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

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G. P. Zhukov⁺

The international space community is pleased to honor Professor *Eugène Pépin* on his birthday celebration and takes this occasion to recognize his outstanding achievements, particularly in the development of international and space law.

Professor Eugène Pépin served as President of the International Institute of Space Law from 1963-1973, and since that time he has served as its Honorary President. He is an outstanding lawyer with extensive experience and vast knowledge in space and air law. From the very beginning of the development of space law, his wisdom and experience has benefited all who have followed his footsteps.

Since 1957, *Professor Eugène Pépin* has taken part in the space law colloquia of the International Astronautical Federation and was the founder of the International Institute of Space Law. As President of the Institute, he expended much of his time and energy in order to make it the leading international center for the study of space law. *Professor Pépin* reflected on the results of these activities in his book, "History of the International Institute of Space Law of the International Astronautical Federation" published in 1982.

Within the framework of the Institute, *Professor Pépin* has done a lot to review the practice of space law teaching around the world and to publish an annual bibliography of space law. In connection with the annual colloquia on space law, organized under his leadership as President of IISL, *Professor Pépin's* above mentioned activities have been a valuable contribution toward increasing the knowledge of space law in the world for the common and peaceful benefit of all mankind.

As President of the IISL, its Honorary President, author, lecturer, editor, commentator and through other scientific activities, *Professor*

* Editor's note: This article was written before the recent death of Dr. *Eugène Pépin* who not long ago celebrated the 100th anniversary of his birth and to whom the previous and current issues of the JOURNAL OF SPACE LAW have been dedicated. The JOURNAL joins his colleagues and friends all over the world in expressing its deepest sympathy to his relatives and loved ones.

+ Professor, Doctor of Sciences (Law); Honorary Director of the International Institute of Space Law; member of the International Academy of Astronautics.

Pépin, from the beginning of the space age up to the present, has contributed to the creation and progressive evolution of international space law. Additionally, he has been the author of many publications, among them "Cours de Droit de l'Espace."

In June of 1958, *Professor Pépin* delivered the world's first academic lectures on space law at the International Institute of Air and Space Law at the Institute of Contemporary International Relations in Paris, France (1961-1982). At that Institute, he created special courses on international law, scientific and technological progress, space and air law, telecommunications law, nuclear law, and admiralty.

Professor E. Pépin has been invited to give lectures on international space law all over the world, including several universities in Europe (Netherlands, Italy, U.S.S.R.), Canada, United States, South America (Brazil, Mexico, Argentina, Chili, Bolivia, Peru), and Asia (Indonesia). *Pépin's* lectures and publications on space law are consistently avant-garde revealing his original insights, as gleaned from his wide experience and knowledge..

Professor Pépin is known around the world as one of the truly great pioneers in the formulation of air law. From 1922 to 1944 he was a member of the Legal Committee of the International Aviation Commission. From 1944 to 1954, he was the first Director of the Legal Bureau of the International Civil Aviation Organization (I.C.A.O.). He was the guest of honor at the 26th Session of the ICAO Legal Committee (Montreal, April 28-May 13, 1987) at which the Committee paid tribute to his contributions to the development of international air law and its codification.

From 1951 to 1954, he gave lectures on the regulation of international civil aviation at what was then called the Institute of Air Law in Montreal, Canada. In 1955, he became the second Director of the Institute, a position he held until 1959.

In 1958, on the request of *Professor Pépin*, the Board of Governors of McGill University changed the name of the Institute to the "Institute of Air and Space Law." During his directorship, *Professor Pépin* continued lecturing at a rate of three hours every morning, seven months a year.

In 1974, *Professor Pépin* gave a series of lectures on air law at The Hague Academy of International Law. On the eve of his 100th anniversary, *Professor Pépin* was invited by alumni of this Institute to speak on a topic of great importance to world peace and human survival: The Denuclearization and Demilitarization of Outer Space.

With all that has been said it is necessary to add that *Professor Pépin* received a sound university education and had a brilliant diplomatic career.

For nine years (1904-1913), *Professor Pépin* studied law at the Law Faculty of Paris University, where he received his doctorate degrees on history of law and international law. He also received degrees at the Literary Faculty (licence es lettres) of Sorbonne, the School of High Commercial Studies (Ecole des Hautes Etudes Commerciales) and the Archives School (Ecole des Chartes).

From 1918 to 1920, *Professor E. Pépin* was the Secretary of the Central Drafting Committee of the Paris Peace Conference. The task of this committee was to finalize the text of all Peace Treaties, as well as other international conventions, such as the 1919 Convention on international air navigation. He was also a member of the geographic committee on the delimitation of the frontiers of new states.

In January 1920, *Dr. E. Pépin* was put in charge of publication of the Acts of the Peace Conference. This publication was completed in 1934.

From 1920 to 1930, *Dr. E. Pépin* was in charge of the Legal Section of the League of Nation's Service at the French Ministry of Foreign Affairs. In that capacity, he attended the Council and Assembly sessions of the League and many other international conferences (on opium traffic, arms, military munitions and material trade; and the first conference on international law codification). In 1928, at the Panamerican Conference in Havana, he participated in the discussions on the Panamerican Aviation Convention. From 1930 to 1933, he was a legal advisor to the Ministry of Foreign Affairs of Japan. From 1934 to 1939, he assisted the VII Panamerican Conference in Montevideo and was involved in studying Pacific problems. He assisted in different functions during World War II.

Professor Pépin's achievements have been recognized by his receiving many outstanding awards, including the Legion d'honneur, the Cross of War G.M.I., the Order of the Rising Sun, and the Andrew G. Haley Gold Medal. Moreover, he is a Doctor "*honoris causa*" of McGill University, and a distinguished member of the International Academy of Astronautics.

Professor Pépin has been very active in different French professional societies. He served as President of the French Association of Air and Space Law in 1984, he was elected "Membre d'Honneur" of the New French "Academie Nationale de l'air et de l'espace." *Professor E. Pépin* is known for being a pioneer in aviation photography, as well as for his capability to direct balloons. Those who have had the privilege to meet and to speak with *Professor E. Pépin*, will always remember his extraordinary personal qualities.

