

JOURNAL

OF

SPACE

LAW

VOLUME 21, NUMBER 1

1993

JOURNAL OF SPACE LAW

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

VOLUME 21

1993

NUMBER 1

EDITORIAL BOARD AND ADVISORS

BERGER, HAROLD
Philadelphia, Pennsylvania

GALLOWAY, EILENE
Washington, D.C.

BÖCKSTIEGEL, KARL-HEINZ
Cologne, Germany

GOEDHUIS, D.
London, England,

BOURÉLY, MICHEL G.
Luzillé par Bléré, France

HE, QIZHI
Beijing, China

COCCA, ALDO ARMANDO
Buenes Aires, Argentina

JASENTULIYANA, NANDASIRI
New York, N.Y.

DEMBLING, PAUL G.
Washington, D. C.

KOPAL, VLADIMIR
Prague, Czechoslovakia

DIEDERIKS-VERSCHOOR, I.H. PH.
Baarn, Holland

MCDUGAL, MYRES S.
New Haven, Connecticut

FASAN, ERNST
Neunkirchen, Austria

VERESHCHETIN, V.S.
Moscow, Russian Federation

FINCH, EDWARD R., JR.
New York, N.Y.

ZANOTTI, ISIDORO
Washington, D.C.

STEPHEN GOROVE, Chairman
Oxford, Mississippi

All correspondence should be directed to the JOURNAL OF SPACE LAW,
P.O. Box 308, University, Mississippi 38677.

The subscription rate for 1993 is \$69.50 (domestic) and \$75
(foreign) for two issues. Single issues may be ordered at \$38 per issue
(postage and handling included).

Copyright © JOURNAL OF SPACE LAW 1993

Suggested abbreviation: J. SPACE L.

JOURNAL OF SPACE LAW

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

VOLUME 21

1993

NUMBER 1

CONTENTS

In Memoriam: Judge Manfred H. Lachs (1914-1993)
(*Stephen Gorove*).....i

ARTICLES

Settlement of Disputes Regarding Space Activities (*Karl-Heinz
Böckstiegel*).....1
Toward a Clarification of the Term "Space Object" -
An International Legal and Policy Imperative?
(*Stephen Gorove*)..... 11

SPECIAL FEATURES

Events of Interest.....27

A. *Past Events*27

Reports

"International Space Cooperation: Learning from the Past,
Planning for the Future," Kona (Hawaii), 13-15 December
1992 (*Kevin J. Madders*).....27
U.N. Scientific and Technical Subcommittee on Outer Space Holds
Annual Meeting in New York (*Ralph Chipman*).....30
Commercial and Industrial Applications in Space: Insurance
Implications (*Marco Molino*).....35
U.N. Legal Subcommittee on Space Convenes its Thirty-Second
Session (22 March-8 April 1993) (*Cheryl Stoute*).....39
Legal Issues of Communications Satellites in LEO (*Marco
Ferrazzani*).....44
Space Debris Mitigation and Policy Issues (*W. Flury*).....46
Second Pan-American Space Conference, Santiago (Chile), 26-30
April 1993 (*Sylvia Ospina*).....50
The Law in Relation to Remote Sensing Satellite Techniques for
the Benefit of the Environment (*Anne-Marie Malavialle*)...52

Comments

The Development of Satellite Communications Law in the FCC:
Highlights of Ten Leading Decisions and Future
Expectations (*M. A. Rothblatt*).....56

Case Note

Avtec Systems, Inc. v. Peiffer.....60

Short Accounts

Nuclear Issues and the Global Environment (*Jonathan Galloway*)..63
Settlement of Space Law Disputes (*Katherine M. Gorove*).....64

Congressional Notes.....65
International Developments.....65
IISL Moot Court Competition.....66
Other Events.....66
Brief News67

B. *Forthcoming Events*.....68

Book Reviews/Notices.....69

ANDEM, MAURICE N., INTERNATIONAL LEGAL PROBLEMS IN THE
PEACEFUL EXPLORATION AND USE OF OUTER SPACE
(*Henri A. Wassenbergh*).....69

JASENTULIYANA, N. (ED.), SPACE LAW: DEVELOPMENT AND
SCOPE (*Katherine M. Gorove*).....70

LEANZA, UMBERTO (ED.), THE FUTURE OF INTERNATIONAL
TELECOMMUNICATIONS (*Katherine M. Gorove*).....71

CENTRE D'ETUDES ET DE RECHERCHES SUR LE DROIT DE L'ESPACE,
FAUT-IL CRÉER UNE ORGANISATION MONDIALE
DE L'ESPACE? (*Katherine M. Gorove*).....72

CHENG, CHIA-JUI/MENDES DE LEON, PABLO (EDS.), THE HIGHWAYS
OF AIR AND OUTER SPACE OVER ASIA.....73

MAYER, JILL S. (ED.), PROCEEDINGS OF THE SEVENTH
ANNUAL INTERNATIONAL SPACE DEVELOPMENT CONFERENCE -
SPACE: THE NEXT RENAISSANCE.....74

BLACKLEDGE, ROBERT C./REDFIELD, CAROL L./SEIDA, STEVEN B.
(EDS.), PROCEEDINGS OF THE TENTH ANNUAL INTERNATIONAL
SPACE DEVELOPMENT CONFERENCE - SPACE: A CALL FOR ACTION.....74

HEINTZE, HANS-JOACHIM (ED.), REMOTE SENSING UNDER CHANGING CONDITIONS.....	75
REIJNEN, BESS C.M., THE UNITED NATIONS SPACE TREATIES ANALYSED.....	75
HARRIS, PHILIP R., LIVING AND WORKING IN SPACE - HUMAN BEHAVIOR, CULTURE AND ORGANIZATION.....	76
MARTIN, PIERRE-MARIE, LES TEXTS DU DROIT DE L'ESPACE.....	76
EUROPEAN CENTRE FOR SPACE LAW, SPACE LAW TEACHING IN EUROPE.....	76
Recent Publications.....	78
Books.....	78
Contributions to Books.....	79
Articles.....	80
Reports.....	81
Comments.....	82
Case Law.....	82
Short Accounts.....	83
Book Reviews/Notices.....	83
Official Publications.....	84
Case Reported.....	86
Miscellaneous.....	87
Current Documents.....	91
Status of Outer Space Treaties (as of 10 February 1933).....	91

**In Memoriam: Judge Manfred H. Lachs
(1914-1993)**

Dr. Manfred H. Lachs, distinguished Judge of the International Court of Justice, honored President of the International Institute of Space Law, seasoned diplomat, eminent scholar and, above all, a warm human being, held in the highest respect among colleagues and friends all over the world, died on January 14, 1993.

Born on April 21, 1917, in Poland and a recipient of degrees from Cracow (LL.M. and J.D.), Nancy (Doctor of the University) and Moscow (D. Sc.) Universities and a laureate from Cracow University, Judge Lachs held leading positions during the post World War II era in his native Poland's Ministry for Foreign Affairs and, later, as Minister Plenipotentiary and Ambassador of his country. He served as Chairman of the Sixth Committee on the U.N. General Assembly and of the Legal Subcommittee of the U.N. Committee on the Peaceful Uses of Outer Space. From 1973-1976, he also served as President of the International Court of Justice and, in 1990, he was elected President of the International Institute of Space Law.

As a member of the International Law Commission, the Institut de Droit International and frequent lecturer at leading institutions of higher learning around the world, Dr. Lachs received many distinguished awards, including those from the American Society of International Law, the International Astronautical Federation and the International Institute of Space Law. He was a prolific writer enriching the literature with such eminent scholarly treatises as *THE LAW OF OUTER SPACE* (1972) and *THE TEACHER IN INTERNATIONAL LAW* (1983). His lead articles appeared in many legal periodicals, including those of the *AMERICAN JOURNAL OF INTERNATIONAL LAW* and the *JOURNAL OF SPACE LAW*.

The International Institute of Space Law mourns the death of a genuine leader, and the grief in the loss of a distinguished judge, great statesman, profound scholar and true friend is shared not only by the international community, but also by this writer and the *JOURNAL OF SPACE LAW* which he honored with his writing.

Stephen Gorove
Vice President, International Institute of Space Law
Chairman, Ed. Board, *JOURNAL OF SPACE LAW*

SETTLEMENT OF DISPUTES REGARDING SPACE ACTIVITIES

Prof. Dr. Karl-Heinz Böckstiegel*

Introduction

Differences of opinions and disputes regarding space activities have occurred from the very beginning of such activities. For a long time during which only the exploration and much less the practical use of outer space took place, such differences and disputes were more of an academic and abstract nature. Natural scientists, legal scholars, politicians, and diplomats disagreed at the national or international level on what could or should be done, what was permitted or forbidden, and which technical, political, and legal steps should be made in the future. All this had little practical impact. Every state, institution, enterprise, and person proceeded as they felt appropriate.

This situation has changed in recent years. With the growing practical use of outer space and the growing number of states, state institutions, international organizations, and private enterprises indirectly or directly involved or at least interested in space activities situations occurred and occur where the various views and uses are practically incompatible. If, as an example, only a limited number of locations are available on the Geostationary Orbit for certain satellites for technical reasons, the diverging views of the states as to the right of access to this Orbit cannot any longer stand beside each other and be implemented, if it is foreseeable that they interfere with each other or even exclude each other. In such a case a solution has to be found in order to assure that an orderly and effective exploration and use of outer space can continue in the future for the benefit of all concerned and for the benefit of the international community.

Space activities and space law, in this context, are of course not in a historically unique or unknown situation. Often in the history of

* Director of the Institute of Air and Space Law and Holder of the Chair for International Business Law, Cologne University; Chairman of Advisory Council, German National Space Agency (DARA); Chairman, Space Law Committee of the International Law Association; Member of the Board of Directors of the International Institute of Space Law; President of the Iran-United States Claims Tribunal, The Hague, 1984-1988; President, European Council, London Court of International Arbitration (LCIA).

This article is an elaboration of the address presented by Prof. Dr. Karl-Heinz Böckstiegel at the Annual Meeting of the American Society of International Law in Washington, D.C. on April 1, 1993.

international relations states have found themselves in a situation where new fields of international cooperation and international competition were in need of a legal framework and, in case no agreement could be reached between disputing partners, in need of a machinery for the settlement of disputes. It is a well-known weakness of public international law that, contrary to national law, rights and duties of a party cannot automatically be enforced against another party by access to and decision by courts. Again, to find a similar situation

in space law, is not a surprising problem. International law has developed a number of methods for the settlement of disputes at the international level most of which are already mentioned in Art. 33 of the Charter of the United Nations and in Resolution 2625 (XXV) of the UN General Assembly on "Principles of International Law Concerning Friendly Relations and Cooperations Amongst States in Accordance with the Charter". Not all of these methods can be dealt with here. In any case, decisive and the real tests are those which assure that a decision is achieved, even if one of the parties does not agree. These methods are international adjudication and international arbitration. These two methods are also possible options, if disputes occur regarding space activities.

2. *Disputes Between States*

Present codified space law - and there is quite a large volume of it by now - presents a diversified picture as far as dispute settlement is concerned. On one hand, one can list not less than 57 international instruments which in some way deal with the settlement of disputes regarding space activities. I have listed all of them in a paper¹ which I presented here in Washington in 1992 at the International Astronautical Congress and we have dealt with most of them in more detail at a research and international colloquium of the Cologne Institute of Air and Space Law some years earlier.² At first sight, this may look quite an impressive list. However, closer scrutiny soon reveals major weaknesses: The major space law treaties, including the Liability Convention, do not provide a machinery for binding dispute settlement. Such binding dispute settlement is only found in very specific instruments for highly limited areas of space activities.

Anyhow, as the issue of liability is of great practical importance and, in other fields of international law, very seldom is the subject of substantive and procedural rules, it must be considered as an important progress that the Space Liability Convention does indeed contain some provisions on dispute settlement. These provisions contain a similar solution as we find it in the Convention on the Law of Treaties, namely to

¹ 35 PROC. COLLOQ. L. OUTER SPACE 27 (1993).

² SETTLEMENT OF SPACE LAW DISPUTES - THE PRESENT STATE OF THE LAW AND PERSPECTIVES FOR FUTURE DEVELOPMENT. PROCEEDINGS OF AN INTERNATIONAL COLLOQUIUM IN MUNICH (K.-H. Böckstiegel ed., Cologne, 1980).

the effect that the only procedure really assured is that of conciliation: If no settlement of a claim is arrived at through diplomatic negotiations as provided for in Art. XI of the Liability Convention, at the request of either party a Claims Commission has to be established. Arts. XV to XVII deal with the details of the appointment and the procedure of this Claims Commission in a similar way as it is known from international arbitration. Contents and form of the decision of the Commission are also similar to what one is used to in an international arbitral award. Art. XVIII provides that the Claims Commission shall decide the merits of the claims for compensation and determine the amount of compensation payable, if any. As Art. XIV para. 1 refers to Art. XII, this determination has to be made "in accordance with international law and the principles of justice and equity". And the last sentence of Art. XIX para. 2 provides that the Commission shall state the reasons for its decision or award. The decisive weakness of this machinery for dispute settlement is caused by Art. XIX para. 2 which provides in its first sentence:

"The decision of the Commission shall be final and binding if the parties have so agreed; otherwise the Commission shall render a final and recommendatory award which the parties shall consider in good faith."

In other words: the decision is only binding if both parties agree. If the two parties so agree before the commencement of the procedure, one might consider the Claims Commission as an ad hoc arbitral tribunal. If the parties only so agree, after the Commission has decided, or if no agreement can be achieved between the parties so that the second alternative becomes applicable, the procedure before the Claims Commission can only be considered as conciliation. Therefore, conciliation only is assured in the Liability Convention, not, however, a binding decision. Under these circumstances it is not surprising that in the only actual dispute that has so far occurred under the Liability Convention, namely when the Soviet satellite Cosmos 954 with a nuclear power source fell on the territory of Canada, the two states negotiated until finally agreement was reached to the effect that the Soviet Union paid half of the amount originally claimed by Canada.³

Another international instrument of high practical relevance which fails to assure a binding decision in case of a dispute is the Agreement Among the Government of the USA, 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 of 29 September 1988. In order to assure from the very beginning that the cooperation on this space station be disturbed as little as possible by disputes, Art. 16 of

³ For further details, see K.-H. Böckstiegel, *Case Law on Space Activities*, in: *SPACE LAW - DEVELOPMENT AND SCOPE* 205, 206 (N. Jasentuliyana ed., Westport and London, 1992).

the Space Station Agreement provides for a very general cross-waiver of liability:

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.

In the very long and detailed further wording of Article 16 the states concerned waive not only all claims against other partner states but also against "a related entity of another Partner State and the employees of any of the entities identified". In addition, each Partner State shall extend the cross-waiver of liability to its own related entities by requiring them, by contract or otherwise, to agree to waive all claims against the entities or persons of the other Partner State. And the Article adds, in para. 3 c: "For avoidance of doubt, this cross-waiver of liability includes a cross-waiver of liability arising from the Liability Convention...". Should, nevertheless, still disputes arise regarding the Space Station, Art. 23 of the Space Station Agreement provides that primarily consultations should be used and then adds in par. 3: "If an issue not resolved through consultations still needs to be resolved, the concerned Partners may submit that issue to an agreed form of dispute resolution such as conciliation, mediation, or arbitration."

Thus it becomes clear that, similarly to the Liability Convention, a binding dispute settlement by arbitration can only be used if all Partners concerned agree. That, in fact, means that a binding dispute settlement is not assured. A special provision, Art. 22, deals with criminal jurisdiction over personnel on the Space Station.

In so far as not by these or similar provisions specific rules have been codified, what remains applicable are only the - weak - provisions of general public international law and of space law both of which are characterized by the lack of binding dispute settlement. The United States had suggested during the negotiations on the Outer Space Treaty in Art. 11 of the Draft they presented that "any disputes arising from the interpretation or application of this Agreement may be referred by any contracting party thereto to the International Court of Justice for decision". However, no agreement could be reached and what resulted was only the provision in Art. III of the Outer Space Treaty to the effect that "states parties to the Treaty shall carry on activities in the exploration and use of outer space, including the Moon and other Celestial Bodies, in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international cooperation and understanding."

That leaves us with Art. 2 para. 3 of the UN Charter calling for the settlement of international disputes by peaceful means and Art. 33 of the Charter with its non-mandatory listing of possible options for dispute settlement including "arbitration" and "judicial settlement". As is well

known, this has not led to many states submitting to the jurisdiction of the International Court of Justice, though the Court has had some more cases in recent years, specifically in certain areas like border disputes. The ICJ has had some more cases since it institutionalized in 1978 the option for Ad Hoc Chambers⁴ a procedure which enables the parties to select certain judges from the Court for such a Chamber to decide their case. Such a procedure which has been used several times brings of course the Court close to arbitration, because - as typically in arbitration - the parties really select their own judges for their specific case. On the other hand, international arbitration shows certain developments which are moving it closer to permanent international courts. One aspect of this development is that, for decades already, administered or institutionalized arbitration, rather than ad hoc arbitration is being used more often as illustrated by the well-known international arbitration institutions such as that of the International Chamber of Commerce⁵ whose arbitration rules are referred to in a great number of international business contracts including those concluded by states. A further step in this direction has been the institution of specific arbitration machinery for investment disputes with states by the Washington Convention which established the International Centre for Settlement of Investment Disputes in 1965. Lastly the arbitral process moved even closer to a permanent court when Iran and the United States in 1981 agreed to establish the Iran-United States Claims Tribunal in The Hague for disputes both between the two states and between one state and nationals of the other state,⁶ in the thus far largest international dispute with regard to the number of cases and the amounts of many billion dollars in dispute. As I have been the President of that Tribunal myself and all decisions of the Tribunal are published and in view of the many publications on the Tribunal both in the United States and elsewhere I will refrain from dealing with that experience in more detail.⁷

⁴ See S. Schwebel, 81 AM.J. INT'L L. 831 *et seq.* (1987).

⁵ In ICC arbitration, involvement of states as parties has a long tradition [see K.-H. Böckstiegel, *Arbitration of Disputes between States and Private Enterprises in the International Chamber of Commerce*, 59 AM.J. INT'L L. 579 (1965)] and goes up to 30 % of all ICC cases as the regular statistics of the ICC Court of Arbitration show.

⁶ Declaration of the Government of the Democratic and Popular Republic of Algeria (General Declaration); Declaration of the Government of the Democratic and Popular Republic of Algeria concerning the Settlement of Claims by the Government of the United States of America and the Government of the Islamic Republic of Iran (Claims Settlement Declaration); Undertakings of the Government of the United States of America and the Government of the Islamic Republic of Iran with respect to the Declaration of the Government of the Democratic and Popular Republic of Algeria (Undertakings); reprinted in 20 I.L.M. 224 *et seq.* (1981).

⁷ As examples for recent publications, see J. WESTBERG, *INTERNATIONAL TRANSACTIONS AND CLAIMS INVOLVING GOVERNMENT PARTIES - CASE LAW OF THE IRAN-UNITED STATES CLAIMS TRIBUNAL* (Washington, D.C., 1991); C. Brown, *The Lessons of the Iran-United States Claims Tribunal*, 32 VA. J. INT'L L. 421 *et seq.* (1992). Not an

What does all this mean for future dispute settlement regarding space activities between states? When the Space Law Committee of the International Law Association, some years ago, took up this matter for the first time and elaborated a Draft Convention on the Settlement of Space Law Disputes,⁸ this instrument followed as much as possible and as closely as possible the dispute settlement procedure of the Law of the Sea Convention. In this context it should be pointed out that the difficulties the Law of the Sea Convention has encountered in not finding ratification by major industrial states is in no way connected to the dispute settlement procedure. The solution offered in the Law of the Sea Convention is, of course, to give the state parties an option between adjudication by the International Court of Justice or by a specific Tribunal or arbitration, supplemented by the rule that, if the parties cannot agree on one of these methods, arbitration is the mandatory method of dispute settlement. In its Draft Convention on the Settlement of Space Law Disputes, the International Law Association made certain adaptations in comparison to the Law of the Sea Convention. Contrary to the International Tribunal for the Law of the Sea, the ILA Draft provided for an "International Tribunal for Space Law" only as an option of the state parties if they wished to establish such a tribunal at a later stage. Otherwise, the Draft gave the state parties a choice between the International Court of Justice and an arbitral tribunal constituted in accordance with section V of the Draft Convention. Similarly to the Law of the Sea Convention, the ILA Draft provides that arbitration is the mandatory method of dispute settlement, if a party has not expressed a choice or if two parties in dispute have not chosen the same method of dispute settlement.

The world of international relations and specifically the environment of space activities has changed considerably since the time of the early 80's when the ILA Draft was elaborated. It may therefore be time to take a new look of what is considered a feasible dispute settlement machinery between states regarding their space activities.

3. Disputes Within International Organizations

As in other areas of international law - one may only mention the Court of Justice of the European Community as an example - also in space law greater progress regarding a mandatory method of dispute settlement can be expected within the framework of international organizations. This

evaluation, but a selective resume of issues in the decisions of the Tribunal can be seen in: K.-H. Böckstiegel, *Zur Bedeutung des Iran-United States Claims Tribunal für die Entwicklung des internationalen Rechts*, FESTSCHRIFT DER RECHTSWISSENSCHAFTLICHEN FAKULTÄT ZUR 600-JAHR-FEIER DER UNIVERSITÄT ZU KÖLN 605 (Cologne 1988); K.-H. Böckstiegel, *Practice of International Dispute Settlement - Thoughts after Resigning as President of the Iran-United States Claims Tribunal*, in LIBER AMICORUM HONOURING NICOLAS MATEESCO MATTE 17 (Montreal 1989).

⁸ INTERNATIONAL LAW ASSOCIATION, REPORT OF THE 61ST CONFERENCE 325 *et seq.*, 334 *et seq.* (Paris 1984)

is less true for global organizations with a wide field of aims and functions, but applies for organizations which are either regional or created for a concrete specific field of space activities.

A good example is the Convention for the Establishment of the European Space Agency ESA. Art. XVII of that Convention provides that any dispute between two or more Member States which is not settled by the ESA Council shall, at the request of any party to the dispute, be submitted to arbitration. If not otherwise agreed, the arbitration tribunal shall consist of three members. Each party to the dispute shall nominate one arbitrator and the first two arbitrators shall nominate the third arbitrator who shall be the chairman of the arbitration tribunal. Member States of ESA which are not parties to the dispute may intervene in the proceedings with the consent of the arbitration tribunal if it considers that they have substantial interest in the decision of the case. The arbitration tribunal shall determine its seat and establish its own rules of procedure. The award of the arbitration tribunal shall be made by majority of its members and this award shall be final and binding on all parties to the dispute and no appeal shall lie against it. Thus, the ESA Convention provides for a typical arbitration procedure as it has been and is used in other fields of international law between states and in international business relations between private enterprises.

Arbitration is also the chosen method of dispute settlement for ESA's external contracts. Art. IV of Annex I to the ESA Convention grants ESA a far-reaching immunity from jurisdiction and execution, but Art. XXV of the same Annex provides as follows:

1. When concluding written contracts, other than those concluded in accordance with the Staff Regulations, the Agency shall provide for arbitration. The arbitration clause or the special arbitration agreement concluded to this end shall specify the law applicable and the country where the arbitrators sit. The arbitration procedure shall be that of that country.

2. The enforcement of the arbitration award shall be governed by the rules in force in the state on whose territory the award is to be executed.

ESA practice has complied with this ruling: The "General Clauses and Conditions for ESA Contracts" have continuously, including their latest Revision 5, included a mandatory arbitration clause which, if no other arbitration is foreseen in the specific contract, refers to the Arbitration Rules of the International Chamber of Commerce in Paris.

An example of a global international organization with a dispute settlement procedure is presented by the INTELSAT Convention. The Convention rules as follows in this respect:

Art. XVIII

(Settlement of Disputes)

a) All legal disputes arising in connection with the rights and obligations under this Agreement or in connection with obligations undertaken by Parties..., or between INTELSAT and one or more Parties, if not otherwise settled within a reasonable time, shall be submitted to arbitration in accordance with the provisions of Annex C to this Agreement.

This ruling is supplemented by a provision for non-mandatory arbitration for other disputes in the same Article:

Any legal dispute arising in connection with the rights and obligations under this Agreement or the Operating Agreement between one or more Parties and one or more Signatories may be submitted to arbitration in accordance with the provisions of Annex C to this Agreement, provided that the Party or Parties and the Signatory or Signatories involved agree to such arbitration.

The details regarding the arbitration procedure are then found in Annex C to the INTELSAT Convention: Art. 3 of that Annex rules that the INTELSAT Assembly of Parties selects 11 persons to be members of a Panel from which presidents of tribunals shall be selected, Art. 7 provides for confidentiality of the proceedings and Art. 13 provides that the decision of the arbitral tribunal is binding. Though INTELSAT therefore has a rather sophisticated dispute settlement machinery available, it should be added that, in practice, an arbitration procedure never was conducted, as I know very well since I am a member of the INTELSAT Panel myself.

4. Disputes Between Private Enterprises

Disputes between private enterprises in connection with space activities have in the past mostly occurred, because private enterprises delivered products and services as subcontractors or consortium members for space activities of states or international governmental organizations. With the growing direct participation of private enterprises in space activities disputes are bound to occur also in this context. In relative perspective, dispute settlement plays a greater role for private enterprises than for state institutions, because private enterprises do not have available diplomatic and political means and because private enterprises rely much more on calculating the exposure to costs and risks on the fulfillment of contractual obligations and, if necessary, on the enforcement for the other to fulfill the contract or pay damages. For dispute settlement between private enterprises regarding their activities for space or in space mostly the same legal sources and criteria are relevant which play a role in

the business cooperation and contractual relations between private enterprises in other areas of business.

The basic option available to private enterprises is that between adjudication by state courts and arbitration. While adjudication by courts is available without any specific agreement between the parties, arbitration is only mandatory if chosen by the parties in an arbitration agreement or in an arbitration clause in a contract. In business relations between private enterprises, arbitration is more and more the preferred method of dispute settlement both at the national and international level.

At the national level, normally companies choose the arbitration rules of national arbitration institutions such as the American Arbitration Association (AAA)⁹ in the United States and the German Institution of Arbitration (DIS)¹⁰ in Germany. In international business contracts, contractual practice mostly chooses the arbitration rules of the International Chamber of Commerce (ICC)¹¹ in Paris, of the London Court of International Arbitration (LCIA),¹² and of the United Nations Commission for International Trade Law (UNCITRAL)¹³ or of national institutions in certain preferred states such as Switzerland, Austria, and Sweden. While arbitration institutions will offer, in addition to their arbitration rules, certain administrative services to ensure that the arbitral procedure can be conducted effectively, not seldom the parties also choose ad hoc arbitration. In this latter case they would have to agree on provisions regarding all important details of the arbitral procedure within their contract or could agree on an UNCITRAL Arbitration Clause, because the UNCITRAL Arbitration Rules have been elaborated by experts from industrialized and developing countries to assure an effective procedural framework for ad hoc arbitration. Finally, it may be mentioned in this context that with the growing popularity of arbitration, many further rules

9 The AAA has several arbitration rules for various kinds of disputes at the national level and separate rules specifically for international cases.

10 The Deutsche Institution für Schiedsgerichtsbarkeit (DIS) has one set of rules (in German and English) applicable both to national and international disputes.

11 ICC arbitration is the most widely used in international business relations and is available already for more than 60 years.

12 The LCIA is an international arbitration institution with headquarters in London, Users Councils in the various regions of the world and rules for arbitration conducted anywhere in the world.

13 The UNCITRAL Arbitration Rules have been developed by practitioners from industrialized and developing countries. As they are made for ad hoc arbitrations which are not administered by a specific institution, they provide for an "appointing authority" in case problems arise regarding the appointment of the arbitrators. An adapted version of the UNCITRAL Rules has also been used by the Iran-United States Claims Tribunal at The Hague.

and institutions of arbitration have been created in recent years both at the national and international level most of which, however, have very little or no acceptance in international contract practice and therefore exist more or less only on paper without actual cases being conducted.

