sui generis* regime, but rather in conformity with existing space law and the relevant decisions of the International Telecommunication Union (ITU). Those delegations considered that the

working paper submitted by the German Democratic Republic at the previous session was a sound basis for the formulation of a legal regime.

The view was expressed that there was converging opinions among most delegations on the following points: that the geostationary orbit was a part of outer space and was a limited natural resource which should accordingly be used in a rational and economic way, that the geostationary orbit was not subject to national appropriation by claim of sovereignty, of occupation or any other means, and that all States should have equitable access to the utilization of the geostationary orbit. COPUOS noted that some progress had indeed been made towards a convergence of views on this item and expressed the hope that consensus on the question would be reached in the near future.

(c) Implementation of UNISPACE 82 recommendations:

Stating that a number of the recommendations of UNISPACE 82 had not yet been fully implemented, the Scientific and Technical Sub-Committee, through its Working Group of the Whole, proposed continued emphasis in the United Nations Space Applications Programme, on long-term training courses centering on the realization of projects in certain space technology applications. The Working Group noted with satisfaction the offers of certain Member States and international organizations in that area and exhorted others to make similar contributions so that the number of training fellowships offered within the Programme for 1988 and following years could be increased.

In order to promote the possibilities of further studies in space-related disciplines, it recommended that the United Nations should, on request, organize consulting services of experts from developed and developing countries with a view to preparing an integrated national action plan for developing, strengthening or re-orienting a programme on the subject which would be in harmony with other national development programmes.

The countries of a region should be encouraged, the Working Group said, to develop their co-operation by pooling their personnel, technical skills, hardware and software resources for space-related projects. If one or several countries of a region were unable to undertake a programme by themselves, the organization should, on request, attempt to co-ordinate its action with theirs in order to set up a regional programme to meet their needs.

Periodic updates on the technological resources and capacities of States in the field of outer space should be ensured, including possibilities in education, training, research and training fellowships, in order to promote co-operation in the peaceful uses of outer space, the Group proposed. It also recommended that countries with the required capacities be encouraged to provide developing countries with financial and technical assistance to allow them to acquire inexpensive group receiving stations for satellite communications programmes and to develop

inexpensive, preferably renewable, energy sources, in order to reach non-electrified zones.

The General Assembly also endorsed the 1989-90 work plan of the United Nations Programme on Space Applications which is a technical assistance programme newly mandated and expanded by UNISPACE 82 emphasizing education and training in space applications for the benefit of developing countries.

(d) Other matters and new agenda items

The General Assembly also noted that COPUOS, particularly through its Scientific and Technical Sub-Committee, had dealt with questions relating to remote sensing, space transportation systems, space medicine, matters relating to the goesphere-biosphere (global change) programme, planetary exploration and astronomy, and had requested that these discussions be continued in 1989. The theme to be given special attention by the Sub-Committee in 1989 will be "Space technology as an instrument for combating environmental problems, particularly those of developing countries" (focusing on problems of desertification, deforestation, floods, erosion and pest infestation). COSPAR and IAF were also invited to arrange a symposium on this theme during the 1989 session of the Sub-Committee.

In previous discussions on the question of a new agenda item for the Legal Sub-Committee, a few proposals were made, including the proposal of the Group of 77 to discuss an item entitled "Legal aspects related to the access of States to the benefits derived from the exploration and utilization of outer space". This year, following long consultations aimed at arriving at consensus about the new item, a formulation proposed by Austria was accepted by consensus and it read: "Consideration of legal aspects related to the application of the principle that the exploration and utilization of outer space should be carried out for the benefit and in the interests of all States, taking into particular account the needs of developing countries."

With regard to the substance of the new item, some developing countries stressed the need to fill the present international legal vacuum. This might in their view lead to revising the existing legal framework based on the Outer Space Treaty of 1967. Others, particularly the United States, did not agree with such an approach and emphasized that the new item did not call for the negotiation of a new international legal framework, but should focus on how the existing legal framework has translated Article 1 of the Outer Space Treaty into practical steps.

The Group of 77 stated that they attached great importance to this item, which some of them characterized as the first item in the Legal Sub-Committee for the benefit of the developing countries, and strongly insisted that a working group be established in the Sub-Committee to deal with the item. They were generally supported by some Western countries and the socialist countries. Some Western countries, particularly the United Kingdom and the United States would like to proceed more

cautiously and consider the establishment of a working group when the topic is more precisely defined. The General Assembly urged the Legal Sub-Committee to pursue at its 1989 session, "with a view to finalizing," its consideration of the question of establishing a working group in order to ensure a satisfactory outcome of the substantive deliberations under this new item.

In order to assist the Legal Sub-Committee in its deliberations in 1989, the Secretary-General has been requested to invite Member States to submit their views as to the priority of specific subjects under this item and to provide information on their national legal frameworks, if any, relating to the development of the application of the principle contained in Article 1 of the Outer Space Treaty.

Following a proposal by the United States, the General Assembly also endorsed the inclusion of a new item on the agenda of COPUOS itself entitled "Spin-off benefits of space technology: review of current status".

Several countries supported the idea of designating 1992 as International Space Year (ISY) and the General Assembly requested COPUOS to consider at its session in 1989 the advisability of so doing, and requested the Scientific and Technical Sub-Committee to consider recommendations regarding possible activities that might be undertaken during an ISY taking note of activities planned by other international organizations.

Although no agreement was reached, proposals were also made concerning other possible new items and they included two items proposed by Pakistan for the Scientific and Technical Sub-Committee entitled "Application of space technology of special relevance to the needs of developing countries and possibilities for international co-operation" and "Ways and means of maintaining outer space free of debris and pollution". On the subject of space debris, it was proposed that an annual report should be submitted to the Scientific and Technical Sub-Committee with updated information on the question of space debris and the first report would be before the Sub-Committee at its 1989 session. During the General Assembly discussions, a proposal was made by the Byelorussian SSR, supported by Uganda, that a third UNISPACE Conference should be convened. Finally, it is to be recalled that several new items for possible consideration of the Legal Sub-Committee were made the previous year and some of them were repeated in the context of discussions and prior to the consensus agreement on the new agenda item of the Legal Sub-Committee.

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*The 31st Colloquium on the Law of Outer Space, Bangalore, Oct. 8-15, 1988*

The Colloquium took place during the XXXIXth Congress of the International Astronautical Federation. The sessions of the Colloquium were held in the Windsor Manor Hotel.

The four official subjects were the following:

1. Legal aspects of maintaining outer space for peaceful purposes;
2. Space law and the problems of the developing countries;
3. National space laws and bilateral and regional agreements;
4. General issues of space law.

The President opened the Colloquium with an extensive commemoration of the *Honorary President, Dr. Pepin*, who passed away on April 28, 1988, and who had contributed so much to the field of air and space law.

*Judge Hidayatullah*, the former Vice-President of India, served as chairman. He was assisted by *Professor Dr. M.V. Naidu*. In his introductory speech *Judge Hidayatullah* also paid tribute to *Dr. Pepin*.

The topic "Legal aspects of maintaining outer space for peaceful purposes" aroused a keen interest among those in attendance. Many participants sent papers for presentation when they were unable to attend. Because of this, there was ample time for the speakers who were present to present their papers in full and also for interesting and vivid follow-up discussions, particularly during the first session.

The Chairman first gave the floor to *Prof. Naidu* (India), who addressed crucial problems concerning the prevention of an arms race in outer space, and scrutinized carefully the contents of the ABM Treaty.

*Dr. Bittlinger* of the FRG gave an interesting survey on "Keep-Out Zones and International Space Law," concluding that "the present concept of establishing, as part of military space projects of the United States, a multitude of 'keep-out zones' affecting all regions of near-earth space contravenes Art. II of the Outer Space Treaty."

The topic of the session was articulated with great clarity by the knowledgeable *Judge Chowdhury* of India. He pointed out problems of the differing interpretations of the term "peaceful purposes" and their impact in determining permissible activities. Also participating was *Dr. Ekblad* of Sweden who gave a slide presentation on "Verification of Outer Space Treaties by an International Space Surveillance Agency" (ISSA).

Following the scheduled presentations, the Chairman expertly summarized the papers of non-attending participants and opened the floor for discussions.

Reflecting on *Prof. Chowdhury's* presentation, *Prof. Gorove* drew attention to the fact that the drafters of the Outer Space Treaty did not follow the interpretation either of those who maintained that "peaceful" meant "non-military" or of those who stated that "peaceful" meant "nonaggressive". This was apparent from Article IV of the Outer Space Treaty which outlawed certain military activities such as the establishment of military bases, installations and fortifications irrespective of whether they were nonaggressive; it was also apparent from the stipulation which permitted the use of military personnel for scientific research, irrespective of the underlying motivation.

*Prof. Gorove* also pointed out that Article IV of the Outer Space Treaty banned atomic weapons and other weapons of mass destruction in earth orbit but did not prohibit the use of nuclear power sources if they

could not be regarded as atomic weapons or other weapons of mass destruction. He stressed that ASATs did not fall under the constraints of the ABM Treaty so long as they were not used in an ABM mode. With respect to *Dr. Ekblad's* remarks, *Prof. Gorove* raised questions as to whose technology would be used, who would pay for ISSA and who would control it. As to *Dr. Bittlinger's* presentation, *Prof. Gorove* noted that in the type of scenario described by *Dr. Bittlinger* not only would the establishment of unilateral keep-out zones violate Article II of the Outer Space Treaty but would also run counter to the principle of freedom of exploration and use, which is a cardinal principle of the Outer Space Treaty. At the same time, he stressed that the establishment of traffic rules of the road by concerted international action should not be hampered.

Concerning *Dr. Bittlinger's* presentation, *Prof. Wirin* noted the following:

(i) Appropriation is ownership and does not exclude use which is beneficial to peace and promotes the purposes of the Outer Space Treaty. Use must be reasonable.

(ii) Unilateral use which is reasonable becomes international law because other nations accept the use, becoming the custom of nations.

(iii) Keep-out zones may promote peace by reducing tension during times of crisis.

(iv) What is needed is an agreement on rules of the road which would include keep-out zones, debris etc.

Concurring with *Prof. Gorove*, *Prof. Wirin* pointed out that a laser powered by nuclear devices is not a weapon within Article IV of the Outer Space Treaty. It is not a weapon of mass destruction. Therefore it is not prohibited.

Complimenting *Judge Chowdhury* on his very valuable paper, *Prof. Diederiks* stressed her view that it would be desirable to identify activities which would be permissible and those which would not. She called for better definitions of certain terms to avoid misunderstandings. She also wondered about the creation and desirability of a category of satellite inviolability.

In the context of this session, *Dr. Doyle* drew attention to the fact that the United States Strategic Defense Initiative Organization (SDIO) was a staff office in the office of the Secretary of Defense, not an organization; that the SDIO has no authority or funding to deploy anything; that the SDIO was a study program to evaluate the technological practicalities of building interceptors and that no full scale development was authorized or underway in the United States.

In connection with the narrow vs. the broad interpretation of the ABM treaty, *Dr. Doyle* noted the official U.S. government position according to which the narrow interpretation applies, whereas the broad interpretation is proposed for consideration, but is not accepted.

Also, *Dr. Doyle* observed that the SDIO systems can be both ground-based and space-based, and if any new defensive interceptor is to

be deployed by the U.S. before the year 2000, a decision that has not yet been taken, it would very likely be a ground-based system for reasons of cost and complexity, but the feasibility studies in process and the technology demonstrations that are in process have no operational dimension.

Reacting to *Judge Chowdhury's* presentation, *Mr. Potter* referred to a fundamental problem in evaluating peaceful activities in space: how can one reconcile the spirit or the letter of the treaties that call for the peaceful use of space with unknown future events? According to him, strategic studies was a complex subject filled with subtleties and nuances driven by technologies, politics, alliances, perceptions, public and world opinions. He suggested that peace and stability are generally evaluated in consequential terms, that to hyper-analyze events that have not occurred is a dangerous undertaking, and that stability and instability transcend the simplistic action-reaction phenomenon that many analysts utilize. He also raised the question: how to reconcile with the situation that what may appear dangerous and destabilizing today may in fact be stabilizing in the future and vice-versa. Complementing *Judge Chowdhury* for his explicit presentation, *Justice Hidayatullah* asked him to suggest a definition of the term "aggression." *Dr. Shankar* asked *Mr. Chowdhury* if there was any difference between "peaceful purpose" and "peaceful utilization."

*Dr. Bittlinger's* presentation raised a number of intriguing questions. *Dr. Ekblad* put forward the question: how does the keep-out zone concept work if two satellites protected by a keep-out zone approach each other, so that the zones interfere with each other? *Justice Hidayatullah* raised the question of whether a satellite in the geostationary orbit also appropriated the space it physically occupied? In addition, *Dr. Shankar* put forth the question: how do you distinguish between "keep-out zones" and "appropriation"?

In response to the question of *Dr. Ekblad*, *Dr. Bittlinger* said that this conflict may indeed arise if other states also declare a keep-out zone around their satellites. Which keep-out zone prevails in that case is not settled by the keep-out zones concept of the United States. This may also illustrate that the keep-out zones concept is not practicable when keep-out zones are set up unilaterally. Agreeing completely with the observation made by *Dr. Gorove*, *Dr. Bittlinger* posed the problem of drawing the line between the right of free use of outer space and an appropriation of outer space, which is prohibited by article II of the Outer Space Treaty. According to him, a keep-out zone exceeds the right of free use of Article I of the Outer Space Treaty and qualified as an appropriation. Disagreeing completely with the views of *Prof. Wirin*, *Dr. Bittlinger* said that what he mentioned as an alternative, consistent with international space law, to the concept of unilateral declaration of keep-out zones, was an appropriate international agreement of a global range or among space-faring nations on space traffic regulation. Answering the

question put by *Justice Hidayatullah*, *Dr. Bittlinger* said that it was a logical consequence that the space a satellite physically needed could not be used by other satellites. However, this must be accepted without regarding it as a prohibition of national appropriation. Otherwise, there would be no right of use of outer space under Article I of the Outer Space Treaty. According to the prevailing opinion in space law literature the use of a geostationary satellite slot may, under certain circumstances, be qualified an appropriation of that slot. However, that point does not seem to be clearly settled and needs further discussion.

Reacting to the question raised by *Dr. Shankar*, *Dr. Bittlinger* categorically remarked: "I do not distinguish between them." The point is, whether "keep-out zones" present a "national appropriation" as explicitly prohibited by Article II of the Outer Space Treaty. "Keep-out zones" are part of space projects envisaged for the future, "national appropriation" is a term of international space law.

Accepting the views expressed by *Prof. Gorove* concerning his presentation, *Mr. Chowdhury* said that in light of the controversy surrounding the definition of "peaceful purpose," it is better to go along with each instance to determine whether it is for "peaceful purpose" or not. In reply to the question put by *Justice Hidayatullah*, *Judge Chowdhury* pointed out that it is very difficult to define the term "aggression," just as it is in the case of defining the term "peaceful purpose." Referring to the clarification required by *Prof. Diederiks*, *Mr. Chowdhury* stated that ASATs are not permitted as they would jeopardize the security of the country concerned. Reacting to the question put by *Dr. Shankar*, *Mr. Chowdhury* emphatically said that there is no difference between "peaceful purpose" and "peaceful utilization," according to the joint statement by the U.S. President *Mr. Reagan* and the Soviet Leader *Mr. Gorbachev*. With regard to the question put by *Dr. Gorove*, *Dr. Ekblad* said that every nation is responsible to implement verification of outer space treaties by an ISSA and also to pay for such verification.

In the second session, chaired by *Dr. Kopal* of Czechoslovakia, and assisted by *Dr. Schmidt-Tedd* of the FRG, *Dr. He Qizhi* of China spoke on "The Legal Status of Geostationary Orbit and the Developing Countries."

*Dr. Hingorani* of India discussed space law problems for developing countries. He observed it was "high time to amend article VIII so as to confer concurrent jurisdiction on the territorial State where the satellite has been found or noticed." Additionally, he noted that "today, much of space research is military oriented. Whatever little is left for peaceful purposes is not given high priority. It is easier to ask for more funds for military purposes than for peaceful purposes. That is why developing countries spend a major part of their national budget for defense purposes and not for welfare of people."

*Dr. Reijnen* of The Netherlands discussed space law and the problems of developing countries. She stressed the importance of the



geostationary orbit and the right of equitable access for the developing countries.

The paper of *Dr. Safavi* was summarized by *Dr. Cocca*. This paper gave *Dr. Safavi's* views as to the Concept of the Human Condition and the Common Heritage of Mankind.

Finally, *Dr. R. Muller* of the GDR presented an extensive paper, written in cooperation with *Mr. W. Hampe* and *Mr. M. Muller* also of the GDR, on "The Legal Order for the Exploration and Use of Outer Space - Basic Principles, Scope of Application, Trends of Development". The extremely informative paper stressed *inter alia* the need for international cooperation. Mention was also made of the problems of debris. The treaties are considered to constitute a good basis to ensure an exploration and use of outer space for peaceful purposes.

In the following discussion, *Prof. W. B. Wirin* of the USA asked *Prof. Hingorani* of India for an explanation of the term 'jurisdiction'. Although *Prof. Wirin* equated jurisdiction to 'ownership', he asked if *Prof. Hingorani* suggested that a satellite, which falls in another country should be owned by that country.

*Dr. Bittlinger* of the FRG made the observation that Art. VIII of the Outer Space Treaty refers only to jurisdiction and control over space objects being in outer space, not to those on earth. He further noted that Art. II of the Rescue Agreement gives jurisdiction and control to the Contracting Party, in whose territory the spacecraft has landed by accident. Finally, *Prof. Gorove* of the USA stated that the state of registry retains jurisdiction according to Art. VIII of the Outer Space Treaty, and not the launching state.

*Prof. Hingorani* replied that according to Art. VIII, last sentence, of the Outer Space Treaty, space objects which are launched by accident must be returned immediately. This practice is, according to *Prof. Hingorani* more strict than in air law. He would prefer it if the concerned state, in which the object landed, would have the right to retain the space object as a pledge until the obligations under the Liability Convention are fulfilled.