THE ROLE OF UNITED NATIONS DECLARATIONS
OF PRINCIPLES IN THE PROGRESSIVE
DEVELOPMENT OF SPACE LAW

*Vladimir Kopal**

In his papers published before and shortly after the launch of the first man-made objects into outer space, *Professor Dr. Eugène Pépin* called for the timely establishment of an adequate legal basis for space activities by the international community. For example, in a lecture delivered on 6 November 1957 he said: "I sincerely hope that some international agency or a government will take, in the near future, the lead for the preparation of a convention. Its universal acceptance would benefit not only the immediate future of scientific research in space, but also the safety of present circulation within the atmosphere and of the people on the surface; it would also prepare the future of the circulation of man in space."¹

This idea was extended by *Professor Pépin* even before the General Assembly of the United Nations adopted its Resolutions 1348 (XIII) of 13 December 1958 and 1472 (XIV) of 12 December 1959 which established a special body to deal with international co-operation in the peaceful uses of outer space. This body, originally an *Ad Hoc* Committee and since 1959 the permanent Committee on the Peaceful Uses of Outer Space (COPUOS), was requested, *inter alia*, "to study the nature of legal problems which may arise from exploration of outer space."² This mandate of COPUOS was confirmed and even amplified in Resolution 1721 A (XVI) of 20 December 1961, which also recommended some basic principles to States for their guidance in the exploration and use of outer space.

* Professor of Law, Doctor of Sciences. Chief, Outer Space Affairs Division, United Nations. The opinions expressed in this paper are those of the author and do not necessarily reflect the views of the United Nations.

1. See Prof. E. Pépin, "Legal Problems Created by the Sputnik," lecture given on 6 November 1957 to the Canadian Bar Association (Quebec Maritime and Air Law Section), reprinted in *LEGAL PROBLEMS OF SPACE EXPLORATION, A SYMPOSIUM* 187 (Prepared by Legislative Reference Service, the Library of Congress, Washington, 1961).

2. See para. 1(b) of U.N. Resolution 1472A (XIV) of December 12, 1959.

When the Committee's consideration of legal aspects of space activities started, it became clear that an attempt at drafting immediately a comprehensive code to govern space activities would be premature. The rule of law in outer space should instead be elaborated step-by-step,³ reflecting the progress in the conquest of space and the actual need for international co-operation in this new area of human endeavor. Thus the idea of a single international convention on outer space was replaced by that of a progressive development of the law of outer space through a number of legal instruments dealing with the most urgent problems of space activities.

Moreover, the first discussions in the Legal Sub-Committee, which was established, together with the Scientific and Technical Sub-Committee at the ninth meeting of COPUOS in 1962⁴ and convened its first session in Geneva on 28 May of the same year, indicated that the development of a legal basis for space activities would lead first to the drafting of a document that should establish a set of general principles, rather than detailed rules to govern the rapidly developing space activities. And when the question of the legal form was considered, it was found more appropriate to adopt such a document first in the form of a General Assembly declaration.⁵ In this way, the first legislative act of the United Nations in the field of space law emerged as the 1963 Declaration of Legal

3. This approach was already reflected in the *Report of the Ad hoc Committee on the Peaceful Uses of Outer Space to the United Nations General Assembly*, U.N. Doc. A/4141, Part III, para. 7 (1959).

4. The two Sub-Committees, composed of the members of COPUOS, were created for detailed consideration of specific proposals and suggestions concerning scientific, technical and legal questions made by members of COPUOS for the development of international co-operation in the field of space exploration for peaceful purposes. (See the statement of the Chairman of COPUOS in *Verbatim Records of the Ninth Meeting held on 29 March 1962*, U.N. Doc. A/AC.105/PV.93. at 3 (1962).

5. Concerning the assessment of the first stage of international co-operation in the field of space law, see MANFRED LACHS, *THE LAW OF OUTER SPACE, AN EXPERIENCE IN CONTEMPORARY LAW-MAKING* 27-41 (Sijthoff, Leiden, 1972).

Principles Governing the Activities of States in the Exploration and Use of Outer Space.⁶

The 1963 Declaration of Legal Principles

Twenty-five years have elapsed since the adoption of this document, but even in light of what has been done in the progressive development of space law since then, we must recognize that the 1963 Declaration of Legal Principles was a remarkable achievement. Almost all of the fundamental principles of space law of our times originated in this Declaration and they still provide a succinct picture of the general nature and content of this new branch of international law.

As to its structure, the 1963 Declaration consisted of a preamble and nine operative paragraphs which may be divided into two groups. The first group included four general principles which established the purposes of the exploration and use of outer space, characterized the legal status of outer space and celestial bodies and outlined the scope of legality of activities of States in this new environment. While outer space and celestial bodies were declared free for exploration and use by all States on a basis of equality, this freedom should be exercised within certain limits. As declared in paras. 1 and 4 of this document, space activities "shall be carried on for the benefit and in the interest of all mankind... in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding."

The second group of paragraphs of the 1963 Declaration were of a different nature. In fact, each of them provided a set of initial rules for handling some already known problems of space activities. Thus they created a starting point for further, more specifically oriented space law projects.

6. This Declaration was included in General Assembly Resolution 1962 (XVIII) adopted by unanimity on 13 December 1963. See its text in 18 U.N. GAOR Supp. (No. 15), at 15-16, U.N. Doc. A/5515 (1963).

The adoption of the UN Declaration was preceded by discussions on similar subjects in some concerned international non-governmental organizations. At its session in Brussels, the prestigious *Institut de Droit International* adopted a resolution on outer space called "Le régime juridique de l'espace". See 50 ANNUAIRE DE L'INSTITUT DE DROIT INTERNATIONAL 361-364 (Tome II/1963). Since 1960, the International Law Association (ILA) has also been involved in space matters, first through its Air Law Committee, which was later transformed into the Air and Space Law Committee. The results of these discussions can be found in the reports of the biennial conferences of the organization. Finally, we should recall the systematic work of the International Institute of Space Law (IISL), which was established by the International Astronautical Federation (IAF) in 1960 and which developed its activities particularly after 1963, when Professor E. Pepin was elected its President.