5. Concluding Remarks

On the basis of these short considerations regarding the settlement of disputes on space activities and on the basis of the material and information collected over recent years in publications and meetings, one may come to the following conclusions:

While certain regional and specific international instruments of codified space law provide for an efficient dispute settlement machinery, mostly choosing arbitration, most areas of space law, though codified on many other aspects, lack such a machinery or at least lack provisions for mandatory binding dispute settlement.

As more and more practical disputes have to be anticipated in the exploration and use of outer space by a growing number of states, international organizations and private enterprises, frameworks for effective dispute settlement will have to be developed at the international level in the near future.

This may be less necessary for commercial space activities, especially as far as the participation of private enterprises is concerned, because the international business community has developed and used for many years international commercial arbitration as the preferred method of dispute settlement. The space industry and state institutions active in commercial space activities including international organizations like ESA are already using this option as well.

TOWARD A CLARIFICATION OF THE TERM "SPACE OBJECT" -
AN INTERNATIONAL LEGAL AND POLICY IMPERATIVE?

Stephen Gorove*

A. INTRODUCTION

Notwithstanding the remarkable achievements of the U.N. Committee on the Peaceful Uses of Outer Space (COPUOS), as reflected in the drafting of five main space treaties, commonly known as the Outer Space Treaty,¹ the Rescue Agreement,² the Liability³ and Registration Conventions⁴ and the Moon Agreement,⁵ a number of crucial concepts and terms like "space object," "outer space," and "launch" remain only partially clarified while many others, including "space debris," "astronauts," "personnel" and "procurement" remain undefined.

There can be little doubt that a clarification of concepts and phrases used in major space agreements and other international instruments constitutes an important aspect of legal development which will have to be addressed by lawyers and policy makers in order to allay

* Chairman, Editorial Board, JOURNAL OF SPACE LAW; Director of Space Law and Policy Studies; Emeritus Professor, University of Mississippi Law Center; Vice President International Institute of Space Law; International Astronautical Federation and International Law Association Representative, U.N. Committee on the Peaceful Uses of Outer Space; Member, International Academy of Astronautics; Associate Fellow, American Institute of Aeronautics and Astronautics.

¹ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205 (*entered into force for the United States* Oct. 10, 1967) [hereinafter "Outer Space Treaty"].

² 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. No. 6599, 672 U.N.T.S. 119 (*entered into force for the United States* Dec. 3, 1968) [hereinafter "Rescue Agreement"].

³ Convention on International Liability for Damage Caused by Space Objects, March 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762, 961 U.N.T.S. 187 (*entered into force for the United States* Oct. 9, 1973) [hereinafter "Liability Convention"].

⁴ Convention on the Registration of Objects Launched into Outer Space, *opened for signature* Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S. No. 8480, 1023 U.N.T.S. 15 (*entered into force for the United States* Sept. 15, 1976) [hereinafter "Registration Convention"].

⁵ Agreement Governing the Activities of States on the Moon and Other Celestial Bodies - adopted by the U.N. Gen. Assembly on December 5, 1979, opened for signature on Dec. 18, 1979, entered into force July 11, 1984 (not in force for the United States), U.N. Doc. A/RES/34/68 (1979) [hereinafter "Moon Agreement"].

illegal uncertainty, a serious potential impediment to the prudent involvement of private enterprise in space activities.

The purpose of this presentation is to focus solely on some significant issues and related policy considerations pertaining to the notion of "space object" and associated with the aforementioned five space treaties. The term "space object" is central to the international law of outer space and the policies and laws relevant to its application will become more crucial with the anticipated expansion of space activities associated with the building of the US/International Space Station and the contemplated moon and Mars missions in the next century. Individuals and organizations, both public and private, engaged in space activities will have to know what their rights and responsibilities are when dealing with objects in outer space. They will have to know whether to regard a particular object in a given set of circumstances as a space object because significant legal consequences, particularly with respect to liability for damage, follow from such determination.⁶

B. PARTIAL DEFINITION OF "SPACE OBJECT" AND THE ISSUES IT RAISES

While the major space law treaties frequently use the phrase "space object," unfortunately, only a partial definition may be found in the Liability and Registration conventions, both of which state that the term "space object" includes "component" parts of a space object as well its "launch vehicle" and "parts" thereof.⁷

The fact that the partial definition of "space object" refers back to itself when speaking of "component parts" of a "space object" and "its" launch vehicle leaves the fundamental issue of what is or is not a space object or under what circumstances an object becomes or ceases to be a "space object" and the question of the applicability of the relevant space treaty provisions unanswered, thereby necessitating a systematic analysis of the various scenarios in which the issues may arise. Before embarking on such a detailed review of the notion of "space object," it may be appropriate to address ourselves, first of all, to two initial issues raised by the partial definition, namely: (a) the question of its applicability to all of the main space treaties and (b) the question of the meaning of "component parts" and

⁶ While occasional definitions of the notion of "space object" may be encountered in the scholarly literature since the dawn of the Space Age, it was not until the Montreal IISL Colloquium in 1991 that, under the chairmanship of this writer, a special session was devoted to "Definitional Issues in Space Law" which *inter alia* also touched upon issues relating to space objects. See Karl-Heinz Böckstiegel, *The terms "Appropriate State" and "Launching State" in the Space Treaties*, 34 PROC. COLLOQ. L. OUTER SPACE 13 (1992); Bin Cheng, "Space Objects," *"Astronauts" and Related Expressions*, *id.* at 17; HE Qizhi, *Review of Definitional Issues in Space Law in the Light of Development of Space Activities*, *id.* at 32; Vladimir Kopal, *Issues Involved in Defining Outer Space, Space Object and Space Debris*, *id.* at 38; William B. Wirin, *Space Debris and Space Objects*, *id.* at 45.

⁷ Liability Convention, art. I(d), Registration Convention, art. I(c).

"parts" with special attention to the issue of what constitutes "space debris."

(a) Applicability of the Partial Definition of "Space Object" to all of the Space Treaties

The first question that comes to mind in connection with the Liability and Registration conventions' partial definition -- that a space object includes its component parts as well as the launch vehicle and parts thereof -- is whether such a definition is also applicable to the other space treaties. The answer to this query is likely to be in the affirmative. For one thing, there is no indication in the Outer Space Treaty and the Rescue and Moon agreements or in their *travaux préparatoires* that the launch vehicle and parts thereof or the component parts of a space object would not be regarded as space objects. For another, it may be pointed out that the Outer Space Treaty speaks of liability for damage caused by a space object or its "component parts,"⁸ thereby implying the inclusion of such parts in the notion of space object in the particular context. Also, the Rescue Agreement refers to component parts⁹ and it would appear untenable, for instance, for a state party to argue that the launch vehicle is not a space object and deny its return in a given situation on that ground.

(b) Meaning of "Component Part" and "Part" with Special Attention to Space Debris

It is the authoritative choice by policy makers that determines in what situations damage caused by space objects will entail international liability and the scope and extent of such liability. Thus a determination of whether to regard an object in a given set of circumstances as a space object or a part of it and impose liability for damage caused by it reflects an antecedent policy choice which should be kept in mind throughout the ensuing discussion.

Reducing the policy considerations to a textual legal analysis, since a space object under the partial definition includes its "component parts" as well as the "launch vehicle and parts thereof," it appears necessary to determine what can be regarded as a component part and a part. Pieces, fragments and other substances of a space object, would normally be regarded as parts of that object. Thus the basic issue arising from the partial definition of a space object is whether the phrase "component part" is to be equated with the term "part." Can any part of a space object be regarded as a component part, or, to put it differently, are all parts of a space object necessarily component parts?

Admittedly, the term "component part" has a distinct meaning and it may be legitimately argued that the drafters of the Liability Convention by their definition regarded only "component parts" and not all "parts" of

⁸ Outer Space Treaty, art. VII.

⁹ Rescue Agreement, art. 5.

a space object as being subject to the constraints of the Convention. However forceful this argument may be at first sight, the fact remains that the quoted definition itself speaks not only of component parts but also of parts when it makes reference to the launch vehicle and "parts" thereof. It would appear unsound and unworkable within the context of the Liability Convention to regard any "part" of the launch vehicle as a space object and, at the same time, to assert that only a "component" part and not just any "part" of a spacecraft is to be taken as a "space object."¹⁰ There is no indication that the drafters ever intended to make such distinction when they formulated the partial definition of a space object. This conclusion is also reinforced by state practice to date. To the knowledge of this writer, whenever there was a question of liability arising from the fall of space debris on earth, the issue of whether the debris was a component part or just a part of a space object with the idea of possibly denying liability in the latter case has never been given consideration.

Of course, as a practical matter, it is highly unlikely that the state of registry or launching authority would request the return of worthless fragments of a space object, particularly since such a party would have to bear the expenses associated with the recovery and return of such fragments. At the same time, it is quite conceivable that a request would be made for the return of a valuable component part.

The Liability and Registration conventions' provisions that the space object includes its component parts has also brought to the fore an important question in connection with the US/International Space Station. The issue that policy makers faced was whether such a station should be conceived as a single space object with the various elements being regarded as the object's component parts or whether it should be taken to constitute a cluster of different space objects requiring separate registration. The latter had notable relevance in connection with the exercise of jurisdiction and control. This matter was settled in the US/International Space Station Agreement which provides for separate registration of each of the flight elements supplied by the partners.¹¹

An issue closely associated with component parts and parts is whether debris, which may result from the break-up, deterioration, loss or abandonment of a space object, is a space object. If space debris is regarded to be a space object or a component part of such an object or

¹⁰ For a discussion of this issue, see STEPHEN GOROVE, DEVELOPMENTS IN SPACE LAW - ISSUES AND POLICIES 151-52 (1991).

¹¹ See art. 5 of the 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. (hereinafter US/International Space Station Agreement). For a text of the Agreement, see UNITED STATES SPACE LAW - NATIONAL AND INTERNATIONAL REGULATION, Sec. II. A. 22 (Stephen Gorove ed., 1982-1993).

happens to be its launch vehicle or a part of it, under the Liability Convention the launching state's international liability would be absolute in case damage was caused by it on earth and would be based upon fault if damage occurred in space.¹²

To date, there has been no general agreement in the scholarly literature on the issue whether the space debris is to be regarded as a space object. Some notable space law writers maintain that space debris is not to be considered a space object or a part of it.¹³ This would mean that a space object which malfunctions or cannot be controlled any more, like a broken part, would no longer be regarded as a space object or a part of it and, as a result, any damage caused by such debris would not fall under the provisions of the Liability Convention. Such a position appears to run counter to the intention of the drafters of the Liability Convention and can hardly be supported by rational arguments. As Bin Cheng quite correctly observes, fragments of a space object are treated as space objects both in the Liability Convention and the Rescue Agreement.¹⁴

While it is difficult and somewhat risky to attempt to provide a workable definition of space debris, the latter may be looked upon as a no longer functioning, no longer controlled, non useful or abandoned space object or a part of such an object, when no change can reasonably be expected in these conditions in the foreseeable future.¹⁵ Under such a definition, every bit of space debris is a space object or a part of a space object but every space object is not necessarily space debris. However, as with any definition, here also care should be exercised in its application. For instance, should a space object be branded immediately as "space debris" -- with whatever legal consequences may follow from such determination -- when a loss of radio contact and control occurs? Most likely not. Also, it should be noted that the space treaty provisions which are currently applicable to space objects do not appear to place any

¹² Liability Convention, arts. II and III.

¹³ See, for instance, HE Qizhi, *Review of Definitional Issues in Space Law in the Light of Development of Space Activities*, *supra* note 6, at 35; In Wirin's view, "space objects and components" should be distinguished from small pieces and fragments of debris which are not capable of reentering the atmosphere and should not be regarded as space objects or components. See William B. Wirin, *Space Debris and Space Objects*, *supra* note 6, at 50.

¹⁴ Cheng states that "Fragments of a space object that fall on the earth are certainly treated as parts of that space object, and are given exactly the same status as the whole object, were the object to come back in one piece.... Nothing suggests otherwise, or that shattered fuel tanks or flakes of paint from space objects in outer space should be treated any differently." Bin Cheng, "Space Objects," "Astronauts" and Related Expressions, *supra* note 6, at 24.

¹⁵ Stephen Gorove, *Space Debris in International Legal Perspective*, 32 PROC. COLLOQ. L. OUTER SPACE 97 (199); Cf. International Academy of Astronautics, Committee on Safety, Rescue and Quality, *Position Paper on Orbital Debris*, August 27, 1992, at 1.

limitation arising out of the kind and size of such an object, whether controlled or uncontrolled.

The issue of the nature of space debris is also significant because under the Outer Space Treaty ownership of objects launched into outer space is not affected by their presence in outer space.¹⁶ At present, there is no right to remove no longer functioning (uncontrolled) and even useless space objects without permission, unless legally justified under the rules of international law governing self defense. It is doubtful that a potential (not actual) threat to one's own functioning space object or one's space activities, would be considered as sufficient justification for such a removal. However, if space debris is not a part of an object launched into outer space, including objects landed or constructed on a celestial body, the ownership provisions of the Outer Space Treaty would not be applicable to it, though conceivably ownership rights could still be asserted albeit with less legalistic justification.

The conclusion that emerges from the foregoing discussion is that the Liability Convention is clearly applicable to damage caused by space debris and that *de lege ferenda*, the international community should address the all-important issue to determine in what situations and under what conditions could space debris be lawfully removed from outer space bearing especially in mind the Outer Space Treaty's stipulation that, in the absence of contrary agreement, the state of registry retains jurisdiction and control over an object launched into outer space and that ownership of such objects is not affected by their presence in outer space.

C. ISSUES RAISED BY SPACE TREATY REFERENCES TO OBJECTS OTHER THAN "SPACE OBJECTS"

Apart from "space object," the treaties also use such phrases as "objects launched into outer space"¹⁷ or "into earth orbit or beyond,"¹⁸ or placed "in orbit around the Earth,"¹⁹ or "around or other trajectory to or around the moon"²⁰ and other celestial bodies within the solar system.²¹ They also speak of "objects landed or constructed on a celestial body,"²² and an occasional reference may also be found to "man-made space objects"²³ and a variety of other objects.

The panorama of additional phrases dealing with objects in the five space treaties and the possible future scenarios that they may imply

-
- 16 Outer Space Treaty, art. VIII.
 17 *Id.*, at arts. VII and VIII; Registration Convention, Preamble.
 18 Registration Convention, art. II.
 19 Outer Space Treaty, art. IV, para. 1.
 20 Moon Agreement, art. 3, para. 2.
 21 *Id.* at art. 1, para. 1.
 22 Outer Space Treaty, art. VIII.
 23 Moon Agreement, art. 3.

call for a consideration of a number of significant legal and policy issues, a clarification of which may shed light on the notion of "space object" and its applicability in the context of the space treaties. These issues may be conveniently discussed under the following headings: (a) the relevance and purpose of "launching," (b) the pre-launch and landing phases, (c) outer space, (d) objects landed or constructed on the moon or other celestial bodies, (e) extraterrestrial objects and (f) stations and habitats in free space. Lastly, a brief reference will be made to (g) the notion of an "object."

(a) Relevance and Purpose of "Launching"

The space treaties occasional allusion to "objects launched" or the "launching" of an object makes one wonder whether the act of launch or launching is an essential prerequisite for an object to be regarded as a space object. The space treaties do not define "launching" or "launch" apart from a stipulation in the Liability Convention that the term "launching" includes "attempted launching."

This issue will assume particular relevance in connection with the advent of the aerospace plane which is expected to take off as a conventional airplane without being launched and may reach outer space. Would such a vehicle have to be "launched" to be regarded as a space object? Should the fact of launching make a difference? Is the meaning of "launch" crucial? Should the aerospace plane be regarded as a space object throughout its flight, or more precisely, should the Liability Convention's provision be applicable to the flight of the aerospace plane in the airspace or in outer space?

Obviously, in the absence of an authoritative determination, several conjectures may be envisaged. The policy choice may well be not to apply space laws to an aerospace plane and adopt the functional approach if the vehicle is used in the course of a point-to-point transportation on earth even though during its flight, it may reach the fringes of outer space. Another possibility would be to apply provisions of space law while the plane is in outer space. Admittedly, such a solution would require a clarification of the boundary line where outer space begins and the line where airspace ends.²⁴

If the term "launch," that is, the manner in which the object ascends is not crucial in determining whether to regard the aerospace plane as a space object, one may use the term take-off or "lift-off" which could conceivably be applied to both the aerospace plane and the shuttle. What appears important, however, is that the act of launching in the sense of lift-off or take-off or its "attempt" must in fact take place before an object may be regarded as a space object, assuming of course that the

²⁴ For a detailed discussion of the legal and policy choices associated with the aerospace plane, see Stephen Gorove, *Legal and Policy Issues of the Aerospace Plane*, 16 J. SPACE L. 147 (1988).

purpose of the intended activity was to put the object in orbit around the earth or beyond and there was a realistic expectancy of achieving it. If, under such circumstances, the launch or lift-off is attempted but fails and the object does not reach outer space, the respective space treaty provisions regarding liability for damage and the return of space objects would still be applicable. For the same reason, sounding rockets which are not launched with this required purpose would not be regarded as space objects.

Launching may take place from land, water, or even from the airspace as recently demonstrated when a B-52 released a Pegasus rocket in the air carrying a satellite into outer space. Karl-Heinz Böckstiegel suggests among several possible alternatives that one might consider the start of the airplane already as the beginning of the launch so that the state from whose territory this start was effected would be regarded as the launching state.²⁵ However, it is more likely that, in the absence of contrary understanding, the state from the airspace of which the object was launched by the airplane would be the launching state.

Another issue which may be raised in connection with launching is whether the launch from a celestial body or from free space would entail the application of the discussed space treaty provisions. Inasmuch as the provisions of several space treaties refer to objects launched "into" outer space, strictly speaking there would be no such occurrence since the object would be launched "in" and "from" outer space and not "into" outer space. Would damage done by such objects on the moon and other celestial bodies in the course of human intervention call for the application of the space treaties? The answer to this question may not be as significant as it appears to be. Liability in such a case under the provisions of the Liability Convention would be predicated on fault and such liability would likely exist even without the provisions of the space treaties. Of course, whatever advantages a recourse to the Liability Convention may carry, would be lost if the objects are not considered to be space objects.

(b) Pre-launch and Landing Phases

Another aspect of the definitional issue of space object relates to the pre-launch and post-landing or disembarkation phases, that is the relevance of time and place. Does the location of an object or the time element make any difference with respect to the occurrence of damage caused by the object in determining liability? To put it differently, at what point in time and place does the Liability Convention's provision become operational or at what point should we regard an object, such as a launch vehicle, to have become a space object or have ceased to be one for purposes of the Convention? Should it always be regarded as a space object and

²⁵ Karl-Heinz Böckstiegel, *The terms "Appropriate State" and "Launching State" in the Space Treaties - Indications of State Responsibility and Liability for State and Private Space Activities*, 34 PROC. COLLOQ. L. OUTER SPACE 15 (1992).

damage caused by it always entail liability irrespective of where and when the damage occurs? Should it make any difference whether the damage causing object is in a manufacturing plant, or in a test facility, or in the process of being transported to the launch site, or being assembled but not installed there as yet? An additional question is whether such flight includes the space object's ascent and descent through the airspace,

Under the definition of a proposed Draft for a Convention on Manned Space Flight an object with a human being on board intended to be launched into space would be regarded from the point of embarkation through the launch, in orbit, deorbit, reentry, landing, and disembarkation phases as a manned space object.²⁶ While the use of the phrase "embarkation" and "disembarkation" may be questioned,²⁷ the only query that arose during the drafting process was in relation to the possible use of the term "post-landing" rather than "disembarkation." However, "disembarkation" appeared to be a better term considering that reference to a "post-landing" phase might have implied an extension of the time period after landing without any specific limitation.

For certain purposes, such as the exercise of jurisdiction and control, the fact of embarkation and the closing of the doors may be significant as provided, for instance, in the application of U.S. territorial jurisdiction and control. Nonetheless, there is no indication that the drafters intended to have the space treaty provisions apply to objects prior to a launch from earth or an attempted launch. Thus an abortive fire on the launch pad, even after embarkation, prior to an attempted launch would appear to preclude the application of the Liability Convention. Acts preparatory to the launch, including the embarkation and count-down, by themselves, would not be regarded as an attempted launch. Only when the engines fire and the lift-off is endeavored would it appear to be an attempted launch. In this connection, it may be important to stress that for an act to qualify as an attempt, it must be intended; it cannot be absolutely impossible of commission; it must involve "perpetration" or "execution" rather than mere "preparation;" it must come "close to success" and the "means" used must be adequate.

If space law were to be applied to the flight of an aerospace plane, it would have to be determined at what point in time (take-off, closing of the doors, etc.) such laws would apply to it. Short of an authoritative

²⁶ See art. I, para. 2 of the Draft for a Convention on Manned Space Flight (hereinafter "Draft") which was prepared by three leading institutions in Germany, the former Soviet Union, and the United States and submitted by this writer to the U.N. Committee on the Peaceful Uses of Outer Space in 1991 on behalf of the International Institute of Space Law, For a text of the Draft, see 18 J. SPACE L. 209 (1990).

²⁷ See comments of Judge Guillaume, in MANNED SPACE FLIGHT - LEGAL ASPECTS IN THE LIGHT OF SCIENTIFIC AND TECHNICAL DEVELOPMENT, PROCEEDINGS OF AN INTERNATIONAL COLLOQUIUM, COLOGNE, MAY 20-22, 1992, at 201 (Karl-Heinz Böckstiegel ed., 1993)

determination to the contrary, most likely a lift-off would have to be attempted in order to have relevant space treaty provisions applicable to it.

In sum, from the viewpoint of the *lex lata*, it may be better to regard the launching and attempted launching rather than the embarkation and closing of the doors as the crucial element in the determination of international liability. Such a position appears to be more in line with the space treaty provisions which only refer to launching and attempted launching and make no reference to embarkation, disembarkation, closing of the doors and similar expressions.²⁸

In light of the preceding considerations, it would also appear that, prior to a launch or attempted launch, the launch vehicle and its parts should not be regarded as space objects, just as an object or component parts of an object would not become space objects prior to a launch or an attempted launch. They would not qualify for such characterization in the manufacturing plant or test facility or on their way to the launch site or at any time, prior to an attempted launch.

Does it make any difference if the damage occurs at the moment or shortly after the object's return to earth or in the course of its subsequent refurbishment? At what point in time and place does the Liability Convention's provision cease to be operational or at what point should we regard an object, such as a launch vehicle, to have ceased to be one for purposes of the Convention? The Outer Space Treaty and the Rescue Agreement speak of "landing" of astronauts and "return" of objects to earth and it may be assumed that such landing and return was intended to serve as the cut-off point.²⁹ *De lege ferenda* another more specific event, like "opening of the doors," or perhaps the Draft's provision designating disembarkation³⁰ as a point of termination for manned space flight may be considered for possible adoption by international policy makers.

(c) Relevance of Outer Space

When the space treaties speak of objects "launched," they occasionally add the phrase "into outer space" or "in orbit around the earth," or "into earth orbit or beyond,"³¹ and, thereby, they raise the question whether it is necessary for the object to reach "outer space." In other words, should one draw the conclusion that, for an object to be regarded as a space object, it must have reached outer space or be or remain in orbit around the earth. This would mean that, if the object is no longer

28 Cf. Stephen Gorove, *Environmental Risks Arising from Space Activities*, in ENVIRONMENTAL ASPECTS OF ACTIVITIES IN OUTER SPACE - STATE OF THE LAW AND MEASURES OF PROTECTION 130 (Karl-Heinz Böckstiegel ed., 1989).

29 E.g. Outer Space Treaty, arts. V and VIII; Rescue Agreement, arts. I, 2, 4, and 5.

30 Draft, art. I, para. 2.

31 E.g. Outer Space Treaty, arts. IV, VII, VIII; Registration Convention, art. II.

in orbit, it would cease to be a space object and, as a result, the relevant provisions of the Liability Convention and the Rescue Agreement would not be applicable to it. Such position would appear to run contrary to the intention of the drafters of the space treaties which speak of liability for damage caused by a space object on the surface of the earth. How could there be international liability if the object would have ceased to be a space object upon its return to earth?

Some space law commentators, invoking Article II of the Registration Convention, appear to suggest that an object is not a space object unless it is already in earth orbit or beyond.³² However, the particular provision was not intended to define the space object but only to determine what objects were subject to the requirement of registration. An object not only can be but is in fact a space object during its flight from earth to outer space and back throughout the indicated phases and it remains a space object during its flight in outer space. Such an object would not be subject to the requirements of registration until it is in earth orbit or beyond. The Registration Convention stipulates that when "a space object is launched into earth orbit or beyond" the launching state shall register the object.³³ This statement makes it clear that the object to which the registration applies is already a space object, otherwise reference would have been made to an "object" and not to "a space object." Also, the reference in Article IV to space objects concerning which the state of registry has previously transmitted information, and which have been and are no longer in earth orbit,³⁴ implies that such objects remain space objects irrespective of whether they are in orbit or not, and so also during their phase of descent.

Another issue which has relevance to outer space in connection with the characterization of objects and the attendant policy alternatives is whether there can be any objects which are launched from earth into outer space or reach outer space as a result of human intervention and are not to be regarded as space objects. Are personal belongings which accompany an astronaut during the flight into and in outer space considered space objects? Possibly so. Does damage caused by such objects make it subject to the application of the relevant provision of the space treaties and do such objects have to be returned to the launching authority under the Rescue Agreement? The space treaty provisions do not appear to shed light on these issues and in the absence of contrary provisions, it would appear that such objects would be regarded as space objects.

³² HE Qizhi, *Review of Definitive Issues in Space Law in the Light of Development of Space Activities*, *supra* note 6, at 32.

³³ Registration Convention, art II.

³⁴ *Id.* art. IV, para. 3.

(d) Space Objects Landed on the Moon or Other Celestial Bodies

In connection with the moon and other celestial bodies, some of the space treaties make occasional references to a variety of other objects such as, for instance, "objects landed or constructed on the Moon," "vehicle"³⁵ and "space vehicle,"³⁶ "supplies,"³⁷ "equipment," "installations," "facilities,"³⁸ and "manned and unmanned stations."³⁹ The envisaged scenarios that may be associated with these references raise a number of additional issues which have a bearing on the notion of "space object."

First and foremost, the question arises whether an object launched from earth would lose its legal characterization as a space object upon its landing on the moon, or Mars or another celestial body? Would a moon rover or other movable objects, equipment or supplies originating from the earth cease to be space objects and would the relevant space treaty provisions not be applicable to them following such landing? Or would such objects continue to remain space objects and, if so, for how long?

While there is a temptation to argue that such objects should no longer be regarded as space objects after their landing or during their stay on a celestial body, it is somewhat doubtful that, in the course of a mission to Mars, a temporary landing is likely to be regarded as a sufficient justification for taking the objects out of the operation and application of the relevant provisions of the space treaties. A contrary position would have to come to grips with the issue whether such objects following their landing would again become space objects after their relaunch. The Draft left open the question whether a space object remains a space object following its landing on the moon or another celestial body.⁴⁰ Logically, and by definition, a flight would come to an end after landing if flight is understood in the conventional sense of the word. Also, a space flight from a celestial body would presumably involve similar phases of embarkation, launch, in orbit, deorbit, and disembarkation, as a flight does from earth to outer space. Notwithstanding the logic of this reasoning, looking at this issue from the vantage point of an earthly perspective, states parties to a convention similar to the Draft who participate in a manned expedition to Mars, may not regard a temporary stopover on the moon or another celestial body as necessarily suspending the operation of the convention. For purposes of both the uniform application of the law as well as reason and logic, it would appear preferable to regard such objects as space objects during such stay.