*Dr. J.F. Galloway* of the USA asked *Dr. He Qizhi* if the conflict between the developed countries and the developing countries over slots on the GSO and frequency space allotments is not moderated by the fact that both groups of states belong to the same functional organizations, e.g. INTELSAT and INMARSAT. *Dr. He Qizhi* answered, that in the context of Arts. XI and XIII of the Outer Space Treaty the attitude and practices regarding allocation of the position for the GSO had changed since the early 70s, but until now there has been no fundamental change, i.e. no guarantees for developing countries. He emphasized the need for the dual step-by-step approach of COPUOS and ITU to reach a special regime for the GSO.

Due to the small number of attending participants, sessions three and four dealing with "National Space Law and Bilateral and Regional

Agreements" and "General issues of Space Law" were combined in one long session, under the able chairmanship of *Dr. Doyle* of the USA assisted by *Dr. Bittlinger*.

The papers of *Dr. G. Catalano Sgrosso* of Italy, and *Dr. Huang Jiefang* of Canada were summarized. These papers were entitled "Establishment of the Italian Space Agency" and "The Roles of Bilateral Agreements in Space Law," respectively. The chairman then gave a solid introduction on the General Issues of Space Law. *Dr. Doyle* gave a survey on the benefits and activities in space and concluded that "a world of economically stable, well-fed and healthy nations is likely to be a world at peace. Space programs pursued in peace can contribute significantly to and strengthen a world of stability, a world of intellectual growth, with harmony among nations." A variety of subjects were then presented.

*Prof. Bockstiegel* of the FRG spoke about the "Environmental Aspects of Activities in Outer Space," a topic with which he is very familiar. *Dr. Clayton* of the USA spoke on "International Cooperative Missions to Mars." The President of the IISL discussed "Space Stations and their Legal Implications," while *Prof. Gorove* gave a view on the future, with his presentation on the Aerospace Plane. *Prof. Jonathan Galloway* presented an interesting contribution on the Ozone Layer, posing the question as to whether the ozone layer is in outer space. He observed that "the crucial question is not where the boundary is dividing air space from outer space or whether there is an exact boundary or not. The question is how to remove these harmful pollutants, which hang as a threatening pall, from the legacy this generation leaves to future generations on earth -- and other species!"

*Dr. Kopal* treated "Some Issues of the Next Progressive Development of International Space Law," concluding that "the present international law of outer space has been the result of the efforts of many nations and different groups thereof. Each of them has contributed by its ideas and legal concepts. By applying the language of article I of the 1967 Outer Space Treaty, it is possible to affirm that not only the exploration and use of outer space, including the Moon and other celestial bodies, but also the progressive development of space law has been the province of all mankind".

The Space Station's Intergovernmental Agreements and Intellectual Property Rights were commented on by *Dr. Oosterlinck* (Belgium) whose contribution was of great value because of his association with ESA.

*Dr. B., Schmidt-Tedd* of the FRG talked about the "Best Efforts Principle and Terms of Contract in Space Business." He concluded that "the present commercial space business surely can be based on Best Efforts Contracts." His remarks may be useful for future contracts.

*Dr. Wirin*, analyzed "Reagan's Final Space Policy," and pointed out that "President Reagan's final space policy is not just old stew in a new broth. The policy statement brings together various space policies that were in separate documents and makes significant additions."

In his paper "Legal Considerations for a Lunar Base: Does the Common Heritage of Mankind Apply?" *Mr. Michael Potter* (USA), observed that "Although the establishment of a lunar base will rekindle the CHM debate, it also offers opportunities for international cooperation for peaceful purposes".

Finally, *Mr. Sankar Bandyopadhyay* made some comments about space law.

Because of the length of the session and because of an IISL General Assembly meeting, no discussion followed. However, some comments were made.

Regarding the presentation of *Prof. Gorove*, *Dr. Horst Bittlinger* made the following observation: "*Prof. Gorove* pointed out that it was uncertain whether 'passengers' are members of the 'personnel' in the sense of international space law. To his mind, 'passengers' are indeed members of the 'personnel' of space objects in the sense of international space law. This can be deduced from the negotiating history of Art. VIII of the Outer Space Treaty in which a distinction between 'personnel' and 'passengers' was never pronounced. There would also be a significant gap in the jurisdiction and control over passengers if passengers would not be addressed as members of the personnel in Art. VIII of the Outer Space Treaty. Furthermore, the national laws of the United States proceed from the qualification of 'passengers' as personnel members by including every person on board their space vehicles to be subject to their criminal jurisdiction and to the space shuttle commander's authority." Concurring with *Dr. Bittlinger*, *Professor Gorove* noted that he was referring to the texts of the space treaties. The latter do not define the term "personnel" which in common usage refers to people who are "employed" in some capacity.

Another observation was made by *Prof. Wirin* who noted that "the presentations on the common heritage of mankind have not considered the natural rights which permanent colonists on the moon, Mars, etc., will assert, and that when colonies are not dependent on nations on the Earth, they must of course 'own' their celestial body and not share with nations on Earth."

The President closed the session saying that, in spite of the limited number of participants, the Colloquium had been a success. The high quality of the papers and those presenting them was obvious. Moreover, there was more time for the presentation of papers, more time for discussion and more possibilities for contacts between the participants, which was pleasant and fruitful.

*I. H. Ph. Diederiks-Verschoor*

President, International Institute of Space Law

*Note/Comment**The Central Role of Eugène Pépin in the Teaching and Research of Space Law : a Note in Memoriam*

It is not an easy task to collect, summarize and classify *Professor Pépin's* diverse academic activities which were performed not only in his homeland but all over the world. Each time I have intended to, I was gratified by the fact that in every book, chronicle, lecture, address, paper or letter, he always referenced the persons, academies, universities or countries in which he attests to have had a precursor or pioneer role.

I must limit my work here to his protagonic presence in the promotion and spread of the teaching, study and research of space law around the world. He has left indelible traces and continued his contributions into the first year of the second century of his distinguished life, scientifically outstanding and spiritually so rich. *Professor Pépin* carried out important academic activities during his many trips to Argentina. These pages reflect the gratitude of my country for his continuous cooperation and guidance in many scientific endeavors.

He gave the stimulus to study, research, teach and spread space law. He provided bibliographies and documentation in times when it was very difficult to obtain. His multiple scholarly activities in the most diverse places allow us to say that his chair traveled with him. The organization and chairmanship of the international colloquia on the teaching of space law, his permanent attachment to useful and valuable innovative ideas and his devotion to the progress of legal science have shown that he continued to be vigorous in his mind.

I. Stimulus for Research: Bibliography and Documentation

*Professor Pépin* played a central role in furthering the teaching of and research in space law. In 1965, by request of the United Nations, he undertook the first world-wide inventory of the teaching of space law and the institutions providing for the study of the legal problems of outer space.<sup>1</sup> In a paper presented in 1966, which were the preliminary results of that survey,<sup>2</sup> *Dr. Pépin* noted that in some universities where there were no specialized courses in space law, it had been possible to organize several lectures by experts in the field. He also enumerated what various professors interested in this new area of law felt were the main obstacles to its development: the traditional conservative spirit found in numerous faculties; the enormous increase in legal subjects to be taught and a

1. E. Pépin, *Perspectives de l'enseignement et de l'étude du droit spatial dans le monde*, PROC. 8TH COLLOQ. L. OUTER SPACE 279 (1966).

2. E. Pépin, *Preliminary Results of an Inquiry Made by the IISL on the Teaching and Study of Space Law in the World*, PROC. 9TH COLLOQ. L. OUTER SPACE 219.

scarcity of available teaching materials, especially official documents. With regard to the latter, *Dr. Pépin* remarked that the IISL had promised to give all possible assistance. The publication of the *Worldwide Space Law Bibliography*<sup>3</sup> was the first effort in this direction.

The Board of Directors of the International Institute of Space Law decided, on 6 March 1965, to prepare a periodical publication of the Institute, a *Worldwide Bibliography* of books, which would include articles and documents of space law and related matters published during the preceeding year. The work was done personally and with particular dedication by *Professor Pépin*. This publication would not have been possible without the important and generous gift made by *Mr. Andrew G. Haley*, General Counsel of the International Astronautical Federation. This gift was to cover the expenses of typing, printing and distributing the document.<sup>4</sup>

The bibliographical references began with information pertaining to only 27 countries.<sup>5</sup> I continue to cooperate in its elaboration.

To be able to evaluate the importance of this task, let me refer to the careful record made by *Professor Pépin* of the activities performed in the field of space law in Argentina, since the first volume of the *Worldwide Bibliography of Space Law/Bibliographie Mondiale du Droit Spatial*.

It should be pointed out that *Professor Pépin* had full knowledge of Argentine academic activity. He maintained contact with Argentine intellectuals over the last fifty years through his scientific and cultural, official and personal missions and through the Quai d'Orsay, the Education Ministry of France, and international organizations. These contacts were strengthened with technological development, and became a relation which generated an abundance of correspondence, particularly with Argentine professors of law and jurists specializing in air law, nuclear law, international law, as well as space law.

The bibliographical references made to the Argentine contribution to space law included 424 books, articles and documents between 1964-1972: 11 in 1964; 29 in 1965; 42 in 1966; 50 in 1967; 44 in 1968; 89 in 1969; 74 in 1970; 48 in 1971 and 37 in 1972. The entire *Worldwide Bibliography of Space Law* series refers to 5,392 books, articles and documents in 374 pages. Argentina's contribution to this world bibliography amounts to almost 8 percent of the total.

3. INTERNATIONAL INSTITUTE OF SPACE LAW, *WORLDWIDE BIBLIOGRAPHY FOR THE YEAR OF SPACE LAW RELATED MATTERS (PARIS 1964-73)*.

4. E. Pépin, "Forewords", *WORLDWIDE BIBLIOGRAPHY FOR THE YEAR 1964* at iv (Paris, 1965).

5. Argentina, Austria, Belguim, Brazil, Bulgaria, Canada, Chile, West Germany, Greece, Hungary, India, Italy, Japan, Netherlands, Norway, Poland, Rumania, Spain, Switzerland, Czechoslovakia, Turkey, United Kingdom, United States, Uruguay, USSR, Venezuela, Yugoslavia.

II. The Teaching of Space Law: The personal contribution.

To recall *Professor Pépin's* personal contribution in the field of space law, we must start with the dissertation given before the *Académies des Sciences Morales et Politiques* of France in September 1956, prior to the operation of Earth's first artificial satellite. In 1957, a few days after the launching of the *Sputnik I*, he called the attention of members of the Canadian Bar Association to various categories of damages which might derive from orbiting space vehicles.

Taking into consideration the possibilities of space activities, *Professor Pépin* stated that gaps in law would have to be filled by scientific research under way and that expansion of air traffic beyond the atmosphere should not be hampered. "There appears to be general agreement on a need for a new international convention supplementing the Chicago document...."<sup>6</sup> "The Geophysical Year is certain to provide data which will permit further progress in the legal study of these problems... It is to be hoped that jurists will not let themselves be outdistanced by technicians."<sup>7</sup>

*Professor Pépin* was convinced that a new treaty, rather than an amendment to the Chicago Convention, was essential and urgent since, if universally accepted, it "would benefit, not only the immediate future of scientific research in space, but also the security of the present circulation within the atmosphere and of the people on the surface; it would also prepare the future of the circulation of man in space."<sup>8</sup>

In 1957, a post-graduate course was prepared for Buenos Aires University after the successful launching of *Sputnik*. While this University was analyzing the initiative, the National Broadcasting Network decided to give the course to the general audience. *Professor Pépin* remembered the fact in this manner. "Le Prof. Cocca avait fait en décembre 1957 à la radio-diffusion argentine une série de 8 conférences

6. Convention on International Civil Aviation (Chicago Convention, 1944), ICAO Doc. 7300/6; 15 UNTS 6605 (entered into force 4 April 1947). 157 States were parties to the Convention by 1987.

7. E. Pépin, *The Legal Status of the Airspace in the Light of the Progress in Aviation and Astronautics*, 3 MCGILL L.J. 70 (1956).

8. E. Pépin, *Legal Problems Created by the Sputnik*, 4 MCGILL L.J. 66 (1957).

sur 'el derecho interplanetario', ce fut la première manifestation de ce genre." <sup>9</sup>

McGill University's Institute of International Air Law was the birthplace of his first course (June 1958) and was the first such course in the world granted a Chair.

It is opportune to point out that, during the Sixth Colloquium of the IISL (Paris, 1963) under the presidency of *René Cassin*, the idea of the creation of a Chair on Space Law Paris-Buenos Aires was born. In the last plenary meeting of the Colloquium, two young lawyers, *Marina Christine Coidan* and *Ives Lepissier*, stated that they regretted the fact that Space Law was not sufficiently well-known in the French universities and asked the IISL to promote its teaching based on the Argentine experience.<sup>10</sup>

From 1961 to 1982 *Eugène Pépin* was professor at the International Institute of Contemporary Relations in Paris, where he taught space law, air law, nuclear law, maritime law and telecommunications law until age 95.

*Professor Pépin* helped Argentina to organize a teaching mission in October 1968. He was also a featured speaker on this teaching circuit, which extended through North and South America. The mission was a great success from the didactic, academic and human points of view.

He also had the experience of teaching around the world, because his country thought of him not only as a professor but also as an outstanding expert. Many governments called upon him for elaboration of codes and domestic regulations on air law and related matters.

Never did he desert his teaching activities. In all his letters he gave generously new knowledge, new hope and optimism. It is a pity that he regularly wrote by hand a large number and kept no copies of his letters. The letters that do exist have not yet been moved from Le Cannet

9. E. Pépin, "Enquête sur l'enseignement et l'étude du droit de l'espace dans le monde," PROC. 12TH COLLOQUIUM ON THE LAW OF OUTER SPACE, 326. Mention of this course was made in 1972 in occasion of the UNESCO-CNIE Seminar of Buenos Aires, where Professor Pépin stated: "Me ha parecido muy importante que este seminario se reúna en un país que ha dado muchas pruebas de su interés en el derecho cósmico, evidenciado hace veinticinco años por el profesor Cocca, a quien corresponde igualmente haber sido el primero en emplear la radiodifusión para la enseñanza universitaria del derecho espacial desde aquellas conocidas clases de 1957, publicadas luego por la Universidad Nacional del Litoral, como primer curso orgánico para estudiantes y también para el público interesado en estos problemas. (E. Pépin, *Discurso*, en LA ENSEÑANZA DEL DERECHO INTERNACIONAL APLICADO AL ESPACIO ULTRATERRESTRE Y LAS COMUNICACIONES ESPACIALES, UNESCO-CNIE, Buenos Aires, 1972, p. 19). Also in the same book see p. 257, note 7. The mentioned University of Litoral, Argentina, edited the course under the title "Reflexiones sobre Derecho Interplanetario", in 7 REVISTA DE DERECHO INTERNACIONAL Y CIENCIAS DIPLOMATICAS, 163-211 (January-June 1958, No. 13).

10. J. Bellveser, *Clarín*, 4 October 1963, Buenos Aires.

to the Library of the City of Tours, the beneficiary of the donation of his books and archives.

International Symposia on Space Law Teaching

*Professor Pépin* organized three international symposia on the teaching of space law. The first one was held at Buenos Aires University on 13 October 1969, under the auspices of this University and the University of Salvador (Buenos Aires). Also participating were the National Commission on Space Research through its Committee on Legal, Social and Political Sciences and 18 other scholars and experts. *Professor Pépin* acted as President of the IISL and Chairman of the Colloquium and asked the 50 jurist participants to inform the conference as to experiences as teachers in this area. He called me to the floor in recognition of my accomplishments: I had started teaching space law as a Visiting Professor at San Marcos University in Lima, Peru, in 1959 and became the full professor of the first chair on Air and Space Law. I had also been included in the curriculum of the Faculty of Legal Sciences at Salvador University of Buenos Aires since 1960, and I have been Professor of Space Law at the National Institute of Air and Space Law since 1962.

This author remembers that *Professor Pépin* in his report, remarked upon the presence of an itinerant professor in Argentina, who was able to update, at the same level and time, all Argentine Universities and Institutes devoted to space law. The courses were supported by the Legal Sciences Committee of the National Commission of Space Research. The participants concluded that this experience would be very useful and should be adopted by other countries.

This symposium was able to obtain consensus on certain recommendations, i.e. to take the necessary measures to develop the knowledge of the legal problems of space, including the study of space law, and to coordinate the action of the IISL with that of international and regional organizations which pursued the same objectives.

It was also requested of the IISL to study (1) the means by which professors' access to necessary information could be improved; (2) where the publication of informative notes could be made available; and (3) most of all, preparation of teaching standard programmes in order to obtain a teaching manual.

In accordance with this recommendation and one other adopted by the Hispano-Luso-American Institute of International Law - the same year, three professors (Cocca of Argentina, Franchini Neto of Brazil and Murillo of Spain) were entrusted with the elaboration of a programme for the universities of the Hispano-Luso-American and Philippine community. The programmes were adopted in 1970 in Lima. The inaugural congress of the Argentine Association of International Law approved a programme of Space Law for all the Argentine universities in 1971.



It is important to remember that in accordance with the United Nations Document A/AC. 105/20/Add. 1 (July 1964), concerning the existing means for the teaching and technical training in connection with the peaceful use of outer space, Argentina was the only country that had acted and implemented "organized teaching of Space Law in its universities."

The Second Symposium on the Teaching of Space Law was held in Brussels on 27 September 1971 with the participation of twelve professors and experts. A resolution was adopted taking into account the remarkable development in the doctrinal elaboration and in the internal and positive law. It called to the attention of all competent educational authorities the need to establish in universities, institutes and schools of all countries, special space law courses with similar programmes.

The Third Colloquium on the Teaching of Space Law, took place in Baku, USSR, on 11 October 1973, where a General Report was submitted by *Professor Pépin*. In the Annex to his Report, it was verified that at that time there were space law books in German, English, Spanish, French, Greek, Hungarian, Italian, Japanese, Polish, Russian and Turkish. The Annex also mentioned the following programmes: University of McGill (1967-1968); Argentine universities' programme approved by professors of International Law (1971); the programme adopted by the Hispano-Luso-American Philippine Congress of International Law (1970); and a basic course programme on space sociology given at the Politechnical University of Barcelona, School of Industrial Engineering (1971-1972).