The first of these sets of rules (para. 5) dealt with international responsibility for national activities, taking account of different subjects or entities carrying on such activities. The next paragraph declared the principle of co-operation and mutual assistance of States in the exploration and use of outer space, as well as their regard for the corresponding interests of other States. A procedure of consultation was also outlined in this paragraph for solving problems of potential interferences. Paragraph 7 enshrined an important principle of jurisdiction and control of the State of registry over its space objects and any personnel thereon while in outer space, confirmed the continuity of ownership of objects launched into outer space and stipulated the return of a space object or its component parts to the State of registry. Paragraph 8 established the principle of international liability of a launching State (or States in a similar position) for damage caused to foreign subjects in all environments. Finally, the principle of assistance, in case of distress, to astronauts, who were designated as envoys of mankind, was declared and a promise of their safe and prompt return in case of emergency landing in foreign States or on the high seas was made.

If we compare the content of all these principles with the elements suggested by *Professor Pépin* (in his above-mentioned paper) for inclusion in an international regulatory act for outer space, we conclude that practically all of *Professor Pépin's* elements were reflected in the 1963 Declaration of Legal Principles. Of course, this Declaration was not an international convention of a type like the 1944 Chicago Convention on International Civil Aviation. This is because the state of development of astronautics in the early 1960's was significantly different from that of aviation which, by the end of World War II, already had a relatively long record and was seen to have enjoyed wide prospects for further growth.

Nevertheless, progressive amplifications of the legal principles set out in the 1963 Declaration followed at relatively short intervals. During the period between 1966 and 1979, five general multilateral treaties, which incorporated the initial principles into legally binding instruments and developed them further, were successfully worked out in COPUOS, which has, since its establishment, played the role of a focal point in the development of international multilateral co-operation in the

peaceful uses of outer space.⁷ Without any doubt, the most important of the subsequent instruments has been the 1967 Outer Space Treaty, which was directly based on the 1963 Declaration. On the occasion of the twentieth anniversary of the entry into force of the 1967 Outer Space Treaty, which has become one of the significant law-making instruments of present international law, enjoying wide endorsement among the members of the international community,⁸ the General Assembly commemorated the conclusion of this Treaty in its Resolution 42/68 which was adopted on the basis of consensus on 2 December 1987. The Resolution stated that the Treaty "has played and continues to play a positive role in the implementation of the purposes and principles of the Charter of the United Nations and the progressive development of the law of outer space, including the elaboration and adoption of other international instruments governing the outer space activities of States."⁹ It should be observed in this connection that much of this praise also belongs to the 1963 Declaration of Legal Principles, the qualities of which greatly facilitated its transformation into the fundamental instrument of space law - the 1967 Outer Space Treaty.

7. These instruments are as follows:

1. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies - adopted by the UN General Assembly on 19 December 1966, opened for signature on 27 January 1967, entered into force on 10 October 1967;

2. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Object launched into Outer Space - adopted by the UN General Assembly on 19 December 1967, opened for signature on 22 April 1968, entered into force on 3 December 1968;

3. Convention on International Liability for Damage Caused by Space Objects - adopted by the UN General Assembly on 29 November 1971, opened for signature on 29 March 1972, entered into force on 1 September 1972.

4. Convention on Registration of Objects Launched into Outer Space - adopted by the UN General Assembly on 12 November 1974, opened for signature on 14 January 1975, entered into force on 15 September 1976;

5. Agreement Governing the Activities of States on the Moon and Other Celestial Bodies - adopted by the UN General Assembly on 5 December 1979, opened for signature on 18 December 1979, entered into force on 11 July 1984.

For the texts of all these instruments, see *THE UNITED NATIONS TREATIES ON OUTER SPACE*. (United Nations, New York, 1984).

8. According to an informal list prepared for the 27th session of the Legal Sub-Committee of COPUOS in 1987, eighty-eight States, including all space-faring Nations, have become parties to this Treaty by ratification, accession or succession, and twenty-nine additional States have signed it. See *Present Status of Outer Space Treaties* 2-5 (1987).

9. See para. 5 of the preamble to this resolution.

1982 Principles Governing Direct Television Broadcasting

Because of its relatively high rate of production of multilateral instruments, the period from 1966 to 1979 could be characterized as the golden age of space law. However, we should not forget that during the 1970's COPUOS and its Legal Sub-Committee also started discussing some politically and technically complex problems, in which the positions of different groups of States were farther apart from the very beginning than had been the case with respect to the subjects of the five space law treaties. The negotiations relating to the last of the five treaties, the 1979 Moon Agreement, already signalled growing difficulties in reaching consensus resulting in a delayed entry of this instrument into force.¹⁰ The controversies relating to the Principles Governing Direct Television Broadcasting provided still more conspicuous evidence of this changing situation.

The topic of Direct Broadcasting by Satellites (DBS) appeared in United Nations documents for the first time in 1967,¹¹ shortly after the conclusion of the Outer Space Treaty which did not directly touch on this issue. The following year COPUOS established a Working Group on DBS, which was requested "to study and report on the technical feasibility of communication by direct broadcast from satellites and the current and foreseeable developments in this field". The Group was also requested to take up "the implications of such developments in social, cultural, legal and other areas".¹²

The Group on DBS held five sessions during 1969-1974 and arrived at many useful conclusions which were incorporated in its successive reports. The legal aspects of the problem were elaborated primarily in the last two reports of this series.¹³ The Group also had at its disposal a number of proposals from individual States, including particularly a draft convention on principles governing the use of States of artificial Earth satellites for direct television broadcasting, submitted by the USSR to the twenty-seventh session of the General Assembly.¹⁴

10. The 1979 Moon Agreement entered into force almost five years after its adoption by the General Assembly, on 11 July 1984, and so far has only seven States Parties with six more signatories. See *supra*, note 8.