35 Moon Agreement, art. 12.

36 Outer Space Treaty, arts. V and XII; Moon Agreement, arts. 8 and 12.

37 Moon Agreement, art. 12.

38 Outer Space Treaty, arts. IV and XII; Moon Agreement, arts. 3, 8, 10 and 12.

39 Moon Agreement, art. 9.

40 Cf. Draft, art. I, para. 2.

In general, two things may be emphasized which may be important for the policy choice: the length of time during which space objects are utilized after their landing on the moon or another celestial body and the associated preferability of making a break with what may likely entail an endless extension of the Liability Convention's application to situations for which it was originally not intended. Admittedly, authoritative policy makers would have to make a determination.

Another issue that arises apart from the landing and length of stay of a space object on a celestial body relates to the possibility of a moveable space object being made into or becoming part of an immovable structure in the form of a station or facility on a celestial body. In such a case, it is doubtful that the policy choice would be to continue to regard such objects as space objects.

(e) *Extraterrestrial Objects*

The Moon Agreement envisages the eventual exploitation of "natural resources" of the moon and other celestial bodies under the auspices of an international regime⁴¹ and also makes reference to "samples of mineral and other substances"⁴² which may be used for scientific purposes. The possible use of extraterrestrial materials may also be envisaged by the Outer Space Treaty's reference to objects "constructed" on celestial bodies.⁴³ If such natural resources and other extraterrestrial materials cause damage at the time of their collection or at a later stage in the course of their use in support of a space mission or upon their return, should liability attach on the basis of the application of the provisions of the Liability Convention or the Outer Space Treaty? Should such objects be required to be returned to the launching authority in appropriate instances under the provisions of the Rescue Agreement? Briefly put, should they be regarded as space objects in given contexts?

As to objects not originating from the Earth, there is some doubt that the provisions of the major space treaties applicable to space objects could be properly invoked. The Outer Space Treaty, the provisions of which were further developed by the Liability Convention, speaks of the "return" of space objects to earth, thereby implying that the objects had to be on the earth beforehand to be regarded as space objects. Up to now, the issue has not been pressing but it could assume significance in future scenarios involving the exploitation of natural resources in space and the use of extraterrestrial materials in support of a space mission.

In the course of the construction of objects on the moon or another celestial body, the question may also arise whether such movable materials made in part of terrestrial and in part of extraterrestrial materials will

41 Moon Agreement, art. 11, para. 5.

42 *Id.* at art. 6.

43 Outer Space Treaty, art. VIII.

remain space objects or whether they will lose their legal identity? If the notion of space object were extended to cover extraterrestrial objects handled by humans as space objects for purposes of the relevant space treaty provisions, then all such composite materials would automatically be regarded as space objects.⁴⁴ In the absence of such policy determination, the likelihood is that the space treaty provisions relating to space objects would not be applicable to them.

(f) *Stations and habitats in free space*

The reference to "stations" in the Outer Space Treaty and to "manned and unmanned stations" in the Moon Agreement⁴⁵ relate to such structures located on the moon or another celestial body. However, legal and associated policy issues may further present themselves in conjunction with the building of space stations and habitats in free space in which both terrestrial and extraterrestrial materials may be used.

There is little doubt that the US/International Space Station built of terrestrial materials would be regarded as a space object or cluster of space objects or parts of a space object to which the space treaty provisions pertaining to such objects would be applicable. This conclusion is fully substantiated by the relevant provisions of the US/International Space Station Agreement.⁴⁶ Even if some extraterrestrial materials were used, the likelihood is that this fact alone, would not change the outcome.

Permanent habitats in free space, as in L-5, which could conceivably be built in whole or in part from materials not originating from the earth may require further scrutiny and consideration by policy makers. This is not a far-fetched possibility in the 21st century. For instance, Professor O'Neil from Princeton University worked on the design of a mass driver to be located on the moon for the purpose of hurling lunar materials into space which could be used when building a habitat in free space, possibly for manufacturing solar power satellites.⁴⁷ Even if the

⁴⁴ Bin Cheng favors an expansion of the definition of space objects to include "Stations and Installations constructed by humans in outer space or on the moon or other celestial bodies." See Bin Cheng, "Space Objects," "Astronauts" and Related Expressions, *supra* note 6, at 24.

⁴⁵ Outer Space Treaty, art. XII.; Moon Agreement, art. 9.

⁴⁶ See, e.g., US/International Space Station Agreement, *supra* note 11, at arts. 2, 5 and 17.

⁴⁷ See G.K. O'NEIL, THE HIGH FRONTIER, HUMAN COLONIES IN SPACE (1977); *idem*, *The Colonization of Space*, PHYSICS TODAY 32 (Sept. 1974); For a comprehensive discussion of the international legal implications of solar power satellites, see STEPHEN GOROVE, SATELLITE POWER SYSTEMS - INTERNATIONAL AGREEMENTS (U.S. Dept. of Energy, 1978). For a recent discussion, see Eilene Galloway, *The Legal and Regulatory Framework for Solar Power Satellites*, in SOLAR POWER SATELLITES - THE EMERGING ENERGY OPTION 183 (Peter E. Glaser et al. eds., 1993).

materials originate exclusively from the Earth, the long term extension of the applicability of the Liability Convention may have to be reexamined.

(g) Notion of an "Object"

Finally a word may be added relating to the connotation to be attached to the word "object." This term in every day usage refers to a person or material thing that can be seen or touched and is stable in form.⁴⁸ Seen in such a context, solar energy, electromagnetic impulses, cosmic and other forms of radiation, as well as nontangible biological or chemical agents, are not regarded as objects. At the same time, installations, equipment, materials, payloads, fragments and debris would be included in the category of objects or parts of objects.

Notwithstanding the seeming simplicity of the foregoing differentiation, questions may arise, for instance, with respect to the applicability of the Liability Convention's provisions when damage is caused by atomic radiation, or solar energy. Under the relevant stipulations, damage must be caused by a space object⁴⁹ and if nuclear or solar energy does not qualify as an object how can liability arise? In such cases, the object regarded to be causing the damage is the nuclear power source from which the radiation emanates, or the solar power satellite which transmits solar energy to earth via microwave or laser.

D. CONCLUSION

The preceding overview and analysis is intended to shed light on the multifaceted issues presented by a single but central notion in the space law literature, that of "space object." The discussed scenarios underscore the need for further delineation of the term, especially in situations when different people can legitimately and, in some cases with equally strong logic, maintain divergent views. Definitional clarifications involve policy choices which decision makers will have to make in light of their value judgments on behalf of the countries they represent.

From among many possible alternatives, space limitations only permit a few examples of definitions, the variations being indicated by additions or omissions of words in square brackets and parentheses. Within the context of the main space treaties, a space object may be defined as "an object launched or attempted to be launched in orbit around the earth or beyond [and includes stations, installations and other objects (whether terrestrial or extraterrestrial) constructed or used by humans in outer space, including the moon or another celestial body]. Such object [or a part of it] is a space object [or a part of it] from the time of its launch or attempted launch, through its ascent from earth to outer space or while in

⁴⁸ Cf. THE RANDOM HOUSE DICTIONARY OF THE ENGLISH LANGUAGE 993 (unabridged ed. 1966).

⁴⁹ Liability Convention, arts. II and III.

outer space, as well as during its orbit, deorbit, reentry and landing on earth. [In case of a manned space flight, a space object (or a part of it) is a space object (or a part of it) from the time of embarkation (closing of the door) to that of disembarkation (opening of the door) on earth.] [A space object (or a part of it) landed on the moon or another celestial body which becomes part of an immovable structure ceases to be a space object (or a part of it).]

Associated with the definitional clarification is the issue whether to split the single legal notion of "space object" into several well defined categories, such as "space station," "space object" in the narrower sense, and "space debris," as suggested by Vladimir Kopal. In his view, such a split will become sooner or later inevitable.⁵⁰

Even with the adoption of one of the intimated definitional alternatives, there will be many remaining issues which may need further consideration. Of course, it is well to keep in mind that there is no fool-proof definition to take care of all possible scenarios which may arise in the future. Nonetheless, even a limited removal of some of the uncertainties associated with the notion of "space object" would go a long way in allaying concerns of private enterprise when undertaking space activities. In addition, a clarification of some of the authoritative policy choices would also help in eliminating possible sources of disputes.

It is fortunate that the International Institute of Space Law (IISL) has already taken the initiative and devoted one of its sessions during the Montreal Colloquium to a discussion of definitional issues of space law. This was followed up during the World Space Congress in Washington, D.C. by an IISL Board decision to establish a Working Group to elaborate on such issues and receive input in the form of comments and suggestions at future colloquia.

The clarification of definitional issues will be ever more pressing as we expand the horizons of space exploration and use in the 21st century. With a reduction of international tensions and the disappearance of the cold war psychology, the unique opportunities of world-wide international cooperation make the objective of achieving consensus on the scope and meaning of undefined or only partly defined legal terms less difficult to achieve. It is this writer's belief that the time has arrived to advance suitable proposals to clarify key notions and phrases of space law for consideration by national and international institutions and policy makers. It is hoped that efforts in this direction will continue unabated and will eventually lead to positive results.

⁵⁰ Vladimir Kopal, *Issues Involved in Defining Outer Space, Space Object and Space Debris*, *supra* note 6, at 41.

EVENTS OF INTEREST

A. Past Events

Reports

International Space Cooperation: Learning from the Past, Planning for the Future, Kona (Hawaii), 13-15 December 1992.

Since the end of the Cold War, international cooperation has come to be seen by many as an element that should now figure more prominently in space endeavors. Some contend, indeed, that this is the only option if some of their nations' more visible space activities are to continue at present levels, let alone expand.

This is probably true, yet cooperation is far easier to preach than to put into practice, given the interdependencies between strategies and actors that constrain space policy; there may well sometimes be persuasive reasons for a country not to cooperate in certain sectors. Nations and space agencies thus face difficult *a priori* and practical questions on the extent to which any general policy favoring cooperation could or should be expected to apply, as well as on the mechanisms through which it is to be promoted and implemented.

To seek possible answers, or at least to start the process of finding them, the American Institute of Aeronautics and Astronautics (AIAA) organized this workshop as the last major event of the International Space Year. Sixty of the world's leading authorities on the subject of international space cooperation from twelve countries were invited to participate. These included senior representatives from space agencies, industry, user organizations and the university and the consultancy sectors, as well as the former heads of a number of space bodies and President Bush's executive secretary to the National Space Council.

The workshop's findings and recommendations were drafted for (and have since been communicated to) relevant government ministers and other space decision-makers internationally. The aim is to give the subject of international space cooperation a higher place on the international policy agenda.

Participants were divided into five working groups:

- Space Science
- Space Applications
- Space Exploration
- Supporting Infrastructure
- Policy and Approaches.

The bulk of the work took place in these groups, although there

were plenary sessions, at which the group chairpersons reported on the progress made, and participants reviewed the workshop's outcomes. Two debates were also held, in order to focus minds on essential issues of international cooperation, one on the necessity for "leadership" in cooperation, the other on whether the time for conducting large space endeavors on a national basis had passed.

The working groups relied for their work on nine background papers by participants, analyzing particular ingredients or experiences of international cooperation. These are not reproduced in the published workshop report mentioned at the end of this note, although copies can be obtained from the AIAA. They were:

- "Space Cooperation in the Post Cold War Era: The Best of Times, the Worst of Times" (Barnes, R.J.H.)
- "International Cooperation in Human Exploration" (Bekey, I.)
- "Space Station -- An International Venture" (Cline, L.F.H., and van Reeth, G.P.)
- "International Cooperation in Space: An Introduction to Space Law" (Galloway, E.M.)
- "Space Science -- A Model for Success" (Johnson-Freese, J.)
- "Development of Space Cooperation: The Western European Case Study" (Madders, K.J.)
- "Environmental Monitoring -- New Opportunities for Cooperation" (McElroy, J.H.)
- "Lessons in International Space Cooperation: The Case of Satellite Communications" (Pelton, J.N.)
- "Space Launch Services: The Competitive Playing Field" (Smith, M.S.).

The reader is referred to the published report for a fuller account of the many questions and viewpoints exposed during discussion. In summary, the interchanges included critical examination of a range of infrastructure, mission and policy aspects and options, with Earth monitoring and Moon/Mars exploration receiving the most attention. Geopolitical factors occupied considerable debate in the Policy and Approaches group, others took stock of why the Space Exploration Initiative had failed, and elsewhere topics bounded from such concrete considerations as the harnessing of existing launch capacities to drivers for eventual Mars colonization.

As to the workshop's recommendations, these can be recapitulated briefly and represent the proceedings' main product:

- Commencement of an international dialogue, at high political level, on common policies and strategies regarding cooperation, together with early work towards eliminating obstacles to such cooperation.

- Promotion of further Earth environmental monitoring cooperation, especially via a new coordinating mechanism to serve data users, and expansion of cooperation via existing mechanisms in other targeted areas of space applications such as navigation, disaster mitigation and even telecommunications (e.g., cooperation to permit international multipoint-to-multipoint connectivity and for the conduct of pilot projects).
- Information sharing by space agencies on their space science project selection and funding processes.
- Establishment by heads of space agencies in "spacefaring nations" of a common, cooperative space exploration strategy.
- Use of existing fora such as UNCOPUOS and the Space Agency Forum to address the overall use of space assets and associated organizational aspects from now on. Creation of a new framework to promote cooperation may though prove necessary. In this context, a World Space Conference, at political level, may be appropriate, although an alternative might be an international inter-agency (i.e.) non-political) coordinating group.

The last recommendation is of particular note for readers of the JOURNAL. During the 1980's (and in fact as a political response to the U.S. "Star Wars" program), the Soviet Union proposed at the UN the idea of a World Space Organization. Since the end of the Cold War, this idea has been adopted by others and given new life. Workshop participants, for the most part at least, did not favor creating a formal organization in the foreseeable future. Rather, it would seem that the process of space policy making involving the major space powers and others would require a highly flexible mechanism. Based on precedents in Europe and more widely, several participants felt that a conference, which could meet at significant points at ministerial level, might provide the right kind of mechanism. It could in particular offer the advantage of integrating discussion at the political and program levels. Some participants felt this proposal went too far, hence the inclusion of inter-agency coordination as an alternative mechanism. The lack of consensus on this vital question of approach was not, though, a negative aspect of the workshop; rather, it is indicative of the difficulties alluded to above and helped to define the terms on which future debate will take place.

A further point that should be mentioned here is that the workshop agreed that the "entire international space community needs to participate" in developing concepts, ideas and mechanisms for cooperation, and that the AIAA and other similar organizations internationally should work to achieve this participation. Though not adequately reflected in the recommendations, participants noted too in this regard the importance of engaging in a greater dialogue with the world public.

In conclusion, one may say that, apart from its recommendations,

the workshop* provided a good opportunity to clear some of the fog that has hindered vision in the post-Cold War period. This included exposing larger geopolitical choices that will inevitably influence the prospects for expanded international space cooperation. Can, for example, ambitious Earth-oriented and exploration programs in the space field provide a bonding element between the world's technostructures and peoples, and provide a new impetus to the Space Age more in line with its proclaimed ideals? Or are we doomed to see the Cold War era followed by a new competitive phase, this time based on the economic contest of large trading blocs and implying a form of reconstructed nationalism in space policy?

Further workshops will follow but the choices clearly concern us all.

Dr. Kevin J. Madders

Chambers of Robert Webb, QC., London,
c/o Cremades et Associés, Brussels, Belgium

U.N. Scientific and Technical Subcommittee on Outer Space Holds Annual Meeting in New York

The Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space held its thirtieth annual session at United Nations Headquarters in New York from 16 to 25 February 1993.

The Subcommittee, during its two-week session, continued its consideration of various questions relating to international cooperation in outer space activities, including the special theme for 1992, "Space-based communications: Expansion of current services and increased understanding of new systems and services." The 53 Member States of the Subcommittee now include the Czech Republic, replacing Czechoslovakia, Yugoslavia, while formally remaining a member of the Subcommittee, was not represented in this session following the General Assembly's resolution that Serbia and Montenegro do not represent Yugoslavia. Following the trend of recent years, East-West conflicts have essentially disappeared, while North-South differences on economic issues remain but are discussed in a non-confrontational spirit.

The session included a symposium, organized by COSPAR and IAF at the request of the Subcommittee, on "Space-Based Communications: Global Systems and New Services." The symposium included presentations on developments in international telecommunication policy through the International Telecommunication Union (ITU), on the expanding services planned by INTELSAT and INMARSAT, and on the use of satellite

* For reference for this workshop, see AIAA, INTERNATIONAL SPACE COOPERATION: LEARNING FROM THE PAST, PLANNING FOR THE FUTURE (L. David and J. Pedrón eds., 1993).

communications for development in China. Technical presentations described proposed constellations of low-orbiting satellites providing global telephone service through hand-held receivers, the use of communication satellites for disaster warning and relief, and the potential of communication satellites to support rural medical services in developing countries. In addition to the technical presentations in the symposium, Member States arranged a number of special presentations, including a presentation on space debris by a specialist from France, a presentation and film by astronaut Dr. Mae C. Jemison on her recent Space Shuttle mission, a presentation on the activities of the Russian Space Agency by the Deputy Head of that agency, and presentations on human space flight, satellite radio broadcasting and small scientific satellites. Members of the Subcommittee also provided information on their national activities in the fields of space transportation, astronomy, planetary exploration, and space biology and medicine.

United Nations Programme on Space Applications

One of the major objectives of the United Nations in the field of space is to promote access by developing countries to the benefits of space activities. The Programme on Space Applications of the Office for Outer Space Affairs, under the direction of the Subcommittee, organizes short training courses and workshops on applications of space technology for economic and social development for the benefit of developing countries. The Programme also administers fellowships for long-term education in space-related disciplines in Brazil, China and the institutions of the European Space Agency, and provides developing countries, on request, with advice on the organization and planning of national and regional space applications programmes.

The Subcommittee reviewed the reports of the 1992 Programme activities, including training courses, workshops and conferences covering various aspects of remote sensing, satellite communications and space science, held in Colombia, Costa Rica, Ecuador, Germany, Kenya, Korea, Sweden and the United States. The Subcommittee approved the Programme for 1993 including meetings on space applications in the fields of communications, disaster mitigation, geology, sustainable development, environmental monitoring and basic space science. The Subcommittee expressed its appreciation for the contributions of the host countries and other supporting countries that had made these activities possible, but also expressed its concern that the resources available to the Programme were not sufficient to meet the needs of the developing countries for such assistance.

The Programme provided consulting services in support of regional space efforts, including supporting the use in North and West Africa of remote sensing data received by ESA ground stations, promoting regional use of the Cotopaxi, Ecuador, remote sensing ground station, and assisting

in the preparations for the Second Space Conference of the Americas, to be held in Santiago, Chile, in April 1993.

An initiative being developed as part of the Programme on Space Applications is a plan for regional centres for space science and technology education, particularly in the field of remote sensing, with an emphasis on educating university teachers in developing countries who can pass their knowledge and skills on to large numbers of students. A number of developing countries have offered to host and support such centres, and missions to evaluate the potential host institutions in each region are being undertaken with the participation of potential supporting countries or organizations. The Subcommittee expressed its support for this initiative and urged support from other countries.

The Subcommittee also noted the publication by the Office for Outer Space Affairs of an updated version of "Space Activities of the United Nations and International Organization," describing the space-related programs of the organizations of the United Nations system and the organization and activities of international and regional space agencies.

Use of Nuclear Power Sources in Outer Space

Following the adoption of a set of principles on the use of nuclear power sources (NPS) in outer space by the Committee and the General Assembly in 1992 (resolution 47/68), the Subcommittee and its Working Group on Nuclear Power Sources held preliminary discussions regarding revision of the principles. When the principles were adopted, it was recognized that new applications of nuclear power in space were emerging and that international principles on radiological protection were evolving, and it was agreed that the principles applied only to electric power generation for non-propulsion purposes. The principles therefore provided that they should be reopened for revision within two years.

This agreement to begin reconsideration of the principles right away was largely in response to a United States request in 1991 to change principle 3, containing technical criteria for safe use of NPS, after it had been agreed upon in draft form. The United States had proposed that the international principles, like the NPS safety criteria used in the United States, should be based on minimizing the probability of radiological exposure of the public or the environment to as low as reasonably achievable, rather than establishing specific criteria that might exclude useful activities of very low risk.

Other delegations had insisted that after 13 years of negotiation, it was important to adopt a set of principles quickly on the basis of the agreed draft texts, even if imperfect, with the understanding that consideration of proposed revisions could begin immediately. The United States ultimately agreed to the adoption of the principles by consensus on that basis.

During the meeting of the Subcommittee, the United States did not

make specific proposals for revision of principle 3, but there was an active discussion of the question by the United Kingdom, France, Germany, Canada and others. There appeared to be general agreement that it would not be desirable to renegotiate the whole set of principles, but that incremental revisions to specific provisions should be considered. The discussion covered the need for further definition of terms such as "highly reliable" and "low-probability accident," principles covering other uses of NPS in space, and the relation between space NPS principles and nuclear safety and radiological protection principles being developed by the International Atomic Energy Agency (IAEA) and the International Commission on Radiological Protection (ICRP). The Subcommittee agreed to continue discussions on the issue next year.

Remote sensing and Environmental Monitoring

Remote sensing remained a largely uncontroversial topic, as it has been since the adoption in 1986 of the "principles relating to remote sensing of the Earth from space". The United States, France, the European Space Agency and Japan encouraged international use of the Landsat, SPOT, ERS-1 and JERS-1 remote sensing satellites. Many developing countries emphasized the actual and potential importance of satellite remote sensing to their development, but noted that the commercialization of remote sensing and the expansion in the number of systems, each with different technologies, were raising financial obstacles to the use of satellite data for resource management and environmental monitoring in their countries. The Subcommittee reaffirmed its view that remote sensing data should be available to all countries at reasonable cost and that there was a need to provide assistance to meet the needs of the developing countries.

The Geostationary Orbit and Space Communications

The Subcommittee continued its consideration of the geostationary orbit without making any progress towards resolving the different views on the subject. A number of developing countries reiterated their concern over the increasing congestion of the orbit and called for a special international regime for coordinating use of the orbit and ensuring equitable access by all States, particularly developing countries. Developed countries reiterated their position that the question of access to the geostationary orbit was being effectively addressed through the procedures of the International Telecommunication Union (ITU) and that improving communications technologies were increasing the effective capacity of the geostationary orbit to meet the needs of all countries.

Space debris

The question of space debris has been a matter of growing concern

to many countries over the last few years, but the Subcommittee has not been able to agree to add the question to its formal agenda, largely due to the United States, which has felt that formal consideration at the international level would not be productive until further research had been carried out at the national level. This year, a number of delegations, including Germany, Pakistan and the United Kingdom submitted information based on national research on space debris, including studies of the risk of collisions between space debris and nuclear power sources. The German delegation felt that the Subcommittee could usefully spend several years exchanging information in this way in order to develop common understandings that would provide a basis for subsequent elaboration of an international agreement to restrain the accumulation of space debris. It also noted that continuing accumulation of debris could eventually result in a chain-reaction cascade of collisions producing such vast numbers of fragments that space activities would become impossible, and that such an eventuality had to be prevented.

The Subcommittee heard a technical presentation by a specialist from the French Centre National d'Etudes Spatiales on measures being undertaken to reduce space debris, including venting of fuel tanks and discharging of batteries after use to prevent explosions, the development of satellite deployment mechanisms that would not release bolts, clamps or other small hardware in orbit, hardening of spacecraft against very small debris, and the possibility of deorbiting satellites at the end of their lives or raising geostationary satellites into higher disposal orbits. The presentation noted that some of those measures were being implemented without major costs, while others had substantial costs, often in the form of a reduction of the operational lifetimes of satellites.

In its report, the Subcommittee reaffirmed the importance of reducing the generation of space debris and the need for further research on the question and for improved technology for monitoring debris in space. Many delegations reiterated their views that the question should be placed on the Subcommittee's agenda beginning next year so that formal considerations could begin, but again there was no consensus. Finally, the Subcommittee requested the Committee to consider, at its session in June, whether to put the question of space debris on the agenda of the Subcommittee for its 1994 session.

Third UNISPACE Conference

Following a proposal made by India at last year's session, the Subcommittee discussed the possibility of holding a third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III). Developing countries strongly supported the proposal, calling for the conference to be held in a developing country in 1995. Developed countries did not oppose the proposal, but felt that more consideration of the purpose and organization of the conference were necessary before any decision

could be made and that 1995 was not realistic. The Subcommittee recommended that the Committee consider the objectives and organization of such a conference.

Ralph Chipman
Chief, Committee Services and Research
UN Office for Outer Space Affairs

Commercial and Industrial Applications in Space: Insurance Implications

Assicurazioni Generali S.P.A. of Trieste, one of the most important insurance groups in Europe, has recently organized its 7th biannual international conference. This conference, held in Rome, Italy on March 11-12, 1993, marks one of the most significant appointments for all those familiar with space insurance: insurers, first of all, but also clients and brokers totalling more than 350 people from 25 nations. In the two-day program a number of issues were examined, including market trends, industry requirements, economic results and legal implications of space insurance contracts and related claims.

Insurance is generally reputed to be a boring subject. Space Law, on the other hand, has sometimes been regarded only as an academic, speculative exercise. After having listened to the space lawyers' contributions one should quickly get rid of their doubts, if he had any: insurance is by no means a boring subject nor is space law a speculative academic exercise. They are a simply fascinating, extraordinary and highly demanding arena where hundreds of million of dollars are spent in complex projects which might spectacularly, yet painfully, vanish into the air leaving technical speculations on the ground open as to what happened and sometimes, harsh legal disputes on whose fault it was.

Space Insurance

What does "Space Insurance" refer to? The limited scope of this report does not allow any detail but some basic hints may be dropped about the environment where this game is played.

Typically a space insurance coverage is meant to indemnify the owner of a telecommunication satellite during all the sequential phases of its launching, transportation and placement in (most of the times) geostationary orbit at about 36,000 kms from the earth and during its "operational life" against the risk of loss or physical damage to it.

We can, therefore, ideally isolate three main time-frames when the satellite is exposed to some sort of "homogeneous risks": the "pre-launch" phase (transportation from the manufacturer's premises to the launch site and preparation to launch); the "launch phase" (from ignition of the launch vehicle transporting the satellite to the completion of in-orbit tests in geostationary orbit); the "in-orbit phase" (from beginning of commercial operations to the "natural end of life", *i.e.* the time when the station

keeping fuel on board the satellite is exhausted and it is placed in the so-called "graveyard orbit"). All these phases are intimately connected and the relevant insurance contracts must carefully match one another, because the insurers might not be the same and, after the satellite is launched, it is often uncomfortable to go out on the spot and investigate the "fortuitous event" which has caused the damage at a given moment in time!

Apart from the main "property coverage" on the satellite itself, there are other policies which are currently offered by the space insurance market: for example the "third party legal liability" policy, which covers the liability for damage to third parties. Another one indemnifies the insured for "loss of revenue and extra expenses", in case of interrupted communications leading both to cancellation of contracts with the various broadcasters who use the satellite's channels and to extraordinary expenses to reactivate the service.

Litigation and legal issues arising from insured space activities

The legal session at the Generali Space Conference received contributions from some of the most renowned U.S. law firms specializing in space insurance disputes: "Haight, Gardner, Poor & Havens, New York" (Mr. *Nesgos*), "Pino & Associates, New York" (Mr. *Pino*), "Mendes & Mount, New York" (Mr. *Tucker*), "Schnader, Harrison, Segal & Lewis, Washington" (Mr. *Smith*). The four gentlemen representing these law firms were wittily introduced by Mr. *Harold Caplan*, a consultant from International Insurance Services, London. He emphasized how grateful the audience should be for having been offered the opportunity of listening to a selection of extremely expensive lawyers with a highest sense of their own time-value. The basic comments expressed in this legal section of the Generali Space Conference will be highlighted in the ensuing summary.