There have been no more meetings on the subject but the torch was taken by *Stephen Gorove*, professor at the University of Mississippi and Vice-President of the IISL, who edited the book "*The Teaching of Space Law Around the World*" in 1986. The book is divided into four parts which follow the introduction of the editor:

- A. Western Hemisphere: United States (*Gorove, Christol, Wirin*), Canada (*Haanappel and Matte*) and Argentina (*Cocca*);
- B. Western Europe: Federal Republic of Germany (*Boeckstiegel*), Holland (*Diederiks-Verschoor*);
- C. Eastern Europe: Czechoslovakia (*Kopal*), Hungary (*Gal*), Poland (*Gorbiel*), Soviet union (*Vereshchetin-Zhukov*).
- D. Far East: China (*He*).<sup>11</sup>

### III. Innovating Ideas

As it was rightly said by *Professor Matte*, *Professor Pépin* "gifted with a wealth of scientific experience, has always striven to share his knowledge and to expand his own and others' horizons...while encouraging

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11. THE TEACHING OF SPACE LAW AROUND THE WORLD (S. Gorove ed. 1986) (University of Mississippi Law Center).

jurists to discover new avenues, he particularly urged to seek global solutions capable of ensuring a better future for mankind."<sup>12</sup>

*Professor Pépin* was invited by alumni of the McGill University Institute of Air and Space Law to speak on a topic of vital importance to world peace and human survival: the denuclearization and demilitarization of outer space. His contribution was published in the Lecture-Seminars given at the Centre for Research in Air and Space Law, McGill University and was expounded at the Institute's graduation dinner. On this occasion, after summarizing the consequences of a nuclear explosion involving 5,000 megatons, which represents less than a half of the world's nuclear arsenal, *Professor Pépin* reviewed the measures already taken to prevent or, at least limit the nuclearization of outer space. He concluded noting that the latest proposal had the objective of complete denuclearization of Europe by the beginning of the 21st Century.<sup>13</sup>

To talk about peace in legal (non-political) terms is, today, a different and innovating idea. The establishment of a regime which would provide for the security and welfare of man and the future of mankind is the task of far-seeing jurists. To keep the human condition safe against attacks of violence, exercised in all imaginable directions, is also an undertaking beyond common thought, and thus, innovating also.

*Dr. Pépin* initiated the first of his many contributions to the academic activities in Argentina when, as President of the IISL, he chaired the Institute's first Round Table in Buenos Aires, on 21-23 July 1964. The subjects of this session were the legal problems of telecommunications by satellite. This meeting was prior to the 51st Conference of the International Law Association (Tokyo, 16-22 August 1964) and before the VIIth Colloquium on the Law of Outer Space (Warsaw, 7-12 September 1964).<sup>14</sup> In this Round Table entitled "Legal Regime of Communications by Satellite," useful conclusions for the coming work were reached:

-UN General Assembly Resolution 1962, of 13 December 1963, with the aid of the terms "jurisdiction," "control" and "ownership" has overcome the obstacle that the term "nationality" could imply.

-All communications by satellite are international and intended to become global.

- When direct transmission to the public is obtained - and this shall be made possible by the use of satellites - very serious problems will arise, especially of a political nature, with regard to propaganda.

12. N. Mateesco Matte, *Eugene Pépin Century*, XII ANNALS AIR & SPACE L. 1 (1987).

13. E. Pépin, *Denuclearization or Demilitarization of Outer Space*, 2 ARMS CONTROL AND DISARMAMENT 201-21 (N. Mateesco Matte ed., Centre for Research of Air and Space Law, McGill University, 1986).

14. See *Worldwide Bibliography*, *supra* note 3, at 3.

- Any international organization - like the one appointed for communications satellites - though it may be of a provisional nature, must be integrated with the participation of all States in the most convenient way to their interest and rights, with no exclusion of any kind based upon technological advancement or economical capacity, so that in this way the principle of equality remains untouched by this recent achievement of man.

- In the use of the communications satellite global network, the idea of monopoly by any State or by any organization of State may be discarded.

- Global communications via satellite must be established as an international public service.<sup>15</sup>

A Seminar on the "Teaching of International law as Applied to Outer Space and Space Communications" was held in Buenos Aires on 7-11 August 1972, sponsored by UNESCO. This meeting was chaired by Professor Pépin, President of IISL.

In connection with the subject "Advisable Ways and Means of Enlarging International Law Programmes in the Face of the Exploration and Use of Outer Space and the Utilization of Space Communications," the Seminar agreed to a recommendation favoring the inclusion, within the International Law syllabus and other related subjects, of complete courses on the legal problems arising from activities in outer space and space communications, for universities to consider teaching it as a specialized subject, in parallel courses or a postgraduate course.

Surely, the most important innovation was obtained as a result of the examination of the item "Legal Solution to the Regional, Continental, Intercontinental and Global Co-operation for Peaceful Uses of Outer Space and Space Communications." The Seminar declared:

1. International co-operation, since the Space Treaty, is a legal obligation which conditions the legality of the activities carried out in outer space and celestial bodies, including space communications.

2. This criterion is to be taken as a guide when preparing regulations for the ways and means of subregional, regional, continental, intercontinental and global co-operation.

When the topic "International Law in the Technological Evolution, the Necessity of Development and Ethic Requirement of Modern Civilization" was considered, the Seminar adopted the following recommendation:

-To proceed, without delay, with a deep study of the causes which may lead to a foreseeable disequilibrium between the new problems and the answers given to the present, as a means of escaping to the alternative

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15. National Commission on Space Research - Legal Political and Social Sciences Committee, Legal Series, CNIE-CCIPS-SJ 1, *Regimen Juridico de las Comunicaciones por Satelite* 32-33 (Buenos Aires, 1964).

solutions given by technique, when they do not have sufficient ethical contents.

The subject "Need of Specialists and the Role of International Law in their Technical Training for the Exploration and Use of the Outer Space with Peaceful Purposes" was conducted with the following declaration made by the participants in the Seminar:

1. That the generalized teaching of International Law principles is an indispensable complement to all technical training in order to achieve adequate preparation in the field of the exploration and use of outer space for peaceful uses.

2. To this end, courses on basic principles of International Law as applied to space activity and space communications are to be included within the syllabi of technical schools.

The Contribution of Broadcasting Entities and Associations to the National and International Regulation was debated as a fourth topic by the Seminar. The meeting reached the following declaration by consensus, which was expressed this way:

1. Its satisfaction for the studies undertaken by broadcasters in the sense of regulating their conduct, both at national and international level, and offering guidelines for the normative labour which shall succeed the mentioned ethical codes.

2. To encourage this movement, recognizing that it is a significant complement, insofar as the international liability of States is concerned, to the freedom of information and other activities carried out in outer space.<sup>16</sup>

*Professor Pépin* worked hard in Buenos Aires during the five days of the UNESCO-CNIE Seminar. Furthermore, all these declarations, recommendations and conclusions were drafted by the Rapporteur in close task with President Pépin.

In this Journal, I have had the opportunity of summarizing the innovations provided by space law which represent a significant advance of the international law:

Jus Humanitatis;

Res Communis Humanitatis;

Common Heritage of Mankind;

Representation of Mankind in Outer Space and Celestial Bodies;

Exploration and Use for the Benefit and Interest of All Peoples;

International Cooperation as a Requisite of the Lawfulness of Activities of Exploration and Use of Outer Space;

Freedom of Exploration and Use of Outer Space and Celestial Bodies and Banning of International Appropriation;

The Predetermined Legal Framework;

Neutralization and Non-Armament in Space and Celestial Bodies;

16. UNESCO-CNIE, *La Enseñanza del Derecho Internacional Aplicado al Espacio Ultraterrestre y a las Comunicaciones Espaciales* 53, 81, 129, 146, 199 (Buenos Aires, 1972).

International Responsibility and Full Compensation;  
Prevention of Contamination of Outer Space and the Earth.<sup>17</sup>

All these innovations were, in due time, supported and encouraged by *Eugène Pépin*, and many of them were developed and expanded by him.

#### IV. Progress of the Legal Science

*Professor Pépin* always had an encompassing vision of legal science, of which the maximum exponent is space law.

In 1962 he recommended that prior to any discussion on the general legal principles which should govern activities in space, a list of possible applicable principles should be prepared.<sup>18</sup> In 1967 at the 10th Colloquium of the IISL, he predicted that future colloquia would make increasingly important contributions to the progress of the space law, and the expansion of legal science.<sup>19</sup> In July 1964, *Dr. Pépin* delivered a lecture in Buenos Aires in which he considered how the future of space law could be planned.<sup>20</sup> In his opinion, it was necessary first to clarify and complete discussions and questions under consideration, even as to whether international organizations were bound by the rules of international law for liability and registration. Second, he felt that attention should be paid to establishing a universal system of satellite telecommunications since it was impossible, in his view, to think of a monopoly or of concessions given by a State for such a system. Issues included were: the legal status of such a global network as an international public service; the question of direct broadcasting by satellite; environmental questions raised by space activities, such as the prevention of contamination of celestial bodies by micro-organisms from Earth; the preservation of natural resources of celestial bodies; and the construction of a lunar station or permanent platforms in outer space. Third, he believed that consideration should be given to exploitation of the natural resources of the Moon for the benefit of all mankind, and to the possibility of the existence of intelligent beings in outer space. With

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17. A. A. Cocca, *The Advances in International Law Through the Law of Outer Space*, 9 J. SPACE L. 13, 13-20 (1972).

18. E. Pépin, *Remarks on the Working Method of the International Institute of Space Law*, PROC. 5TH COLLOQ. L. OUTER SPACE 4 (1963).

19. E. Pépin, *Dix ans de Colloque de droit spatial*, PROC. 10TH COLLOQ. L. OUTER SPACE 5, 7 (1987).

20. E. Pépin, *El Porvenir del Derecho Espacial*, 2 REVISTA CIENCIAS AEROSPAZIALES 7 (1966). See also Centre National de la Recherche Scientifique, *Comment, Concevoir l'organisation internationale mondiale future des telecommunications par satellite*, Les telecommunications par satellites 293 (Paris, Cujas 1968); see further E. Pépin, *A Legal Order for Outer Space: Next Steps*, in NEW FRONTIERS IN SPACE LAW 1 (E. McWhinney and M.A. Bradley eds. 1969).

regard to the latter, *Professor Pépin* proposed a code of conduct to be followed for making extraterrestrial contacts.

*Professor Pépin* made another important contribution to the future of legal science in a paper delivered in 1968. After summarizing the present status of positive space law, he proposed that the next issues which should be addressed in space law were those arising from the applications and interpretation of space law treaties and those resulting from the increased activities of States in space and from technical and scientific development in astronautics. In his presentation he also supported Jenk's notion that satellite telecommunications should be a world public service, since "the adoption of regulations for 'world or space public services' would be an important step in the development of space."<sup>21</sup> Early on, *Professor Pépin* also recognized the significance of "mankind" as a new subject of law, not only in the international law of outer space, but also as applied to the law of the sea.<sup>22</sup>

Sixteen years ago, *Eugène Pépin* summarized the present and future of legal science in connection with the international law, in the following manner: "Technique does not stop. Consequently, it is necessary to examine and re-examine the legal implications of scientific and technical progress. The effects of science and technology on international law appear in every human progress. The way and manner of elaboration of international law has been modified. The control of execution of treaties has already started. The subjective responsibility is replaced by the objective responsibility. The idea of an international compensation is born. In the last 25 years some spaces on the surface or around our planet have had bestowed upon themselves a particular legal status which preserves them from any State sovereignty. The approachment of peoples due to the new media strengthens the consciousness of their interdependence. The appeals for international cooperation are multiplied everywhere."<sup>23</sup>

*Professor Pépin's* body of legal work has always reflected an orientation towards the future and the prospects that the future held for legal science. "Concerns for the Future" is not the most accurate description of his production as jurist and *animateur* of law, but it did express his deep concern for the law and the human condition. The body of work reflecting this perspective began at the turn of the century.<sup>24</sup>

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21. E. Pépin, *A Legal Order for Outer Space*, *supra* note 20, at 235.

22. E. Pépin, *L'humanité et le droit des gens*, 8 ANNUAIRE DE DROIT MARITIME ET AÉRIEN 12 (1983).

23. E. Pépin, *Discurso* in LA ENSEÑANZA DEL DERECHO INTERNACIONAL APLICADO AL ESPACIO ULTRATERRESTRE Y LA COMUNICACIONES ESPACIALES, UNESCO-CNIE 19-20 (Buenos Aires, 1972).

24. A.A. Cocca, *Eugène Pépin: His Contributions to the Future of Legal Science* (1987).

He was instrumental in the development of the International Institute of Space Law. As legal historian, he chronicled precisely and accurately the events leading to the creation of this Institute.<sup>25</sup>

To continue in the analysis of *Professor Pépin's* permanent contribution to the development of legal science would require the study of the multiple and diverse means used for expression of his thought: books, lectures, addresses, articles, declarations, papers and letters spread all over the world. Thus, I shall limit myself to our last conversation during the visit paid to my old friend and *Madame Pépin* at their home in Le Cannet, Cannes, on 23 October 1987. All that day, he gave proof of the youth of his spirit and of the mind always open to academic improvements. We talked about the future of the Academy of International Studies in order to orient its task to assure that those scientists who love man and the human condition be not deceived by the improper use given to their creations. These misuses often result in imbalance and destruction of nature and annihilation of natural wealth, man included. He will be missed.

*Professor Dr. Aldo Armando Cocca*  
President, Council of Advanced International Studies  
Cordoba, Argentina

*The U.S./International Space Station Agreement of September 29, 1988:  
Some Legal Highlights*

The Governments of the United States of America, Japan, Canada, and Member States of the European Space Agency entered into an Agreement to establish a long-term international cooperative framework for the detailed design, development, operation, and utilization of a permanently manned civil Space Station for peaceful purposes. The Agreement provides for NASA and ESA, and the Ministry of State for Science and Technology in Canada ("MOSST") to be the cooperating agencies responsible for the Agreement's implementation. The Government of Japan's Cooperating Agency designation for implementing Space station cooperation is made in the Memorandum of Understanding ("MOU") between NASA and the Government of Japan. MOUs and implementing arrangements have and will be made concerning the detailed design, development, operation, and utilization of the Space Station. All will be subject to this Agreement.

The Agreement provides that each Partner shall register as space objects the flight elements which it provides and shall retain jurisdiction and control over the elements it registers and over persons in or on the Space Station who are its nationals. The United States, acting through

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25. E. PÉPIN, HISTORY OF THE INTERNATIONAL INSTITUTE OF SPACE LAW OF THE INTERNATIONAL ASTRONAUTICAL FEDERATION 1 (1982).

NASA, is made responsible for overall program coordination and direction of the Space Station, overall system engineering, and integration. NASA is also responsible for establishment of overall safety requirements and plans, overall planning for and direction of the day-to-day operation of the manned base and the U.S. polar platform, and management of its Space Station utilization activities. The Agreement provides that the other Partners be responsible for doing the same with respect to the elements they provide. The Agreement makes ESA responsible for design, development and planning and direction of the day-to-day operation of the polar platform it provides and of the Man-Tended Free Flyer ("MTFF"). Decision-making responsibilities will lie primarily with management bodies which shall plan and coordinate activities affecting the design and development of the Space Station. The goal is to have decision-making primarily by consensus, but where it is not possible, the MOUs provide an alternative.

Article 10 provides that the Partners acting through their Cooperating Agencies shall have responsibilities in the operation and functional performance of the elements they provide. Article 11 allows for each Partner to provide qualified personnel to serve on an "equitable basis" as Space Station crew members, with a Code of Conduct for the crew being developed by all the Partners and each Partner responsible for ensuring that its crew members observe the Code. Article 16 establishes a cross-waiver of liability by the Partner States and related entities (*e.g.*, a contractor or subcontractor of a Partner State, a user or customer of a Partner State, or a contractor or sub-contractor of a user or customer of a Partner State) with respect to any damage arising out of Protected Space Operations. The latter is defined to include launch vehicle activities, Space Station activities, and payload activities on Earth, in outer space, or in transit between Earth and outer space in implementation of the Agreement, the MOUs, and implementing arrangements (see Appendix, Art. 16 for the specifics of the definition). The Agreement makes it clear that the cross waiver of liability is to be liberally construed and that each Partner State shall ensure that all of its own related entities, as defined above, agree to waive all claims against any of the other Partner States or their related entities. Article 16 also specifies that the provision is intended to include a cross-waiver for liability arising from the Liability Convention where the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The Article specifies that the waiver does not apply to claims between a Partner State and its own related entity or between its own related entities. It is also inapplicable to claims made by a natural person for injury or death, claims for damage caused by willful misconduct, and intellectual property claims. Article 17 clarifies Article 16, by noting that if Article 16 does not preclude a claim, the Partner States and ESA shall remain liable in accordance with the Liability



Convention. Article 17 also requires consultation between the parties on liability, apportionment of liability and on the defense of a claim arising out of the Liability Convention, permitting the parties to conclude separate agreements regarding the apportionment of any potential joint and several liability arising out of the Liability Convention.

The Agreement provides for facilitating the movement of persons and goods necessary for its implementation by providing specifics with respect to immigration and elimination of customs duties. Articles 19 and 20 obligate each of the Partners to transfer promptly or to provide for the expeditious transit of technical data and goods, when appropriate, but gives such data and goods proprietary protection, when marked accordingly. Article 21 stipulates intellectual property rights for the inventions made in or on any Space Station flight element. Article 22 states that each of the Partners may exercise criminal jurisdiction over the flight elements they provide and over personnel in or on any flight element who is their national. In addition, it allows the United States to exercise criminal jurisdiction over misconduct committed by a non-U.S. national in or on a non-U.S. element of the manned base or attached to the manned base with endangers the safety of the manned base or the crew members thereon. Article 22, however, outlines the parameters with which the United States must comply before pursuing prosecution. Article 23 obligates the Partners to consult with each other on any matter arising out of Space Station cooperation, using their best efforts to settle such matters, either through bilateral consultation or multilateral consultation. Article 23 provides that if an issue is not resolved through consultations, the concerned partners shall agree on a method of dispute resolution.

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#### *The Commercial Space Launch Act Amendments of 1988: A Brief Overview*

In 1984 Congress passed the Commercial Space Launch Act, Public Law 98-575, which established the regulatory framework necessary to encourage the growth of private sector satellite launch services. Following the destruction of the space shuttle Challenger, the President announced that NASA would no longer provide launch services for commercial satellite customers, reserving Government resources solely for Government-sponsored research or military payloads. As a result, since 1986 the commercial expendable launch vehicle ("ELV") industry has no longer shared the risks of space launch ventures with the Federal Government, but rather has operated with an unbounded liability. This has damaged the ability of the U.S. domestic industry to compete world-wide and hindered the long-term viability of United States ELV's.