11. See para. 13 of U.N. Res. 2260 (XXII) of 3 November 1967.

12. See para. 5 of U.N. Res. 2453 B (XXIII) of 20 December 1968.

13. See *Report of the Working Group on DBS on the Work of Its Fourth Session*, U.N. Doc. A/AC.105/117 at 9-15 (1973) and *Report of the Working Group on DBS on the Work of Its Fifth Session*, U.N. Doc. A/AC.105/127, at 9-20 (1974).

14. See U.N. Doc. A/8771, which is reproduced in the 1973 report of the Working Group on DBS, U.N. Doc. A/AC.105/117, Annex III, 1-6 (1973).

A significant impetus to the discussions on the legal aspects of this topic was given when the General Assembly, by Resolution 2916 (XXVII) of 9 November 1972, stated that it considered it necessary "to elaborate principles governing the use by States of artificial earth satellites for direct television broadcasting with a view to concluding an international agreement or agreements."¹⁵

Almost simultaneously with the United Nations, UNESCO, a specialized agency concerned with educational, scientific and cultural problems of international co-operation, was considering the topic of DBS from its particular point of interest. At the adoption of Resolution 2916 (XXVII) by the General Assembly, UNESCO was completing work on a document called Declaration of Guiding Principles on the Use of Satellites Broadcasting for the Free Flow of Information, the Spread of Education and Greater Cultural Exchange. This Declaration was adopted by the General Conference of UNESCO at its seventeenth session in Paris on 15 November 1972.¹⁶

Another specialized agency of the United Nations system, the International Telecommunication Union (ITU), acting primarily through its World Administrative Radio Conferences, (WARCs), has been harmonizing the actions of nations in regard to the development and use of all forms of telecommunications, including those using space techniques. The 1971 WARC discussed the problem of use of the geostationary satellite orbit in which the DBS satellites were to be placed. The 1977 WARC was specifically convened for the Planning of the Broadcasting Satellite Service. This Conference agreed on a specific orbital position and frequency allotment plan for the Broadcast Satellite Service in the 12 GHz band for the countries of Europe, Africa, Asia and Oceania. A similar plan for the countries of the Americas was worked out later by the 1983 Regional Administrative Radio Conference (RARC) for Region 2, the Americas.¹⁷

15. See 27 GAOR Supp. (No. 30), at 14, U.N. Doc A/8730 (1972). On the same day, another resolution was adopted by the General Assembly on the same topic Resolution 2917 (XXVII) entitled "Preparation of International Instruments or United Nations Arrangements on Principles Governing the Use By States of Artificial Earth Satellites for Direct Television Broadcasting". It was noted in this document that the work done on the draft Convention on Freedom of Information and deliberations thereon in the General Assembly might be useful in the discussion and elaboration of international instruments or United Nations arrangements relative to direct television broadcasting. Id. at 14-15. The simultaneous adoption of two different resolutions on one subject reflected the two opposing approaches to the problem that would characterize all subsequent discussion on this item.

16. The text of the UNESCO Declaration was reprinted in UN Doc. A/AC.105/109 (1973).

17. For a more detailed assessment of the work done by ITU in the field of space telecommunications, see Arnold A. Matthey, *International Legislation in Relation to Space Radio-Communications*, in 52 TELECOMM. J. 341-367 (VI,1985).

In the United Nations itself, further efforts took place in COPUOS, and its Legal Sub-Committee toward the "Elaboration of Principles Governing the Use by States of Artificial Earth Satellites for DBS", as this item of the Legal Sub-Committee agenda was called since 1975. Following the recommendation of the General Assembly, the Sub-Committee started the formulation of principles, using several drafts and working papers submitted during the course of these discussions. Negotiations were generally held in a special Working Group established by the Legal Sub-Committee for this purpose and several areas of agreement emerged during these debates. In particular, the Members of the Sub-Committee agreed, or were close to a consensus, on the purposes and objectives of these Principles, the applicability of international law, rights and benefits, international co-operation, peaceful settlement of disputes, copyright and neighboring rights, and notification to the United Nations. On the other hand, a number of disagreements persisted. They related particularly to State responsibility for these types of activities, duty and right to consult, and consultation and agreements between States.¹⁸

The disagreement on these issues reflected the gap between the position of the group of Western nations, which were emphasizing the need to ensure a free flow of information and ideas, and the position of other groups of nations (the developing and the Socialist countries), which shared a concern for the sovereign rights of all States and requested adoption of adequate measures for protecting their political, economic and cultural identity.

In order to facilitate the bridging of this gap, a group of twelve nations (mostly developing countries) submitted a negotiating text in 1981.¹⁹ During the thirty-sixth session of the General Assembly in 1981, as well as during the twenty-fourth session of COPUOS and the thirty-seventh session of the General Assembly in 1982, further attempts were made to reconcile the outstanding issues. Despite these efforts, agreement was not reached. Under these circumstances, the final version of the above mentioned draft was presented to the General Assembly for its decision. On 10 December 1982 the United Nations General Assembly adopted by a vote Resolution 37/92 including, in an annex, the

18. See *Report of the Legal Sub-Committee on the Work of Its Eighteenth Session* (12 March - 6 April 1979), U.N. Doc. A/AC.105/240 Annex II, Appendix A at 8-13 (1979).

19. See U.N. Doc. A/AC.105/C.2/L.131 in *Report of the Legal Sub-Committee on the Work of Its Twentieth Session* (16 March - 10 April 1981) Annex IV, 1-4 (1981).

"Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting."²⁰

Without doubt, the fact that consensus, which has been the usual method of work of COPUOS and its Legal Sub-Committee in developing space law, was not attained on this particular item, was a certain setback in these endeavours. Nevertheless, Resolution 37/92 was adopted in accordance with the United Nations Charter and the Rules of Procedure of the General Assembly in force.