Mr. *Nesgos* concentrated on his experience gained in negotiating space contracts, *i.e.* satellites and transponders (channels) purchase agreements, launch services agreements and space insurance policies. In his opinion ambiguity in contract wording is the greatest contributor to space contract litigation. Ambiguity is certainly the reason why so many warranty disclaimers used in contracts between space manufacturers and service providers, on the one side, and their customers, on the other, have also been challenged in courts. The satellite manufacturer and the launch service provider have long been seeking to limit or disclaim their liability towards their customer, the satellite owner, on the assumption that space is a high risk area of endeavor. Liability limitation provisions are therefore used in these contracts so that the customer undertakes to assume damage to his own property and to waive any claim against any other participant. Furthermore, he has to ensure that his own sub-contractors adhere to the same provisions. However, this interparty waiver of liability approach is sometimes implemented with excessively restrictive language, sometimes with an overly inclusive one.

Mr. *Tucker* analyzed some recurring problem areas in both launch and in-orbit coverages which have given rise to space related insurance disputes. The "insuring agreements" are the core of a space policy. There the parties "meet their minds" and its there that, in case of dispute, the existence of mutual assent is to be ascertained. Unfortunately not always is this mutual assent clearly expressed in the policy wording. Sometimes the language used is conditional in nature, like in the following example: "underwriters will indemnify the assured if the power output on the transponder (*i.e.* channel) fails to meet a level to be later agreed." On the other hand, in the sentence "Underwriters will indemnify the assured if the power output on the transponders falls below a usable level" the true intent of the parties does not appear as univocal.

A typical provision in a space policy is the "due diligence" clause. Typically the Insured warrants to "use due diligence and do and concur in doing all things reasonably practicable to avoid or diminish any loss under the policy". But what is "reasonable" in space activities? For the *Leasat 3* satellite, marooned in low orbit, a total loss was paid by all insurers but one, who was brought to court by the insured. A jury in California determined that it would have been reasonable to attempt an unprecedented salvage mission via a Space Shuttle to repair the stranded satellite, with a cost approaching one-quarter of the total cost of the satellite itself, and rejected the claim.

Mr. *Pino*, in turn, reviewed the most recent developments in U.S. litigation. He criticized the fact that, although the technology utilized in commercial space ventures has advanced at an almost unimaginable pace in recent years, disputes involving insurance coverage, property damage, cross-waivers of liability, subrogation, salvage, product liability and choice of law have been resolved so far by courts using traditional legal principles that are often hundreds of years old. He advocated recourse to the arbitration procedure for any disputes related to commercial space ventures. The arbitrators should be experts in the field and the procedure would probably be more expeditious and less expensive than traditional litigation.

Mr. *Pino* quoted the *Martin Marietta v. Intelsat* case where the latter claimed that, as a result of *Martin Marietta's* negligence and gross negligence, the *Intelsat VI* satellite did not reach its intended orbit. The losses claimed totaled 400 million U.S. dollars. The focus of the claim turns around the existence of a valid express waiver of liability and the possibility to impute a cross waiver provision based on the Commercial Space Launch Act, as amended in 1988, thereby barring *Intelsat* claim. This claim was decided by relying upon the holding in a case where the plaintiff was injured when he parachuted into power lines and therefore sued the operator, despite having signed a waiver of liability just prior to departing on his parachute adventure. It is difficult to hide, however, that there is very little similarity between the relative bargaining position of *Intelsat* and of the parachuter!

A different solution was found to resolve another well-known space insurance claim. In July 1990, ten days before the original launch date, the hook of a launch pad crane fell onto Insat 1 D's C-Band antenna and the spacecraft had to be removed and repaired. At that time, the risk of loss was still with Ford Aerospace, the spacecraft manufacturer. Insures paid the loss and were subrogated in Ford Aerospace's rights. A claim was then filed by various London Underwriters against McDonnell Douglas, which had the responsibility of the pre-launch and launch operations. The Federal Judge determined that he was bound to apply state law in existence at the time the land where the accident occurred was ceded to the government, and that happened to be the Florida State law of the 1950's! Then McDonnell Douglas, through arbitration in London, sought to recover, from the Indian Space Department, their customer, what they had to pay to the above underwriters, based on the indemnity provisions in their contract. To complete the circle, the Indian Space Department itself commenced arbitration proceedings in New Delhi against Ford Aerospace on the grounds that Ford Aerospace had agreed, in the spacecraft purchase agreement, that it would not seek indemnity from any party in the event of a loss. Eventually, and with no surprise, a global settlement was reached. But this example clearly illustrates how carefully the commencement of legal actions should be considered by wise undertakers of space endeavors!

Mr. *Smith* took a wider perspective and considered some more general issues affecting the Space Industry with possible insurance spin-offs. Orbital arc availability is, according to Mr. *Smith*, no longer just a hypothetical problem. There might soon be cases where a satellite is drifted on purpose into the operational orbital slot of another, causing unprecedented interference problems for the broadcasting of the latter with very little remedies to the injured party. This scenario would call for a different definition of "total loss" (currently limited to physical damage to the satellite), a new interpretation of the "due diligence clause" (should it include the commencement of legal action to defend the insured's right in front of the international telecommunication authorities?), and perhaps, new commercial demands to satisfy the need to actually buy orbital slots from commercial firms!

On the other hand, all these future private issues might be confronted with political and regulatory uncertainties. There is a growing influence of export governmental control and foreign policy over decisions involving private East-West Joint Ventures for commercial space launches. Eastern companies will most likely provide hardware and launch capabilities and western partners will contribute investment and marketing experience. But these undertakings will surely face new risks, which they will hardly be able to control: space products import and export regulations, programme delays, protectionist measures, dumping practices.

Conclusion

Among the many issues raised during the last Generali International Conference one point stands out clear: the space insurance community is asked to provide its international clients with a superior service. No doubt, only with the concurrent assistance of knowledgeable lawyers and legal experts involved in space law, will this task be satisfactorily accomplished, to the benefit of all interested parties!

Marco Molino

Non-Life Departments, Marketing
Assicurazioni Generali S.P.A., Trieste, Italy

U.N. Legal Subcommittee on Space Convenes its Thirty-Second Session (22 March-8 April 1993)

On 22 March 1993, the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) convened its thirty-second session at United Nations Headquarters in New York. The three-week session, which ended on 8 April, was chaired once again by *Mr. Václav Mikulka* of the Czech Republic.

The session was attended by forty-two of the 53 States members of the Subcommittee (Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Burkina Faso, Canada, Chile, China, Colombia, Czech Republic (which replaced Czechoslovakia), Ecuador, Egypt, France, Germany, Greece, Hungary, India, Indonesia, Iran (Islamic Republic of), Iraq, Italy, Japan, Lebanon, Mexico, Mongolia, Netherlands, Niger, Nigeria, Pakistan, Philippines, Poland, Romania, Russian Federation, Spain, Sweden, Ukraine, United Kingdom of Great Britain and Northern Ireland, United States of America, Uruguay and Viet Nam); six specialized agencies and other international organizations (IAEA, UNESCO, ITU, ESA, IAF and ILA); as well as eight observers (Bolivia, Cuba, Kazakhstan, the Libyan Arab Jamahiriya, Portugal, the Republic of Korea, Slovakia and Turkey).

Pursuant to the recommendations of the thirty-fifth session of COPUOS (held in June 1992), which were endorsed by the General Assembly at its 47th session (December 1992), the Subcommittee reestablished working groups to consider the three substantive items on its agenda:

(1) Question of early review and possible revision of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space (agenda item 3).

(2) Matters relating to the definition and delimitation of outer space and to the character and utilization of the geostationary orbit, including consideration of ways and means to ensure the rational and equitable use of the geostationary orbit without prejudice to the role of the International Telecommunication Union (agenda item 4).

(3) Consideration of the 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 (agenda item 5).

In its discussions on these three items, the Legal Subcommittee continued to make slow and careful progress, building on the work it had done in the previous year.

Principles Relevant to the Use of Nuclear Power Sources in Outer Space

Under the chairmanship of *Mr. Helmut Freudenschuss* of Austria, the Working Group began with gusto its consideration of the question of early review and possible revision of the Principles. There was a unanimous expression of satisfaction that, after more than a decade of work, the Principles had been adopted without a vote by the 47th General Assembly. Nevertheless, there were differing views on the question of a review and delegations expressed themselves candidly on the subject. To facilitate matters, the Chairman suggested that the Working Group could have a preliminary exchange of views on possible grounds for revision of the Principles, without actually undertaking such a revision, which principle 11 did not necessarily require at the current stage.

In the course of the debate on this question, some delegations observed that the time which had elapsed between the adoption of the Principles and the current session of the Subcommittee had been insufficient for a meaningful assessment of the operation of those Principles in practice and that, therefore, an actual review should be postponed until the following session of the Subcommittee. The United Kingdom felt that it would be better to await the maturation of the debate in the Scientific and Technical Subcommittee. Japan and France expressed similar views, as did the Russian Federation, noting that it would be essential to complete a thorough scientific and technical analysis first, which would then provide the Legal Subcommittee with a basis for a proper review and possible revision.

Some delegations also noted that the effect of the Principles would be weakened if a discussion on possible shortcomings and defects was undertaken immediately after their adoption. Others, such as Brazil and Mexico, believed, however, that the Working Group should indeed undertake such a discussion right away to allow delegations to express their views and concerns with respect to the Principles.

In order not to weaken the impact of the Principles, which were already "soft law", some delegations suggested that an incremental approach to revising them could be considered. The Working Group, for example, would not reopen the discussion on the principles already adopted, but rather, would attempt to supplement those principles with new provisions if necessary.

The Working Group also debated the issue of principle 4 - "Safety

assessment", with some delegations expressing concern that this principle did not cover cases where a State does not agree with the results of the safety assessment carried out by a launching State in conformity with paragraph 1, and made publicly available pursuant to paragraph 3.

Mexico believed that the question of safety assessment was closely linked to the question of notification prior to the launching of a space object carrying a nuclear power source. It was argued, however, that the wording of paragraph 4 did not require the concurrence of other States with the results of the safety assessment carried out by a launching State and, accordingly, no provision was needed to cover the case where a State disagreed with such results. It was also argued that if a dispute arose because of a disagreement with the results of a safety assessment, such a dispute could be resolved in accordance with principle 10. Furthermore, if there were dissatisfaction with the results of the safety assessment on the part of a State, that State could have recourse to the 1967 Outer Space Treaty, under article IX, which provided for consultations concerning an activity which may harmfully interfere with activities of other States.

The United States, observing that it was currently revising its position on the issue, decided to make no specific proposals for the time being.

In its conclusion, the Working Group suggested that any future revision of the substantive provisions of the Principles should be based on technical developments which might occur, and it was therefore advisable to await input from the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space.

Definition and Delimitation of Outer Space and the Character of the Geostationary Orbit

The Working Group on this item, reconvened under the chairmanship of *Mr. Estanislao Zawels* of Argentina, discussed separately the two aspects - the definition and delimitation of outer space, on the one hand, and the geostationary orbit, on the other. The Subcommittee had before it for consideration a number of documents which had been submitted at its previous session and in the Committee.

With regard to the definition and delimitation of outer space, the Subcommittee focused its attention on a working paper entitled "Questions concerning the legal regime for aerospace objects," which had been submitted by the Russian Federation at the Subcommittee's 1992 session. Although there was again very little narrowing of the differences between those who considered the definition and delimitation of airspace and outer space to be a practical and legal necessity and those who maintained that there was no practical need to establish a juridical boundary between airspace and outer space, the working paper served as a way of centering the Subcommittee's attention on concrete issues.

In presenting the working paper, the Russian Federation explained

that the paper was of a preliminary character and had been submitted as a stimulus for discussion which could possibly break the impasse in the debate. In spite of its preliminary nature, however, debate on the working paper proved to be quite constructive, yielding questions on many points of law and giving the Subcommittee sufficient food for thought.

The view was expressed, for example, that there would still be the need to resolve the question of the delimitation of airspace and outer space because the definition of "an aerospace object" in the paper was based on the object's potential to fly both in outer space and in airspace. It would hardly be advisable, it was argued, to subject a flying object to different legal regimes merely because it crossed a certain imaginary line in the course of its flight. If such an approach were adopted, numerous legal difficulties would arise, concerning such areas as contractual rights, safety rules, the status of the aircraft commander and other areas which were now regulated under air law. It might therefore be preferable to have, if one were needed at all, a single legal regime for aerospace objects. Consideration would also have to be given to the passage of an object, launched into outer space, through the airspace of foreign States.

Any principle applicable to aerospace vehicles would have to take into account technical factors such as the launching of space vehicles and space objects and the period they spend in airspace, aerodynamic properties of space vehicles and space objects, questions relating to entry into earth orbit and re-entry into the atmosphere, the flight regime for space vehicles depending on their location, procedures and notifications of launch, and possible revision of the registration of aerospace objects.

A "Draft questionnaire concerning aerospace objects," was prepared by the Chairman in consultation with a number of delegations as a starting-point for preparing a questionnaire to be sent to Member States.

Some delegations, while welcoming the Chairman's initiative, suggested that the questions should be divided into two groups: legal questions and technical questions, and that the legal questions should be further subdivided into de lege lata and de lege ferenda problems. Some delegations believed that the objective of the questionnaire was not quite clear and more refinement of the document was needed. In spite of these reservations, however, the Working Group agreed that the questionnaire could possibly be quite useful and that it should continue with its finalization.

Again, this year, there was no appreciable change in the positions of delegations with regard to the second part of this agenda item, the geostationary orbit. The developed countries generally continued to maintain that the GSO was part of outer space and therefore governed by the same legal instruments, in particular, the 1967 Outer Space Treaty. Most developing countries persisted in the view that the specific and particular characteristics of the GSO demanded the creation of a special legal regime to regulate access and utilization, which would take account of the needs of developing countries.

assessment", with some delegations expressing concern that this principle did not cover cases where a State does not agree with the results of the safety assessment carried out by a launching State in conformity with paragraph 1, and made publicly available pursuant to paragraph 3.

Mexico believed that the question of safety assessment was closely linked to the question of notification prior to the launching of a space object carrying a nuclear power source. It was argued, however, that the wording of paragraph 4 did not require the concurrence of other States with the results of the safety assessment carried out by a launching State and, accordingly, no provision was needed to cover the case where a State disagreed with such results. It was also argued that if a dispute arose because of a disagreement with the results of a safety assessment, such a dispute could be resolved in accordance with principle 10. Furthermore, if there were dissatisfaction with the results of the safety assessment on the part of a State, that State could have recourse to the 1967 Outer Space Treaty, under article IX, which provided for consultations concerning an activity which may harmfully interfere with activities of other States.

The United States, observing that it was currently revising its position on the issue, decided to make no specific proposals for the time being.

In its conclusion, the Working Group suggested that any future revision of the substantive provisions of the Principles should be based on technical developments which might occur, and it was therefore advisable to await input from the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space.

Definition and Delimitation of Outer Space and the Character of the Geostationary Orbit

The Working Group on this item, reconvened under the chairmanship of *Mr. Estanislao Zawels* of Argentina, discussed separately the two aspects - the definition and delimitation of outer space, on the one hand, and the geostationary orbit, on the other. The Subcommittee had before it for consideration a number of documents which had been submitted at its previous session and in the Committee.

With regard to the definition and delimitation of outer space, the Subcommittee focused its attention on a working paper entitled "Questions concerning the legal regime for aerospace objects," which had been submitted by the Russian Federation at the Subcommittee's 1992 session. Although there was again very little narrowing of the differences between those who considered the definition and delimitation of airspace and outer space to be a practical and legal necessity and those who maintained that there was no practical need to establish a juridical boundary between airspace and outer space, the working paper served as a way of centering the Subcommittee's attention on concrete issues.

In presenting the working paper, the Russian Federation explained

that the paper was of a preliminary character and had been submitted as a stimulus for discussion which could possibly break the impasse in the debate. In spite of its preliminary nature, however, debate on the working paper proved to be quite constructive, yielding questions on many points of law and giving the Subcommittee sufficient food for thought.

The view was expressed, for example, that there would still be the need to resolve the question of the delimitation of airspace and outer space because the definition of "an aerospace object" in the paper was based on the object's potential to fly both in outer space and in airspace. It would hardly be advisable, it was argued, to subject a flying object to different legal regimes merely because it crossed a certain imaginary line in the course of its flight. If such an approach were adopted, numerous legal difficulties would arise, concerning such areas as contractual rights, safety rules, the status of the aircraft commander and other areas which were now regulated under air law. It might therefore be preferable to have, if one were needed at all, a single legal regime for aerospace objects. Consideration would also have to be given to the passage of an object, launched into outer space, through the airspace of foreign States.

Any principle applicable to aerospace vehicles would have to take into account technical factors such as the launching of space vehicles and space objects and the period they spend in airspace, aerodynamic properties of space vehicles and space objects, questions relating to entry into earth orbit and re-entry into the atmosphere, the flight regime for space vehicles depending on their location, procedures and notifications of launch, and possible revision of the registration of aerospace objects.

A "Draft questionnaire concerning aerospace objects," was prepared by the Chairman in consultation with a number of delegations as a starting-point for preparing a questionnaire to be sent to Member States.

Some delegations, while welcoming the Chairman's initiative, suggested that the questions should be divided into two groups: legal questions and technical questions, and that the legal questions should be further subdivided into de lege lata and de lege ferenda problems. Some delegations believed that the objective of the questionnaire was not quite clear and more refinement of the document was needed. In spite of these reservations, however, the Working Group agreed that the questionnaire could possibly be quite useful and that it should continue with its finalization.

Again, this year, there was no appreciable change in the positions of delegations with regard to the second part of this agenda item, the geostationary orbit. The developed countries generally continued to maintain that the GSO was part of outer space and therefore governed by the same legal instruments, in particular, the 1967 Outer Space Treaty. Most developing countries persisted in the view that the specific and particular characteristics of the GSO demanded the creation of a special legal regime to regulate access and utilization, which would take account of the needs of developing countries.

The Working Group, therefore, sought to make progress by continuing the discussion it had begun on the basis of a "working non-paper" at its 1992 session. Colombia submitted a working paper, which took into account that "non-paper" as well as the suggestions of various delegations made at previous sessions, explaining that the issue was to find a legal solution to situations in which two or more countries claimed the same orbital position or neighboring orbital positions, the location of which gave rise to significant radio frequency incompatibilities or operating restrictions, placing a country which did not have access to the orbit or a developing country at a disadvantage compared with a country which already did have access or a developed country. Such a regime would apply especially to space communications services which had not been planned with national allotments.

As usual, there was concern about the possible conflict of activities between the International Telecommunication Union (ITU) and other international bodies, including the Legal Subcommittee. Some delegations believed that the views of ITU would be very pertinent and useful in connection with the consideration of this item. In their view, working contacts with ITU were needed to ensure consistency.

Developed countries stressed that the Subcommittee had no mandate to develop new legal principles which would lead to the establishment of a special legal regime. Those delegations believed that ITU was quite successfully dealing with the various aspects of the rational and equitable use of the GSO and that it was necessary to avoid conflict. Developing countries argued that the Legal Subcommittee did indeed have a mandate to deal with all aspects of this item.

As has progressively been the case in recent years, several members of the Working Group addressed the question of space debris and its removal from the geostationary orbit. A number of them drew attention to the threat posed by space debris and suggested that consideration be given to an international agreement dealing specifically with this question. It was recognized, however, that that would require resolving a number of legal issues such as the definition of space debris, jurisdiction and control over such debris and responsibility for damage caused by space debris.

In concluding its discussion, the Working Group agreed that the preliminary exchange of views which had taken place on the basis of the Colombian working paper had been very interesting, and provided a good basis for future work.

Exploration and Utilization of Outer Space for the Benefit and in the Interests of all States, Taking into Particular Account the Needs of Developing Countries

The Working Group on this item met again under the Chairmanship of *Mr. Raimundo González* of Chile and continued its exchange of views which it had begun in earnest at the previous session. This year, however,

the Working Group moved away somewhat from the theoretical discussions of the subject it had had at past sessions and focused on a new working paper submitted by a number of developing countries (Argentina, Brazil, Chile, Colombia, Mexico, Nigeria, Pakistan, the Philippines, Uruguay and Venezuela) entitled "Principles regarding international cooperation in the exploration and utilization of outer space for peaceful purposes."

This document, a revision of a paper submitted to the Subcommittee in 1991, also contained a series of preambular paragraphs and a set of six principles. It followed the same format and stressed the same issues as the original version. According to the sponsors, the revision sought to incorporate the suggestions and views of other delegations, which had been expressed during the heated debate which began on this question at the 1992 session of the Subcommittee. The sponsors also indicated a willingness to further revise the draft principles if necessary, based on the discussions of the current session.

The revision, however, was essentially an attempt on the part of the sponsors to build consensus by toning down the language of the new draft.

In Principle I, for example, a new paragraph stressed that "States are sovereign in deciding the modalities of their cooperation," in space activities -- in contrast to the previous document which had mandated the various forms that international cooperation should take -- and is obviously intended to alleviate some of the misgivings expressed by the developed countries that United Nations principles would have the effect of requiring specific kinds of cooperative programmes.

The previous reference in Principle II to the need for special treatment for developing countries was similarly replaced by the observation that "developing countries should benefit from a treatment which will enable them to fully benefit" from international cooperation in the exploration and utilization of outer space.

While there continued to be a strong divergence of views among the members of the Working Group, particularly over the level of mandated cooperation and the goals of such cooperation, the session's tight focus on the principles was generally thought to have yielded significant progress and marked a new phase in the Subcommittee's discussions on the issues related to this agenda item.

Cheryl Stoute
U.N. Office for Outer Space Affairs

Legal Issues of Communication Satellites in LEO

As in prior year, once again in 1993, the IISL was instrumental in organizing in connection with the session of the Legal Subcommittee of COPUOS a one hour presentation of current legal doctrines and practices by varied speakers authoritative in the subject matter.

This year's program focused on the "Legal issues concerning Low

Earth Orbit Communication Satellites" and was held at the United Nations Headquarters in New York on March 31, 1993. Under the Chairmanship of Dr. *Vaclav Mikulka* of the Czech Republic, who is the present Chairman of the Legal Sub-Committee, the discussion of this session was opened and moderated by *John B. Gantt*, a Washington based lawyer who is specializing in space and telecommunication law. He introduced the topic of the day as an interesting opportunity for an overview of the key legal issues as seen from diverse legal perspectives. In fact, each of the three invited speakers gave its own views of the subject as lawyers and practitioners of a different geographical area and facing peculiar local problems and regulations of satellite telecommunication systems that are conceived as global.

The topic was handled by the speakers with an explanatory and practical approach, which most benefitted the audience of UN delegations and Secretariat, who showed appreciation for the most informative and competent contribution offered to the reflection of the Legal Sub-Committee and asked questions of clarification and substance.

Professor *Robert Frieden* from the School of Communication of the Penn State University presented the legal and regulatory challenges to universal personal communications provided by Low Earth Orbiting satellites. After a brief presentation of the currently planned systems, he explained how much the key legal issue in the United States is the licensing, and the role of the FCC in taking efforts to expedite this process.

The scope of the regulatory action was explained emphasizing the difference of classification between common and private carriers and their conditions of access to the telecommunication market. Such conditions contain restrictions for non-US enterprises taking investment in US LEO systems. He concluded indicating with how much latitude of flexibility and discretionary power national administration of the concerned States will be able to agree internationally under the WARC-92 approved schemes.

Dr. *Marco Ferrazzani*, lawyer with the European Space Agency, presented some recent regulatory issues arisen in the European legal system that are to impact on Communication satellite systems in general and in particular on low Earth orbit systems.

The political and economical context of the European Community was discussed as the basis and the Directives as legislative tools used in the EEC for the present harmonization and liberalization efforts. Also in this area the different licensing schemes of each European state appear to prevent the establishment of a global services market and are therefore intended to be unified under a general EEC system provided for by the proposed Directive now under scrutiny. In essence, the new system would allow a satellite operator to apply and be granted a licence in one European State to be considered valid throughout the EEC based on the principle of mutual recognition of national authorizations from any EEC Member State. This fundamental legal principle will assort with the idea of subsidiary powers granted by EEC law to the Commission of European Communities in

the case of lack of action by a national administration.

The paper further analyzed the provisions of the Draft Directive and called for more analysis and practice to prove the concept.

The last contribution, prepared by *Said Mosteshar*, Attorney in London, was presented by *Richard Mizrack* since *Mosteshar* was unable to attend. The paper addressed the United Kingdom perspective on two issues of the general topic and, in particular, the impact of mobile satellite communication system on the regulatory environment in the UK and the ability of the authorities to exercise licensing jurisdiction.

The paper drew attention to the possible differences between national jurisdiction when adjudicating cases based on rules of standardization, licensing, competition and intellectual property rights. Discussing the UK Jurisdiction, the contribution presented the audience with the relevant provisions deriving from the UK Telecommunication acts and licensing system, stressing how much the recent trend of policy-making is towards liberalization of services.

The other main issue raised was the interesting problem of mobile services which has the effect of diverting the places of revenue generation and taxation. An operator of telecommunication services based on LEO systems might have no physical or legal presence in the overwhelming majority of the countries in which the revenue is generated. This will inevitably provoke revenue shifts and many other economic consequences.

Marco Ferrazzani
Legal Affairs Department
European Space Agency

Space Debris Mitigation and Policy Issues

At the initiative of the European Space Agency (ESA), the First European Space Debris Conference was held in Darmstadt, Germany, from April 5-7, 1993, gathering 251 experts from 17 countries including China, India, Japan, Russia, and the USA. The conference was cosponsored by the national space agencies Agenzia Spaziale Italiana (ASI), British National Space Centre (BNSC), Centre National d'Etudes Spatiales (CNES) and Deutsche Agentur für Raumfahrtangelegenheiten (DARA).

The purpose of this First European Conference on Space Debris was to provide a forum for the presentation of results from research on space debris; to assist in defining future directions for research; to identify methods of debris control, reduction and protection, and to discuss international implications and policy issues. In thirteen sessions more than one hundred presentations were given, covering mostly technical aspects of space debris but also policy issues. In addition, at the end of the conference a round table discussion explored the possibilities to control and regulate space debris.

J.P. Loftus Jr. ("Debris Mitigation Policies and Practices") gave an overview on current mitigation practices and an outlook in the future. Spacefaring nations in response to the increasing hazards represented by orbital debris are adopting a number of mitigation measures to protect future spacecraft and to protect the space environment from further degradation. Actions to date have been procedural and passive. In the future mitigation measures will probably require some international agreements with the force of treaty law in order to assure equitable competition among the current spacefaring nations and be enforceable for new entrants.

The paper by *W. Flury* and *D. McKnight* "IAA Position Paper on Orbital Debris" summarized the Space Debris Position Paper of the International Academy of Astronautics. This paper, which is the result of the effort of an ad hoc group of experts, is in the process of being approved by the IAA. The objective of this paper is threefold. First to make clear how significant and severe the continued placement of orbital debris into the near Earth environment is to the future use of space for all mankind. Second, to provide some clear guidelines as to how the international community might wish to proceed in order to combat this growing environmental hazard. Third, to extend discussion of the debris issue by other international groups to exercise the techniques and dialogue necessary to begin to formulate international agreements on this topic. Several debris control measures are recommended for immediate application in a first phase. These measures focus mainly on the prevention of debris.

The paper by *G.C.M. Reijnen* "Some Observations on Policy and Legal Issues in Regard to Space Debris" reviewed policy and legal issues of space debris. The author noted that as to legal implications, little to no advance has been made. A survey of existing legal instruments related to the subject under discussion reveals that general principles of law, and in particular general principles of international space law, if interpreted according to their intention, might, together with the updating of some of those principles, lead to mitigating the increase of the space debris population. For example, strict interpretation of the Registration Convention 1975, article IV, par. 2, might lead States, international organizations and private entities to enhanced awareness of the space debris problem.