The newly passed Commercial Space Launch Act Amendments, P.L. 100-657, will resolve this situation. The new law requires providers of launch services to obtain the maximum insurance available at a reasonable cost, up to \$500 million, for the payment of claims resulting from injuries to third parties. In addition, the provider would also be required to purchase \$100 million of insurance, if at a reasonable cost, to cover possible damage to Government launch facilities should an unsuccessful launch occur. In the event that third party damages would be incurred above the amount covered by insurance, a specially expedited appropriations process would bring the payment of claims up to 1.5 billion dollars by the Federal Government under direct review by Congress and the Administration. The launching corporation would be responsible for any claims above and beyond that amount. Although these provisions providing for Government support will expire in five years, it is expected that Congress will approve some form of Government support for the following five years, if this new legislation proves successful.

Both the Soviet Proton and Chinese Long March launches are fully insured by their Governments. The French Government and the European Space Agency indemnify Arianespace for third party losses in excess of \$70 million losses. The new law will make it easier for the U.S. commercial ELV industry to compete successfully with other nation's launch programs.

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#### *Short Accounts*

##### *The Latin American Conference on International Air Transport and Outer Space Activities, Mexico City, 14-18 August 1988*

This conference was organized by the Universidad Nacional Autonoma de Mexico and the International Institute of Air and Space Law at Leiden University (The Netherlands). Speakers originated from Latin and North America, as well as from Europe, in particular The Netherlands. Participants were representatives of Latin American governments, universities, airlines, insurance companies, airports and law firms. The purpose was to set up a high level dialogue inspiring these participants on the basis of challenging speeches and interventions by foremost experts in public, private and penal air law, as well as space law. Special attention was paid to the "*lex ferenda*" and the need for closer world-wide, next to regional and plurilateral, cooperation in the field of international air transport and activities related to outer space. The subjects were viewed from a legal, political, economic and financial angle.

The troublesome situation within the Latin American air transport market was explained among others, by *Dr. Gontran Elcizalde Pettit* (Venezuela) and *Dr. Ernesto Vasquez Rocha* (Colombia). The former stated that a change of attitude of the governments towards their airlines was needed. In order to be more competitive, airlines should, to a certain extent, be privatized; *Dr. Elcizalde Pettit* pointed out the danger that Latin American airlines were thus susceptible of being taken over by the big international airlines. *Dr. Vasquez Rocha* stressed the need for regional cooperation in Latin America in order to overcome the internal and external threats. A comprehensive overview of the Chicago Convention and the bilateral network was given by *Professor Francoz Rigalt* (Mexico), who valued the strength of this system.

Financial aspects were dealt with by *Professor Peter Haanappel* (Canada) in his rather technical speech on tariff-setting and airline revenues. *Professor Haanappel* indicated worldwide developments with respect to currency fluctuations and airline ticket taxes and expressed the hope that these developments would have a positive impact upon the LACAC countries. *Brigadier Pinto da Fonseca*, Director General of Civil Aviation in Brazil, gave a very interesting overview of aircraft financing techniques, illustrated by many examples taken from his own country.

The need for a reform of the Warsaw System was put forward by *Professor Bin Cheng* (United Kingdom). In a passionate presentation *Professor Cheng* pleaded for an unlimited and absolute liability system. The programme also included airline insurance aspects, which were treated by *Dr. Medina Urbizu* (Mexico).

Criminal law and security aspects were presented by *Dr. Bauza Araujo* (Uruguay), *Professor Videla Escalada* (Argentina) and *Dr. Roderick van Dam* (The Netherlands). These speakers discussed the legal instruments (The Conventions of Tokyo, The Hague and Montreal), Article 3 of the Chicago Convention, as well as a proposed Protocol to the Montreal Convention, aimed at the suppression of unlawful acts of violence at international airports. *Dr. Michael Milde* (ICAO) delivered a highly interesting talk on the role of his organization in the suppression of drug abuse and illicit trafficking.

The Western views on the regulation of international air transport were given by *Judge Gilbert Guillaume* (International Court of Justice), *Professor Michael Levine* (Yale University) and *Dr. Henri Wassenbergh* (International Institute of Air and Space Law). *Judge Guillaume* (Int. Court of Justice) pictured in a very lucid way the liberalization of European air transport, whereas *Professor Levine* examined the results of the United States deregulation. A future framework for the global regulation of international air transport was designed by *Dr. Henri Wassenbergh*, who provoked and stimulated creative thinking in this field. It was felt that these Western views were quite optimistic, in contrast to those presented by the Latin American speakers (i.e. *Dr. Vasquez Rocha, supra*), who adopted a more protectionist attitude.

The space law sessions covered three subjects addressing general space law, remote sensing, and international telecommunications both from a Latin American and a Western point of view. During the first session that dealt with space law generally, *Dr. Aldo Armando Cocca* (Argentina) spoke extensively of Latin America's role in outer space law. He indicated that both in doctrine and teaching as well as in the codification of space law, Latin America has played and continues to play a very substantive role. *Dr. Peter van Fenema* (International Institute of Air and Space Law) exposed his views on the future of space law. He submitted that countries who admit private commercial space enterprises should create national legislation in order to take care of their obligations under international space law. He was of the opinion that the future international regulation of space activities of private enterprises will be embodied in bilateral agreements between the concerned countries rather than in multilaterally agreed instruments. Thus, the contents of space law will to a great extent be determined by the space industry, organized in multinational associations.

Next, *Dr. Kopal* (United Nations) gave an interesting overview of the developments in the United Nations. He divided the work of the UNCOPUOS into three periods: 1963 through the 1970's, the 1980's, and the future. He argued that the present international law of outer space has been the result of the efforts of many different nations, and that the Latin American countries have also played an active role in this process. The 1967 Outer Space Treaty and other instruments of the first period and, perhaps even more so, the principles adopted or drafted during the present period, bear visible traces of the ideas and initiatives developed by these countries. He submitted that the endeavors and activities of the Latin American lawyers deserve full attention from the international community of space lawyers.

The second subject of space law was remote sensing. *Professor Stephen Gorove* (USA) gave a very useful survey of the role of the United Nations in the elaboration of the 1986 United Nations Principles on Remote Sensing, indicating their scope of applicability and definitional setting, distinguishing new principles from already existing ones, and mentioning the issues which had not been resolved and which may become impediments to the incorporation of the principles into an international treaty. His conclusion was nevertheless optimistic; he was hopeful that the delicate balancing of the interests of both advanced and less developed nations, coupled with mankind's interest in environmental protection, would serve to reduce possible future frictions that could arise from provisions susceptible to divergent interpretations. *Dr. Eduardo Gaggero* (Uruguay) elaborated on Latin America's contribution to these principles, and stated that Latin America's concerns had been ensured in a satisfactory way. These concerns had been identified in 1983 and included the recognition of the sovereign and permanent rights of all States over their natural resources, the priority access of the sensed State

to data concerning its territory and the establishment of an international responsibility regime. He regarded the adopted principles which support cooperation and sharing of abilities in space activities, as a valuable and adequate framework for the aspirations of Latin American States.

The third and final session dealt with the important issue of international telecommunications. *Professor Manuel Ferrer* (Argentina) talked about the legal status of the geostationary satellite orbit, indicating Latin America's views on that matter. He noted the enormous usefulness of this "natural resource" for telecommunications and the fear of the developing nations that it will become overcrowded before they will have the economic possibility of exploring it. *Professor Carl Q. Christol* (USA) gave a valuable overview of the matters to be dealt with by the second session of the "World Administrative Radio Conference on the Use of the Geostationary Satellite Orbit and the Planning of Space Services Using It" (WARC-ORB '88). He outlined the 'dual planning procedure' which had been proposed by the 1985 session. This procedure included an Allotment Plan and an Improved Procedures planning, the first being capable of satisfying the developing countries' needs for guaranteed access, and the second, introducing the possibility of convening Multilateral Planning Meetings (MPM's), which are essential in the view of the developed countries. *Dr. Christol* concluded that it will be necessary, if new regulations are to be meaningful, for the competitors to consider their long-term interests in achieving basic accommodations. In his view, this will be no small accomplishment, since there are security, political, social, economic and legal problems to be resolved within the technical framework imposed by the physical nature of the orbit/spectrum resource.

All in all, the Conference proved to be a very useful forum for the exchange of views between Latin America and the Western continent, as well as for the improvement of transatlantic cooperation, which are both essential in order to reach the universal objective of successful exploitation of international air transport and outer space activities.

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*Space Law Session at the Warsaw Conference of the International Law Association (ILA), August 22, 1988*

The ILA's Space Law Committee met on August 21, 1988 during the Association's Warsaw Conference with the participation of a number of Committee members as well as other association members. Two substantive presentations were made: one by the Committee Chairman, *Professor D. Goedhuis* (The Netherlands) and the other one by the Committee's rapporteur, *Professor K. H. Böckstiegel* (FRG).

*Professor Goedhuis* started by making a few general observations on the current military situation in outer space. As a follow-up, he referred to the Report of the Space Law Committee and summarized briefly some of the views advanced by committee members in response to three questions raised. With respect to the first question which related to the ABM Treaty, he noted that different approaches aimed at a clarification of, and possible amendments to, some of the ambiguous provisions of the Treaty have been suggested. From the opinions expressed, the Chairman concluded that on certain controversial issues negotiations between the two parties might lead to a consensus. He submitted that the Conference, in an appropriate Resolution, might stress the importance of an early agreement on the period required for withdrawal from the Treaty.

As to the second question, which related to the use and testing of ASAT weapons, he suggested that a Resolution "might stress the need of negotiations, both on a bilateral and multilateral level, aimed at reaching an agreement on an extended ban on the testing of these weapons."

The third issue to which consideration has been given in the Report, concerned the permissibility or nonpermissibility of military uses of, or on, space stations. While the Chairman stressed that in his view both the Outer Space Treaty and Moon Agreement prohibited the testing of any kind of weapon on space stations and that the testing of defensive weapons on the stations would violate the two treaties, he suggested that the Conference in a Resolution might "stress the importance of not delaying studies both on a bilateral and multilateral basis of the ways on which some form of control of these uses might possibly be agreed upon."

Following the Chairman's remarks *Professor Böckstiegel* summarized the Report of *Professor Maureen Williams* (Argentina), a member of the ILA Space Law Committee, in which she dealt with the International Colloquium on the Environmental Aspects of Activities in Outer Space, held in Cologne May 16-19, 1988, to commemorate the 600th anniversary of the University of Cologne. The Colloquium was organized by the Institute of Air and Space Law of Cologne University in cooperation with the International Institute of Space Law and the ILA Space Law Committee.

The Report emphasized the increasing environmental concerns arising from space activities and stressed the need for international action.\* *Professor Böckstiegel* noted that the subject matter of the Report of Professor Williams was important to be considered in an appropriate Resolution by the Conference.\*\*

*Stephen Gorove*

Member, ILA Space Law Committee

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\* For a report on the Colloquium, see 16 J. SPACE L. 91-93 (1988).

\*\* For the final texts of the Resolutions, see REPORT OF THE SIXTY-THIRD CONFERENCE OF THE INTERNATIONAL LAW ASSOCIATION, WARSAW, AUGUST 20-26, 1988.

*The 5th Intercosmos Seminar, Berlin, September 26- October 1, 1988*

The Intercosmos seminars are organized every two years in the capitals of member-states of the Intercosmos program, to discuss various legal aspects of space utilization and exploration. The Berlin seminar was attended by lawyers from Bulgaria, Czechoslovakia, the German Democratic Republic, Hungary, Poland, and the Soviet Union.

Participants in the meeting exchanged views on the following subjects:

1. Legal problems of the spread of the arms race into outer space;
2. Legal aspects of socialist States' co-operation within the framework of the Intercosmos program;
3. Legal issues dealt with by COPUOS and its Legal Subcommittee.

*Mrs. K. Schuttpelz*, of the Ministry for Foreign Affairs of the GDR, made a presentation concerning some aspects of the prevention of an arms race in outer space. In particular, this topic was viewed in the context of the Geneva Conference on Disarmament. *Prof. G. Gal*, of the Hungarian Academy of Sciences, discussed the problem of precisely defining the concept of space weapons. In his paper on legal problems relating to the prevention of an arms race in outer space, *Dr. A. Jacewicz* of the Polish Academy of Sciences, stressed the importance of defining a number of terms. First and foremost, it was felt that the notions of militarization of space and space weapons had to be clarified. Next, *Dr. D. Georgev*, of the Bulgarian Academy of Sciences, spoke of the advisability of creating an anti-ballistic missile treaty having a universal character. In his turn, *Prof. M. Mohr*, of the Academy of Sciences of the GDR, discussed the possibility of limiting the arms race in outer space through adoption of appropriate means of verification.

In the course of the discussion that followed, the speakers underscored the necessity of more precise definitions of commonly used terms such as "militarization," "weapons," "non-weaponization," "space activities," and "space objects." In the participants' view, such definitions were essential to the creation of legal instruments which are to be utilized as a means of preventing further militarization of space.

Next, the participants looked into the question of direct co-operation between the socialist states within the Intercosmos Program. *Dr. O. V. Vorobieva*, of the Academy of Sciences of the USSR, spoke about the development of direct scientific and technological cooperation between the members of Intercosmos. *Dr. L. Neustupna*, of the Czechoslovak Academy of Sciences, stressed the need to elaborate effective legal mechanisms as a means of enhancing direct cooperation within the framework of Intercosmos. *Dr. C. Kamenova*, of the Bulgarian Academy of Sciences, discussed legal solutions applicable to the cooperation issues that have been employed in the legal system of her country. *Dr. R. Hara*, of the Polish Academy of Sciences, advanced a proposal for the creation of an organization which would pursue certain space activities, such as

remote sensing and direct broadcasting. This organization would be based upon the already existing bilateral agreements on direct scientific cooperation between socialist states. *Dr. H. Finke*, of the Academy of Sciences of the GDR, focused on those aspects of agreements on direct cooperation in space activities which have as their parties the legal entities of the respective socialist countries. *Prof. O. Kunz*, of Prague University, briefed the gathering about procedures to be followed in the event of a need for revision of the existing Intercosmos Agreement of 1976.

The participants in the Berlin seminar agreed that cooperation could be pursued on the basis of protocols drawn up by its direct participants. Moreover, the protocols should define both the subject-area and stages of projected research and the parties' rights regarding the results of such studies. The participants in the Berlin Seminar further agreed that cooperation even in its individual stages, should be governed by those rules promulgated in relevant legal agreements of a civil nature, regardless of the ultimate use of the research. A proposal was also approved, that every member of the Intercosmos program should provide a review of its internal regulations by the end of 1988 concerning scientific and technological cooperation.

Discussion of the third item included an exchange of opinions on a variety of subjects concerning topical legal problems arising from space activities. *Dr. E. P. Kamenetskaya*, of the Academy of Sciences of the USSR, presented a paper on the prospects of the creation of a World Space Organization. *Mr. B. G. Maiorsky*, of the Ministry for Foreign Affairs of the USSR, briefed the members of the seminar on those main issues recently discussed by COPUOS and its Legal Subcommittee. *Mr. K. Volkov*, of the Bulgarian Academy of Sciences, presented an assessment of the consequences that UNGA Resolution 41/65 has had for developing countries. *Dr. V. M. Postyshev*, of the Academy of Sciences of the USSR, examined the significance of certain provisions enshrined in space law conventions regarding the problem of developing nations' lack of access to space exploration and utilization. *Dr. E.G. Zhukova*, of the same Academy, focused her paper on issues relating to protection of the environment, placing special emphasis on the problem of space debris. *Mr. M. Howald*, of Halle University, discussed the problem of enforcement of Article VI of the Outer Space Treaty in the national legislations of selected capitalist states. In addition to the authors listed above, significant contributions to these discussions were provided by the following participants: *Dr. E. Konstantinov* of the Bulgarian Academy of Sciences; *Prof. R. Müller*, of Halle University, and, above all, *Prof. V. S. Vereshchetin* of the Academy of Sciences of the USSR.

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*International Academy of Astronautics Symposium on "Benefits to Society From Space Activities," Oct. 1, 1988, Bangalore, India*

The International Academy of Astronautics (IAA) Symposium on Benefits to Society from Space Activities was held in Bangalore, India, on October 11, 1988. The Symposium had two themes underlying it: (a) Space Exploration and its Relevance to Society; (b) Benefits to Society from Uses of Outer Space. *Professor Stephen Gorove* (USA) chaired the well attended session in which a number of presentations were made by distinguished participants.

Following the introduction by the Chairman in which he reviewed briefly the subject matter of the discussion, *Professor F. Shahrokhi* (USA) spoke of potential economic returns and advantages that communication, remote sensing, weather and navigation satellites and material processing in space hold out to both developing and developed nations in addition to socio-political benefits. *Dr. K. Karnik* (India) stressed the importance of determining not only the types of benefits but also the particular segments of society that benefit from space exploration and touched upon India's experiences.

*Dr. A. G. Massevitch* (USSR) discussed the impact of space exploration and space science on various aspects of life on Earth, its significance for developing countries and the influence that space exploration has on international relations (e.g., Intercosmos), the development of literature, art, and ideology. *Dr. Barbara Stone* (USA) emphasized that the real benefit of space to the economy lies in the creation of new technologies, products and services. She elaborated on private sector involvement in expendable launch vehicles in upper stage development and the privatization efforts, noting several Joint Endeavor and Cooperative Agreement Programs as well as the Centers for the Commercial Development of Space established by NASA.

*Dr. Stephen E. Doyle* (USA) identified tangible and intangible benefits and explained how space activity stimulates education, research and growth, as well as national productivity, employment and autonomy. In addition to highlighting some of the benefits of the space program to India and the global community in his own presentation, at the Chairman's request, Dr. Doyle also summarized some of the salient points of *Dr. Salim Mehmud's* (Pakistan) paper which stressed that the gains of science and technology, particularly space technology, had to be shared by all through deliberate and wilfull policies of the developed nations in order to release stresses and relax tensions. *Professor Aldo Armando Cocca* (Argentina), focusing on the supreme value of man as a legal subject, called for a reevaluation of the human condition and the common heritage of mankind which he regarded as the keys to the social benefit of space technology. Speaking extemporaneously, *Professor Yash Pal* (India) shared his wisdom and many years of experience in different positions

associated with the Indian space program and his work in the United Nations.