If we read carefully the text of the 1982 Principles Governing Direct Television Broadcasting as a whole, we must admit that its language is moderate and the requirements addressed to States and other international persons are not excessive. This conclusion also applies to those principles which remained controversial until the end. Thus the principle of State responsibility for activities in the field of international direct television broadcasting, both with regard to States and international intergovernmental organizations, is based on Articles VI and XIII of the 1967 Outer Space Treaty. The principle of Duty and Right to Consult in fact only recommends a prompt entering into consultations between the broadcasting and the requesting receiving State within the same service. And though the final principle of Consultations and Agreements between States goes farther by making the establishment of such a service dependent on agreements between the States concerned, the language of para. 14 of the 1982 Principles remained fairly soft and flexible even in this point. The establishment of an international DBS service is made conditional on notification, consultation and "on the basis of agreements and/or arrangements in conformity with the relevant instruments of the International Telecommunication Union and in accordance with these principles".²¹

20. Resolution 37/92 was adopted by a recorded vote of 107 votes in favor, 13 votes against and 13 abstentions. See its text in 37 U.N. GAOR Supp. (No. 51) at 98-99, U.N. Doc. A/37/51 (1982). The lack of consensus during the adoption of the 1982 Principles led some authors to a skeptical assessment of this document. According to Professor Christol "The circumstances surrounding the introduction of the subject at the General Assembly, and the distribution of votes, have cast a doubt on the significance of the resolution. Proponents, as well as opponents, have taken note of its non-binding status." C. Q. Christol, *Prospects for an International Legal Regime for Direct Television Broadcasting*, 34 INT'L & COMP. L.Q. 149-150 (1985).

21. The Georgetown Space Law Group directed by Professor Paul B. Larsen, on the basis of a detailed analysis of the negotiations, came to similar conclusions on this document: "Compared to previous drafts of the Working Group of COPUOS, the DBS principles in final form are surprisingly moderate in their requirements for obtaining prior consent and, even more surprisingly, practically silent on the issues of program content and recourse for the unwilling recipient of DBS transmissions." The Georgetown Space Law Group, *DBS Under FCC and International Regulation*, 37 VAND. L. REV. 131 (1984). A similar conclusion is spelled out also on p. 135 of this study.

The 1982 Principles Governing Direct Television Broadcasting represent the outcome of the first attempt to ensure the expansion of the most advanced telecommunication technology under the conditions of the co-existing plurality of social, political and cultural groups in the world today. Though reflecting the decline of international co-operation that prevailed during the late 1970's and early 1980's, these Principles, too, should be counted as a valid contribution to the progressive development of space law.

The 1986 Principles Relating to Remote Sensing

Almost simultaneously with the debates over Principles Governing Direct Television Broadcasting, another topic of comparable significance was under consideration in COPUOS and its Legal Sub-Committee for years that of remote sensing. While the first proposal relating to remote sensing was introduced in 1970,²² the views on this subject crystallized by the mid 1970's. In 1974 a joint working paper on principles relating to remote sensing was presented to the Legal Sub-Committee by France and the USSR, two space nations with significant activities in this field.²³ The title of the agenda item became more specific in 1975 when it was spelled out as "Legal Implications of Remote Sensing of the Earth from Space" to which the phrase "with the Aim of Formulating Draft Principles" was added in 1978.²⁴ In these discussions, as on DBS, different opinions on problems and diverging approaches to their solutions persisted for many years. Nevertheless, it became possible to surmount these differences on the basis of a new impetus given to the deliberations on this item between 1981 and 1984, when a number of working papers seeking ways to compromise solutions on the remaining issues were introduced at the sessions of the Legal Sub-Committee and its

22. See Argentina: *Draft International Agreement on Activities Carried Out Through Remote Sensing Satellites Surveys of Earth Resources*, U.N. Doc. A/AC.105/C.2/L.73 (1970) in *Report of the Legal Sub-Committee on the Work of Its Ninth Session (8 June - 3 July 1970) to the Committee on the Peaceful Uses of Outer Space*, U.N. Doc. A/AC.105/85 Annex II, at 2-14 (1970).

23. See France and USSR: *Working Paper* (Doc. A/AC.105/C.2/L.99 of 27 May 1974) *Draft Principles Governing the Activities of States in the Field of Remote Sensing of Earth Resources by Means of Space Technology*, in *Report of the Legal Sub-Committee on the Work of Its Thirteenth Session (6-31 May 1974)*, U.N. Doc. A/AC.105/133, Annex IV at 9-10 (1974). See also Eugène Pépin "French Proposals with Respect to Remote Sensing of Earth Resources by Satellites" in *LEGAL IMPLICATIONS OF REMOTE SENSING FROM OUTER SPACE* 85-87 (A.W. Sijthoff, Leyden 1976).

24. See 1975 and 1978 reports of the Legal Sub-Committee, U.N. Doc. A/AC.105/147 (1975) and U.N. Doc. A/AC.105/218 (1978).

special Working Group for this subject.²⁵ The completion of the Remote Sensing Principles at the 1986 session of the Legal Sub-Committee and the adoption, without a vote, of Resolution 41/65 of 3 December 1986, to which the "Principles Relating to Remote Sensing of the Earth from Outer Space" were annexed, were the outcome of these intensified efforts.²⁶

Considering the legislative techniques, it is interesting to note that the 1986 Principles start with a number of definitions of terms, as is usual in international treaties. This fact distinguishes them from most other United Nations declarations of principles and is clear evidence that it was the intention of their authors not to formulate vague guidelines, but rather to establish general regulatory norms of conduct with a precise area of application.

As to the terms defined in Principle I, it should be particularly noted that "remote sensing" does not embrace all types of observation of the Earth or all analysis of the phenomena observed and data collected. Remote sensing, in the sense of the Principles, is considered to cover only those activities which are performed for the purpose of improving natural resources management, land use and the protection of the environment. The Remote Sensing Principles apply only to these activities.²⁷ On the other hand, the sensing of the Earth's surface for these specified purposes can be effected by any available techniques, which are also listed in very general terms in Principle I.