As to policy implications, the author noted that a new international custom is, in regard to space debris, on the way of establishing itself, namely that of consultation between states, and members of international organizations, promoted in article IX of the Outer Space Treaty 1967. At present, consultation between ESA, NASA, the Russian Space Agency and organizations from Japan is taking place. Recommendations resulting from this consultation could be useful for an international legal instrument serving to mitigate and to prevent space debris creation. Also, the International Law Association (ILA) has, in its 1992 Cairo meeting,

adopted a Draft International Instrument concerning the protection of the environment from damage caused by space activities. This Draft Instrument needs, however, further improvement, e.g. definition of space debris. Recently, a set of principles on nuclear power sources in outer space was adopted by the United Nations General Assembly. These principles are, by their nature, legally non-binding.

One central issue is that of liability for damage as a consequence of pollution by space debris. The text of the Liability Convention 1972 article 1.a. seems to be insufficient to cover the present pollution of outer space. One possible means to actively engage States, international organizations and private entities to mitigate space debris, and pollution of outer space in general, is to introduce the legal concept of risk liability, that is liability of manufacturer and launching authority. A second proposal would be the creation of an international fund consisting of mandatory donations by each launching authority, the donations to be fixed amounts of money proportional to the mass of the object to the estimated hazardous nature of the object.

M. Benkő, K.U. Schrogl and G. Gruber contributed the paper "Space debris-legal problems to be solved within the United Nations". The authors are of the opinion, that space debris, as an issue of great concern to all spacefaring nations, should be globally dealt with by the United Nations Committee for the Peaceful Uses of Outer Space (UNCOPUOS). National studies on space debris have been submitted to the UNCOPUOS Scientific and Technical Subcommittee for a number of years already. As to the legal aspects, the authors are of the opinion, that is necessary to start the debate in the Legal Subcommittee. Legal problems which can be dealt with immediately with respect to space debris are the definition of space debris and its incorporation into the already existing definition of space object in international space law. The term space debris could be referred to as a space object regardless whether it still exists as a whole or whether it is fragmented to any size, in the event that such an object is non-functional and there is no reasonable expectation of it assuming or resuming its function. Such definition shows that the difference between space debris and a functioning space object has not to be seen primarily in the fragmentation of a space object, but in the decisive criterion whether a space object (as a whole or fragmented to any size) is functional or not.

Another question which could be dealt with is state liability in case of damage caused by unidentified space debris reentering the Earth's atmosphere.

As to questions relating to measures to be taken to avoid the generation of space debris as well as measures of protection against damage caused by debris, these problems have to be studied by the UNCOPUOS Scientific and Technical Subcommittee first. Only then the results of such studies can be translated into legal terms by the Legal Subcommittee.

The presentation "International Regulation of Space Debris: Policy Considerations" by *H.A. Baker* approached the space debris problem from

an environmental perspective. The author offered recommendations for consideration when developing space debris policy and for adjusting the existing legal regime in order to implement these policies. These policy recommendations are drawn from two areas of law: international space law and international environmental law. The latter provides existing principles relating to environmental protection which should be examined for their application to the space debris issue. The former provides both developing and accepted principles of law to be considered when developing a regulatory regime for the management of space debris.

The major provisions in International space law for protection of the outer space and Earth environments are article IX of the Outer Space Treaty and articles 7 and 15 of the Moon Agreement.

Space debris and its potential effects raise several issues which cannot be conveniently categorized as belonging to the domains of either space law or environmental law. Special considerations are needed for such issues, *e.g.* use of nuclear power sources, Earth orbits as natural resources and military or hostile use of space debris.

The main conclusions of the conference may be summed up as follows:

Ground-based observations with radar and optical facilities reveal the existence of about 7000 objects (larger than 10 cm) in space, which do not represent an immediate and excessive danger. However, the risk of collisions with orbital debris is steadily growing and adequate measures have to be taken in order to keep the debris hazard for manned and unmanned missions within safe limits. Of most concern are the long-term prospects of the debris hazard, particularly in those regions in space which are most heavily used, *e.g.* low Earth orbits (900-1500 km) and the geostationary belt (about 36,000 km altitude).

Significant efforts are in progress to characterize and improve the knowledge on the mid-size debris population (1-50 cm size objects). Shielding in this category is currently not practical and the knowledge on the spatial distribution is rather inaccurate.

Clean-up of debris is neither technically practical nor economically feasible. The thrust of the action must be toward preventing the creation of debris. Several preventive measures have been identified and implemented in space activities, such as releasing residual propellant in rocket upper stages to preclude a subsequent explosion generating many fragments, and the reorbiting at higher altitudes of geostationary satellites at the end of their mission in order to avoid collision with operational satellites. Further possibilities include destructive reentry into the atmosphere to burn up the spacecraft or selection of orbital parameters to limit the lifetime.

The space debris problem can only effectively be solved by international cooperation. Bilateral discussions between space agencies on the debris issue have taken place since 1987. Furthermore, on the occasion of the First European Space Debris Conference, the first multilateral

discussions among representatives of NASA, the Russian Space Agency, Japan, and ESA took place in Darmstadt (on 2-3 April).

It was agreed to establish a Space Debris Coordination Committee which would regularly meet (semi-annually) and which would be supported by four technical working groups. Within the framework of this cooperation the four parties will exchange relevant technical information and experience related to space debris and will prepare common strategies to counter the space debris problem.

In the absence of internationally agreed regulations and conventions on space debris mitigation and control, the aforementioned cooperation can be considered as a significant step toward a common approach on space debris control among four major space operators.

In view of the high interest this ESA initiative has stimulated, the holding of a second conference on the debris issue is envisaged in about 2-3 years from now.

W. Flury
Conference Organizer

Second Pan-American Space Conference, Santiago (Chile), 26-30 April 1993

Santiago, Chile was the venue chosen for the Second Pan-American Space Conference, which drew together scientists, academicians, educators, engineers and lawyers involved in space activities in the Americas. Also present were representatives of industrialized countries, such as the U.S.'s NASA, ESA, the French CNES, the German and Spanish aerospace agencies, as well as some from developing countries (Brazil's Instituto de Pesquisas Espaciais conference was a follow-up to the First Pan-American Space Conference held in Costa Rica, March 1990).

The plenary sessions were devoted to presentations by specific countries, and to those of the space agencies and United Nations' specialized agencies (WMO, UNEP, the UN's Office for Outer Space Affairs, and the Committee on the Peaceful Uses of Outer Space (COPUOS). Several sub-committees were established, charged with evaluating projects suggested in Costa Rica, and making proposals for additional projects related to the application of space sciences and technology in the Americas.

Remote Sensing activities, including monitoring the environment from outer space, were important themes of the conference, as was education. Regarding the latter, the Spanish government made several presentations regarding its proposal for educational or distance learning in the Spanish-speaking Americas, using the Spanish HISPASAT satellite. Several other countries discussed their present and future telecommunication satellite plans--Indonesia, Argentina, Mexico, among others.

The Legal Sub-committee was chaired by *Dr. Eduardo Gaggero* of Uruguay, assisted by *Dr. Aldo Armando Cocca* of Argentina as Rapporteur.

Fewer lawyers were present in Santiago than had been in Costa Rica, with the result that few presentations or project proposals for future action were made.

Quantity not being a reflection of quality, however, the few papers that were presented were most informative, for example, the one on Mexico's space activities and policies, by *Dr. Javier Abud Osuna* of the Secretariat of External Relations. *Dr. Alfredo Rey* of Colombia, and currently that country's representative at the UNCOPUOS, provided an excellent analysis of the evolution of the issues related to the use of the geostationary orbit, both at the COPUOS and the International Telecommunication Union (ITU), and the newest proposals of the countries with "special geographic situations". Issues related to space debris were the focus of the paper presented by *Dr. Marta Gaggero* (Uruguay). *Sylvia Ospina* presented a paper on the evolution of communication satellites and their regulation, including future low earth orbit (LEO) systems.

Educational programs, as well as the need for greater cooperation among countries and agencies were the topics of the sub-committees on Education and Science and Technology. The latter sub-committee also included several presentations on telecommunications satellites, and the changing role of the ITU, as presented by *Dr. Juan Zavattiero* of the I.T.U.'s office in Latin America.

The second Pan-American space conference was perhaps less well-attended than the first one in Costa Rica. One of the goals of the Santiago conference was to establish the meeting of Pan-American space experts on a regular basis, and to convene a third conference within the next two to three years.

This conference, as well as several other space and satellite-related conferences held in Washington within the last few months (Satellite XII, the International Small Satellite Organization, as well as the U.S. Global Change Policy Symposium), highlight the fact that space activities and small satellites are being recognized as increasingly important.

Most of these conferences have also highlighted the multiple uses that can be made of future low earth orbit (LEO) systems. They range from paging and other personal communications, to geographic information systems and environmental monitoring.

Conspicuously absent from the agendas of most of these conferences, however, are a number of issues that need to be considered prior to launching the LEO systems. For one, the small amount of spectrum (35 MHz) available for mobile services means that not all of the proponents will succeed in launching their system, let alone make efficient use of the spectrum. Many technical coordination questions remain unsolved, while licensing agreements between private parties and governments have yet to be obtained.

Secondly, multiple launches of multiple satellites will create if not contribute to the debris in outer space. (Ironically, many of the LEO's are launched and used to monitor the earth's environment and ecological

changes, but no attention is being paid to the changes that these very launches are causing in and to the outer space environment.)

Another issue that should be studied, regarding the increasing involvement of private parties in outer space activities, relates to their potential liability. While the 1972 Liability Convention, as well as the 1967 Outer Space Treaty talk about liability and responsibility, their focus is on the States, or governments, not on private, multi-national corporations. Is the time at hand to reconsider these treaties?

These are just three of the many issues that need to be thoroughly studied and resolved prior to implementing any LEO satellite system, whether for earth-monitoring or personal communications.

Due to their complexity, the cooperation of multi-disciplinary teams will be required to arrive at workable--and livable--solutions. The "bottom-line" question remains the same: who will be willing to finance solutions to these issues, to pay for a clean outer space environment and at what price?

Sylvia Ospina, J.D., LL.M.

International Telecommunications / Space Law Consultant

The Law in Relation to Remote Sensing Satellite Techniques for the Benefit of the Environment

The Center for Study and Research on Space Law of the Comparative Law Institute of the University of Paris II, the Environmental Law Center of the Robert Schuman University of Strasbourg, the Working Group on Scientific Space Remote Sensing and the University Space Research and Study Group of the Louis Pasteur University of Strasbourg, organized a colloquium on "The Law in Relation to Remote Sensing Satellite Techniques for the Benefit of the Environment," in Strasbourg, on June 2, 3, 4, 1993.

The attention focused on problems of environmental protection has sharpened, especially since the "Earth Summit" held in Rio de Janeiro in June 1992, concentrating on the continuing deterioration of the ecosystems on which people depend for their well-being.

The five sessions of this international colloquium dealt respectively with:

- an overview of technical and legal aspects of space remote sensing;
- the main environmental problems;
- the technical and legal framework of collecting and distributing data systems;
- the access to and protection of data; and
- the issue of a global environmental data system.

The approach followed was interdisciplinary, taking account not only of the interdependence between scientific knowledge and law, but also of the economic, social, and political implications of remote sensing activities.

The scientists detailed the basic principles necessary to direct the legal reflections on the problems posed by the use of remote sensing for environmental protection. Accordingly, they discussed recent and potentially dangerous changes in the earth equilibrium, such as the greenhouse effect, destruction of the ozone layer, deforestation and desertification, pollutions, and natural disasters.

These phenomena may be characterized as "main problems" because of their potentially catastrophic consequences or their irreversibility or because they may extend worldwide beyond territorial boundaries; in each case, those problems present differing ecological, economic, or legal consequences.

In this context, remote sensing by satellites has become an irreplaceable tool for efficient environment monitoring, including routine information collection and processing - and for maintenance of an inventory of the earth resources.

At this level, international lawyers must work with scientific knowledge in order to formulate rules which will facilitate the struggle against pollution rather than simply allowing the cataloguing of its effects. New and various problems confront them in this task.

The implementation of the "Principles Relating to Remote Sensing of the Earth from Space," adopted by the United Nations General Assembly on December 3, 1986, in Resolution 41/65 and governing the activities of States, was analyzed and much discussed during the colloquium.

Have these fifteen principles unanimously adopted by the General Assembly become, as a result, tenets of customary international law binding on all nations? Certainly, it was concluded that these principles had provided States with a legal framework which allowed them to conduct freely their remote sensing activities, which otherwise would not have been possible. Nevertheless, whether they could be said to be customary law was still a debate open to question.

In addition, contradictory positions were advanced on the adequacy of these principles in relation to the actual needs of the international community, particularly on the question of striving for a proper balance between the interests of the industrialized countries which possess the necessary technology and those of the developing countries which wish to have a share in the results.

A second basic question concerned the supply of remote sensing information and the appropriate roles of government and the private sector in this activity. The main operating systems - FRS, Landsat, Radarsat, Spot, MOS-JERS, and the Russian system - were explained. In the United States, the new policy of Landsat data distribution, according to the Land Remote Sensing Policy Act of 1992, has decided, after the experience of quasi-commercialization practiced with Eosat, the return of Landsat programme to the public sector.

After a debate on the concept of commercialization, it has been agreed that governments have never thought of privatizing completely the

remote activities; but while assuming the financing of satellites, they tried to recover parts of the costs by selling collected data to promote the widespread use of data and the continuity thereof.

Another issue was, in cases where data was commercially provided, whether a multi-tiered pricing structure was compatible with the fundamental principle of open and non-discriminatory access and at what conditions.

A third basic question to be clarified was the legal character of the data produced by remote sensing satellites and especially the problem of their protection, necessary for their commercial exploitation.

The impressive results of the study carried out in ten Community Member States, on this subject, for the Commission of the European Communities, confirmed that in positive law, remote sensing data were not protected adequately. An important solution for this situation would be to bring remote sensing data under the protection offered by "the European Commission Proposal for a Council Directive on the Legal Protection of Data bases."

Finally, the colloquium concentrated on the central objective of developing international cooperation in order to institute a global environmental surveillance system in the service of mankind, and thus, advancing the expressed goals of space law.

While there was agreement that it would be premature to establish a permanent international organization for this purpose, there appeared to be a good example of how such cooperation can work with the "Committee on Earth Observing Satellites": within this forum, on an informal basis, the various space agencies were already consulting on and coordinating their environmental activities.

The desire of the colloquium expressed in its general conclusions was that scientists and jurists continue their common efforts, in the spirit of Action 21, programme defined by the "United Nations 1992 Conference on Environment and Development," which made environmental monitoring a global priority thereafter inseparable from sustainable development.

*Anne-Marie Malavialle**

International Conference on Air Transport and Space Applications in a New World -- The Use of Airspace and Outer Space for all Mankind in the 21st Century

The second International Conference on Air Transport and Space Applications in a New World was held in Tokyo, June 2-5, 1993. It was organized by international institutions of air and space law at Soochow University, Taiwan; Leiden University, The Netherlands; McGill University,

* Centre National de la Recherche Scientifique, Institut de Droit Comparé, Centre d'Etudes et de Recherches sur le droit de l'espace.

Canada; Komazawa University, Japan and the Society for the Study of Law and Space Utilization, Japan. More than 150 people from all over the world attended the conference. About 30 speakers out of 47 were invited from abroad. There were six sessions, four on air law and two on space law.

The first space law session was dedicated to the issues of legal and political aspects of commercial space activities in the 21st century. It was chaired by Dr. *Jasentuliyana*, director of the U.N. Office for Outer Space Affairs and Dr. *Miyazawa*, Director of the Tsukuba Space Center, NASDA.

Prof. *HE Qizhi's* paper on "Legal Aspects of Organizing Space Cooperation in Asia-Pacific Region" was read in his absence by Mr. *Lu*. The author stressed the necessity of regional cooperation in space activities, especially in the Asia-Pacific region and advocated the establishment of an Asia-Pacific Regional Space Organization with a step by step approach and within the legal framework of a regional intergovernmental agreement similar to that of ESA. Then Professor *Kosuge*, University of Electro-Communications, Tokyo, presented his paper on "Satellite Communications Systems and Legal Issues in the Asia-Pacific Region." He mentioned the growing number of satellites for commercial communication services and especially the legal issues pertaining to trans-border TV broadcasting by satellite. He analyzed the present legal framework of national and international regulations and stressed the need for the establishment of new rules for trans-border TV broadcasting services in the Asia-Pacific region as soon as possible.

The next speaker, Dr. *Bourély*, former Legal Adviser of ESA and President of the French Society of Air and Space Law, spoke on "New Relationships between Western and Eastern European Countries in the Field of Space Activities." He underlined the great necessity for a wider European cooperation in the field of space activities for the further development of unification and referred to good examples and experiences of ESA. Ms. *Trinder*, a partner in the law firm Zucker, Scoutt & Rasenberger, Washington, D.C., gave her paper on "Legal Aspects of Commercial Space Activities, US Space Law: Development in Case Law." She stressed that there has been surprisingly little litigation in the space law field in the U.S., as compared to the amount of litigation in other areas. She analyzed several court cases and suggested to learn the lessons taught by these cases and to incorporate them into our thinking and drafting agreements. Mr. *Yoshida*, a senior analyst with CSP, Japan, and Mr. *Kitano*, Vice President of Dowa Fire & Marine Insurance Co., Tokyo, made comments on these papers and participated in the ensuing discussions.

The second session on space law, dedicated to the Exploration and Use of Outer Space, Celestial Bodies and Resources, was chaired by Prof. *Kuribayashi*, Keio University, Tokyo and Professor *Chiu*, President, Chinese Society of Aeronautics and Astronautics, Taipei. The first speaker, Dr. *Jasentuliyana* addressed "The Exploration, Exploitation and Use of Space Resources, The Benefit of All Mankind" and, referring to UN discussions, stressed the special considerations to be taken into particular

account with respect to the needs of developing countries. The next speaker, Mr. *van Fenema*, Vice President, KLM Royal Dutch Airlines, The Netherlands, presented his paper on "Cooperation and Competition in Space Transportation." He analyzed the increasing competition of launching transportation systems among countries and future developments of cooperation. Prof. *Gorove*, Director of Space Law and Policy Studies, University of Mississippi, spoke on "Legal Problems of Manned Space Flights." He reviewed the rules currently governing manned space flights and the issues which may arise in connection with them, as well as some of the solutions offered by the Space Station Agreement and the Draft for A Convention on Manned Space Flight. The next presentation was made by Prof. *Christol*, Emeritus Professor, University of Southern California, on "Protection of the space Environment: Debris and Nuclear Power Sources." He provided a detailed analysis of debris including nuclear power sources in outer space and evaluated U.N. efforts and positive steps concerning the protection of outer space environment, such as the Principles Relevant to the Use of Nuclear Power Sources in Outer Space. The last speaker, Dr. *Mendes de Leon*, Director of the International Institute of Air and Space Law, Leiden University, The Netherlands, spoke on the the "Settlement of Dispute in Air and Space Law." He dealt with dispute settlement in international treaties and pointed to the lack of efficient procedures for dispute settlement and suggested provisions or additional protocols to fill the gap. Ms. *Trinder* and Mr. *Miyazaki*, Manager, Tokyo Marine & Fire Insurance Co., Japan, commented on the presentations.

All in all the conference proved to be an outstanding event and a great success.

Prof. Toshio Kosuge
Univ. of Electro-Communications, Tokyo

Comments

The Development of Satellite Communications Law in the FCC: Highlights of Ten Leading Decisions and Future Expectations

The Federal Communications Commission, established by the Communications Act of 1934, has played and is expected to continue to play a major role in the development of satellite communications law in the United States.

The purpose of the ensuing brief overview and commentary is to highlight what this writer regards as the ten most significant FCC decisions in this field. Pursuant to these decisions, dozens of privately operated satellites have been authorized over a span of twenty years. The decisions gave birth to a multi-billion dollar space communications industry and create a formidable body of space law.

Brief Overview

One of the early decisions, *Domestic Communications Satellite Facilities*, 22 FCC 2d 86 (1970), set forth the basic technical, legal, and financial information required by the FCC to process an application for authority to construct, launch, and operate radio communications facilities onboard a space station, *i.e.*, a communications satellite. This decision also established the "open skies" policy of authorizing any qualified entity to operate a satellite communications system, not simply telephone companies.

The policy that the FCC is free to assign a satellite to whichever orbital location it decides is best, despite the request of a particular company for a particular orbital location was laid down in *Western Union Telegraph Company*, 47 FCC 2d 274 (1974). This decision also clarified the authority of the FCC to demand that a satellite licensee be able to move a satellite to a different orbital location upon the demand of the FCC.

Another decision, *Domestic Fixed Satellite Service*, 77 FCC 2d 956 (1980), established the policy of always processing satellite communications systems in groups, based on providing the public with 60 days notice within which to file applications for satellite systems to be considered simultaneously with the first application filed by an organization for a specific frequency band ("cut off" notice). This ruling applied the U.S. Supreme Court decision *Ashbacker v. FCC*, 326 U.S. 327 (1945), to satellite communication systems, such decision holding that the FCC must provide any qualified organization which timely files an application for a radio frequency with a fair opportunity to be granted a license to use that frequency.

Orbit Deployment Plan-Domestic Satellite, 84 FCC 2d 584 (1981) laid down the principle that variation in the characteristics of geostationary arc are not comparatively significant and therefore the Ashbacker decision does not apply to specific orbital locations, but only to specific frequency bands. This decision enabled the FCC to continue its "open skies" policy of authorizing all qualified satellite applicants, without the delays of judicial-type hearings to ensure a fair opportunity for each of the numerous applicants for the same specific orbital locations to get their preferred orbital location, based on the legal "fiction" that different orbital locations in the same portion of the geostationary arc were of commensurate value.

The principle that satellite licensees could sell the transponders or channels on-board their satellite, and that the purchaser would not be regulated by the FCC was enunciated in the decision dealing with *Domestic Fixed-Satellite Transponder Sales*, 90 FCC 2d 1238 (1982). This ruling began the process of deregulating economic review and control by the FCC of the satellite industry, and contributed significantly, to the financeability of new satellite systems.

The decision in the *Filing of Applications for New Space Stations*

in the *Domestic Fixed-Satellite Service*, (Appendix B) 93 FCC 2d 1260 (1983) formalized and expanded the still-current application requirements for satellite communications systems, including a limitation on the number of satellites that could be applied for, a demonstration of technical compatibility with existing U.S. and non-U.S. satellites, and financial qualification standards for satellite applicants. This ruling began the "multiple entry" precedent, an iteration of the earlier "open skies" policy. The "multiple entry" policy basically involves accommodating all qualified applicants by having the FCC either reduce the orbital spacing among different satellite systems to create more orbital locations, or more strictly construe its detailed application requirements to disqualify particular satellite applicants, as a means of avoiding legal type comparative hearings before an administrative law judge among different satellite applicants to select a licensee, when the number of applicants exceed the number of available orbital locations at a particular frequency band.

The approval of a satellite service for the purpose of broadcasting television programming from space directly to people's homes came about in the ruling pertaining to *Direct Broadcast Satellite Service*, 90 FCC 2d 676 (1982). This decision established the principle that broadcasting via satellite was consistent with the U.S. law, codified in the Communication Act of 1934, requiring that broadcasting frequencies be "equitably distributed" among local communities.

The important issue of whether privately operated international satellite communications systems may be in partial competition with the global INTELSAT consortium was decided upon in the decision relating to *International Communications*, 101 FCC 2d 1046 (1985). This ruling applied the previously developed legal precedent for domestic satellite communications systems to those companies which sought approval for orbital locations from which to connect earth stations in different countries.

Another important decision, *Satellite Communications*, 104 FCC 2d 650 (1986), established the Radiodetermination Satellite Service (RDSS) as the first satellite service to provide satellite communications among mobile users, and as the first satellite service in which all qualified applicants would be licensed so long as they were technically compatible, based on the use of a mandated modulation technique (spread spectrum communications), with the first group of licensed companies. This ruling also clarified that strict financial qualification criteria would not be required for satellite applicants if there was adequate technical ability to accommodate all of the satellite applicants.

Another significant decision dealing with *Mobile Satellite Services*, 2 FCC Rcd 485 (1987) established the Mobile Satellite Service (MSS) as the first satellite service to provide voice communications among mobile users. This decision also was the first use by the FCC of a mandated consortium among all qualified applicants for a satellite service, instead of the past

precedent of separate licenses for each applicant. This was due to the inability of the FCC to accommodate more than one license in the limited amount of frequency spectrum available for MSS, and the FCC's disinclination to conduct legal-type comparative hearings among the applicants to select the most qualified applicant for a license.

Conclusion and Forecast

Since 1987 there have been no FCC decisions which set fundamental new precedent for satellite communications systems. Instead, the FCC has issued new licenses to companies consistent with the above-described decisions, reaffirmed its Mobile Satellite Services decision in the face of legal challenges to it, and undertaken preliminary legal activity leading to new legal decisions in the areas of voice and data-only Low Earth Orbit (LEO) Satellite Services, International Satellite Sound Broadcasting Services, and Satellite Digital Audio Radio Services.

During 1993 it can be expected that the FCC will Create a Non-Voice Low Earth Orbit Satellite Service and possibly a Non-Geostationary Mobile Satellite Service. For the Non-Voice Low Earth Orbit Satellite Service the FCC has already established a frequency allocation and is in the process of developing a specific legal regime based on a consensus reached by four companies which have applied for licenses (Leosat, Orbcom, Starsys, and Vita). For the Non-Geostationary Mobile Satellite Service the FCC has already accepted applications in accordance with the 1983 Filing of Applications decision described above, and has secured the consent of the WARC'92 global regulatory treaty to this type of service. While it is too early to predict the legal foundation of these new satellite services, they are likely to be consistent with the basic legal framework established by the FCC in its Domestic Fixed Satellite, International Communications and Satellite Communications decisions described above.

During 1994 it can be expected that the FCC will create a Satellite Digital Audio Radio Service and possibly an International Satellite Sound Broadcasting Service. For the Satellite Digital Audio Radio Service the FCC in October 1992 proposed a frequency allocation and provided the public with 60 days within which to file applications to be considered in conjunction with that of the initial proponent of the service, Satellite CD Radio, Inc. For the International Satellite Sound Broadcasting Service, the FCC authorized the pioneer of this service, AfriSpace Corporation, to construct, launch, and operate an initial satellite system on an experimental basis. The legal foundation for these services will probably be similar to that established earlier in Direct Broadcast Satellite Systems.

The FCC has shown a remarkable ability to adapt to new satellite technology with rational legal regimes. In the twenty years since it began authorizing satellite communications systems, no company that was ready, willing, and able to implement a satellite system has failed for want of a

license from the FCC. The FCC is likely to continue its multiple entry, forward-looking policies throughout the 1990's.

M. A. Rothblatt
President, MARCOR, Inc.

Case Note

*Avtec Systems, Inc. v. Peiffer**

From 1984 to 1992, Peiffer was a full time employee of Avtec Systems, a government contractor that markets space related computer services. During this period, Peiffer developed substantial expertise in computer simulations of satellite orbits and orbital analysis. In 1985, Peiffer first began developing the "Orbit Program," a computer software program that performs various orbital simulations for satellites. Between 1988 and 1991, several modifications to the orbit program were suggested by fellow employees and subsequently incorporated into the Orbit Program.

Peiffer demonstrated the revised Orbit Program to several of Avtec's clients as a unique Avtec capability. Avtec subsequently labeled the Orbit Program as an Avtec trade secret in its 1991 client capability materials. In January 1992, Peiffer demonstrated the Orbit Program to NASA as part of an Avtec effort to obtain a contract. However, unknown to Avtec, Peiffer used an outdated version of the Orbit Program that lacked recent improvements which Peiffer knew were of importance to NASA. Avtec was not awarded this NASA contract. Peiffer believes that had he demonstrated the most recent version of the Orbit Program to NASA, Avtec would have been awarded this NASA contract.