The presentations were followed by an open discussion between the participants and the audience. In response to a question raised by the Chairman, namely, how a developing nation without any financial resources of its own or a loan from another country could get started in establishing a space program and receive benefits, *Dr. Mashevitch* responded that international cooperation is the only means to get access to space explorations. As an example, she referred to the Intercosmos Program noting also that the creation of a satellite tracking station with a cooperating country does not require any serious capital investment but does allow for observations by a large number of students and school children. "Acquiring practical skills in handling astronomical photographic camera, a satellite laser ranging device or a Doppler mount, an observer is sure to broaden his outlook in electronics, precise time-measuring, mechanics, astronomy, physics and foundations of cosmonautics."

In conclusion, the Chairman expressed his belief that outer space holds the key to man's destiny for his ultimate benefit or final doom, and the greatest benefit that man and society could derive from it is that of peace.

*Stephen Gorove*  
Co-chairman of IAA Symposium  
Vice President, IISL

*International Colloquium on "Les Satellites de Telecommunications et le Droit International" (Telecommunications Satellites and International Law), Bruxelles, November 8, 1988*

The Centre for the Study of the Law of the United Nations of the University of Brussels (V.U.B.) hosted, on November 8, 1988, a Colloquium on "Telecommunications Satellites and International Law."

The purpose of the Colloquium, as planned by the Belgian Society of International Law, was to provide for international lawyers not specialized in space law a first introduction to the legal problems with regard to telecommunications satellites.

As *Judge Manfred Lachs* concluded, towards the end of the day: we are dealing now with two kinds of space law: heaven-oriented and earth-oriented. Thus, the programme of the day could be divided into

- a first part, on status, functioning, technical aspects, of communications satellites;
- a second part, on international regulation and international practice;
- a third part, on "earth-bound" international law problems which are a consequence of the use of satellites for telecommunications.

The first speaker was *Professor Isabella Diederiks-Verschoor*, President of the International Institute of Space Law, who introduced the subject matter to the audience. She gave a broad outline, covering earlier ITU regulations, the UN's efforts in developing the international law of outer space, and then, going back to the ITU, the problem of equitable access to the geostationary orbit. Conflicts in international space law (including the INTELSAT-INMARSAT agreements) could be avoided by incorporating in each instrument the fundamental provisions of the Outer Space Treaty. In concluding, she stressed the fundamental importance of telecommunications in outer space, citing ITU's Secretary-General: "...whatever happens in space or whatever use is made of space, telecommunications are required to make it possible."

This outline was followed by a "Technical and Legal Introduction: Function, Status, Nationality of Satellites" by *Mr. Walter Thiebaut* of ESA. He described the technical aspects of space communication, the legal framework (UN and ITU regulations, regional cooperation, etc.) and the various applications of telecommunications in our society.

The first part was concluded with comments by *Dr. Peter Malanczuk* (formerly of the Max Planck Institute in Heidelberg, now a member of the Iran-U.S. Claims Tribunal in The Hague). In reiterating the legal regime for satellites, he pointed out that the legal issues cannot be solved by these specialized texts alone, but will have to be decided in accordance with general international law. He stressed that, although the law of outer space has its own characteristics, it is not separated from, but is a part of international law, including customary international law. He noted that when the existing rules do not seem to be able to provide the answers, we should search for new solutions.

The second part of the programme was devoted to international regulation (*Dr. Alfons Noll*, legal adviser, ITU) and to international practice (*Dr. Wolf von Noorden*, legal adviser, INMARSAT). Both reported, not only on the history and basic functions of their organizations, but also on the newest developments.

*Dr. Noll*, was able to report on the results of the 1988 session of the WARC-ORB 2/88 Conference, which had been concluded on October 6th in what he called a "much more relaxed and serene atmosphere than that in 1985." Nevertheless, it had taken five weeks and four days of difficult and hard work to reach the results as laid down in the Final Act of the Conference. Most important: the adoption of a new Appendix 30 B to the ITU Radio Regulations, containing a plan for the Fixed Satellite Service (FSS), with a view to guarantee in a very concrete way, equitable access to the geostationary orbit for all States. An allotment plan was adopted, consisting of a part A (national allotments) and a part B (the existing systems networks).

An important step forward was made by the improvement of the existing procedures for coordination, notification and registration, notably by the introduction of a new "coordination procedure" designed to

obtain the necessary coordination between the different administrations, and called the "Multilateral planning meeting" as developed and recommended by the first session of WARC-ORB/85.

*Dr. Noll* summarized by highlighting that the success of the WARC-ORB 2/88 shows the need for the ITU to continue its activities in the field of international regulation, loyal to her international mandate and aware of her mission and technical qualifications.

*Dr. von Noorden* reported from his perspective as General Counsel of INMARSAT. (His report was presented by *Mr. Philip Dann*, assistant legal counsel of INMARSAT). In early 1985 the Council of INMARSAT decided in favour of enlarging the Organization's competence in order to provide aeronautical satellite communication. Thereafter the Assembly approved amendments to the INMARSAT Convention and Operating Agreement in October 1985. Recently, the Council has also recommended the adoption of further amendments which would give INMARSAT the competence to provide land mobile satellite communications. These amendments will be considered by an extraordinary Session of the Assembly in January 1989.

*Dr. von Noorden* also reported on the extent to which an international telecommunications organization, such as INMARSAT, is exposed to competition: INMARSAT has to operate within certain institutional restrictions which are not shared by its competitors. The Organization is faced with quite a separate category of constraints, namely those related to the domestic jurisdiction of States which may affect its effectiveness. The question is: will INMARSAT be permitted to offer services or will it be excluded in favour of a domestic operator, for instance in the USA? It is also possible that the domestic operator will be given a monopoly, but may seek to lease space segments from INMARSAT. In concluding, he remarked that the legal framework in which INMARSAT operates extends not only to international space and telecommunications law but to the whole of public international law, to which may be added European Community Law and national law, insofar as they apply to the various activities of the Organization.

*Prof. Neri Sybesma-Knol* (University of Brussels) opened her comment upon this second session with a question: is this still space law? She felt that the international regulation concerning communications satellites comprises two basically different and almost separate regimes with their different development and elaboration:

- The international law of the space environment ("up there") largely developed within the U.N. and within the G.A.'s Committee on the Peaceful Uses of Outer Space.

- The second generation space law, for the secondary uses of outer space ("down here").

She remarked that the two speakers gave the message that we have to start once more to reformulate existing international legal rules to make them applicable to what we could call the secondary uses of outer

space. We are now confronted with earth-bound problems created by the old and too familiar problems of nation-states competing with each other in economic as well as in the political field. Citing *Professor Christol*, she said "The direct television broadcast debate is merely a new phase of historic differences."

*Dr. Adolf Dietz* (Max Planck Institute, Munchen) gave, during the third part, a broad outline of the copyright problems which arise in connection with satellite programme transmission. He made the traditional technical and legal distinction between the point-to-point satellites and distribution satellites (called Fixed Services Satellites, "FSS"), on the one hand, and direct broadcasting satellites (DBS), on the other hand. In addition to those, he mentioned a new type of satellites ("Medium-Power Satellite"). It is characterized by the fact that even if it will, like FSS, be primarily used to serve cable systems, it will also be capable of being received by individual households (with disk aerials of a diameter of essentially the same size as needed for DBS). He noted that this characteristic blurs the clear distinction between FSS and DBS which marked the initial phase of discussions on satellite communication and copyright law. He stressed that legal solutions should not be too far apart.

*Dr. Dietz* concentrated his statements regarding FSS satellites on a situation where programmes transmitted via FSS are retransmitted by cable systems in a country other than the country where the organizer is established. He pointed out that questions of legal responsibility and applicability will have to be solved, although the system of direct negotiations (between satellite programme organizers and the various collecting societies of the countries within the footprint of the satellite) is a "semi-centralized" solution. From the viewpoint of international private law the result will be a cumulative application of all national copyright laws within the footprint of the FSS.

As to the DBS, *Dr. Dietz* made a distinction between the situation in Europe and large countries like Australia, USA, China or India versus geographically isolated countries like Japan. He discussed the application of the *Bogsch* theory or footprint theory stating that the real problem lies in the field of application of the different copyright laws of the different countries because of their different content and extent of protection. He contended that only the application of the footprint theory can lead to adequate and just results.

In conclusion, *Dr. Dietz* stressed that, in the European situation, a simple neglect of national copyrights to the detriment of copyright owners is unacceptable. Only a unified European copyright protection system would help to overcome the difficulties. In any case, he stressed avoidance of the kind of "country shopping" where organizers of satellite programmes get established in countries with the lowest copyright protection possible. Only the footprint theory would help in this situation.

*Professor Frank Gotzen* (University of Louvain, Belgium) commented on this report, pointing out that the problems concerning copyright law which have now risen in connection with satellite communication cannot be solved with existing traditional copyright law. According to *Prof. Gotzen*, the footprint theory alone may not be able to provide solutions.

At the conclusion of the Colloquium, a Round Table discussion took place, with *Judge Manfred Lachs* (Judge in the International Court of Justice) as Chairman.

The subject of this discussion was: the contradiction between the principle of the free flow of information and the need for protection of the national cultural heritage, especially of smaller countries.

Members of the panel were:

*Professor Andre Lange* (University of Liège, Belgium) who reported on the newest developments within the 21-member Council of Europe. A draft European convention on transborder television broadcasting is now before the Committee of Ministers. He pointed out that even though this draft contains only a minimum of international regulation, many difficulties still seem to exist.

*Dr. Ivo Schwartz* (of the EEC Commission and author of the Commission's famous "Green Paper" on the "Establishment of the Common Market for Broadcasting, especially by Satellite and Cable," of 1984) presented a most interesting outline of EEC-media policy noting that because broadcasting is a service, it falls within the competence of the European Community. Thus the EEC Treaty's provisions relating to the free movement of services form the basis for a common market for radio and television. Recently, the EEC Commission has submitted to the Council its proposal for a Council Directive concerning broadcasting activities.

*Professor Cees Hamelink* (University of Amsterdam) reported on the question of the Third World and the free flow of information, the work of UNESCO in this field, and the need for a renewed political and legal debate on the issues. His comments gave rise to lively discussion among the participants.

*Professor Daniel Turp* (University of Montreal), spoke on the specific situation in Canada, a country which also wants to protect its cultural identity against the massive influx of television and radio broadcasts from the USA, in much the same way as the smaller European countries.

*Judge Lachs* then, in his closing statement, pointed out the usefulness of such a wide discussion of the telecommunications issue reiterating that new problems have arisen, as reflected in the various papers, and have created a new distinction: a distinction between heaven-oriented and earth-oriented space law, so different from the first state of development of the law of outer space.

*Neri Sybesma-Knol*

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*Other Events*

A Symposium on "Space Surveillance for Arms Control and Verification Options" was held on October 21-23, 1987 at McGill University's Centre for Research in Air and Space Law.

The 2nd Conference and Exhibition of European Telecommunications was held in Madrid, Spain from May 17-20, 1988. It is reported that more than fifty exhibitors and manufacturers showed their newest products or advances in Integrated Services Digital Network, High Digital T.V., Added Value Services and Multifunction Terminals.

The University of North Dakota's Center for Aerospace Sciences sponsored an "International Conference on Hypersonic Flight in the 21st Century" on September 20-23, 1988 in Grand Forks, North Dakota. Conference topics addressed were the recent progress in the National Aerospace Plane Program, European Vehicles, as well as the Japanese Spaceplane Concepts and Soviet Spaceplane Designs.

The 35th American Astronautical Society Symposium, entitled "The 21st Century in Space" was held from October 24-26, 1988 in St. Louis, Missouri. Issues discussed included future space stations and moon bases, expeditions to Mars and enhanced space technologies.

The "Pacific Rim Opportunities: 2nd Space Entrepreneurs Conference" held from November 13-16, 1988 in Kona, Hawaii, focused on commercial space opportunities, specifically for the citizens of Pacific Rim countries.

"What Priorities Should the New Administration Set for the Uses of Outer Space?" was the topic of a panel discussion organized by the Aviation and Space Law Section of the Association of American Law Schools on January 6, 1989 in New Orleans.

*Brief News*

America's first manned spaceflight in thirty-two months was successfully completed with the landing of the Shuttle Discovery on October 3, 1988....A commercial Space Launch Act "to insure continued access to government ranges and services" and "establish a statutory standard for the determination of property and liability insurance" was signed by the President. He also signed into law a bill creating compulsory copyright license for satellite uplinkers.

A European Radiodetermination Satellite Service, named Locstar, was recently created by the French space agency, CNES, with the participation of over two dozen European countries and banks and the American Geostar Corporation....An International Working Group is to study the feasibility of International Space Docking...India has developed a remote sensing system to monitor drought....A West German Space Agency is about to be created....The U.S./International Space Station

Agreement was signed on September 29, 1988 in Washington, D.C. by the participating countries. Twelve western nations are to participate in the construction of this international space station named "Freedom" by President Reagan. Its cost is estimated at \$22 billion of which \$14.5 billion would be contributed by the U.S. and the remainder by Canada, Japan and nine European countries....Recent NASA budget of \$10.7 billion allocates \$900 million for the space station....President-elect Bush is reportedly committed to the launching of a manned operational space station by 1996....Launching of the Hubble Space Telescope has been delayed by NASA until 1990....NASA and the European Space Agency plan to launch an interplanetary craft in 1996 to probe Saturn and its largest moon, Titan....NASA completed preliminary design for an industrial space facility. It plans a twenty-first century space fleet to include a small plane resting atop a heavy lift launch vehicle....Domestic US space industry grows to \$14.1 billion....A NOAA meteorological satellite is to monitor ozone levels....E. Prime Aerospace Corp. is to launch the first privately funded spacecraft under NASA and U.S. Air Force approval.... A Congressional bill was introduced to limit the export of western satellites for launching by Soviet Proton or Chinese Long March launchers....The launch of three Hughes-built satellites by the Chinese Long March 3 rockets will need approval by Congress as well as by a Coordinating Committee on Multilateral Export Control (COCON)....Scott Science and Technology, Inc. plans to put up direct broadcast satellites (DBS) for Dominion Video's religious programming by using China's Long March launcher....The Andean Satellite Telecommunications Organization plans to launch a satellite around 1992 to link nations of the Andean Pact.

The U.S., Canada and Mexico signed an agreement on geostationary orbit sharing and band use....Both the United States and the Soviet Union are reportedly planning to put more nuclear power sources into space thereby reviving fears about the possible spread of radioactive debris....The Soviet Union is willing to open up its space program to international inspection on a reciprocal basis with other nations....The USA and the USSR plan to coordinate joint manned missions to the solar system....ITU's WARC '88 adopts and plans regulatory provisions for geostationary satellites which are to enter into force on March 16, 1990....ITU membership increases to 166 with the accession of Western Samoa....According to a study presented at the IAF Congress, it might be feasible to use retired missiles as space launchers for payloads.... A Japanese spacecraft is to be launched toward Venus in 1996.... The development of an autonomous space processor might be a solution to the problem of space debris.

Soviet Cosmonaut Romanenko's record 326 days in space has been surpassed by cosmonauts of the Mir space station...The Soviet shuttle design is similar to that of the U.S. shuttle but its extended delta wing gives it a potential for greater maneuverability....Third world countries enter the ballistic missile race....The Organization for African Unity



contributed \$200,000 toward financing a Regional African Satellite Communications System study.... Israel launches its first satellite which is to study solar effects and the geomagnetic field....European economic community is to finance a telecommunication project in Somalia.

#### *Forthcoming Events*

Asia Telecom '89, a conference organized under the auspices of the Telecommunication Authority of Singapore in cooperation with the International Telecommunication Union, will be held in Singapore during the week of February 20-25, 1989.

The 5th International Conference organized by Assicurazioni Generali on "Commercial and Industrial Activities in Space: Insurance Implications" will be held in Rome, Italy on March 2-3, 1989.

As reported previously, an international conference on Space Commercialization: Roles of Developing Countries, sponsored by the University of Tennessee Space Institute and cosponsored by the United Nations, the American Institute of Aeronautics and Astronautics, and the International Academy of Astronautics, is to take place in Nashville, Tennessee, March 5-10, 1989.

Recent Developments in the International Law of Telecommunications will be discussed on April 7, 1989 in Chicago by panelists during the Annual Meeting of the American Society of International Law. A day earlier, the Society's Interest Group on Space Law expects to have an "open forum" discussion on the legal issues to be considered in connection with the development of the aerospace plane.

A conference to provide detailed information on the new NOAA system of Geostationary Operational Environmental Satellite (GOES), which is anticipated to enter service in 1990, will be held on April 3-6, 1989 in Crystal City, Virginia.

The Fifth International Space Symposium on "Space - A New Era" sponsored by the United States Space Foundation is planned for April 4-7, 1989, in Colorado Springs.

The 32nd International Colloquium on the Law of Outer Space will take place in Beijing, China, October 7-13, 1989 during the IAF Congress. Topics proposed for discussion are: 1. Legal Aspects of Protection of the Outer Space Environments; 2. Legal Implications of the Principle according to which the Exploration and Use of Outer Space shall be Carried out for the Benefit and in the Interests of all States taking into Particular Account the Needs of Developing Countries; 3. The Legal Status of the Geostationary Orbit in Light of the Recent Activities of ITU; 4. Other Issues of Space Law.

The third international forum on commercial and industrial exploitation of space, "Space Commerce 90," is to be held at Montreux, Switzerland, in March, 1990.

## BOOK REVIEWS/NOTICES

### Reviews

*Weltraumrecht - Law of Outer Space (Textsammlung)*, edited by Stephan Frhr. von Welck and Renate Platzöder (Nomos Verlagsgesellschaft, Baden-Baden, 1 Auflage 1987), pp 825.

A cooperative effort of two West German Institutes, the Research Institute of the German Society for Foreign Politics in Bonn and the Research Institute for International Politics and Security of the Science and Politics Foundation in Ebenhausen, FRG, has produced this useful collection of legal and political documents relating to outer space. Dr. Stephan Frhr. von Welck and Dr. Renate Platzöder are the editors of this handsome publication. With long experience in the field of the law of the sea as FRG delegates to the UN Law of the Sea Conference and authors of several studies on sea-law matters, the two scholars have now directed their efforts to space issues as reflected in the important documents of the space age from its beginning through early 1987.