Politically, the most outstanding feature of the 1986 Principles was the attempt at compromise between the interests of the sensing States, i.e. States possessing the necessary space capabilities on the one hand, and the needs of sensed States, many of them developing countries, on the other hand. The elements of the compromise reached are reflected in different principles. Thus in Principle IV, the respect for full and permanent sovereignty of all States and peoples over their own wealth and natural resources, as well as due regard to the rights and interests of

25. A significant role in the shaping of the final draft of the Remote Sensing Principles was played in particular by two working papers submitted by France in 1984 and 1985. U.N. Doc. A/AC.105/C.2/L.144 (1984) and U.N. Doc. A/AC.105/C.2/L.150 (1985), in *Report of the Legal Sub-Committee on the work of Its Twenty-third Session* (19 March - 6 April 1984), U.N. Doc. A/AC.105/337 Annex IV, at 33-36 (1984) and *Report of the Legal Sub-Committee on the Work of Its Twenty-fourth Session* (18 March-4 April 1985), U.N. Doc. A/AC.105/352 Annex IV, at 35-39 (1985).

26. See the text in 41 U.N. GAOR Supp. (No. 53) at 115-116, U.N. Doc. A/41/53 (1986).

27. The adoption of the 1986 Principles Relating to Remote Sensing therefore has no implications regarding the status of observation and data gathering for other purposes, such as e.g. military reconnaissance. Nor do these principles reflect the existence of any general international right to engage in fact-gathering from outer space for any purpose whatsoever.

other States and entities under their jurisdiction, are emphasized side by side. Moreover, according to the same Principle IV, remote sensing activities shall not be conducted in a manner detrimental to the legitimate rights and interests of the sensed States.

The most important part of this compromise, however, as enshrined in Principles XII and XIII, consists of 1) the access of sensed States to the results of remote sensing, and 2) the duty of sensing States to consult with the sensed States.

The access of the sensed States is ensured both to "the primary data and the processed data" and to "available analyzed information" on equal terms, *i.e.* "on a non-discriminatory basis and on reasonable cost terms."

The duty of a State carrying out remote sensing to consult with a State whose territory is sensed is qualified by a number of elements limiting its extent. The sensing State is obliged to enter into consultations only upon request and such consultations need not necessarily take place before the beginning of a remote sensing programme. Another significant feature is the lack of any guidelines concerning the outcome of such consultations, though it may be expected that they would lead to opportunities for participation and mutual benefits, as declared in Principle XIII.

Unlike the 1982 Principles Governing Direct Television Broadcasting, the 1986 Principles Relating to Remote Sensing do not require any form of prior consent on the part of the sensed State or States with respect to either the collection of remote sensing data of its territory in general, or the dissemination of economically important products of these activities in particular.²⁸

Another major compromise between the interests of the sensing States and the sensed States, and also between the divergent positions of the Western and Eastern countries, was reached in the formulation of Principle XIV which deals with international responsibility of States for their activities. It is not quite clear, however, whether according to this Principle as adopted, "activities" for which States shall bear international responsibility are "remote sensing activities" in the sense of Principle I,

28. Such a requirement formed an essential element of the position of many States concerning the rights of sensed States during the earlier stages of negotiations and was still reflected in the bracketed text of Principle XV in the 1981 Report of the Legal Sub-Committee. See U.N. Doc. A/AC.105/288 Annex I, at 10 (1981). A change in the attitude of these States, which opened the way to reaching a compromise, was first signalled in the Working Paper of Brazil (WG/RS (1982) /WP.11 of 8 February 1982) which concentrated on ensuring access to primary data and analyzed information, and on international responsibility for the dissemination of primary data or analyzed information that would adversely affect the interest of a sensed State. At the same time the working paper of Brazil suggested the deletion of Principle XV. See Report of the Legal Sub-Committee on the Work of Its Twenty-first Session, U.N. Doc. A/AC.105/305 Annex I, at 20 (1982).

including not only the operation of remote sensing space systems, primary data collection and storage stations, but also activities in processing, interpreting and disseminating the processed data. If the responsibility should apply only to the operation of remote sensing satellites,²⁹ the declaration of responsibility of States in this document would remain practically meaningless. Such a restrictive interpretation would also be inconsistent with the second sentence of Principle XIV which speaks explicitly about "State responsibility for remote sensing activities." At the same time, however, it may be assumed on the basis of the last sentence of this Principle that it was not the intention of the authors of the 1986 Principles Relating to Remote Sensing either to broaden, or to narrow the content of the responsibility of States as established in the rules of general international law.

Remarks on the Legal Nature of United Nations Declarations of Principles

The three above-mentioned United Nations documents have one common denominator: they include principles that should govern all or some categories of mutual relations among States and other international persons participating in space activities. This undisputable fact invites us to think about their common role in the development of space law, and about their legal significance.

We believe that we can do so notwithstanding certain differences as to their wording, their historical background and the political support they may have been enjoying from members of the international community. For example, from this point of view there is a notable difference between the 1963 Declaration of Legal Principles on the one hand and the 1982 and 1986 Principles on the other hand. Only the first of these documents was formally called a "declaration" and qualified the declared principles *expressis verbis* as "legal". Enjoying the unanimous support of United Nations Members, some of which had declared, by the time of its adoption, their intention to fully comply with its stipulations,³⁰ this Declaration was soon followed by further negotiations leading to the transformation of its content into a legally binding instrument, the 1967 Outer Space Treaty.

The situation of the two other documents has been rather different. These "Principles" have been spelled out in a less formal manner, without any preamble, and they have been simply annexed to the respective

29. M. Benkő and G. Gruber, *The UN Committee on the Peaceful Uses of Outer Space: Adoption of Principles on Remote Sensing of the Earth from Outer Space and Other Recent Developments*, 36 ZEITSCHRIFT FÜR LUFT- & WELTRAUMRECHT 24 (1987).

30. See e.g. the statement of the representatives of the US and USSR in the First Committee of the General Assembly, Verbatim Records, A/C.1/PV/1342, 12 and 42 (1963).

General Assembly resolutions in which their adoption was expressed. Moreover, the 1982 Principles Governing Direct Television Broadcasting suffered from the lack of consensus, in spite of the efforts of its drafters to reach a compromise on the essential issues involved.³¹ The 1986 Principles Relating to Remote Sensing, while they were adopted on the basis of a consensus reached after lengthy negotiations, are in many respects similar to the 1982 pattern. Neither of these two documents has yet opened a treaty-making process that would lead to the conclusion of legally binding instruments dealing with the same matters.³² Nevertheless, like the 1963 Declaration, the two sets of Principles declare general rules of conduct addressed to States and other international persons, the firm establishment of which in actual practice should contribute to the strengthening of international co-operation in the respective fields of space activities.