In 1988, the Orbit Program was in a format known as the ".309 version." In early 1989, however, Peiffer began developing the Orbit Program into something different -- the "2.05 version." This version was not a program intended for demonstrations and specific problem solving, but rather a general "stand alone" software package that could be marketed commercially. Peiffer subsequently met one Kisak and discussed marketing this Orbit Program through Kisak's corporation, KKI. Peiffer did not inform Avtec of this meeting. In March 1989, Peiffer signed an agreement with KKI giving KKI an exclusive license to market the Orbit Program. Again, Peiffer failed to inform Avtec of his agreement with KKI. Since its 1989 evolution, sales of the Orbit Program have generated \$197,000 in gross revenues for KKI. Peiffer has received approximately \$98,500 of this amount.

Avtec alleges ownership of the Orbit Program, and seeks damages for copyright infringement of the Orbit Program, misappropriation of its trade secret in the Orbit Program, breach of Peiffer's fiduciary duty, and

* 805 F. Supp. 1312 (1992).

imposition of a constructive trust. Specifically, Avtec alleges that Peiffer developed the Orbit Program in the scope of his employment with Avtec and, accordingly, Avtec owned the Orbit Program by virtue of the "work for hire" doctrine.

I. Copyright Infringement

The basis of Avtec's action centers on the ownership of the Orbit Program. Avtec maintains Peiffer created the Orbit Program in the scope of his employment with Avtec, thereby making Avtec the program's true owner. Peiffer disputes this, claiming he created the Orbit Program in his spare time, as a "hobby," and in no way created the program for Avtec.

The court stated the presumption is that the one who creates the work is its rightful owner for copyright purposes. This presumption may be overcome, however, if the work is prepared by an employee within the scope of his or her employment. As Peiffer was clearly a full-time employee of Avtec for the time period in question, the court turned to the Second Restatement of Agency to determine what constitutes "scope of employment." The Restatement provides that conduct of a servant is within the scope of employment only if:

- (a) it is of the kind he is employed to perform;
- (b) it occurs substantially within the authorized time and space limits;
- (c) it is actuated, at least in part, by a purpose to serve the master.

The Court held that Avtec failed to satisfy the three-part Restatement test. Although Avtec did present evidence that the .309 version of the Orbit Program performed many of the same functions found in reports and other computer programs utilized by Peiffer as an employee, Avtec failed to produce sufficient evidence to satisfy the Court that Peiffer developed the current 2.05 version of the Orbit Program within Avtec authorized time and space limits or that Peiffer was motivated by a purpose to serve Avtec. Peiffer performed the majority of the work during his non-working hours and in furtherance of his personal hobby, and not to satisfy specific work obligations for Avtec. Since Avtec failed to overcome the presumption that Peiffer, as the Orbit Program's creator, is the rightful owner for copyright purposes, the Court denied Avtec's complaint for copyright infringement.

II. Misappropriation of Trade Secrets

The Court found that the use of the .309 version of the Orbit Program as a demonstration and marketing device qualified as a trade secret. While Avtec never sold or attempted to sell the Orbit Program as a "stand alone" product, it did use the Orbit Program to market its services.

The court found it significant that Peiffer performed numerous demonstrations of the Orbit Program for Avtec's potential clients, and knew that Avtec held out the Orbit Program as an Avtec capability in marketing demonstrations. Furthermore, Avtec's 1991 capability materials explicitly cited the Orbit Program as a trade secret for marketing purposes. Thus, the Court believed that Peiffer, while not creating the 2.05 version of the Orbit Program as a work for hire, granted Avtec a license to use the program as a marketing tool to demonstrate Avtec's capabilities by his numerous demonstrations at Avtec's request.

With respect to KKI, the Court held that KKI knew or should have known that it acquired the Orbit Program under circumstances giving rise to a duty to maintain its secrecy or limit its use. As president of KKI, Kisak cannot be excused for failing to communicate with Peiffer's principals at Avtec to inquire of Avtec's proprietary interest, if any, in the Orbit Program. KKI had an obligation to investigate any ownership claims by Avtec and it failed to do so. Consequently, the court found KKI also liable for misappropriation of Avtec's trade secret in the use of the Orbit Program.

III. Breach of Fiduciary Duty

Avtec asserted that as its employee, Peiffer owed Avtec the duties of loyalty, fidelity, non-competition and full disclosure. The court found it well established that an employee violates his duty of loyalty, fidelity and responsibility to his employer by using confidential information to the detriment of his employer and to the advantage of a competitive firm. Since Peiffer and KKI entered into an agreement granting KKI an exclusive license to market and distribute the Orbit Program while Peiffer was still a full-time employee of Avtec and without Avtec's knowledge, Peiffer essentially began "serving two masters -- Avtec and KKI." Furthermore, Peiffer should have used an updated version of the Orbit Program in the January 1992 NASA demonstration, which occurred when he was still a full time paid employee of Avtec. Accordingly, the Court held that Peiffer breached his fiduciary duty to Avtec.

IV. Constructive Trust

In light of Peiffer's misappropriation of Avtec's trade secret in the use of the Orbit Program, and Peiffer's breach of his fiduciary duty to Avtec, the court felt Peiffer and KKI would be unjustly enriched if permitted to retain all benefits and revenues generated by the Orbit Program. Accordingly, the Court granted Avtec's request to impose a constructive trust upon Peiffer and KKI.

The Court ordered that Peiffer and KKI remit to Avtec fifteen 15% of the gross revenues realized by KKI from the Orbit Program as well as 15% of any future gross revenues generated by the Orbit Program through

the efforts of KKI. Although the Court found that Peiffer owned the 2.05 version of the Orbit Program for copyright purposes, it ordered that the use of such program and its enhancements as well as a portion of the revenues generated therefrom must be shared with Avtec as a portion of the Court's damage award.

Michael A. Gorove*

Short Accounts

Nuclear Issues and the Global Environment

"Nuclear Issues and the Global Environment" was the subject of a panel at the 34th Annual Convention of the International Studies Association which met in Acapulco, Mexico, 23-27 March, 1993. Professor *Nikita F. Glazovsky*, First Deputy-Director of the Institute of Geography in the Russian Academy of Sciences was the chair. Two papers were presented, one by Professor *Jonathan F. Galloway* of the Department of Politics at Lake Forest College and the other by Professor *Anna Scherbakova* of the Monterey Institute of International Studies. *Galloway's* paper was entitled, "The New Regime For Nuclear Power Sources in Outer Space," and *Scherbakova's* paper was entitled, "The Past and Future Use of Peaceful Nuclear Explosions in the Former Soviet Union."

Galloway examined the 1992 United Nations "Principles Relevant to the Use of Nuclear Power Sources in Outer Space" (U.N. General Assembly Res. 47/68, December 14, 1992) from an interdisciplinary vantage point involving perspectives from the natural sciences and technology, law and policy, economics, history and ethics. He contrasted different nuclear power sources - nuclear reactors, radioisotope thermoelectric generators (RTGs) and nuclear rockets - and noted that the UN Principles apply only to the first two sorts of power sources. There are eleven principles in all, but *Galloway* devoted most of his analysis to Principle 3, "Guidelines and Criteria for Safe Use." Disagreements over the word "shall" and quantitative or probabilistic limits on radiation dosages were noted. How consensus was finally reached after thirteen years of study and negotiations in the UN was outlined. The author also emphasized that the matter is still on the agenda of COPUOS. In concluding, *Galloway* said, "The work of the Committee on the Peaceful Uses of Outer Space on NPS gives us reason to be optimistic about the continuing processes of developing international environmental space law..."

There is not much reason for optimism when one examines the history of peaceful nuclear explosions (PNE's) in the former Soviet Union. *Scherbakova* outlined ten uses of PNE's - 1) for the removal of rock strata and ore extraction, 2) for seismic sounding, 3) to eliminate gas flares, 4) for excavations, 5) to increase oil and gas recovery, 6) for expansion of

* Boston University School of Law.

prospecting and industrial developments of deposits, 7) to create underground storage cavities, 8) for waste burial, 9) to eliminate gas pockets in coal beds, and 10) for sump holes. She outlined forty-one PNE's and explained how there was a vested interest in this technology but little reason to think that entrenched interests may wish to continue dubious programs without adequate safeguards.

Glazovsky acted not only as chair but as a discussant and he also presented a new color-coded map of environmental threats in the territories of the former Soviet Union. There was a lively discussion within the panel and from the audience. Much work remains to be done.

Prof. *Jonathan F. Galloway*
Lake Forest College, Illinois

Settlement of Space Law Disputes

On April 1, 1993, during the Annual Meeting of the American Society of International Law, the Space Law Interest Group, chaired by Prof. *Stephen Gorove*, held a panel discussion on the Settlement of Space Law Disputes. In his introduction, the chairman noted that the U.N. Under-Secretary-General for Legal Affairs at the recent COPUOS Legal Subcommittee meeting called on lawyers and policy makers to create a legal framework for the orderly and dispute free conduct of outer space activities. This created a real challenge which would be hard to meet.

The main presentation was given by Professor *K.-H. Böckstiegel*, who provided an overview of his paper published in this issue of the JOURNAL.* In his discussion, he focused on the availability and potential mechanisms for the settlement of space law disputes. Commenting on the presentation, Professor *H. Almond* addressed various methods that might be used for settling disputes. Among the examples, he mentioned a consultation procedure along the lines used by the GATT Contracting Parties, consultations similar to those used between Argentina and the United Kingdom on the Falkland Islands question, the approaches taken in the Alabama Claims case and in the Aramco Arbitration. The other commentator, *Dr. E. Frankle*, General Counsel of NASA, also provided a short presentation, noting that the U.S. goal is not to bind itself to a compulsory dispute settlement mechanism. Rather, to the extent that an agreement contained a provision on dispute settlement, the U.S. would examine it individually. Furthermore, he noted that the key to any analysis or discussion of dispute settlement was to define the types of disputes that would be covered by provisions on dispute settlement. Nevertheless, he stressed that to provide specific provisions for disputes arising out of space activities would continue to fuel the notion that space is a specialty area, a notion which results in misunderstandings - for

* See this issue of the JOURNAL, at 1.

example, large insurance premiums.

The ensuing discussion was quite lively with some advocating general umbrella provisions for settling disputes arising out of space activities and others contending that such disputes should either be settled on an *ad hoc* basis or within the general framework of international law and international legal dispute settlement.

Katherine M. Gorove

Visiting Fulbright Lecturer in Law
Eötvös Lóránd University
Budapest, Hungary

Congressional Notes

The scaled-back space station project survived in the House by the slimmest margin of one vote and awaits Senate action where it may fare slightly better.

In response to concerns expressed by astronomers and environmentalists that extensive space advertising could interfere with the study and unfettered vision of celestial objects and add to "space junk," a Space Advertising Prohibition Act was proposed in the House and Senate (S. 1145). The act would forbid the launching of huge orbital billboards to display luminous corporate logos. Last April, Space Marketing Inc. announced plans to launch by 1996 a mile-long advertising billboard which would be visible from earth.

International Developments

An agreement on cooperation in space was signed by the United States and the Russian Federation on June 17, 1992. It provides a broad framework for NASA and the Russian Space Agency for cooperation in human and robotic space flight projects, ground-based operations and experiments and other important activities, such as monitoring the global environment from space, MIR space Station and Space Shuttle missions, involving the participation of U.S. astronauts and Russian cosmonauts, safety of space flight activities, and space biology and medicine.

In a resolution passed on Dec. 9, 1992, the U.N. General Assembly stressed the need for verification measures to prevent an arms race in outer space and called upon all states, in particular those with "major space capabilities," to contribute to the peaceful use of outer space. Both the Russian Federation and the United States were urged to undertake intensive bilateral negotiations in a constructive spirit to reach an early agreement on preventing an arms race in outer space (Res. 47/51). The General Assembly also urged an immediate nuclear arms freeze and emphasized the need to begin negotiations on an international convention prohibiting the use or threat of use of nuclear weapons under any circumstances (Res. 47/53).

On January 3, 1993, Russia and the United States signed the Treaty

on Further Reduction and Limitation of Strategic Offensive Arms (START II). It codifies the Joint Understanding signed by President Bush and President Yeltsin on June 17, 1992. It bans all long-range, land-based missiles with multiple nuclear warheads. START II will not enter into force until START I and its additional Protocol signed at Lisbon in May 1992 have been ratified by all parties (Belarus, Kazakhstan, Russia, Ukraine and the United States).

The new Constitution and the new Convention of ITU were signed on December 22, 1993 on the last day of the Additional Plenipotentiary Conference (7-22 December 1992). ITU's new structure is organized into three sectors: development, standardization and radiocommunication. The first Director of the Telecommunications Development Bureau which was set up by the Nice Plenipotentiary Conference and became operational on January 1, 1990 was also elected.

At the recent meeting of the Committee on Peaceful Uses of Outer Space, the United States dropped its opposition to having the space debris issue placed on the agenda of the Committee's Scientific and Technical Subcommittee on the condition that the agenda item was appropriately focused on research being done on the debris environment.

IISL Moot Court Competition

As a follow-up to the very successful moot court competition among Washington D.C. universities organized in connection with the 1992 World Space Congress, the IISL decided to hold in 1993 an International Moot Court Competition in which American and European universities would participate. The Preliminaries of this event were already held and George Washington University had won the U.S. Preliminary against three other U.S. universities. The European Preliminary was won by Leiden University and the finals between the two universities are expected to be held in Graz in October 1993. A similar moot court competition is planned for 1994.

Other Events

At the World Telecommunication Standardization Conference in Helsinki, on March 1-12, 1993, over 450 standards were approved and an Advisory Group was established to review priorities and strategies for activities of the Telecommunication Standardization Sector.

The Ninth National Space Symposium and Commercial Space Expo USA, held in Colorado Springs, April 13-16, 1993, devoted some of its sessions to international space cooperation, policy and security issues.

The 10th IAA Man in Space symposium took place in Tokyo, April 19-23, 1993.

The first Development Conference for the Asia-Pacific region under the auspices of the ITU was convened May 10-15, 1993 in Singapore.

Brief News

A faraway super-bright galaxy, the source of as much energy as a trillion suns, was observed by scientists through data sent by the **Extreme Ultraviolet Explorer** spacecraft....The SR71, a high speed reconnaissance aircraft, an abandoned remnant of the Cold War, was turned into a useful science platform, equipped with an ultraviolet camera to study stars and comets from 85000 feet.

President Clinton replaced the National Space Council with the Office of Science and Technology Policy....The space based anti-missile weapons program, commonly known as "Star Wars" has been shelved by the Clinton administration....The FCC on March 2, 1993 has conditionally approved Comsat Mobile Communications to provide a number of mobile satellite communications products and services.

The Space Shuttle **Discovery** which was launched on April 8, 1993 carrying the first hispanic woman into space studied the depletion of the earth's protective but withering ozone layer which is consumed by human-made pollutants and possibly by volcanic gases. It deployed and retrieved a small satellite which collected data on the sun's blazing corona.

The DCX, a single stage rocket developed by SDI would put payloads in orbit cheaper than other currently available rockets....The best performing owners, builders, and launchers of satellites can expect to be awarded premium rates that are two or three percentage points below the prevailing rates of 15-18 percent....The \$213 million, 4 1/2 ton stranded satellite, called **Eureca** (European Retrievable Carrier), was retrieved by the Space Shuttle **Endeavour** during its June flight....The **Hubble Space Telescope** repair mission is scheduled for December 1993.

On February 4, 1993 **Russia** deployed a giant space mirror to reflect sunlight toward the earth....The **Cosmos 2225** reconnaissance spacecraft, launched in December 1992, self-destructed in orbit on February 18, 1993....Several companies, including **INTELSAT**, signed agreements with Russia's **Informkosmos** to lease their **Express** satellite, a new model derived from a Russian **DBS** design....During their recent meeting in Vancouver, President Clinton and President **Yeltsin** also discussed Russian access to the world market of commercial satellite launches. The US may allow Russia to enter its commercial launch market under an agreement similar to a 1987 deal with China which permitted Chinese launch of a specified number of US-built satellites in exchange for missile proliferation controls and pricing on a par with those charged by Western launch companies....The Russian Ministry of Posts and Telecommunications and the Russian Space Agency have chosen an international consortium, as the first private satellite company, to establish a commercial communications system for Russia....The United States and Russia plan an unmanned mission to Mars in October 1994.

Arianespace contracted to launch two **Intelsat VIII** and one **GE Americom** satellites in 1996....A second **ESA** agreement on cooperation in

the peaceful exploration and use of outer space has been signed recently with Romania; the first one was signed with Hungary in April 1991.

India tested a secret hypersonic propulsion technology which may be an important step in the development of a future aerospace plane. ISRO, the Indian Space Agency, denied that cryogenic engine technology bought by India from Russia would be used for military purposes....

With the admission of Georgia, Kazakhstan and Slovakia, ITU's membership rose to 176.

B. *Forthcoming Events*

The 1993 **IISL Colloquium** on the Law of Outer Space will be held **October 16-22, 1993** during the IAF Congress in **Graz, Austria**. Topics to be discussed include: (1) Legal aspects of space activities of organizations of the U.N. system and other international organizations (*e.g.* ICAO, WMO, WHO, FAO, IAEA, ITU, etc.); (2) Adjudication and arbitration of disputes regarding space activities; (3) Legal aspects of space insurance; (4) Recent legal developments with special emphasis on nuclear power sources.

In addition to the foregoing events, the International Academy of Astronautics will hold a **Scientific-Legal Roundtable** on space debris and **Symposia, *inter alia***, on international space plans and policies, space activities and society, extraterrestrial intelligence, and space safety and rescue. The finals of the **1993 International Moot Court Competition** between George Washington and Leiden Universities will also take place in Graz at the same time.

Immediately preceding the Colloquium, the U.N., the IAF, the Austrian Space Agency, ESA, and the Commission of the European Community have agreed to jointly sponsor a **Workshop** on "Organizing Space Activities in Developing Countries: Resources and Mechanisms."

The **Africa TELECOM 94**, a follow-up to Africa TELECOM 86 in Nairobi, Kenya and Africa TELECOM 90 in Harare, Zimbabwe, will be held in **Cairo, Egypt** from **April 25-29, 1994** for the purpose of reviewing policies for both the regional and global telecommunication integration of Africa and the Middle East.

The **1994 Colloquium** on the Law of Outer Space is expected to take place **October 9-14 1994** in **Jerusalem, Israel**. Topics to be discussed include: (1) New Legal Developments in Satellite Communications, to be chaired by Prof. Ruth Lapidot (2) Definitional Issues in Space Law, to be chaired by Prof. S. Gorove (3) Liability in Commercial Space Activities, to be chaired by Prof. Böckstiegel; (4) Other Legal Matters, to be chaired by Prof. Kopal

An organizing committee, consisting of Dr. E. Fasan, Dr. M. Smith, Ms. V. Kayser and Ms. T. Masson-Zwaan, IISL secretary, is in charge of the **1994 International Moot Court Competition**, the finals of which are expected to be held in **Jerusalem** during the Colloquium.

Reviews

INTERNATIONAL LEGAL PROBLEMS IN THE PEACEFUL EXPLORATION AND USE OF OUTER SPACE, by Maurice N. Andem (Univ. of Lapland Publications in Law, Rovaniemi, 1992), pp. 511.

This book enriches the body of literature on space law: Mr. *Andem* not only gives the reader a 'historic' overview of the genesis of a great number of international law, which is outer space law, but he also provides an insight into the value for mankind of the technological developments in this field, provided that they are accompanied by the appropriate legal rules to ensure their peaceful use in outer space.

He is an idealist when it comes to the difficulty of bridging the many conflicting interests that play a role in the efforts to shape a globally acceptable legal regime governing national and international space activities by States and private entities. In his conclusion, Mr. *Andem* states that it is encouraging to observe a spirit of compromise between the USA and the USSR. This was written before the 'glasnost' and 'perestroika'. After the demise of the communist system of the USSR and in Eastern Europe, a new situation and new opportunities present themselves, inviting Mr. *Andem* to write a sequel to his book. The book has a foreword, written by that eminent lawyer and judge Manfred Lachs, who considers the book "one of the most detailed analysis of progress made in developing rules of conduct for States and individuals to, in and from outer space." Judge *Lachs* points out that Mr. *Andem* is, and rightly so, preoccupied with the necessity to 'de-militarize' and 'neutralize' outer space and use the benefits of space activities in the interest of all countries and peoples of the world. And of course, the survival of mankind demands this.

Mr. *Andem* makes a point of the necessity, from the legal point of view, 'to define and delimit the upper limit of the airspace of States and the lower limit of outer space': He suggests to take 80 kms as the upper limit of the airspace and the lower limit of outer space. However, politically, the acceptance of a definite limit is still unattainable under the prevailing international circumstances. There may still be claims in the future to extend national sovereignty into outer space, *i.e.*, beyond the present 'practical' limit of 85-110 km above sea level?

The book is well documented with an extensive bibliography and a list of UN documents. The choice of subjects for the seven Annexes to the book are rather arbitrary though.

Mr. *Andem* deserves a compliment for bringing outer space closer to man on the earth's surface and to bring man on earth closer to space activities.

Prof. *Henri A. Wassenbergh*
Leiden University, Holland

SPACE LAW: DEVELOPMENT AND SCOPE, edited by N. Jasentuliyana (Praeger, 1992), pp. xxiii, 278.

This recent book on space law dedicated to *Dr. Eilene Galloway* published under the auspices of the International Institute of Space Law consists of eighteen chapters written by renowned specialists from all over the world and has a Foreword by Judge *Manfred Lachs*, a Dedication to *Dr. Galloway* by *I.H. Ph. Diederiks-Verschoor*, along with two appendices: one a list of publications of *Dr. Galloway* and the other a selected bibliography on outer space law prepared by *Kuo-Lee Li*.

One group of chapters focus on current and possible future principles of space and the process of their creation. A chapter written by *H. DeSaussure* discusses maritime antecedents of the outer space freedoms and chapters written by *V. Kopal*, *N. Jasentuliyana*, and *S. Gorove* give an overview of space law. A chapter by *C. Christol* discusses the future of space law and one by *E. Galloway* underscores the process for creating space law. In addition, *K-H. Böckstiegel* offers a summary of the case law on space activities and *G. Gál* opines on the study and teaching of space law.

Another group of chapters relate to national and international regulation of space activities. With respect to national regulation, *J. Galloway* deals with space law in the United States, while *V. Vereshchetin* discusses trends in the Soviet Union. *M. Bourély* offers an overview of the European Space Agency and *N. Matte* focuses more broadly on institutional arrangements for international space activities.

F. Lyall's chapter deals with satellite communications, while *S. Doyle's* contribution pertains to legal aspects of commercialization. *P. Jankowitsch* focuses on military activities, *HE Qizhi* stresses environmental aspects of outer space activities, *L. Perek* highlights some of the crucial scientific aspects which are often overlooked by lawyers and *A.A. Cocca* examines mechanisms for the settlement of space disputes.

Some of the chapters in the book provide a summary for those individuals new to the field of space law. Other chapters pose a number of interesting questions such as, for instance: Should a single global communications satellite organization still be sought? Should INTELSAT and INTERSPUTNIK merge? How can national interests and international cooperation be balanced to deal with military activities in space? Should principles on nuclear power sources be incorporated into a convention? What legal steps can be taken to begin to protect outer space from pollution? Should law follow, precede or develop simultaneously with scientific and technical developments? Should there be a push for an International Convention on the Settlement of Space Disputes? Should the terms of the 1979 Moon Agreement be reviewed? Should there be a new organization created to deal with outer space issues or rather can existing organizations meet the challenges? Should there be a legal regime for space transportation? Should outer space be delimited? What forms of space cooperation should currently be taking place?

Because of the large number of contributing writers, unfortunately none could go into great depth on any one issue. Consequently, the book could be used best by students of space law and those individuals needing an introduction to a number of space law topics and a quick but thorough summary of the remaining challenges and problems.

Katherine M. Gorove

Fulbright Lecturer, Faculty of Law
Eötvös Lóránd University, Budapest

THE FUTURE OF INTERNATIONAL TELECOMMUNICATIONS, edited by Umberto Leanza (4 vols., Univ. Rome II & Oceana, 1993), pp. 2890.

This ambitious project is the result of surveys of a number of areas pertaining to telecommunications law conducted by a group of nine Researchers and directed by Professor *Umberto Leanza* of the Faculty of Law, University of Rome. The compilation reprints documents or excerpts of documents which touch upon a wide variety of subjects pertaining to international telecommunications.

The 4 volumes are broken down into five parts: (1) definition and delimitation of outer space; (2) peaceful uses of outer space; (3) the legal regime of the geostationary orbit; (4) the legal regime of telecommunications by geostationary satellites and (5) the appendix. The first 3 parts are contained in Volume 1, approximately 1/4 of Volume 1 and all of Volumes 2 and 3 deal with the fourth part, and the appendix is in Volume 4.

Because two and one-fourth volumes are devoted to the part dealing with the legal regime of telecommunications by geostationary-orbit satellites, the editors were able to include documentation on a number of related topics. Subjects include: property and registration; satellite launching and tracking; removal; responsibility; liability and damages; telecommunications; freedom of information; copyright and "neighboring rights"; radiotelevision; remote sensing; navigation; meteorology; and intergovernmental juridical cooperation. For all of these topics within this part, as well as for the four other parts, documents that relate to any of the following six subjects are grouped accordingly and reproduced: (1) international agreements; (2) international organizations, which includes the treaties establishing the particular organization and acts of such organizations; (3) non-governmental organizations, which includes statutes and acts of those organizations; (4) national practice, which includes domestic legislation, the domestic approach, and statements of countries in international bodies; (5) acts of international conferences; and (6) settlement of international disputes. Some parts obviously would have no relevant documents to be included under one of these subjects. For example, no documents exist relating to international dispute settlement in the context of the definition and delimitation of outer space, while a number of documents exist on that subject as it relates to GSO satellites.

An enormous amount of useful research material is included in this

set. Excerpts from most Background papers prepared by COPUOS, excerpts from letters from intergovernmental organizations, excerpt from Reports of UNCOPUOS or from Reports of the Legal Sub-Committee to UNCOPUOS, relevant national legislation, statements as far back as the early 1960-s from nations as to their position on the relevant subject taken from the Summary Record of the Legal Subcommittee or taken from the WARC negotiations, and resolutions, recommendations, as well as other documents from regional organizations. Therefore, if one were to research the question of delimitation, one could find the relevant Background Reports, countries' practice and statements, working papers and other proposals, etc.

This four volume set provides a valuable asset to any serious scholar of space law, particularly the more junior scholars, who are not familiar with the history of many of the laws that exist today. It also is an enormous time saver for the more senior scholar who knows that a particular point of view has been expressed by a certain group of countries, but cannot quite remember which ones or at which point in time during the last twenty-five years. All relevant material appears to be included in this set. The last volume contains an excellent bibliography and a superb index, allowing one to find materials quickly. The only complaint is that the volumes are individually bound and do not lend themselves to being updated, which means that documents after 1990 are probably not included.

Katherine M. Gorove

Fulbright Lecturer, Faculty of Law
Eötvös Lóránd University, Budapest

*CENTRE D'ETUDES ET DE RECHERCHES SUR LE DROIT DE L'ESPACE,
FAUT-IL CRÉER UNE ORGANISATION MONDIALE DE L'ESPACE?* (Paris,
1992), pp. 167.

This report on whether a world space organizations is necessary comes at a time when countries are looking for new forms of cooperation after the Cold War. It is particularly welcome in light of the dearth of literature on this subject. The report was drawn up by a working group composed of *M. Bourély, S. Courteix, Ph. Cristelli, G. Lafferranderie, Y. Rebillard, D. Ruzie, and O. de Saint-Lager* under the auspices of the Centre national de la recherche scientifique (CNRS) by its Center for research and studies in space law. The current report is in French with a 12 page summary report, one in English and one in French, and contains the Working Group's recommendations and conclusions. An English version of the Report is expected to appear later this year.