This collection of documents has several priorities. One is the greatest possible comprehensiveness attainable in a one volume publication. Furthermore, the editors have succeeded in solving the problem of achieving both an international and a national character for the publication. Their solution ensures the usefulness of the publication not only for domestic users but also for readers who are not proficient in German, since many of the documents are published in English, their authentic language. On the other hand, the book has maintained its undeniably national features through the inclusion of many documents relating to European relations and the space policies of the Federal Republic of Germany in their authentic versions, i.e. in German.

The one hundred and thirty documents included in this collection are divided into fifteen sections. One of these sections (documents dealing with international organizations and conferences concerning outer space and arms control in outer space) is further divided into several sub-sections.

The first five documents are the United Nations Treaties on Outer Space, which the editors have divided into two sections, "Treaties Relating to the Legal Status of Outer Space," and "Treaties Relating to the Use of Outer Space." The 1967 Outer Space Treaty and the 1979 Moon Agreement form the first group, while the other three UN treaties make up the other group.

"Treaties Relating to Disarmament and Arms Control in Outer Space" follow in the third section, beginning with the 1962 Partial Test

Ban Treaty and including nine other documents. Among them are the 1972 ABM Treaty and the 1974 Protocol to this treaty, the SALT I Treaty, the 1977 Environmental Modification Techniques Convention, and the 1979 SALT II Treaty.

Draft treaties and official proposals relating to the same subject are collected in a separate section. The French proposal for an International Satellite Monitoring Agency (ISMA), the two USSR draft treaties on the demilitarization of outer space (the 1981 draft on the Prohibition of the Stationing of Weapons of Any Kind in Outer Space and the 1983 draft on the Prohibition of the Use of Force in Outer Space and from Space Against the Earth), and the 1985 USSR proposal on principles of international co-operation in the peaceful exploration of outer space under conditions of its non-militarization, are reprinted in this section.

The following four sections are devoted to documents concerning the exploration and uses of outer space. The first of these sections deals with multilateral treaties and contains four items (including the 1976 Intercosmos Program Agreement and the 1984 COSPAS-SARSAT Memorandum of Understanding among them), while the second section contains numerous bilateral and multilateral treaties on cooperation in the exploration and uses of outer space to which the Federal Republic of Germany is a Party. The twenty-one items included in this section begin with the 1967 France-FRG agreement on the telecommunication satellite *Symphonie* and go up to the Memorandum of Understanding between FRG and China on co-operation in civil space science and technology. The third section includes the treaties concluded by ESA (the 1985 memorandum of understanding between ESA and NASA concerning the permanent manned space station is published here) and the fourth contains proposals relating to the exploration and uses of space and to the peaceful settlement of space disputes. This section also includes a document that is unique both from the point of view of substance and with respect to its sponsorship, namely the draft Convention on the Settlement of Space Law Disputes adopted by the 1984 Conference of the International Law Association, an international non-governmental body.

The next section consists of the statutes of international organizations including Intelsat, Intersputnik, ESA, Arabsat, Inmarsat, Eutelsat, ITU (1982 Nairobi Convention) and Eumetsat.

The largest section of documents is entitled "Principles of Resolutions, Recommendations and Declarations and International Organizations and Conferences Relating to the Legal Status of Outer Space, its Exploration and Uses as well as to the Disarmament and Arms Control in Outer Space," and as mentioned above, it is divided into several sub-sections. Documents of the UN General Assembly are listed first, amongst them the 1963 Declaration of Legal Principles, the 1982 Direct Broadcasting Satellites Principles and the 1986 Principles Relating to Remote Sensing. In addition, a number of resolutions on international co-operation in the peaceful uses of outer space and resolutions dealing with

the prevention of an arms race in outer space are included. The other sub-sections comprise documents of UNESCO, UNISPACE 82, ITU (WARC 79 and WARC-ORB-85), Inter-Parliamentary Conference, NATO, European Council, ESA, WEU as well as the 1967 Bogota Declaration of Equatorial Countries. From the substantive report of UNISPACE 82, which presented an overall picture of the status of all areas of international cooperation in the peaceful uses of outer space and was adopted by consensus, however, only two recommendations are reprinted, that dealing with the Prevention of an Arms Race in Outer Space and that concerning COPUOS. Perhaps more could have been included from this comprehensive document, particularly from the section dealing with the role of the United Nations, or at least its general structure and content could have been indicated.

The last five groups of the collection are devoted to documents of the Federal Republic of Germany. Laws and decrees (including the 1980 Air Navigation Law), declarations of policy principles and positions of the FRG government, laws and State treaties of individual states (Länder) of the FRG, as well as the statute of the aerospace research organization established under FRG law, are included in these remaining parts of the book.

In general, this collection of documents on the Law of Outer Space offers a thorough and well balanced picture of the development of the legal order for outer space and the political efforts in the international community relating to this area, which has become an important theater of international relations in our times. For the future, we sympathize with the view of the editors expressed in the Preamble to the book, the English translation of which reads: "The large number of the regulatory documents presented here represent after all only a beginning. The rapidly advancing technical development and the political interests in the exploration and uses of outer space accompanying this development make it necessary to extend and further develop the outer space law now in force. This effort could lead to the convening in a few years of an international conference similar to the Third United Nations Conference on the Law of the Sea, in order to work out a regime embracing all uses of outer space."

Vladimir Kopal  
Chief, Outer Space Affairs Division  
United Nations

*Outer Space: Politics and Law*, by V. Vereshchetin, E. Vasilevskaya, and K. Kamenetskaya (Moscow, Progress Publishers, 1987), pp. 131.

The international scientific community has already had some opportunities to get acquainted with works on international law by Soviet authors. The book under review was prepared by the well known Soviet Jurist, Professor V. Vereshchetin and Doctors of Law, E. Vasilevskaya and

*E. Kamenetskaya.* The book is devoted to legal problems arising out of the exploration of outer space. It is especially notable for the attention given to the interconnection between law and politics. This lends considerable practical interest to the book, a fact that is rightly stressed by a prominent scientist, *Academician R. Sagdeyev*, who wrote in the preface of the book, that international space law should be a guarantee of new successes in the field of space exploration.

The first chapter begins with the question: "Star Wars or Star Peace?" The authors' train of thought is as follows: first, an analysis of valid norms, which restrict military use of outer space; second, several discourses on various interpretations of the relevant fundamental provisions of international law; and third, the legal aspects of SDI.

One may also find here many interesting theoretical issues discussed. For example: is the judicial model, "everything not prohibited by international law, is permitted", applicable in the field of international space law? What is a peaceful space activity? Is it possible to exercise the right of self defense in a preventive way? Do prohibitions and restrictions of military activities in outer space continue to be valid in the event of armed conflict?

The key idea of the entire first chapter concerns the need for the interpretation of treaties in good faith and the need for their secret observance. From their analysis, the authors strongly criticize the "new interpretation" of the ABM Treaty. They underline the positive character of certain Soviet initiatives, such as the draft Treaty on the Prohibition of the Deployment of Weapons of Any Kind in Outer Space, or the draft Treaty on the Prohibition of the Use of Force in Outer Space and From Space Against the Earth.

The problems of the law-making process are considered in the second chapter. The authors believe that the resolutions of the United Nations General Assembly in the fields of direct television broadcasting and remote sensing of the Earth typify such problems. They highlight the task of elaborating a set of judicially binding norms in these branches of space law, noting that the issue was included in the agenda of the Legal Sub-Committee of the UN Committee on Peaceful Uses of Outer Space as early as 1967. The authors also address the questions surrounding the fair use of the geostationary orbit stating that although waiting for its legal determination, the situation is being aggravated with the appearance of aerospace systems. The authors point out that up to now, there has been no reliable legal foundation for using nuclear power sources. The authors also elaborate on another problem of the law-making process in the area of manned space flights, devoting attention to the problems of safety for space crews, including the establishment of safety zones and international rescue service. The authors note that there are other areas that also need attention, such as the prevention of space pollution.

The legal mechanism of international space cooperation is discussed in the third chapter. Here the reader will find an examination

of various forms of cooperation, used in Soviet space practice: cooperation within the Intercosmos Programme, bilateral agreements with the USA, France, India, and an examination of the role and competence of the U.N., international, intergovernmental and non-governmental space organizations. Of special interest to specialists will be the idea of a World Space Organization. New impetus to the development of this idea was given by recent Soviet proposals in the U.N. regarding the legal content of the principle of cooperation in international space law. The authors consider that it must be treated "above all as the duty of states to cooperate with one another in maintaining international peace and security in outer space. It also presupposes the duty to promote the development of broad contacts and the joint exploration and use of outer space for peaceful purposes. As for concrete rights and duties in the sphere of scientific and technical cooperation in space, they can follow only from treaties concluded for this purpose..."

The fourth and last chapter of the book traces the current tendency of privatization of space activity. The authors' point of view can be summarized in the following provisions: There are no serious grounds for claims about the existent principle in international law providing for "freedom of private enterprise in outer space". International space law has always developed as a law of interstate cooperation. It regards the space activities of non-governmental legal entities, including private companies, not as a rule or principle, but as an exception to the general rule. Political responsibility and liability for private activities in outer space are borne by the states permitting such activities, which can be carried out only with the authorization and under the constant supervision of the relevant state. In the long run, according to the authors, intensive activities of private companies in outer space would negatively affect the further development of international space law.

In conclusion, one may note also that the reviewed book is remarkable for its intelligibility which renders it useful for a wide circle of readers.

G. Silvestrov.

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*Arms Control and Disarmament in Outer Space - Volume II*, edited by Nicolas Mateesco Matte (Centre for Research in Air and Space Law, McGill University, 1987), pp. 282.

This book is a compilation of lecture-seminars given at the Centre for Research in Air and Space Law at McGill University over the year prior to the I.N.F. summit. It focuses on the contentious issues concerning arms

control, disarmament and verification in outer space. The book is organized into two sections: (1) a series of sixteen lectures given by respected international authorities, and (2) a section containing two addresses given at the Centre prior to the Workshop on Outer Space and Arms Control. Some of the issues discussed include: the prospects of particle beam weapons and their effect on current military strategy; an examination of the areas on which the superpowers currently might agree and which could lead to greater confidence, if reduced to a treaty form; the implications of an international satellite monitoring agency; analogous legal interpretations of the Antarctic Treaty and the Law of the Sea Convention and its applicability to the Outer Space Treaties; the role of verification in promoting stability and confidence in treaties; current national viewpoints on the space policies of six major powers, and present issues concerning satellite sensing by private companies.

Three articles merit special consideration. The first is "Control of the Future Use of Outer Space," by *Bhupendra Jasani* and *Guy Letteer*. This article contains many statistics, charts, and graphs concerning satellite use. It explains the basic physical components of satellite orbits, directed energy weapons (lasers, radio frequency weapons, and particle beam weapons) and kinetic energy weapons (rockets and electromagnetic railguns). In addition, the article examines the legal underpinnings of existing outer space treaties and future areas of weapons. Lastly, the authors explain how satellites aid in the various verification schemes.

Another excellent article is *Pierre M Gallois'* "Europe and the Defensive Technology of the Future." This French Air Force Brigadier General examines future weapons and their effect on current military planning. Specifically, he discusses the future areas of the arms race, the need of a European S.D.I. independent of N.A.T.O. and the current imbalance of conventional forces.

*Stephen Gorove's* article, "Another Look at Arms Control in Space and at What May Be Agreed Upon," is another insightful article. In this paper, the author examines various areas of possible agreement among the superpowers, which if reduced to treaty form could be the basis for future substantial arms control agreements. These areas are classified into five distinct categories: (1) atomic weapons and other weapons of mass destruction, (2) anti-satellite weapons (ASATs), (3) military bases and maneuvers, (4) use of force, injury, and damage, and (5) permissible activities. Though these alternatives were suggested prior to the I.N.F. Treaty, they are still relevant and can provide the needed confidence-building measures which could lead to the establishment of more substantial arms control treaties.

In the preface to the book, the editor states that the purpose for the Centre of Research in Air and Space Law was "to study *in extenso* and to disseminate research results and inform the public at large on this issue. . ." With this book, the Centre can justifiably claim to have met

their goal for 1987. This book collects and discusses in detail the various issues and viewpoints on arms control and disarmament. It provides an excellent base for future study of viewpoints concerning the regulation and use of man's fourth environment - outer space.

*The Law and Regulation of International Space Communication*, by Rita L. White and Harold M. White, Jr. (Artech House, 1988), pp. 309.

The development and evolution of the various principles, laws, and regulations regarding space communications are highlighted in this volume. The book attempts to lay out in coherent form the complex and often confusing growth of issues within this international concern.

The book is divided into four major parts, each concentrating upon different aspects of the regulation process. Part I begins with a helpful overview of the roots of space communication. The chapters within this section outline and analyze radio and geostationary satellite orbit issues which provided the initial impetus for regulation. Historical and technical basics with regard to the use of space for communication purposes are provided, to enable those unfamiliar with the subject to obtain a working understanding of the field. The chapters enumerate the major structural and institutional provisions which provided the cornerstones to present regulatory principles.

Part II looks at the multiple organizations responsible for the promulgation, amendment and enforcement of the regulations adopted. Of primary focus is the International Telecommunication Union (ITU). In Part III the authors explain the structure and proceedings of the multiple conferences and conventions creating the existing framework of regulation.

The specific findings and resolutions of each of the significant ITU conferences, during the period 1979-1983, are discussed in detail. Throughout the years, the general themes of these conventions center upon equal access to the resource, assistance to developing nations and technical development. Of current interest are the chapters dealing with the 1985 World Administrative Radio Conference on the Use of the Geostationary Satellite Orbit and the Planning of the Space Services Utilizing it (WARC-ORB). This conference laid the groundwork for the session scheduled for mid-1988. Uppermost on the agenda of these sessions are the formulations of approaches to meet the goal of guaranteed equitable access to orbital resources. One part of a planning method suggested by the WARC-ORB '85 was an arc allotment plan. This type of plan would provide guaranteed national service communication requirements by giving member states at least one orbital position within pre-designated arc and frequency. At present, the U.S. and other developed countries apparently oppose this plan. How the 1988 WARC-



ORB session will act upon this issue and other such regulatory revisions is theorized upon.

Part IV encapsulates two special space communication issues: direct broadcast satellites and development within the United Nations with regard to international space law. The text ends with a look to the future and the existence of a global village, due in part to space communications. Tables summarizing the conferences, a glossary and an index are attached. Though not extensive, the bibliography is adequate for the purpose of the book.

The authors have produced this primer with the general reader in mind. Additionally, the book's categorization and examination of the international regulatory environment should be of interest to those who operate in this field.

*American Space Law*, by Nathan C. Goldman (Iowa State University Press, 1988), pp. 374.

This text represents an overview of American interaction with the international community with respect to outer space and with an emphasis on space law. In its two major parts the study discusses international and American municipal space law. It first introduces the reader to "Space - The Evolving Frontier" starting with the space sciences, passing through space commerce and space defense, and ending with a brief discussion of the major space-faring nations.

The next section of the text describes international space law and focuses on the United Nations and other international governmental organizations, their functions and effects. The author traces the developments of the space era in two parts, the first being from 1958 to 1979, and the second from 1980 to the present. International space law and its development is traced from 1957 to the present. The author elaborates on the major space treaties in some detail and ends with a discussion of new areas.

In the second major portion of the book the author addresses American involvement in space. Various domestic regulatory agencies are briefly discussed, followed by the harder legal issues facing the United States and its activities in outer space. Two chapters are devoted to NASA and the Federal Communications Commission, detailing their involvement in space with concentration on their activities and regulations, respectively. The Department of Transportation and other major agencies are discussed with their changes and expansions explored.

Finally, the book has a useful appendix for quick reference. It includes copies of the major international treaties, the NASA Act, and various other relevant laws and agreements.

*Communications Satellites in the Geostationary Orbit*, by Donald Jansky and Michael Jeruchim (Artech House Publishing Co., 1987), pp. 633.

This book is a comprehensive overview of geostationary satellites and how they operate. These satellites have played a vital role in the development of telecommunications services. Social and economic changes in data communications, weather protection, navigation, t.v. and worldwide voice have been enhanced and accelerated by these satellites. Furthermore, fixed satellite services have been developed to allow extensive high speed transmission of documents and high speed data transmission among widely separated computers. Audio conferences with visual aids and video teleconferences whereby groups of people at different sites can confer with each other through live television transmissions have been made possible by satellites in the geostationary orbit.

Broadcast satellite services are also discussed in detail. Such services have been implemented in both the maritime and aeronautic areas allowing position determination, data channels as well as position determination of other boats and aircrafts. These satellites are a unique resource of vital importance to a variety of space applications, including communications, meteorology, broadcasting, and data relay from orbital satellites. These satellites can also be used for possible future applications such as solar power satellites.

*Space Law: Views of the Future*, edited by Tanja L. Zwaan, Walter W. C. de Vries, Paul Henry Tuinder and Ilias I. Kuskouvelis (Kluwer Law and Taxation Publishers, 1988), pp. 187.

This publication is a scholarly attempt to identify and pinpoint existing gaps in space law and to offer theoretical models for their successful resolution. Composed of papers submitted by eleven authors, it is organized into four main topics with an average of three papers supporting each topic. Among the topics examined are the general perspectives of the future of space law, the commercial exploitation of outer space, the power interest of states conducting activities in outer space, and the changing role of states in the regulation of space activities.

Apart from the text of the five U.N. sponsored space treaties, the book also contains a list of common acronyms and abbreviations used in most space law based literature.

This compilation should prove useful to those with a legal background but not specifically trained in space law, by providing a review of some of the existing views and criticisms of the current space treaties and the needed regulation essential to the orderly development of man's final frontier.

*Notices*

*Economics and Technology in U.S. Space Policy* (Proceedings of a Symposium held in Washington, D.C., June 24-25 1986), edited by Molly K. McCauley (Resources for the Future, Inc. 1987), pp. 270.

This publication records the proceedings of a June 1986 Symposium on "Economics and Technology in United States Space Policy." In this paper *Molly K. McCauley* stresses the need for joint research in economics and technology in forming space policy. Particularly, Ms. McCauley addresses the role of government in space activities, implications of international competition and cooperation, and the impact of space commercialization.

*State Responsibility and the Direct Broadcast Satellite* by Marika Natasha Taishkoff and Frances Pinter (Design Publishers) 1987, pp. 197.