With respect to their status, the three documents are resolutions of the General Assembly, adopted in conformity with the United Nations Charter, furthering its purposes and principles. Though the General Assembly is the most representative among the principal organs of the world organization - since all its Members are equally represented in this body - its resolutions on substantive matters have, legally, the nature of recommendations.

However, the declaration of principles that have been adopted by the General Assembly on several occasions during its forty-two years of existence, concerning different categories of international relations and

31. For this reason, in addition to some substantive changes, the term "should" was generally adopted in the final text of this document for expressing the duties of States and other international persons in carrying out DBS activities.

32. However, an initiative to this end was already made with regard to the 1982 Principles Governing Direct Broadcasting. As reflected in the 1984 report of COPUOS "Some delegations expressed the view that the Committee on the Peaceful Uses of Outer Space should give further consideration to the question of direct broadcasting satellites in order to conclude a legally binding instrument in the form of a convention or a treaty as recommended by General Assembly Resolution 2916 (XXVII) of 9 November 1972. Other delegations did not share this view." See *Report of the Committee on the Peaceful Uses of Outer Space*, 39 U.N. GAOR Supp. (No. 20) para. 79, at 13, U.N. Doc. A/39/20 (1984). No such recommendation has been expressed so far with regard to the 1986 Principles Relating to Remote Sensing. However, a reformulated item, "Matters relating to remote sensing of the Earth by satellites, including, *inter alia*, applications for developing countries" remains on the agenda of the Scientific and Technical Sub-Committee of COPUOS which is considering it on a priority basis. These discussions might lead to a new legal interest in these matters in the future.

not only those originating from space activities,³³ have had a special place among the General Assembly resolutions. Since they declared general rules of conduct addressed to all United Nations Members or all States of the world, or even to all international persons in general, these resolutions have not only had political meaning and moral weight, but they have also become important tools in the process of evolving international law. By declaring, whether in a more or less formal manner, what international law governing the given subject matter already is or what should be adopted as international law in the foreseeable future - and it is sometimes difficult to establish an exact limit between these two stages - these documents express a legal conviction of all members of the world organization, or an overwhelming majority thereof, concerning their particular subject matter.

In many cases these documents were the first stage in the law-making process, serving as a basis for negotiating international agreements on the given subjects, as an initial formulation of future provisions of the respective treaties. The influence of the United Nations declarations of principles was strong, particularly in those cases where the drafters of these documents succeeded in grasping the legal substance of problems in a definite manner and when the solutions included in such principles ended all controversies. The 1963 Declaration of Legal Principles can serve as one of the best examples of this kind.

But even in those cases when the second stage of the law-making process was not initiated, or not yet completed, the United Nations declarations of principles have not lost all their significance. The development of international law is usually a lengthy process which may be delayed by different events and changes in attitudes of governments. Under such circumstances, the United Nations declaration of principles will continue playing their regulatory role and can provisionally substitute for lacking treaty provisions.

And even if an international treaty regulating the same subject matter, into which all essential principles of a previous resolution are incorporated, is finally concluded, the purpose and meaning of the declarations of principles will not become fully obsolete. The original principles will maintain their residual regulatory role which is

33. See e.g. Resolution 96 (1) of 11 December 1946 called "The Crime of Genocide"; Resolution 217 (III) of 10 December 1948 including "Universal Declaration of Human Rights"; Resolution 1653 (XVI) of 24 November 1961 called "Declaration on the Prohibition of the Use of Nuclear and Thermo-nuclear Weapons"; Resolution 2625 (XXV) of 24 October 1970 called "Declaration on Principles of International Law concerning Friendly Relations and Co-operation among States in accordance with the Charter of the United Nations"; Resolution 2749 (XXV) of 17 December 1970 entitled "Declaration of Principles Governing the Sea-Bed and the Ocean Floor, and the Subsoil Thereof, beyond the Limits of National Jurisdiction"; Resolution 42/22 of 18 November 1987 entitled "Declaration on the Effectiveness of the Principle of Refraining from the Threat or Use of Force in International Relations," and others.

especially important in relation to States which do not adhere to the treaty instrument. While a treaty binds only its parties, the number of which may remain limited, a United Nations declaration of principles, addressed to all members of the international community, can exercise a wider influence.

As to their content, all individual principles declared by the United Nations in its resolutions are not of the same character. If we analyze the principles declared in the three documents relating to outer space, we ascertain that some of them formulate the norms of conduct only in very general terms. Others, however, are more specific and closer to treaty provisions from which the exact rights and duties can be derived. Some of the principles confirm an already existing practice, declaring it as correct. Others, however, establish new norms of behaviour, which are applicable to situations that have already occurred or might occur in the future. Still other principles only stipulate the willingness of States to co-operate for reaching certain goals and establish guidelines for such efforts.

By their provisional character and mixed content, the United Nations declarations of principles have become a suitable form for developing international law of outer space for new, more sophisticated categories of space activities. Direct television broadcasting and remote sensing are examples of such categories which may be followed by others.³⁴ The form of United Nations principles is particularly convenient when not all members of the international community are convinced about the usefulness and viability of immediate treaty regulation.

The United Nations declarations of principles may also remain the only form available for the progressive development of space law during the present period, which is characterized by exhaustion of the original euphoria and by rather unfavorable general political conditions. At the same time, however, they may prepare the ground for a new growth of space law in the future.

34. The present title of another item on the agenda of the Legal Subcommittee - The Elaboration of Draft Principles Relevant to the Use of Nuclear Power Sources in Outer Space - indicates that another set of principles to be declared by the United Nations might be finalized in the near future. See *Report of the Committee on the Peaceful Uses of Outer Space*, 42 U.N. GAOR Supp. (No. 20) paras. 77-80, at 14, U.N. Doc. A/42/20 (1986).