The Report outlines the pros and cons of a World Space Organization. It notes that international cooperation occurs with respect to drawing up rules governing (1) space activities, (2) research and development, and (3) the commercial exploitation of space applications. Nonetheless, such cooperation differs as to the nature of the parties

involved, its objectives, its form, and its formal framework. Because the international scene has changed dramatically with the end of the Cold War, many new requirements have developed which call for international cooperation. For example, the growing number of spacecraft requiring coordination for launches, orbit, and reentry, the development of programs for planetary exploration pursued by the developed countries, the pursuit of operational activities such as the remote sensing of natural resources, weather forecasting, environmental monitoring and launch services, as well as other areas.

The Report discusses some of the problems inherent in setting up a world space organization: some relate to the nature of space activities, such as the costs, national security requirements and competition; others concern political aspects, particularly the different views of developing and developed nations; and yet others involve economic considerations, which lead many developed countries to be suspect of new international organizations. The Report argues that although there is no prospect of setting up a world space organization with broad powers, there are grounds for setting up a limited world space organization which would not be operational and which would not be used for commercial ends. It suggests that the tasks of such an organization should be confined to tasks that cannot be undertaken through other forms of international cooperation, for example, drawing up international rules and monitoring compliance with them, as well as gathering technical information on space activities, and circulating data gathered in the course of such activities, for example, data relating to environmental monitoring. The Working Group suggests that to accomplish these tasks a United Nations Centre for Space, which was planned as part of UNISPACE-82, could be revived. This would mean that the organization would be attached to the United Nations, would be streamlined and flexible, and for some tasks, would incorporate the existing structures of the UN Office for Outer Space Affairs, the UNCOPUOS and its Sub-Committees.

The Report also discusses the issues pertaining to a military mission for such an organization, although agreement was not reached within the Working Group on some of those issues.

The Report is extremely well organized and appears to be thorough. It should definitely be read by all interested in the development of space law.

Katherine M. Gorove
Fulbright Lecturer, Faculty of Law
Eötvös Lóránd University, Budapest

THE HIGHWAYS OF AIR AND OUTER SPACE OVER ASIA, edited by Chia-Jui Cheng and Pablo Mendes De Leon (Nijhoff, 1992), pp. 364.

This treatise contains the proceedings of the Conference on the Law, Policy, and Commerce of International Air Transport and Space Activities which was held in May 1991 in Taiwan and organized by the International

Institute of Air and Space Law at Leiden University and the Tamkang University Graduate School of European Studies.

As intimated in its title, the book deals with two major areas: aviation and outer space. It singles out the legal aspects and regulatory aspects of these two domains. Within this broad framework, the aviation aspects are discussed with a focus on issues of regulating reform, safety and security, liability, and the future of aviation seen in Euro-Asian relationships. As to the space area, the legal aspects of commercial space activity and the future of these space activities in the context of Euro-Asian relationships are discussed. Of special interest to space lawyers and policy makers are the discussions of the legal and commercial aspects of data gathering by remote sensing (*Bin Cheng*), the legal aspects of aerospace planes (*Carl Q. Christol*), the legal problems of direct broadcasting by satellite, with special attention on program, advertising, and copyright issues (*Toshio Kosuge*), international telecommunication and ITU developments (*Tanja L. Masson-Zwaan*), and the international space station (*Frans G. von der Dunk*). The future of space activities is espoused by *Michel Bourély*. Also covered are the benefits of space activities for Asian countries (*Sompong Sucharitkul*) and cooperation and competition in space transportation (*H. Peter van Fenema*). The materials presented in this treatise should be of great interest both to the specialist and the general reader as well. They contain substantial and valuable information presented by many internationally known scholars. For the organization of the conference and the publication of a large number of solid presentations special credit should be given to the inviting institutions, their leaders and associates.

PROCEEDINGS OF THE SEVENTH ANNUAL INTERNATIONAL SPACE DEVELOPMENT CONFERENCE - SPACE: THE NEXT RENAISSANCE, edited by Jill Steele Mayer (Univelt, 1991). pp. 501.

PROCEEDINGS OF THE TENTH ANNUAL INTERNATIONAL SPACE DEVELOPMENT CONFERENCE - SPACE: A CALL FOR ACTION, edited by Robert C. Blackledge, Carol Luckhardt Redfield, and Steven B. Seida (Univelt, 1991), pp. 385.

These two paperbacks are devoted to the 1988 and 1991 International Space Development Conferences and have been published in 1991. Both of them deal with space development in a broad perspective. The first one, in addition to the fields of science and engineering extends to areas related to economics, politics, grassroots initiative, business, education, social sciences, medicine, architecture, arts, and international activities.

The second volume is directed toward the vision of space development for humanity. The great expectations frequently attached to the exploration and use of outer space are well reflected in the introductory summation that "space is another place to look from and to in

order to find solutions to our current problems." (P.v.). In that context, the book addresses international and global issues with specific attention to aspects of technology, space stations, space manufacturing, planetary communities, off-planetary colonies and future technologies. In addition, sessions have been devoted to medical, economic and business aspects.

While there are many topics which have interest to lawyers, e.g., the discussion on *The Future of Space Commercialization and Space Debris* by *Edward R. Finch, Jr.*, it is regrettable that only brief abstracts of the various presentations are included. Fortunately, the first paperback has a bit more information on the presented topics than a mere collection of brief abstracts.

REMOTE SENSING UNDER CHANGING CONDITIONS, edited by Hans-Joachim Heintze (Bochum, Universitätsverlag Brockmeyer, 1992), pp. 222.

This paperback contains the proceedings of the Immenstaad Workshop 1992 which was an internationally presented follow-up to a 1988 meeting by researchers to investigate remote sensing possibilities for securing peace in Europe. The subjects touched upon in the workshop include remote sensing in European security, the potential application of ESA's remote sensing systems for disarmament verification, the role of verification satellites in European arms control, including verification of a chemical weapons convention, the various organizational options for verification, the German position on verification, and the U.N. and NATO positions on verification.

Additional chapters deal with experiences gained from on-sight mock inspections, the harmonization of civil and military satellite-borne remote sensing activities, the lessons from Desert Storm, computer-aided interpretation of remote sensing data, and a future of verification.

All in all, the book which was published by the Institut für Friedenssicherungsrecht and Humanitäres Völkerrecht of the Ruhr-Universität Bochum addresses a number of important issues concerning the use of remote sensing satellites for verification of arms control agreement. While the Workshop aims to take account of the new political and security conditions in the wake of the demise of the cold war, it is unfortunate that it has no input reflecting the positions and practices of the two major military powers, the United States and the former Soviet Union.

Book Notices

THE UNITED NATIONS SPACE TREATIES ANALYSED, by Bess C. M. Reijnen (Editions Frontières, 1992), pp. 330.

This treatise contains commentaries on the Nuclear Test Ban Treaty of 1963 and the five major U.N.-drafted space treaties, including the Outer Space Treaty, the Rescue Agreement, the Liability Convention, the Registration Convention, and the Moon Agreement. The procedure followed

by the author is to reproduce the text of selected articles of these conventions and follow them up with brief commentaries. Before embarking on her analytical commentaries, the author briefly refers to some basic issues on the background and history of the United Nations space treaties, including the "common heritage of mankind" concept and the principles of equity and equality. While the placing of her comments immediately after each treaty provision in a sequential order is helpful for the reader, it detracts from the value of the book that the very substantial scholarly literature on the topics is only commented upon very briefly and without direct reference to supporting annotations.

LIVING AND WORKING IN SPACE - HUMAN BEHAVIOR, CULTURE AND ORGANIZATION, by Philip R. Harris (Ellis Horwood, 1992), pp. 339.

This hard cover book addresses some of the human opportunities arising from space exploration and habitation. One of the intimated purposes of the book is to enlighten people in various fields of science, education, business, engineering, and politics on why we are going into space. Out of the eight chapters, some of which address human behavioral and cultural implications, personnel deployment and macromanagement of space enterprises, only the last one, dealing with challenges in space industrialization and settlement, touches specifically on commercial, legal, and political issues.

Of specific interest is the text of the "Description of First Principles for the Governance of Outer Space Societies" which was drafted by scholars assembled for two conferences at the National Air and Space Museum, Washington, D.C., in December 1986 and November 1987, and is included in Appendix A.

LES TEXTS DU DROIT DE L'ESPACE, by Pierre-Marie Martin (Presses Universitaires de France, 1992), pp. 127.

This is a handy booklet in the Collection Encyclopédique's "Que sais-je?" series inasmuch as it contains the French texts of the U.N.-drafted and other space treaties relating to arms control agreements, international organizations and the U.S./International Space Station.

SPACE LAW TEACHING IN EUROPE, by the European Centre for Space Law (2d ed., Martinus Nijhoff, 1993), pp. 127.

This useful paperback provides in its second edition an expanded alphabetical list, according to countries, of European Universities and Institutes engaged in some form of space law teaching. The names of the respective professors, their courses and lists of theses and publications are also included together with the outline of the First European Summer Course on Space Law and Policy held in Messina, Sept. 7-16, 1992. It is

hoped that future editions will include such omitted countries, like Hungary and the former Soviet Union, where space law has been taught by eminent specialists (e.g. Professors Gál, Vereshchetin and Zhukov), probably for a longer time than in most of the other countries.

RECENT PUBLICATIONS*

A. Books

- BLACKLEDGE, ROBERT C., REDFIELD, CAROL LUCKHARDT, AND SEIDA, STEVEN B. (EDS.), PROCEEDINGS OF THE TENTH ANNUAL INTERNATIONAL SPACE DEVELOPMENT CONFERENCE - SPACE: A CALL FOR ACTION (Univelt, 1991).(Univelt, 1991).
- CENTRE D'ETUDES ET DE RECHERCHES SUR LE DROIT DE L'ESPACE, FAUT-IL CREER UNE ORGANIZATION MONDIALE DE L'ESPACE? (Paris, 1992).
- CHENG, CHIA-JUI, AND MENDES DE LEON, PABLO (EDS.), THE HIGHWAYS OF AIR AND OUTER SPACE OVER ASIA (Nijhoff, 1992).
- GLASER, P.E./DAVIDSON, F.P./CSIGI, K.I. (EDS.), SOLAR POWER SATELLITES: THE EMERGING ENERGY OPTION (Ellis Horwood, 1993).
- HARRIS, PHILLIP R. , LIVING AND WORKING IN SPACE, HUMAN BEHAVIOR, CULTURE AND ORGANIZATION (Ellis Horwood, 1992).
- HEINTZE, HANS-JOACHIM, REMOTE SENSING UNDER CHANGING CONDITIONS (Universitätsverlag Brockmeyer, 1992).
- HOBE, STEPHAN, DIE RECHTLICHEN RAHMENBEDINGUNGEN DER WIRTSCHAFTLICHEN NUTZUNG DES WELTRAUMS (Duncker & Humblot, 1992).
- INSTITUT DE DROIT COMPARE DE L'UNIVERSITE PANTHEON-ASSAS (PARIS II), CENTRE D'ETUDES ET DE RECHERCHES SUR LE DROIT DE L'ESPACE: CHRONIQUE DES ACTIVITES SPATIALES, JANUARY 1991 - MAY 1992 (1992).
- JANE'S INFORMATION GROUP, JANE'S SPACE DIRECTORY (Jane's Info. Group, 1993).
- LEANZA, UMBERTO (ED.), THE FUTURE OF INTERNATIONAL TELECOMMUNICATIONS (U. Rome II and Oceana Publications, Inc. 1992).
- MASSON-ZWAAN, TANJA L, AND MENDES DE LEON, PABLO M.J. (EDS.), AIR AND SPACE LAW: DE LEGE FERENDA: ESSAYS IN HONOR OF HENRI A. WASSENBERGH (Nijhoff, 1992).
- MAYER, JILL STEELE (ED.), PROCEEDINGS OF THE SEVENTH ANNUAL INTERNATIONAL SPACE DEVELOPMENT CONFERENCE, SPACE: THE NEXT RENAISSANCE (Univelt, 1991).
- REIJNEN, B.C.M. THE UNITED NATIONS SPACE TREATIES ANALYSED (Editions Frontières, 1992).
- SMITS, JAN M., LEGAL ASPECTS OF IMPLEMENTING INTERNATIONAL TELECOMMUNICATION LINKS (Dordrecht, 1991).
- TATSUZAWA, K. (ED.), LEGAL ASPECTS OF SPACE COMMERCIALIZATION (Tokyo, 1992).

B. Contributions to Books

- Bourély, Michel, *The Experience of Regional Cooperation: The example of ESA*, in: CHENG, CHIA-JUI/MENDES DE LEON, PABLO (EDS.), THE HIGHWAYS OF AIR AND OUTER SPACE OVER ASIA (Nijhoff, 1992).
- Cheng, Bin, *Legal and Commercial Aspects of Data Gathering by Remote Sensing*. *Id.* at 49 (1992).

* Compiled and edited by Michael A. Gorove, Boston University School of Law.

- Christol, Carl Q., *Legal Aspects of Aerospace Planes*. *Id.* at 77 (1992).
- Dunk von der, Frans G., *Legal Aspects of the International Space Station. General Partnership or No Genuine Partnership: What is the Question?* *Id.* at 109 (1992).
- Fenema van, H. Peter, *Cooperation and Competition in Space Transportation*. *Id.* at 283 (1992).
- Kosuge, Toshio, *Legal Problems of Direct Broadcasting by Satellite-- Programme, Advertising and Copyright Issues*. *Id.* at 91 (1992).
- Masson-Zwaan, Tanja L., *International Telecommunications and ITU Developments*. *Id.* at 99 (1992).
- Sucharitkul, Sompong, *The Benefits of Space Activities for Asian Countries*. *Id.* at 259 (1992).
- Drewniok, C., *Computer-Aided Interpretation of Remote Sensing Data*, in: HEINTZE, HANS-JOACHIM, *REMOTE SENSING UNDER CHANGING CONDITIONS: PROCEEDINGS OF THE IMMENSTAAD WORKSHOP 1992*, at 187 (1992).
- Fischer, H., *From Early-Warning to Civilian Remote Sensing for Security Purposes - New Perspectives*. *Id.* at 15 (1992).
- Goldsmith, P., *ESA's Space Systems and Their Potential Application in Space Remote Sensing for Disarmament Verification*, *Id.* at 23 (1992).
- Graaf, van der, H.J., *Organizational Options for Verification*. *Id.* at 91 (1992).
- Jaeschke, R., *Harmonization of Civil and Military Satellite-Borne Remote Sensing Activities*. *Id.* at 163 (1992).
- Jasani, B., *European Arms Control and Verification Satellites*. *Id.* at 37 (1992).
- Lewis, P., *The Future of Verification*, *Id.* at 151 (1992).
- Niebecker, J., *Experiences From On-Site Mock Inspections*. *Id.* at 145 (1992).
- Oudraat, Ch. de Jonge, *The United Nations and the Verification Issue*. *Id.* at 119 (1992).
- Pike, J./Stambler, E., *Military Space Systems - Lessons from Desert Storm*. *Id.* at 175 (1992).
- Röhr, W., *The German Position on Verification*. *Id.* at 109 (1992).
- Schlüter, J.H., *NATO and the Verification Issue*. *Id.* at 137 (1992).
- Stock, T., *Verification and the Future Chemical Weapons Convention: Possible Use of Remote Sensing Techniques*. *Id.* at 67 (1992).
- Wallner, J./Heintze, H.-J./Hounam, D./Nowak, M., *Remote Sensing and European Security*. *Id.* at 1 (1992).
- Barré, Martine, *Les Systèmes de transmission de données par satellites*, in: *EXPLOITATION COMMERCIALE DE L'ESPACE - DROIT POSITIF, DROIT PROSPECTIF* 313 (Université de Bourgogne - CNRS, Travaux du Centre de Recherche sur le Droit des Marchés et des Investissements Internationaux, vol. 15, Dijon, 1992).
- Benzoni, Laurent, *Club, monopole, marché: enjeux de l'organisation économique de l'espace*. *Id.* at 19.
- Daouphars, Philippe, *L'assurance des risques spatiaux*. *Id.* at 253 (1992).

- Edelman, Bernard, *La télédiffusion par satellites des oeuvres de l'esprit*. *Id.* at 375 (1992).
- Hermitte, Marie-Angèle, *Découvertes et inventions en microgravité*. *Id.* at 333 (1992).
- Kahn, Philippe, *Situations d'un droit commercial spatial*. *Id.* at 91 (1992).
- Martin, Annie, *L'imagerie spatiale: quelle propriété?* *Id.* at 437 (1992).
- Martin, Francois, *Le financement des projets de télécommunications spatiales*. *Id.* at 245 (1992).
- Murphy, Marie-France, *Activités industrielles menées en microgravité propriété industrielle*. *Id.* at 423 (1992).
- Oppetit, Bruno, *La propriété des engins*. *Id.* at 301 (1992).
- Porquet, Daniel, *Les activités de Locstar*. *Id.* at 221 (1992).
- Silane, Frank A., *Civil Liability in Commercial Space Ventures under United States Law*. *Id.* at 233 (1992).
- Villain, Rachel, *Perspectives des applications spatiales à l'horizon de dix ans*. *Id.* at 61 (1992).
- Cheng, Bin, *Nationality for Spacecraft?*, in: MASSON-ZWAAN, TANJA L./MENDES DE LEON, PABLO M.J. (EDS.), *AIR AND SPACE LAW: DE LEGE FERENDA* 203 (Nijhoff 1992).
- Dunk, von der, Frans G., *Jus Cogens Sive Lex Ferenda: Jus Cogendum?* *Id.* at 219 (1992).
- Lachs, Manfred, *Freedoms of the Air - The Way to Outer Space*. *Id.* at 241 (1992).
- Masson-Zwaan, Tanja L., *The Aerospace Plane: An Object at the Cross-Roads between Air and Space Law*. *Id.* at 247 (1992).
- Matte, Nicolas Mateesco, *The Role of Communications Satellites in Preserving Peace*. *Id.* at 263 (1992).
- Trinder, Rachel B., *Dispute Resolution: A Proposal for Avoidance of Litigation in the Space Law Arena*. *Id.* at 273 (1992).
- Vereshchetin, Vladlen S., *"Open Skies": The Metamorphosis of a Concept*. *Id.* at 283 (1992).
- Galloway, Eilene, *The Legal and Regulatory Framework for Solar Power Satellites*, in: GLASER, P.E./DAVIDSON, F.P./CSIGI, K.I. (EDS.), *SOLAR POWER SATELLITES: THE EMERGING ENERGY OPTION* (Ellis Horwood, 1993).

C. Articles

- Benkö, Marietta/Gruber, Gerhard/Schrogl, Kai Uwe, *The UN Committee on the Peaceful Uses of Outer Space: Adoption of Principles Relevant to the Use of Nuclear Power Sources in Outer Space and Other Recent Developments*, 42 ZEITSCHRIFT FÜR LUFT- UND WELTRAUMRECHT (ZLW) 35 (1993).
- Bunker, Donald H. *Law of the Space Station*, 14 REVISTA DEL CIDA-E 9 (1989-1990).
- Farand, André, *The Legal Regime Applicable to the Space Station Cooperation: A Canadian Perspective*, 17-1 ANN. AIR & SPACE L. 293 (1992).

- Gorbiel, A., *Legal Essentials of the International Maritime Satellite Organization*, 66 ZESZYTY NAUKOWE UNIWERSYTETU SZCZECINSKIEGO, ROCZNIKI PRAWNICZE (JURIDICAL ANNALS) 23 (No. 3, 1991).
- He, Qizhi, *Legal aspects of Monitoring and Protecting Earth Environment by Space Technology*, 20 J. SPACE L. 111 (1992).
- Hobe, Stephan, *The Legal Framework of the Decisions made at the Ministerial Level ESA Conference in Munich*, 17-2 ANN. AIR & SPACE L. 237 (1992).
- Hobe, Stephan, *The New German Space Agency (DARA)*, 17-1 ANN. AIR & SPACE L. 303 (1992).
- Jakhu, Ram S., *Space Debris in the Geostationary Orbit: A Major Challenge for Space Law*, 17-1 ANN. AIR & SPACE L. 313 (1992).
- Jasentuliyana, Nandasiri, *Space law and the United Nations*, 17-1 ANN. AIR & SPACE L. 137 (1992).
- Kayser, Valérie, *Commercial Exploitation of Space: Developing Domestic Regulation*, 17-1 ANN. AIR & SPACE L. 187 (1992).
- Kayser, Valérie, *Air and Space Law Bibliography*, 17-2 ANN. AIR & SPACE L. 597 (1992).
- Levine, A.L., Shafritz, J.M., McCurdy, H.E., Lambright, W.H. & Logsdon, J.M., *The Future of the U.S. Space Program: A Public Administration Critique*, 52 PUB. ADMIN. REV. 183 (1992).
- Madders, K.J. & Thiebaut, W.M., *Two Europes in One Space: The Evolution of Relations Between the European Space Agency and the European Community in Space Affairs*, 20 J. SPACE L. 117 (1992).
- Matte, Nicolas M., *L'accord sur la lune: quel avenir?*, 17-2 ANN. AIR & SPACE L. 283 (1992).
- Nesgos, Peter D., *The Practice of Commercial Space Law*, 17-1 ANN. AIR & SPACE L. 177 (1992).
- Ospina, Sylvia *Acuerdos Regionales, Convenios Internacionales y las Telecomunicaciones Por Satelite en America Latina: El Proyecto Condor del Pacto Anding*, 14 REVISTA DEL CIDA-E 27 (1989-1990).
- Robinson, George S., *Exobiological Contamination: the Evolving Law*, 17-1 ANN. AIR & SPACE L. 325 (1992).
- Schwetje, F. Kenneth, *They Shall Beat Their Swords into Plowshares (In Accordance with all Relevant Arms Control Agreements)*, 17-1 ANN. AIR & SPACE L. 383 (1992).
- Smith, Milton L., *The Role of the ITU in the Development of Space Law*, 17-1 ANN. AIR & SPACE L. 157 (1992).
- Spring, B., *Space Weapons Systems: A Looming Proliferation Threat*, 4 J. PRACTICAL APPLIC. IN SPACE 81 (1992).
- Stockfish, Bruce, *Space Transportation and the Need for a New International Legal and Institutional Regime*, 17-2 ANN. AIR & SPACE L. 323 (1992).

Reports

- Alwes, Detlef and Schrogl, Kai-Uwe, *Deutsche Agentur für Raumfahrtangelegenheiten (DARA) GmbH, Tagung: Stand der Space*

- Debris-Forschung in Deutschland und internationale Regulierungsfragen*, Bonn, 9 December, 1992, 42 ZLW 83 (1993).
- Böckstiegel, Karl-Heinz, & Focke, Knut, *Manned Space Flight: Legal Aspects in the Light of Scientific and Technical Development*, 20 J. SPACE L. 168 (1992).
- Bogomolov, Vladimir, *Prevention of An Arms Race in Outer Space: Developments in the Conference on Disarmament in 1992*, 20 J. SPACE L. 137 (1992).
- Chipman, Ralph, *United Nations Committee on the Peaceful Uses of Outer Space Holds Annual Meeting in New York*, 20 J. SPACE L. 133 (1992).
- Focke, Knut, *European Center for Space Law (ECSL), First ECSL Practitioner's Forum, Paris, November 18, 1992*, 42 ZLW 79 (1993).
- Gorove, Katherine, M., *First European Practitioner's Forum, Paris, November 18, 1992*, 20 J. SPACE L. 175 (1992).
- Hobe, Stephan, *International Institute of Space Law, 35th Colloquium on the Law of Outer Space, Washington, 1-4, September 1992*, 42 ZLW 81 (1993).
- Malanczuk, Peter, *International Law Association (ILA) Continues Work on Draft Instrument to Protect Environment from Damage Caused by Space Activities*, 20 J. SPACE L. 164 (1992).
- Masson-Zwaan, Tanja L., *The 35th Colloquium on the Law of Outer Space, Washington, D.C., 28 August - 5 September 1992*, 20 J. SPACE L. 141 (1992).
- Ospina, Sylvia, *Space Technology in Developing Countries*, 20 J. SPACE L. 160 (1992).
- Rothblatt, Martin A., *Third Satel Conseil Symposium, Paris - September 28-30, 1992*, 20 J. SPACE L. 172 (1992).
- Tuinder, P.H. *Europe's First Space Law and Policy Summer Course*, ESA BULL 77 (Feb. 1993).

Comments

- Butler, C.E., *The Antitrust Liability of COMSAT in its Role as Representative to INTELSAT*, 17 N.C. J. INT'L L. & COM. REG. 547 (1992).
- Dunk, von der, Frans G., *The Minsk Space Agreement: A 'Commonwealth in Space'?*, 20 J. SPACE L. 179 (1992).
- Lafferranderie, Gabriel, *ESA*, 17-2 ANN. AIR & SPACE L. 510 (1992).
- Sagar, David, *INMARSAT*, 17-2 ANN. AIR & SPACE L. 500 (1992).

Case Law

- Martin Marietta Corporation v. International Telecommunication Satellite Organization*, 20 J. SPACE L. 189 (1992).

Short Accounts

- Gorove, Margaret J., *International Academy of Astronautics Academy Day*, 20 J. SPACE L. 193 (1992).
- Larsen, Paul B., "Law and Outer Space", *Fourth Annual Symposium*, 20 J. SPACE L. 194 (1992).
- Schwetje, F. Kenneth, *Moot Court Competition Highlights World Space Congress Special Activities Day*, 20 J. SPACE L. 194 (1992).

Book Reviews/Notices

- BAINUM, PETER M. AND OTHERS (EDS.), *INTERNATIONAL SPACE YEAR IN THE PACIFIC BASIN*, Univelt, 1992 (S. Gorove), 20 J. SPACE L. 199 (1992).
- BÖCKSTIEGEL, K.-H.(ED.), *HANDBUCH DES WELTRAUMRECHTS*, 17-2 ANN. AIR & SPACE L. 543 (1992).
- CODDING, GEORGE A., *THE FUTURE OF SATELLITE COMMUNICATIONS*, Westview, 1990, 20 J. SPACE L. 201 (1992).
- DICTIONNAIRE DE SPATIOLOGIE, TOME 1: TERMES ET DÉFINITIONS. TROISIEME ÉDITION, CONSEIL NATIONAL DE LA LANGUE FRANÇAISE, 17-2 ANN. AIR & SPACE L. 545 (1992).
- EUROPEAN SPACE DIRECTORY 1992, SEVENTH EDITION, Sevig, Paris, 1992, 20 J. SPACE L. 202 (1992).
- GOLDMAN, NATHAN C., *SPACE POLICY: AN INTRODUCTION*, Iowa U./AMES 1992, 20 J. SPACE L. 200 (1992).
- GOROVE, STEPHEN, *DEVELOPMENTS IN SPACE LAW: ISSUES AND POLICIES*, 17-2 ANN. AIR & SPACE L. 567 (1992).
- HEATH, GLORIA W. (ED.), *SPACE SAFETY AND RESCUE*, Univelt, San Diego, 1991 (S. Gorove), 20 J. SPACE L. 199 (1992).
- HEINTZE, HANS-JOACHIM (ED.), *REMOTE SENSING UNDER CHANGING CONDITIONS*, PROCEEDINGS OF THE IMMENSTAAD WORKSHOP 1992, Bochum, 1992 (Benkö), 42 ZLW 103 (1993).
- JASANI, BHUPENDRA (ED.), *PEACEFUL AND NON-PEACEFUL USES OF SPACE - PROBLEMS OF DEFINITION FOR THE PREVENTION OF AN ARMS RACE*, Taylor and Francis, New York, 1992 (S. Gorove), 20 J. SPACE L. 198 (1992).
- JASENTULIYANA, NANDASIRI (ED.), *SPACE LAW - DEVELOPMENT AND SCOPE*, Praeger, 1992 (Stoffel), 42 ZLW 102 (1993).
- JASENTULIYANA, NANDASIRI, *SPACE LAW: DEVELOPMENT AND SCOPE*, Praeger, 1992 (Smith), 87 AM. J. INT'L L. 357 (1993).
- LORIDANT, PAUL, *OFFICE PARLEMENTAIRE D'ÉVALUATION DES CHOIX SCIENTIFIQUES ET TECHNOLOGIQUES. RAPPORT SUR LES ORIENTATIONS DE LA POLITIQUE SPATIALE FRANÇAISE ET EUROPÉENNE*, 17-2 ANN. AIR & SPACE L. 549 (1992).
- MARTIN, PIERRE-MARIE, *DROIT DES ACTIVITES SPATIALES*, Paris, 1992 (de Graaff), 42 ZLW 109 (1993).
- MARTIN, PIERRE-MARIE, *LE DROIT DE L'ESPACE: QUE SAIS-JE?*, 17-2 ANN. AIR & SPACE L. 560 (1992).