This work attempts to evaluate the impact of the direct broadcast satellite (DBS) upon the notions of State Sovereignty, international responsibility, and international law as a whole, exploring at the same time possible avenues for an effective solution to the direct broadcast crisis. It is suggested that, through application of the doctrine of international responsibility, a system of prior consultation and balancing of interests will adequately satisfy both the interests of state sovereignty and the free flow of information, while simultaneously acting as an effective deterrent to potentially harmful DBS transmissions.

*Introduction of Satellite Communications*, by Bruce E. Elbert (Artech House Publishing Co., 1987), pp. 371.

As *Elbert* points out the bulk of transoceanic telephone and data communications is by satellite. Television, perhaps the most popular source of entertainment and news, has embraced satellite communications as the primary source of carrying programming from the programs' originator to the final point of distribution. Satellites are also beginning to dominate the type of communications between vehicles, ships, and aircrafts. Because satellite communications are less burdensome than conventional communications, they are becoming a way of life.

*Arms and Artificial Intelligence: Weapons and Arms Control Applications of Advanced Computing*, edited by Allan M. Din (Oxford University Press, 1987), pp. 229.

This book was written to present an overview of the prospects of machine intelligence in the context of international security. *Din* divided his book into three main topics: artificial intelligence concepts and

computer technology, military and strategic implications, and applications in arms control analysis. Any nonspecialist in need of an up-to-date analysis of information technology as it relates to weapons systems and arms control will find this book interesting and informative.

*The Overview Effect, Space Exploration and Human Evolution*, by Frank White (Houghton Mifflin Company, 1987), pp 318.

In a thought-provoking book, *Frank White* examines the impact of space travel on those who have made the voyages into space during the short twenty-five year history of manned space flights. *Mr. White* begins with a wide array of experiences and impressions of astronauts and cosmonauts, turning next to the possibility of future civilizations in space. The final section of the book relates experiences of 16 individuals who have traveled in space, and encourages the reader to use these interviews as a starting point for understanding the human experience in space.

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## CURRENT DOCUMENT

AGREEMENT  
AMONG THE GOVERNMENT OF THE UNITED STATES OF AMERICA,  
GOVERNMENTS OF MEMBER STATES OF THE EUROPEAN SPACE  
AGENCY, THE GOVERNMENT OF JAPAN, AND THE GOVERNMENT OF  
CANADA ON COOPERATION IN THE DETAILED DESIGN,  
DEVELOPMENT, OPERATION, AND UTILIZATION OF THE  
PERMANENTLY MANNED CIVIL SPACE STATION  
Signed Sept. 29, 1988 in Washington, D.C.  
(Excerpts)

### Table of Contents

#### Preamble

Article 1	-	Object and Scope
Article 2	-	International Rights and Obligations
Article 3	-	Definitions
Article 4	-	Cooperating Agencies
Article 5	-	Registration; Jurisdiction and Control
Article 6	-	Ownership of Elements and Equipment
Article 7	-	Management
Article 8	-	Detailed Design and Development
Article 9	-	Utilization
Article 10	-	Operation
Article 11	-	Crew
Article 12	-	Transportation
Article 13	-	Communications
Article 14	-	Evolution
Article 15	-	Funding
Article 16	-	Cross-Waiver of Liability
Article 17	-	Liability Convention
Article 18	-	Customs and Immigration
Article 19	-	Exchange of Data and Goods
Article 20	-	Treatment of Data and Goods in Transit
Article 21	-	Intellectual Property
Article 22	-	Criminal Jurisdiction
Article 23	-	Consultations
Article 24	-	Space Station Cooperation Review
Article 25	-	Entry into Force
Article 26	-	Amendments
Article 27	-	Withdrawal
Annex	-	Space Station Elements to be Provided by the Partners

Article 1  
Object and Scope

1. The object of this Agreement is to establish a long-term international cooperative framework among the Partners, on the basis of genuine partnership, for the detailed design, development, operation, and utilization of a permanently manned civil Space Station for peaceful purposes, in accordance with international law. This permanently manned civil Space Station will enhance the scientific, technological, and commercial use of outer space. This Agreement specifically defines the nature of this partnership, including the respective rights and obligations of the Partners in this cooperation. This Agreement further provides for mechanisms and arrangements designed to ensure that its object is fulfilled.

2. The Government of the United States has a Space Station program which will produce a core U.S. Space Station. The European Governments as governments of Member States of the European Space Agency, the Government of Japan, and the Government of Canada have space programs to produce significant elements which, together with the core U.S. Space Station, will create an international Space Station complex with greater capabilities that will enhance the use of space for the benefit of all participating nations and humanity. Canada's contribution will be an essential part of the infrastructure of the international Space Station complex. This Agreement lists in the Annex the elements to be provided by the Partners to form the international Space Station complex.

3. The permanently manned civil international Space Station complex (hereinafter "the Space Station") will be a multi-use facility in low-earth orbit, comprising both manned and unmanned elements. It will consist of a permanently manned base comprising elements provided by all the Partners, unmanned platforms in near-polar orbit, a man-tended free-flying laboratory to be serviced at the manned base, and Space Station-unique ground elements.

4. The Space Station is conceived as having an evolutionary character. The Partner States' rights and obligations regarding evolution shall be subject to specific provisions in accordance with Article 14.

Article 2  
International Rights and Obligations

1. The Space Station shall be developed, operated, and utilized in accordance with international law, including the Outer Space Treaty, the Rescue Agreement, the Liability Convention, and the Registration Convention.

2. Nothing in this Agreement shall be interpreted as:

(a) modifying the rights and obligations of the Partner States found in the treaties listed in paragraph 1 above, either toward each other or toward other States, except as otherwise provided in Article 16;

(b) affecting the rights and obligations of the Partner States when exploring or using outer space, whether individually or in cooperation with other States, in activities unrelated to the Space Station; or

(c) constituting a basis for asserting a claim to national appropriation over outer space or over any portion of outer space.

#### Article 4 Cooperating Agencies

1. The Partners agree that the National Aeronautics and Space Administration (hereinafter "NASA") for the United States, the European Space Agency (hereinafter "ESA") for the European Governments, and the Ministry of State for Science and Technology (hereinafter "MOSST") for the Government of Canada shall be the Cooperating Agencies responsible for implementing Space Station cooperation. The Government of Japan's Cooperating Agency designation for implementing Space Station cooperation shall be made in the Memorandum of Understanding between NASA and the Government of Japan referred to in paragraph 2 below.

2. The Cooperating Agencies shall implement Space Station cooperation in accordance with the relevant provisions of this Agreement, the respective Memoranda of Understanding between NASA and ESA, NASA and MOSST, and NASA and the Government of Japan concerning the detailed design, development, operation, and utilization of the Space Station (hereinafter "the MOUs"), and arrangements between or among NASA and the other Cooperating Agencies implementing the MOUs (hereinafter "implementing arrangements"). The MOUs shall be subject to this Agreement, and the implementing arrangements shall be subject to the MOUs.

3. Where a provision of an MOU sets forth rights or obligations accepted by a Cooperating Agency (or, in the case of Japan, the Government of Japan) not a party to that MOU, such provision may not be amended without the written consent of that Cooperating Agency (or, in the case of Japan, the Government of Japan).

#### Article 5 Registration; Jurisdiction and Control

1. In accordance with Article II of the Registration Convention, each Partner shall register as space objects the flight elements listed in the Annex which it provides, the European Partner having delegated this responsibility to ESA, acting in its name and on its behalf.

2. Pursuant to Article VIII of the Outer Space Treaty and Article II of the Registration Convention, each Partner shall retain jurisdiction and control over the elements it registers in accordance with paragraph 1 above and over personnel in or on the Space Station who are its nationals. The exercise of such jurisdiction and control shall be subject to any relevant provisions of this Agreement, the MOUs, and implementing arrangements, including relevant procedural mechanisms established therein.

Article 16  
Cross-Waiver of Liability

1. The objective of this Article is to establish a cross-waiver of liability by the Partner States and related entities in the interest of encouraging participation in the exploration, exploitation, and use of outer space through the Space Station. This cross-waiver of liability shall be broadly construed to achieve this objective.

2. For the purposes of this Article:

(a) A "Partner State" includes its Cooperating Agency. It also includes any entity specified in the MOU between NASA and the Government of Japan to assist the Government of Japan's Cooperating Agency in the implementation of that MOU.

(b) The term "related entity" means:

(1) a contractor or subcontractor of a Partner State at any tier;

(2) a user or customer of a Partner State at any tier;  
or

(3) a contractor or subcontractor of a user or customer of a Partner State at any tier.

"Contractors" and "subcontractors" include suppliers of any kind.

(c) The term "damage" means:

(1) bodily injury to, or other impairment of health of, or death of, any person;

(2) damage to, loss of, or loss of use of any property;

(3) loss of revenue or profits; or

(4) other direct, indirect or consequential damage.

(d) The term "launch vehicle" means an object (or any part thereof) intended for launch, launched from Earth, or returning to Earth which carries payloads or persons, or both.

(e) The term "payload" means all property to be flown or used on or in a launch vehicle or the Space Station.

(f) The term "Protected Space Operations" means all launch vehicle activities, Space Station activities, and payload activities on Earth, in outer space, or in transit between Earth and outer space in implementation of this Agreement, the MOUs, and implementing arrangements. It includes, but is not limited to:

(1) research, design, development, test, manufacture, assembly, integration, operation, or use of launch or transfer vehicles (for example, the Orbital Maneuvering Vehicle), the Space Station, or a payload, as well as related support equipment and facilities and services;



(2) all activities related to ground support, test, training, simulation, or guidance and control equipment and related facilities or services.

"Protected Space Operations" also includes all activities related to evolution of the Space Station, as provided for in Article 14. "Protected Space Operations" excludes activities on Earth which are conducted on return from the Space Station to develop further a payload's product or process for use other than for Space Station related activities in implementation of this Agreement.

3. (a) Each Partner State agrees to a cross-waiver of liability pursuant to which each Partner State waives all claims against any of the entities or persons listed in subparagraphs 3(a)(1) through 3(a)(3) below based on damage arising out of Protected Space Operations. This cross-waiver shall apply only if the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations. The cross-waiver shall apply to any claims for damage, whatever the legal basis for such claims, including but not limited to delict and tort (including negligence of every degree and kind) and contract, against:
- (1) another Partner State;
  - (2) a related entity of another Partner State;
  - (3) the employees of any of the entities identified in subparagraphs 3(a)(1) and 3(a)(2) above.
- (b) In addition, each Partner State shall extend the cross-waiver of liability as set forth in subparagraph 3(a) above to its own related entities by requiring them, by contract or otherwise, to agree to waive all claims against the entities or persons identified in subparagraphs 3(a)(1) through 3(a)(3) above.
- (c) For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of liability arising from the Liability Convention where the person, entity, or property causing the damage is involved in Protected Space Operations and the person, entity, or property damaged is damaged by virtue of its involvement in Protected Space Operations.
- (d) Notwithstanding the other provisions of this Article, this cross-waiver of liability shall not be applicable to:
- (1) claims between a Partner State and its own related entity or between its own related entities;
  - (2) claims made by a natural person, his/her estate, survivors, or subrogees for injury or death of such natural person;
  - (3) claims for damage caused by willful misconduct;
  - (4) intellectual property claims.
- (e) Nothing in this Article shall be construed to create the basis for a claim or suit where none would otherwise exist.

Article 17  
Liability Convention

1. Except as otherwise provided in Article 16, the Partner States, as well as ESA, shall remain liable in accordance with the Liability Convention.

2. In the event of a claim arising out of the Liability Convention, the Partners (and ESA, if appropriate) shall consult promptly on any potential liability, on any apportionment of such liability, and on the defense of such claim.

3. Regarding the provision of launch and return services provided for in Article 12(2), the Partners concerned (and ESA, if appropriate) may conclude separate agreements regarding the apportionment of any potential joint and several liability arising out of the Liability Convention.

Article 21  
Intellectual Property

1. For the purposes of this Agreement, "intellectual property" is understood to have the meaning of Article 2 of the Convention Establishing the World Intellectual Property Organization, done at Stockholm on 14 July 1967.

2. Subject to the provisions of this Article, for purposes of intellectual property law, an activity occurring in or on a Space Station flight element shall be deemed to have occurred only in the territory of the Partner State of that element's registry, except that for ESA-registered elements any European Partner State may deem the activity to have occurred within its territory. For avoidance of doubt, participation by a Partner State, its Cooperating Agency, or its related entities in an activity occurring in or on any other Partner's Space Station flight element shall not in and of itself alter or affect the jurisdiction over such activity provided for in the previous sentence.

3. In respect of an invention made in or on any Space Station flight element by a person who is not its national or resident, a Partner State shall not apply its laws concerning secrecy of inventions so as to prevent the filing of a patent application (for example, by imposing a delay or requiring prior authorization) in any other Partner State that provides for the protection of the secrecy of patent applications containing information that is classified or otherwise protected for national security purposes. This provision does not prejudice (a) the right of any Partner State in which a patent application is first filed to control the secrecy of such patent application or restrict its further filing; or (b) the right of any other Partner State in which an application is subsequently filed to restrict, pursuant to any international obligation, the dissemination of an application.

4. Where a person or entity owns intellectual property which is protected in more than one European Partner State, that person or entity may not recover in more than one such State for the same act of infringement of the same rights in such intellectual property which occurs in or on an ESA-registered element. Where the same act of infringement in or on an ESA-registered element gives rise to actions by different intellectual property owners by

virtue of more than one European Partner State's deeming the activity to have occurred in its territory, a court may grant a temporary stay of proceedings in a later-filed action pending the outcome of an earlier-filed action. Where more than one action is brought, satisfaction of a judgment rendered for damages in any of the actions shall bar further recovery of damages in any pending or future action for infringement based upon the same act of infringement.

5. With respect to an activity occurring in or on an ESA-registered element, no European Partner State shall refuse to recognize a license for the exercise of any intellectual property right if that license is enforceable under the laws of any European Partner State, and compliance with the provisions of such license shall also bar recovery for infringement in any European Partner State.

6. The temporary presence in the territory of a Partner State of any articles, including the components of a flight element, in transit between any place on Earth and any flight element of the Space Station registered by another Partner State or ESA shall not in itself form the basis for any proceedings in the first Partner State for patent infringement.

#### Article 22 Criminal Jurisdiction

In view of the unique and unprecedented nature of this particular international cooperation in space:

1. The United States, the European Partner States, Japan, and Canada may exercise criminal jurisdiction over the flight elements they respectively provide and over personnel in or on any flight element who are their respective nationals, in accordance with Article 5(2).

2. In addition, the United States may exercise criminal jurisdiction over misconduct committed by a non-U.S. national in or on a non-U.S. element of the manned base or attached to the manned base which endangers the safety of the manned base or the crew members thereon; provided that, before proceeding to trial with such a prosecution, the United States:

(a) shall consult with the Partner State whose national is the alleged perpetrator concerning the prosecutorial interests of both States; and

(b) shall have either

(1) received the concurrence of such Partner State in the continuation of the prosecution; or

(2) if such concurrence is not forthcoming, failed to receive assurances from such Partner State that it intends to prosecute its national on commensurate charges supported by the evidence.

## INDEX TO VOLUME 16

- Aerospace Plane, 147-156.
  - Delimitation of Airspace and Outer Space, 149-150
  - General Characteristics, 147.
  - Legal and Policy Alternatives, 147-156.
  - Liability Issues, 151-152.
  - Other Issues, 155.
  - Registration Issues, 152-154.
  - Space Object Issues, 154-155.
  - Status of Astronauts, 150-151.
- Almond, Harry H. Jr., *The Strategic Defense Initiative: What If the United States Terminates Its Program to Defend Itself?*, 75-80.
- Anti-Ballistic Missile Treaty, 76, 77, 79.
- Arms Control and Disarmament 45, 72, 157-159, 164.
- Astronauts, Status of, 150-151.
- Ban on Nuclear Reactor, 94.
- Biological Contamination, 119.
- Book Reviews/Notices, 96-99, 201-211.
  - Brotman, Stuart N., *The Telecommunications Deregulation Sourcebook*, 97-98.
  - Din, Allen M., *Arms and Artificial Intelligence*, 210.
  - Elbert, Bruce E., *Introduction of Satellite Communications*, 210.
  - Goldman, Nathan C., *American Space Law - National and International*, 208.
  - Jansky, Donald and Jeruchim, Michael, *Communications Satellites in Geostationary Orbit*, 209.
  - McCauley, Molly K., *Economics and Technology in U. S. Space Policy*, 210.
  - Matte, Nicolas M., *Arms Control and Disarmament*, 205-207.
  - Rothblatt, Martin A., *Radiodetermination Satellite Services and Standards*, 98.
  - Taishkoff, Marika N. and Pinter, Francis, *State Responsibility and the Direct Broadcast Satellite*, 210.
  - Torres, George, *The Space Shuttle - A Quantum Leap*, 96
  - Vereshchetin, V., Vasilevaskaya, E. and Kamenetskaya, E., *Outer Space: Politics and Law*, 203-205.
  - Von Welck, Stephan Frhr. and Renate Platzöder, *Weltraumrecht - (Law of Outer Space)*, 201-203.
  - White, Frank, *The Overview Effect, Space Exploration and Human Evolution*, 211.
  - White, Rita L. and White, Harold M., *The Law and Regulation of International Space Communication*, 207-208.
  - Zwaan, Tanja L. *et al.*, *Space Law: Views of the Future*, 209.

- Bourély, Michel, *Legal Problems Posed by the Commercialization of Data Collected by the European Remote Sensing Satellite ERS-1*, 129-146.
- Christol, Carl, *Remote Sensing and International Space Law*, 21-44.
- Clonospheric Institute, 84
- Cocca, Aldo Armando, *The Central Role of Eugène Pépin in the Teaching of and Research on Space Law: A Note in Memoriam*, 171-182.
- Colloquium on the Law of Outer Space, 95, 163-170, 177.
- Columbia, the First Space Shuttle, 96.
- Commercial Space Law Act Amendments of 1988, 184-185.
- Commercialization of Space Activities, 68, 90, 129-146.
- Common Heritage Concepts, 84.
- Common Heritage Institute, 88-89.
- Conference on Cooperation in Space, 86.
- Conference on the History of Aviation and Space Investigations, 85.
- Convention on the Prohibition of Military and Other Hostile Use of Environmental Modification Techniques, 123.
- Copper Canyon Program, 148.
- COSMOS 1900, 159.
- COSMOS 1990, 94.
- COSPAR, 162.
- Current Documents, 110-115, 220-226.
- U.S. Commercial Space Transportation Risk Allocation and Insurance - An AIAA Position Paper, 110-115.
- Agreement Among the Governments of the United States of America, Governments of Member States of the European Space Agency, the Government of Japan, and the Government of Canada on Cooperation in the Detailed Design, Development, Operation and Utilization of the Permanently Manned Civil Space Station, Signed September 29, 1988 in Washington, D.C. (Excerpts), 220-226.
- Delta 1180 Experiment, 92.
- Doyle, Stephen E., *U. S. National Space Policy Comprehensively Revised: A Commentary*, 64-75.
- Economic Policy Council, 68.
- Environmental Problems in Space, 91-93, 117-127, 169, 189
- European Space Agency (ESA), 52, 133-146.
- Events of Interest
- A. Past Events, 45-94, 157-200.
- Reports, 45-57, 157-171.
- Review of the United Nations' Work in the Peaceful Uses of Outer Space in 1987 (*N. Jasentuliyana*), 45-50.

- The 25th Session of the Scientific and Technical Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Space, February 16-26, 1988 (*Vladimir Kopal*), 50-57.
- The 27th Session of the Legal Sub-Committee of the UN Committee on the Peaceful Uses of Outer Space, March 14-31, 1988 (*Paul C. Szasz*), 57-63.
- Review of the Work of the United Nations concerning Outer Space in 1988 (*N. Jasentuliyana*), 157-163.
- The 31st Colloquium on the Law of Outer Space. Bangalore, Oct. 8-15, 1988 (*I.H. Ph. Diederiks-Verschoor*), 163-170.

Comments/Notes 64-85, 171-185.

- U. S. National Space Policy Comprehensively Revised: A Commentary (*Stephen E. Doyle*), 64-75.
- The Strategic Defense Initiative: What if the United States Terminates its Program to Defend Itself? (*Harry A. Almond, Jr.*), 75-80.
- Development of Space Research in Pakistan (*Salim Mehmud*), 80-85.
- The Central Role of Eugène Pépin in the Teaching of and Research on Space Law (*Aldo Armando Cocca*), 171-182.
- The U.S./International Space Station Agreement of September 29, 1988: Some Legal Highlights (*Katherine M. Gorove*), 182-184.
- The Commercial Space Launch Act Amendments of 1988: A Brief Overview (*Katherine M. Gorove*), 184-185.

Short Accounts, 85-93, 185-200.

- The 30th Anniversary of the Space Era: International Conferences and Forums (*E. Kamenetskaya and E. G. Zhukova*), 85-86.
- Seminar on "Open Skies," Washington D.C., November 4, 1987 (*Colleen Driscoll Sullivan*), 87-88.
- The Common Heritage Institute's 20th Anniversary Colloquium on "The Common Heritage Concept: Past, Present and Future," Villanova, December 11 and 12, 1987 (*Colleen Driscoll Sullivan*), 88-89.
- Second International Conference on the Commercial and Industrial Uses of Outer Space, Montreux, Switzerland, February 21-25, 1988 (*Jerzy*

*Rzymanek*), 89-91.

Environmental Aspects of Activities in Outer Space -  
State of the Law and Measures of Protection,  
International Colloquium Organized by the  
Institute of Air and Space Law, Cologne  
University, held at Cologne, May 16-19, 1988  
(*Elmar Vitt*), 91-93.

The Latin American Conference on International Air  
Transport and Outer Space Activities, Mexico City,  
14-18, August 1988 (*Pablo M.J. Mendes and Tanja  
L. Zwaan*), 185-188.

Space Law Session at the Warsaw Conference of the  
International Law Association, August 22, 1988,  
(*Stephen Gorove*), 188-189.

The 5th Intercosmos Seminar, Berlin, September 26-  
October 1, 1988 (*Ryszard Hara and Andrzej  
Jacewicz*), 190-191.

International Academy of Astronautics Symposium on  
Benefits to Society From Space Activities,  
Bangalore India, Oct. 11, 1988 (*Stephen  
Gorove*), 192-194.

International Colloquium on "Les Satellites de  
Télécommunications et le Droit International"  
(Telecommunications Satellites and International  
Law), Bruxelles, November 8, 1988 (*Neri Sybesma-  
Knol*), 193-197.

Other Events, 93, 198.

Brief News, 94, 198.

#### B. Forthcoming Events, 95, 200.

Export Restriction on Space Technology, 90.

Funding Requirements of the U.S. Space Program, 94.

Geosphere-Biosphere Program, 49.

Geostationary Orbit, 48, 55, 60, 160, 167.

Gorove, Katherine M., *The U.S./International Space Station Agreement of  
September 8, 1988: Some Legal Highlights*, 182-184.

Gorove, Katherine M., *The Commercial Space Launch Act Amendments of  
1988: A Brief Overview*, 184-185.

Gorove, Stephen, *Legal and Policy Issues of the Aerospace Plane*, 147-156.

He, Qizhi, *Environmental Impact of Space Activities and Measures for  
International Protection*, 117-127.

Innocent passage, 150.

- Insurance, 110-115.  
Inter-Agency Meeting on Outer Space Activities, 52.  
Intercosmos Seminar, 190-191.  
International Academy of Astronautics Symposium, 192-103.  
International Astronautical Federation (IAF), 162.  
International Colloquium on Telecommunications Satellites and International Law, 193-197.  
Internationalizing Commercial Remote Sensing, 87.  
International Conference on Space Commercialization: Roles of Developing Countries, 95.  
International Maritime Satellite Organization (INMARSAT), 52.  
International Satellite Launch Center, 91.  
International Satellite Monitoring Agency (ISMA), 159.  
International Space Year (1992), 163.  
International Telecommunication Union (ITU), 52.
- Jasentuliyana, N., *Review of the United Nations' Work in the Peaceful Uses of Outer Space in 1987*, 45-50.  
Jasentuliyana, N. *Review of the Work of the United Nations Concerning Outer Space in 1988*, 157-163.
- Keep-Out Zones, 164-167.  
Kopal, Vladimir, *The 25th Session of the Scientific and Technical Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Space*, 50-57.
- Landsat Act, 87.  
Latin American Conference of the Law of Air Transport and Outer Space, 95.  
Launch Vehicles and Priorities, 70-72.  
Legal Aspects of Space Business, 90.  
Liability Convention of 1972, 126, 151-155.
- Manned Space Mission to Mars, 94.  
Manufacturing in Space, 97.  
Mehmud, Salim, *Development of Space Research in Pakistan*, 80.  
Mercury and Gemini Programs, 96.  
Microgravity Experiments in Space, 49, 56  
Militarization of Space, 79.  
Moon Agreement of 1979, 122.  
NASA, 66, 67, 72, 81, 92, 94.  
NAS Act of 1958, 66.  
NOAA, 66.  
North American Aerospace Defense Command (NORAD), 121.  
Nuclear Power Sources in Outer Space, 47, 50, 54, 57, 60, 91, 159-160.  
Guidelines and Criteria for Safe Use, 47.  
Nuclear Weapons, 75, 76.



- Objective of U.S. Civil Space Sector, 66.
- OMB Circular A-25, 69.
- Open Skies Proposal of 1955, 8.
- Operational Anti-Satellite System, 71.
- Outer Space Affairs Division, 49, 53.
- Outer Space, defined, 48, 60, 160.
- Outer Space Treaty of 1967, 149-154, 156, 162-170.
  
- Pakistan Space and Upper Atmosphere Research  
Commission (SUPARCO), 80.
- PAKSAT, 82.
- Partial Test Ban Treaty, 122.
- Peaceful Uses for Outer Space, 89.
- Pépin, Eugène, 1, 164, 171-182.
- Planetary Exploration, 56.
- Pollution, 118-120.
  - Biological, 119-120.
  - Chemical, 118-119.
- President's Space Program, 73, 74.
- Principles under which U.S. Goals Will Be Pursued, 65.
- Project Pathfinder, 74, 75.
  
- Radiodetermination Satellite Service, 98.
- Registration Convention, 153-154.
- Remote Sensing of the Earth by Satellite, 49, 55, 82, 87, 129-146.
- Restrictions on the Export of Space Technology, 90.
  
- SALT Agreements, 76, 77, 79.
- Senior Interagency Group on Space (SIG), 68, 72.
- Skylab, 96.
- Sounding Rockets, Launch, 81.
- Sounding Rocket Fabrication Plant, 81.
- Soviet Soyuzkarta Organization, 87.
- Space and International Relations, 86.
- Space Challenge '88, 89.
- Space Control, 70.
- Space Debris, 72, 73, 117-127.
- Space Era, Thirtieth Anniversary of, 85.
- Space Law Interest Group (ASIL), 93, 200.
- Space Medicine, 49.
- Spacelab, 97.
- Space Object, 125, 152-154.
- Space Station Agreement, U.S./International,
  - Some Legal Highlights, 182.
  - Text (excerpts), 220.

- Spot Satellite, 87, 130.  
Strategic Defense Initiative, 69, 75-80, 96.  
Symposium on Outstanding Achievements in Space Exploration, 56, 57.  
Szasz, Paul C., *The 27th Session of the Legal Sub-Committee of the U.N. Committee on the Peaceful Uses of Outer Space*, 57-63.  
  
Tactical Ballistic Missile Defense System, 72.  
Technical Committee on Legal Concepts of Aeronautics and Astronautics, 94.  
Technospace '88, 95.  
Television Receive-Only Terminals (TVRO), 83.  
Titan ELV Program, 70.  
  
United Nations Committee on the Peaceful Uses of Outer Space (UNCOPOUS, COPUOS), 45-50, 157-163.  
    Legal Subcommittee, 57-63, 159ff.  
    Scientific and Technical Subcommittee, 50-56, 159ff.  
United Nations General Assembly Res. 37/90, 10 December 1982, 51.  
United Nations General Assembly Res. 42/33 (1987), 45.  
United Nations General Assembly Res. 42/68 (1987), 46, 53.  
United Nations General Assembly Res. A/43/27, 158.  
United Nations General Assembly Res. 43/56 (1988), 157-158.  
United Nations General Assembly Res. 43/70 (1988), 157.  
U.N. International Meeting of Experts on Space Science and Technology, 51.  
UNISPACE 82, 49, 50, 51, 161.  
U.N. Program on Space Applications, 50, 51, 52, 53, 161.  
U.S. Leadership in the International Sphere of the 198 Dept. of Commerce (NOAA) Regulations, 87.  
U.S. Space Goals, 64, 65.  
Vienna Convention for Protection of the Ozone Layer, 169.  
Zhukov, G. P. *In Honor of Dr. Pepin*, 1.

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**VOLUME 16, NUMBER 2  
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VOLUME 16	CONTENTS	1988
-----------	----------	------

---

(No. 1, 1988, pp. 1-116; No. 2, 1988, pp.117-233)

In Honor of Dr. Pépin (*G. P. Zhukov*).....1

## ARTICLES

- The Role of the United Nations Declarations of Principles in the  
Progressive Development of Space Law (*Vladimir Kopal*)...5
- Remote Sensing and International Space Law (*Carl Q. Christol*)...21
- Environmental Impact of Space Activities and Measures for  
International Protection (*He Qizhi*).....117
- Legal Problems Posed by the Commercialization of Data Collected  
by the European Remote Sensing Satellite ERS-1 (*Michel  
Bourély*) .....129
- Legal and Policy Issues of the Aerospace Plane (*Stephen  
Gorove*).....147

## SPECIAL FEATURES

Events of Interest.....45-94, 157-200

A. Past Events.....45-94, 157-200

### Reports

- Review of the United Nations Work in the Peaceful Uses of  
Outer Space in 1987 (*N. Jasentuliyana*).....45
- The 25th Session of the Scientific and Technical Sub-Committee  
of the United Nations Committee on the Peaceful Uses  
of Outer Space, February 16-26, 1988 (*Vladimir  
Kopal*).....50
- The 27th Session of the Legal Sub-Committee of the United Nations  
Committee on the Peaceful Uses of Outer Space,  
March 14-31, 1988 (*Paul C. Szasz*).....57
- Review of the Work of the United Nations Concerning  
Outer Space in 1988 (*N. Jasentuliyana*).....157

The 31st Colloquium on the Law of Outer Space, Bangalore, October 8-15, 1988 ( <i>I.H.Ph. Diederiks-Verschoor</i> ).....	163
--	-----

#### Comments/Notes

U.S./National Space Policy Comprehensively Revised: A Commentary ( <i>Stephen E. Doyle</i> ) .....	64
The Strategic Defense Initiative: What if the United States Terminates its Program to Defend Itself? ( <i>Harry A. Almond, Jr.</i> ).....	75
Development of Space Research in Pakistan ( <i>Salim Mehmud</i> ).....	80
The Central Role of Eugène Pépin in the Teaching of and Research on Space Law: A Note in Memoriam ( <i>Aldo Armando Cocca</i> ) .....	171
The U.S./International Space Station Agreement of September 29, 1988: Some Legal Highlights ( <i>Katherine M. Gorove</i> ).....	182
The Commercial Space Launch Act Amendments of 1988: A Brief Overview ( <i>Katherine M. Gorove</i> ).....	184

#### Short Accounts

The 30th Anniversary of the Space Era: International Conferences and Forums ( <i>E. Kamenetskaya and E.G. Zhukova</i> ).....	85
Seminar on "Open Skies", Washington, D.C., November 4, 1987 ( <i>Colleen Driscoll Sullivan</i> ).....	87
The Common Heritage Institute's 20th Anniversary Colloquium on "The Common Heritage of Mankind Concept: Past, Present and Future," Villanova, December 11 and 12, 1987 ( <i>Colleen Driscoll Sullivan</i> ).....	88
Second International Conference on the Commercial and Industrial Uses of Outer Space, Montreux, Switzerland, February 21-25, 1988 ( <i>Jerzy Rzymanek</i> ).....	89
"Environmental Aspects of Activities in Outer Space - State of the Law and Measures of Protection." International Colloquium organized by the Institute of Air and Space Law, Cologne University, held at Cologne, May 16-19, 1988 ( <i>Elmar Vitt</i> ).....	91
The Latin American Conference on International Air Transport and Outer Space Activities, Mexico City, 14-18 August 1988 ( <i>Pablo M. J. Mendes de Leon and Tanja L. Zwaan</i> ).....	185
Space Law Session at the Warsaw Conference of the International Law Association, August 22, 1988 ( <i>Stephen Gorove</i> ).....	188
The 5th Intercosmos Seminar, Berlin, September 26-October 1, 1988 ( <i>Ryszard Hara and Andrzej Jecewicz</i> ).....	190

International Academy of Astronautics Symposium on "Benefits to Society from Space Activities," Bangalore, India, October 12, 1988 ( <i>Stephen Gorove</i> ).....	192
International Colloquium on "Les Satellites de Télécommunications et le Droit International" (Telecommunications Satellites and International Law), Bruxelles, November 8, 1988 ( <i>Neri Sybesma-Knol</i> ).....	193
Other Events.....	93, 198
Brief News.....	94, 198
 B. Forthcoming Events.....	95, 200
 Book Reviews/Notices.....	96-99, 201-211
George Torres, Space Shuttle, A Quantum Leap.....	96
Stuart N. Brotman (ed.) The Telecommunications Deregulation Sourcebook.....	97
Martin A. Rothblatt, Radiodetermination Satellite Services and Standards.....	98
Von Welck, Stephan Frhr. and Renate Platzöder, Weltraumrecht - Law of Outer Space ( <i>Vladimir Kopal</i> ).....	201
V. Vereshchetin, E. Vasilevskaya and E. Kamenetskaya, Outer Space: Politics and Law ( <i>G. Silvestrov</i> ).....	203
Nicolas M. Matte (ed.) Arms Control and Disarmament in Outer Space. Vol. II.....	205
Rita L. White and Harold M. White, Jr. The Law and Regulation of International Space Communication.....	207
Nathan C. Goldman, American Space Law - National and International.....	208
Donald Jansky and Michael Jeruchim, Communications Satellites in Geostationary Orbit.....	209
Tanja L. Zwaan <i>et al.</i> (eds.), Space Law: Views of the Future.....	209
Molly K. McCauley, Economics and Technology in U. S. Space Policy.....	210
Marika N. Taishkoff and Francis Pinter, State Responsibility and the Direct Broadcast Satellite.....	210
Bruce E. Elbert, Introduction of Satellite Communications.....	210
Allen M. Din, Arms and Artificial Intelligence: Weapons and Arms Control Applications of Advanced Computing.....	210
Frank White, The Overview Effect, Space Exploration and Human Evolution.....	211



**Recent Publications.....100-109, 212-219**

Books.....	100, 212
Articles.....	100, 212
Reports.....	102, 214
Comments.....	102, 214
Book Reviews/Notices.....	102, 214
Official Publications.....	103, 215
Miscellaneous.....	106, 219

**Current Documents.....110-115, 220-226**

U.S. Commercial Space Transportation Risk Allocation and Insurance, An AIAA Position Paper (January 1988).....110

Agreement Among the Government of the United States of America, Governments of Member States of the European Space Agency, the Government of Japan, and the Government of Canada on Cooperation in the Detailed Design, Development, Operation, and Utilization of the Permanently Manned Civil Space Station, Signed September 29, 1988 in Washington, D.C. (Excerpts).....220

**Index.....227-233**

# UNITED STATES SPACE LAW

## National & International Regulation

Compiled and edited by

**STEPHEN GOROVE**

A newcomer to the family of legal disciplines, space law has experienced one of the fastest growths in legal doctrines and institutional practices during the past two decades, especially in the international field. Today the network of institutions—domestic, foreign and international—dealing with matters of outer space encompasses a broad and ever widening panorama. This service brings together national and international regulations pertaining to outer space. These include national laws, decrees, orders, bills, reports, court decisions, relevant references, tables, and lists. For the international area, there are draft treaties, proposals and reports as well as actual treaties. There will be periodic supplementation to ensure that the material is current.

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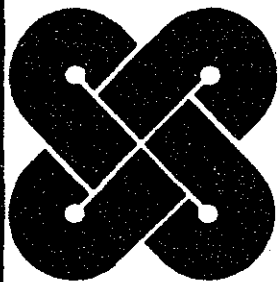
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