- MASSON-ZWAAN, TANJA L./MENDES DE LEON, PABLO M.J. (EDS.), AIR AND SPACE LAW: DE LEGE FERENDA, ESSAYS IN HONOUR OF HENRI A. WASSENBERGH, Dordrecht, 1992 (Heintze), 42 ZLW 96 (1993).
- MENON, P. K., THE UNITED NATIONS' EFFORTS TO OUTLAW THE ARMS RACE IN OUTER SPACE - A BRIEF HISTORY WITH KEY DOCUMENTS, Edwin Meller, 1990, 20 J. SPACE L. 201 (1992).
- MEREDITH, PAMELA L./ROBINSON, GEORGE S., SPACE LAW: A CASE STUDY FOR THE PRACTITIONER - IMPLEMENTING A TELECOMMUNICATIONS SATELLITE BUSINESS CONCEPT, Dordrecht, 1992 (Heintze), 42 ZLW 106 (1993).
- NEUHOLD, H./HUMMER, W./SCHREUER, CB. (HRSG.), ÖSTERREICHISCHES HANDBUCH DES VÖLKERRECHTS, Wien, 1991 (Heintze), 42 ZLW 99 (1993).
- REIJNEN, BESS C.M., THE UNITED NATIONS SPACE TREATIES ANALYSED, Gif-sur-Yvette Cedex, 1992 (Heintze), 42 ZLW 101 (1993).
- SGROSSO, GABRIELLA CATALANO, LA RESPONSABILITÀ DEGLI STATI PER LE ATTIVITÀ SVOLTE NELLO SPAZIO EXTRA-ATMOSFERICO, 17-2 ANN. AIR & SPACE L. 547 (1992).
- SGROSSO, GABRIELLA CATALANO, LA RESPONSABILITÀ DEGLI STATI PER LE ATTIVITÀ SVOLTE NELLO SPAZIO EXTRA-ATMOSFERICO, Padua, Cedam 1990 (Del Duca), 87 AM. J. INT'L L. 354.
- SMITH, MILTON, INTERNATIONAL REGULATION OF SATELLITE COMMUNICATION, UTRECHT STUDIES IN AIR AND SPACE LAW, 17-2 ANN. AIR & SPACE L. 565 (1992).
- SMITS, JAN M., LEGAL ASPECTS OF IMPLEMENTING INTERNATIONAL TELECOMMUNICATION LINKS, Dordrecht, 1991 (Hobe), 42 ZLW 105 (1993).
- STAUDT, BIRGITTA, DIE TRANSATLANTISCHE RAUMSTATIONSKOOPERATION - DER RECHTLICHE RAHMEN EINER LANGFRISTIGEN MULTINATIONALEN ZUSAMMENARBEIT, Peter Lang, Frankfurt am Main, 1992, 20 J. SPACE L. 200 (1992).
- TATSUZAWA, K. (ED.), LEGAL ASPECTS OF SPACE COMMERCIALIZATION, Tokyo, 1992 (Knittlmayer), 42 ZLW 109 (1993).
- WILSON, ANDREW (ED.), INTERAVIA SPACE DIRECTORY 1992-93, Jane's Info. Group, 1992, 20 J. SPACE L. 201 (1992).

D. Official Publications

Agreements

- Agreement Among the European Community, Japan, Russia and the United States to establish the International Science and Technology Center. Done at Moscow, Nov. 27, 1992.
- Agreement on the Rescue of Astronauts, the Return of Astronauts, and the Return of Objects Launched into Outer Space. Done at Washington, London, and Moscow Apr. 22, 1968. Entered into force Dec. 3, 1968. TIAS 6599. *Succession deposited*: Slovenia, Aug. 20, 1992.
- Convention on International Liability for Damage caused by Space Objects. Done at Washington, London, and Moscow Mar. 29, 1972. Entered into force Sept. 1, 1972; for the U.S. Oct. 9, 1973. TIAS 7762. *Succession deposited*: Slovenia, Aug. 20, 1992.
- Convention on the International Maritime Satellite Organization (INMARSAT), with Annex. Done at London Sept. 3, 1976. Entered

- into force July 16, 1979. TIAS 9605. Signature: Cyprus, June 8, 1992. *Accession deposited:* Cyprus, June 8, 1992.
- Operating Agreement on the International Maritime Satellite Organization (INMARSAT), with Annex. Done at London Sept. 3, 1976. Entered into force July 16, 1979. TIAS 9605. *Signature:* Cyprus, June 8, 1992.
- Operating Agreement relating to the International Telecommunications Satellite Organization (INTELSAT), with Annexes. Done at Washington Aug. 20, 1971. Entered into force Feb. 12, 1973. TIAS 7532. *Signatures:* Azerbaijan, Apr. 13, 1992; Bhutan, June 23, 1992; Czechoslovakia, May 27, 1992.
- Satellite Communications Systems Agreement relating to the International Telecommunications Satellite Organization (INTELSAT), with Annexes. Done at Washington Aug. 20, 1971. Entered into force Feb. 12, 1973. TIAS 7532. *Accessions deposited:* Azerbaijan, Apr. 13, 1992; Bhutan, June 23, 1992; Czechoslovakia, May 27, 1992.
- Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies. Done at Washington, London, and Moscow Jan. 27, 1967. Entered into force Oct. 10, 1967. TIAS 6347. *Accession deposited:* Algeria, Jan. 27, 1992.
- Treaty on Open Skies: Message from the President of the United States transmitting the Treaty on Open Skies, with twelve Annexes. *Done* at Helsinki, Mar. 24, 1992.

CONGRESS

- HOUSE COMM. ON SCIENCE, SPACE AND TECHNOLOGY, COMMERCIAL SPACE COMPETITIVENESS ACT OF 1992: REPORT (to accompany H.R. 3848 which ... was referred jointly to the Committee on Science, Space, and Technology and the Committee on Armed Services) (including cost estimate of the Congressional Budget Office) (1992).
- HOUSE COMM. ON SCIENCE, SPACE AND TECHNOLOGY, SUBCOMMITTEE ON SPACE, LEGISLATIVE ACTIVITIES, 1992. MARKUP BEFORE THE SUBCOMMITTEE ON SPACE AND THE FULL COMMITTEE ON SCIENCE, SPACE AND TECHNOLOGY, 102d Cong., 2d Sess., Apr. 1, 8, 9; June 10; July 1, 1992 (1992).
- HOUSE COMM. ON SCIENCE, SPACE AND TECHNOLOGY, U.S. SPACE PROGRAM BENEFITS TO EDUCATION: HEARING BEFORE THE SUBCOMMITTEE ON SPACE, 102d Cong., 2d Sess., June 10, 1992 (1992).
- HOUSE COMM. ON SCIENCE, SPACE AND TECHNOLOGY, GENERAL ACCOUNTING OFFICE: AEROSPACE PLANE TECHNOLOGY [MICROFORM], RESEARCH AND DEVELOPMENT EFFORTS IN JAPAN AND AUSTRALIA: REPORT TO THE CHAIRMAN. (1991).
- SENATE COMM. ON COMMERCE, SCIENCE, AND TRANSPORTATION, THE SPACE STATION FREEDOM AND SPACE LAUNCH ISSUES: HEARING BEFORE THE SUBCOMMITTEE ON SCIENCE, TECHNOLOGY, AND SPACE OF THE COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION, 102d Cong., 2d Sess., Mar. 18, 1992 (1992).

ESA

Satellites at the Service of the Environment and Development (Paris 1992).

ANNUAL REPORT - RAPPORT ANNUEL '92 (ESTEC, 1993)

INDIA

Government of India, Insat Coordination Committee, *Indian National Satellite System* (June 1992).

ITU

Thirty-second Report by the International Telecommunication Union on Telecommunication and the Peaceful Uses of Outer Space (Geneva 1993).

UNITED NATIONS

General Assembly, Committee on the Peaceful Uses of Outer Space, *Centres for Space Science and Technology Education*, doc. A/AC.105/534 (1993).

General Assembly, Committee on the Peaceful Uses of Outer Space, *International Cooperation in the Peaceful Uses of Outer Space - Activities of Member States*, doc. A/AC.105/523 (1992).

General Assembly, Committee on the Peaceful Uses of Outer Space, *Report of the Committee on the Peaceful Uses of Outer Space*, Off. Rec., 48th Sess., doc. A/48/20 (1993).

General Assembly, Committee on the Peaceful Uses of Outer Space, *Report of the Legal Subcommittee on the Work of its Thirty-second Session*, doc. A/AC.105/544 (1993).

General Assembly, Committee on the Peaceful Uses of Outer Space, *Report of the Scientific and Technical Subcommittee on the Work of its Thirtieth Session*, doc. A/AC.105/543 (1993).

General Assembly, Committee on the Peaceful Uses of Outer Space, *Report of the United Nations Expert on Space Applications to the Scientific and Technical Subcommittee*, doc. A/AC.105/533 (1992).

Secretariat, *Coordination of outer space activities within the United Nations system: programmes of work for 1993 and 1994 and future years: report of the Secretary General*, doc. A/AC. 105/524 (1992).

Secretariat, *Space Activities of the United Nations and International Organizations - A Review of the Activities and Resources of the United Nations, its Specialized Agencies and Other International Bodies Relating to the Peaceful Uses of Outer Space*, doc. A/AC.105/521 (1992).

E. Case

Avtec Systems, Inc. v. Peiffer, 805 F. Supp. 1312 (E.D. Va. 1992).

F. Miscellaneous

- AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, INTERNATIONAL SPACE COOPERATION, REPORT ON AN AIAA WORKSHOP MARCH 1993 (1993).
- EUROCONSULT, EUROPEAN SPACE DIRECTORY (8th ed. Sevig Press, 1993).
- EUROCONSULT, SPACE DIRECTORY OF RUSSIA (Sevig Press, 1993)
- EUROCONSULT, WORLD SPACE INDUSTRY SURVEY :10 YEAR OUTLOOK (1993)
- EUROPEAN CENTRE FOR SPACE LAW, SPACE LAW TEACHING IN WESTERN EUROPE (VOL.2, KLUWER 1993).
- EUROPEAN CENTRE FOR SPACE LAW, SPACE LAW TEACHING IN EUROPE (NIJHOFF, 1993).
- INTERNATIONAL INSTITUTE OF SPACE LAW OF THE INTERNATIONAL ASTRONAUTICAL FEDERATION, PROCEEDINGS OF THE THIRTY-FIFTH COLLOQUIUM ON THE LAW OF OUTER SPACE, AUG. 28-SEPT.5, 1992, WASHINGTON, D.C. (AMERICAN INSTITUTE OF AERONAUTICS AND ASTRONAUTICS, WASHINGTON, D.C.1993). INCLUDED ARE:

IISL Board of Directors.....	iii
In Memorium.....	iv
Introduction	
Judge Manfred Lachs	v

Emerging and Future Supplements to Space Law Specifically in the Context of the International Space Year

Standardized Terms and Conditions—The Implementation of Common Objectives in Outer Space	
H. H. Almond Jr.	3
The Developing US Law of Liability Applicable to Launch Agreement Parties	
R. Bender.....	13
Developing a System of Dispute Settlement Regarding Space Activities	
K.-H. Böckstiegel.....	27
A Way to Complement, Enforce and Improve the Space Treaty and Related International Instruments of Space Law	
A. A. Cocca.....	36
The New Age of Discovery and the Changing Structure of Space Law	
H. DeSaussure.....	44
Expanding Space Law into the 21st Century	
E. Galloway.....	49
The Role of the Spaceport Florida Authority in the Development of Cooperative International Arrangements	
G. M. Ganzkow.....	61
Biojuridics and Astrolaw: An Updated Application to Social and Legal Theory	
V. Garshnek.....	72
Major Definitional Issues in the Space Agreements	
S. Gorove.....	76
Self-Determination in Space Law: A Retreat to Basic Human Rights	
B. A. Hurwitz.....	80
Legal Regulations of Space Activities in Russia and Commonwealth of Independent States	
E. Kamenetskaya, V. Vereshchetin, and E. Zhukova	86
Cross-Waivers of Liability	
P. B. Larsen.....	91

Legislator Versus Interpreter: How Far is it Necessary to Supplement Space Law?	
P. M. Martin	97
Spacecraft Motion Management (SMM): Institutional and Legal Frameworks	
P. L. Meredith	102
Space Policy in Russia: Perspectives for Legal Development	
V. Postyshev and I. Moiseyev	113
International Satellite Organizations: From Monopoly to Cartel	
M. Potter	120
The End of the Cold War and the Prospects for the Settlement of Space Law Disputes	
O. M. Ribbelink	130
Legal Issues Raised by the Detection of Near-Earth Objects	
G. P. Sloup	140
International Liability for Damage Caused by Space Objects with Nuclear Power Sources on Board	
A. D. Terekhov	151
ESA and the EC: A Coherent Approach in Space	
W. M. Thiebaut and K. J. Madders	163
Towards a European Space Agency, Mark II? The Space Program of the Former Soviet Union and the Commonwealth of Independent States	
F. G. von der Dunk	172
Resolution of Disputes Arising in Outer Space	
W. N. White Jr.	183
Quo Vadis? Space Law in the 21st Century	
W. B. Wirin	194

Legal Regulation of Economic Uses of Outer Space

Alternative Legal Regimes to Enable Universal Telecommunications Roaming	
R. L. Anglin Jr.	207
Industrial Property Rights in Outer Space: The Space Station International Governmental Agreement (IGA) and the European Partner	
A. M. Balsano	216
The Legal Implications of High Technology Export Controls for Commercial Activities in Outer Space	
L. F. Martinez	229
The Martin Marietta Case or How to Safeguard Private Commercial Space Activities	
T. L. Masson-Zwaan	239
Procurement of Launch Vehicles and Services	
D. E. Reibel	248

Managing Environmental Issues Including Space Debris

Stratosphere Ozone Problem and Space Activity	
C. Q. Christol	259
Solar Power Satellites: Legal, Ecological and Institutional Implications	
S. Courteix	271
Space Debris: A Functional Approach	
E. Fasan	281
The Implementation of Environmental Treaties: The Case of the Montreal Protocol on Substances that Deplete the Ozone Layer	
J. F. Galloway	291
Legal Aspect of Monitoring and Protecting Earth Environment by Space Technology	
He Qizhi	297
Must Space Missions be Beneficial?	
L. Perek	303

Environmental Liability Issues of Rocket Exhaust Under International Space Law	
M. Rothblatt	307
Legal Aspects of Using Nuclear Reactors on the Moon	
Marcia S. Smith	312

Other Legal Subjects

Demilitarization of Outer Space	
G. Catalano Sgrosso	325
Human Society in Mars: New Legal Needs for a Different Mankind	
M. M. Esquivel de Cocca	335
Prospects of Verifying Space Weapons Treaties	
U. Ekblad	346
About the Legal Definition of International Cooperation in the Exploration and Use of Outer Space	
J. M. Filho	355
The Legality of the Military Uses of Outer Space by the Canadian Forces	
L. Haeck	360
The Space Plane and International Space Law	
Y. Hashimoto	378
Space Law as a Branch of International Law	
E. Konstantinov	382
UK Space Law	
F. Lyall	385
The International Frequency Registration Board	
F. Lyall	394
The Art and Science of the LEO Satellite License Game	
J. S. Y. Kwok, G. E. Morgan, and H. R. Patel	400
Consultation Regime in Space Law	
M. Nakamura	411
The Art of Living in Space: International Law and Settlement Autonomy	
P. M. Sterns and L. I. Tennen	416

Addenda

Report of the Discussions Held After the Four Sessions of the 35th Colloquium on the Law of Outer Space	
T. L. Masson-Zwaan	427

Fourteenth Scientific Legal Roundtable: Exploration and Uses of the Moon and Other Celestial Bodies

Introductory Note	
V. Kopal	431
Space Exploration: Scientific and Technological Aspects	
C. Pilcher	432
Exploration and Uses of Celestial Bodies of the Solar System	
M. Coradini	461
Legal Implications of the Exploration and Uses of the Moon and Other Celestial Bodies	
N. M. Matte	471
Some Legal Aspects of the Return to the Moon and Expected Flights to Other Celestial Bodies	
V. Kopal	491
Utilization of Extraterrestrial Resources: Law, Science and Policy	
P. M. Sterns and L. I. Tennen	499

United Nations Resolution on Principles Relevant to the Use of Nuclear Power Sources in Outer Space A/RES/47/68 adopted by the UN General Assembly on 14 December 1992	508
Annual Report 1992: Standing Committee on the Status of International Agreements Relating to Activities in Outer Space A. D. Terekhov	516
The 1992 International Institute of Space Law of the International Astronautical Federation Moot Court Milton L. Smith	525
Statutes of the International Institute of Space Law of the International Astronautical Federation	547
Author Index	550

CURRENT DOCUMENT

Status of the Outer Space Treaties (as of 10 February 1993)*

1. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty)

Adoption by the UN General Assembly: 19 December 1966
Opening for signature: 27 January 1967
Entry into force: 10 October 1967
Depositary: U.K., U.S.A., Russian Federation

2. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space (Rescue Agreement)

Adoption by the UN General Assembly: 19 December 1967
Opening for signature: 22 April 1968
Entry into force: 3 December 1968
Depositary: U.K., U.S.A., Russian Federation

3. Convention on International Liability for Damage Caused by Space Objects (Liability Convention)

Adoption by the UN General Assembly: 29 November 1971
Opening for signature: 29 March 1972
Entry into force: 1 September 1972
Depositary: U.K., U.S.A., Russian Federation

4. Convention on Registration of Objects Launched into Outer Space (Registration Convention)

Adoption by the UN General Assembly: 12 November 1974
Opening for signature: 14 January 1975
Entry into force: 15 September 1976
Depositary: UN Secretary-General

5. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (Moon Agreement)

Adoption by the UN General Assembly: 5 December 1979
Opening for signature: 18 December 1979
Entry into force: 11 July 1984
Depositary: UN Secretary-General

* Information provided through the courtesies of the U.N Office for Legal Affairs.

State	(1) Outer Space Treaty	(2) Rescue Agreement	(3) Liability Convention	(4) Registration Convention	(5) Moon Agreement
Afghanistan	R				
Algeria	R		S		
Antigua and Barbuda	R	R	R	R	
Argentina	R	R	R	S	
Australia	R	R	R	R	R
Austria	R	R	R	R	R
Bahamas	R	R			
Bangladesh	R				
Barbados	R	R			
Belarus	R	R	R	R	
Belgium	R	R	R	R	
Benin	R		R		
Bolivia	S	S			
Botswana	S	R	R		
Brazil	R	R	R		
Bulgaria	R	R	R	R	
Burkina Faso	R				
Burundi	S		S	S	
Cambodia			S		
Cameroon	S	R			
Canada	R	R	R	R	
Central African Rep.	S		S		
Chile	R	R	R	R	R
China	R	R	R	R	
Colombia	S	S	S		
Costa Rica		S	S		
Cuba	R	R	R	R	
Cyprus	R	R	R	R	
Czech Republic				R	
Denmark	R	R	R	R	

State	(1) Outer Space Treaty	(2) Rescue Agreement	(3) Liability Convention	(4) Registration Convention	(5) Moon Agreement
Dominican Republic	R	S	R		
Ecuador	R	R	R		
Egypt	R	R	S		
El Salvador	R	R	S		
Equatorial Guinea	R				
Ethiopia	S				
Fiji	R	R	R		
Finland	R	R	R		
France	R	R	R	R	S
Gabon		R	R		
Gambia	S	R	S		
Germany	R	R	R	R	
Ghana	S	S	S		
Greece	R	R	R		
Guatemala			S		S
Guinea- Bissau	R	R			
Guyana	S	R			
Haiti	S	S	S		
Holy See	S				
Honduras	S		S		
Hungary	R	R	R	R	
Iceland	R	R	S		
India	R	R	R	R	S
Indonesia	S				
Iran (Islamic Rep. of)	S	R	R	S	
Iraq	R	R	R		
Ireland	R	R	R		
Israel	R	R	R		
Italy	R	R	R		
Jamaica	R	S			

State	(1) Outer Space Treaty	(2) Rescue Agreement	(3) Liability Convention	(4) Registration Convention	(5) Moon Agreement
Japan	R	R	R	R	
Jordan	S	S	S		
Kenya	R		R		
Korea, Rep. of	R	R	R	R	
Kuwait	R	R	R		
Laos	R	R	R		
Lebanon	R	R	S		
Lesotho	S	S			
Libyan Arab Jamahiriya	R				
Liechten- stein			R		
Luxembourg	S	S	R		
Madagascar	R	R			
Malaysia	S	S			
Maldives		R			
Mali	R		R		
Malta		S	R		
Mauritius	R	R			
Mexico	R	R	R	R	R
Monaco		S			
Mongolia	R	R	R	R	
Morocco	R	R	R		R
Myanmar	R	S			
Nepal	R	R	S		
Netherlands	R	R	R	R	R
New Zealand	R	R	R		
Nicaragua	S	S	S	S	
Niger	R	R	R	R	
Nigeria	R	R			
Norway	R	R	S		
Oman			S		
Pakistan	R	R	R	R	R
Panama	S		R		
Papua New Guinea	R	R	R		

State	(1) Outer Space Treaty	(2) Rescue Agreement	(3) Liability Convention	(4) Registration Convention	(5) Moon Agreement
Peru	R	R	S	R	S
Philippines	S	S	S		R
Poland	R	R	R	R	
Portugal		R			
Qatar			R		
Romania	R	R	R		S
Russian Federation	R	R	R	R	
Rwanda	S	S	S		
San Marino	R	R			
Saudi Arabia	R		R		
Senegal		S	R		
Seychelles	R	R	R	R	
Sierra Leone	R	S	S		
Singapore	R	R	R	S	
Slovenia		R	R		
Somalia	S	S			
South Africa	R	R	S		
Spain	R		R	R	
Sri Lanka	R		R		
Swaziland		R			
Sweden	R	R	R	R	
Switzerland	R	R	R	R	
Syrian Arab Rep.	R	R	R		
Thailand	R	R			
Togo	R		R		
Tonga	R	R			
Trinidad and Tobago	S		R		
Tunisia	R	R	R		
Turkey	R	S			
Uganda	R				
Ukraine	R	R	R	R	
United Kingdom	R	R	R	R	

State	(1) Outer Space Treaty	(2) Rescue Agreement	(3) Liability Convention	(4) Registration Convention	(5) Moon Agreement
United Rep. of Tanzania			S		
U.S.A.	R	R	R	R	
Uruguay	R	R	R	R	R
Venezuela	R	S	R		
Vietnam	R				
Yemen	R	S			
Yugoslavia	S	R	R	R	
Zaire	S	S	S		
Zambia	R	R	R		
	S-27 R-91	S-24 R-80	S-27 R-73	S-5 R-36	S-5 R-9
Organization					
European Space Agency (ESA)		D	D	D	D
European Telecommunications Satellite Organization (EUTELSAT)			D		
		D-1	D-2	D-1	D-0

Notes:

S - Signature only

R - Ratification, accession or succession

D - Declaration of acceptance of rights and obligations

Developments in Space Law

Issues and Policies

by Stephen Gorove

UTRECHT STUDIES IN AIR AND SPACE LAW 10

Following an overview of United States domestic space laws, this book focuses on some of the crucial issues that space lawyers and policy makers had to face during the last two decades. Presented in thirty-three chapters, the materials highlight basic issues associated with the use of the geostationary orbit, international direct television broadcasting by satellite, solar powered satellites and the relevant concerns of developing nations. The book addresses policies regarding the protection of the space environment, deals with issues of space transportation systems, international space flight, liability for damage, arms control, remote sensing from space, and those associated with space stations. The study also projects expectations and presents a case study of issues that are likely to arise with the aerospace plane. Major international space instruments are reproduced in the Annex.

Contents

Preface. Part I: Background. Part II: Resources. Part III: Environment. Part IV: Transportation. Part V: Liability. Part VI: Arms Control. Part VII: Remote Sensing. Part VIII: Space Stations. Part IX: Future. Part X: Annexes. Index.

1991, 428 pp. ISBN 0-7923-1444-1
Hardbound \$109.00/Dfl. 195.00/£66.00
Martinus Nijhoff Publishers, Dordrecht/NISER

P.O. Box 322, 3300 AH Dordrecht, The Netherlands
P.O. Box 358, Accord Station, Hingham, MA 02018-0358, U.S.A.

New
Publication

KLUWER
ACADEMIC
PUBLISHERS





IMPORTANT PUBLICATIONS

on Space Law



AN INTRODUCTION TO SPACE LAW

by Dr. Isabella Diederiks-Verschoor

This new work on Space Law fills the need for a concise and comprehensive overview of the subject. Students, practitioners, and corporate executives will appreciate this useful guide to the legal problems and practical consequences of the important space treaties that have been negotiated to date — the texts of which are provided for reference.

An Introduction to Space Law also covers the legal issues raised by the commercialization of space, such as environmental issues, and the drive to preserve outer space for peaceful purposes.

Available in May, 1993. Softcover, ISBN 90-6544-692-3, 245 pgs, price approximately \$70.00

AIR & SPACE LAW

Board of Editors: B.J.H. Crans, I.H.Ph. Diederiks-Verschoor, W.P. Heere, A.A. van Wijk, H.A. Wassenbergh

Previously known as *Air Law*, this journal is the leading periodical in this field. Appearing six times a year, it presents topical information on aviation policy and the civil, commercial administrative and penal aspects of the study and practice of air — and now space — law.

Each edition of *AIR & Space LAW* contains many valuable insights provided by experts in the field, comments extensively on recent worldwide case law, presents the latest news from international air organizations and provides conference reports. Once each year you'll also receive an annual bibliography section.

All subscribers will receive an annual binder to enable easy storage. Bound back volumes are available, up to and including 1991.

Bi-monthly journal, ISSN 0165-2079. 1993 subscription: \$191.00

KLUWER LAW & TAXATION PUBLISHERS

6 Bigelow Street • Cambridge, MA 02139
Voice (617) 354-0140 • FAX (617) 354-8595

ANNOUNCEMENT

We have purchased the reprint rights of

JOURNAL OF SPACE LAW

(Vol. I through Vol. 13)

Complete sets to date are now available.

We can also furnish single volumes and issues.

William S. Hein & Co., Inc.

1285 Main Street

Buffalo, New York 14209

JOURNAL OF SPACE LAW

P.O. Box 308, University, MS 38677

Tel. 601-234-2391 Fax: 601-232-7010

The 1993 subscription rate is \$69.50 (domestic), \$75 (foreign) and \$85 (airmail) for two issues or one combined issue.

Single issue price is \$38.

Postage and handling are included.

Enclosed please find \$_____ for a one-year subscription.

Name: _____

Address: _____