Carl Q. Christol*

Introduction

On December 11, 1986 the General Assembly of the United Nations gave its unanimous approval without a formal vote to Resolution 41/65.

This Resolution consisted of fifteen "Principles on Remote Sensing," which had obtained consensus in the Legal Sub-Committee of the Committee on the Peaceful Uses of Outer Space (COPUOS) on April 11, 1986.¹ Consensus had been reached by the Working Group on April 1, 1986.²

The adoption of the Principles is testimony to the importance of fact-gathering from space. The final recognition that the space-resource States were engaged and would continue to engage in remote-sensing activities resulted in the winnowing of controversial legal proposals. They originated as early as the Unispace Conference in 1968, in the 1970 proposals of Argentina,³ and in dozens of others, which surfaced as late as 1986. Of special importance were those put forward in 1970 by Argentina,⁴ in 1973 by the Soviet Union cosponsored by France,⁵ in 1973 separate proposals by these two States,⁶ in 1974 a joint draft by the two,⁷ in 1974 a joint Argentinian and Brazilian draft, cosponsored by

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1. U.N. Doc. A/AC.105/C.2/24.450, at 6 (1986).
2. U.N. Doc. A/AC.105/370, Annex I, at 11, (1986); 25 ILM 1331, September (1986).
3. U.N. Doc A/AC105/C.2/L.73 (1970).
4. *Id.*
5. U.N. Doc. A/AC.105/111 (1973).
6. *Id.*
7. U.N. Doc. A/AC.105/C.2/L.99 (1974).

Chile, Mexico, and Venezuela,⁸ in 1978 by a Working Group, referred to as the Austrian draft since the chairman of the Working Group was an Austrian,⁹ in 1981 by Mexico,¹⁰ in 1984 by France,¹¹ and in 1985 by Austria.¹²

The remote sensing principles of 1986 were the product of the acquisition in space, the return to Earth, the subsequent collating, the processing, and the interpretation of raw data. These activities and practices, including the dissemination of primary data, processed data, and analyzed information, particularly following the successful LANDSAT operations after 1972, gave impetus to the finalization of the 1986 Principles. The practices of private firms, international intergovernmental organizations, and sovereign States constituted facts which could not be disregarded by COPUOS.

Between 1968 and 1986 the fears of some States relating to foreign sensing activities were not realized. During the same period it became evident that extremely important benefits were being derived from sensing activities carried out in space. This applied both to military and non-military activities.

The growing awareness of the benefits being derived from the fact-gathering activities resulted in the elimination of some of the more strident restrictive proposals. In the end many of the participants in the consensus process applauded the spirit of accommodation and compromise which led to the adoption of General Assembly Resolution 41/65. For example, on March 27, 1986 Brazil indicated that while all delegations could not be completely satisfied, the combined efforts had "achieved a balance."¹³ On April 1, 1986 the Mexican representative credited the consensus process as having produced "equitable legal relations."¹⁴ Comparable pronouncements were made by numerous representatives who had vigorously promulgated views which did not entirely find their way into the final Principles.

8. U.N. Doc. A/C.1/1047 (1974).

9. U.N. Doc. 105/218 Annex III, at 5, (1978).

10. U.N. Doc. WG/RS (1981)/WP.2 (1978); U.N. Doc. A/AC.105/288 Annex I, at 13, (1981).

11. U.N. Doc. A/AC.105/C.2/L.144 (1984); U.N. Doc. A/AC.105/337 Annex IV, at 33, (1984).

12. U.N. Doc. A/AC.105/L.158 (1985); 40 U.N. GAOR/COPUOS Supp. (No.20) Annex V, at 29, U.N. Doc. A/40/20.

13. U.N. Doc. A/AC.105/C.2/SR.439, at 5, (1986).

14. U.N. Doc. A/AC.105/C.2/SR.440, at 5, (1986).

The unanimous acceptance of General Assembly Resolution 41/65 demonstrated that seemingly irreconcilable positions could, over time, be overcome. An emerging awareness of the vast resources in space and opportunities for sharing of benefits lent commitment to fact-gathering activities. The advantages of an orderly regime came to be appreciated. Original perceptions, often based on ignorance and constrained by fears of an economic and military nature, gave way to the principle of sharing. Since the concerns which had arisen in the late 1960's and early 1970's never materialized, fifteen Principles allowing for an orderly and peaceful use of fact-gathering capabilities have emerged to materially influence space activities.

Factors Influencing the Successful Search for Agreement

During the lengthy negotiations leading to the adoption of General Assembly Resolution 41/65 the negotiators were confronted by many and frequently conflicting national policies. In order to understand the true value of the adopted Principles it is necessary to comprehend the compromises and accommodations which ultimately marked the work of COPUOS.

First, a major contest requiring resolution resulted from the views held on the one hand by States favoring international cooperation in the acquisition and dissemination of the product of remote sensing, and on the other by countries which emphasized the role of national sovereignty with its focus on the condition of national privacy. The latter group was committed to the policy of national sovereignty over natural resources, which had found expression in a number of important General Assembly Resolutions dating back to 1952. A prime example is General Assembly Resolution 1803 (XVII) on Permanent Sovereignty Over Natural Resources. This Resolution provided in I.1. "The right of peoples and nations to permanent sovereignty over their natural wealth and resources must be exercised in the interest of their national development and of the well-being of the people of the State concerned." These States wished to extend this concept to the product gathered by the sensing process.

Second, there was a contest between the sensing States and those which did not possess sensing capabilities, but were sensed by foreign countries. States subject to foreign sensing include both advanced countries and developing countries. The contestants on this matter encompassed advanced and developing, Northern and Southern hemispheric, and "have" and the "have not" countries.

Third, there was a more particularized contest between the States possessing sensing capabilities and the less-developed countries. The latter, fearing the prospect of exploitation of their natural resources, expressed concerns respecting the dissemination of the product of remote sensing, particularly to other countries.

Fourth, differences of outlook were built upon varying political and ideological perspectives. The outlooks of States committed to democratic principles found opposition on the part of countries which feel

more comfortable with a closed societal structure. Some of the negotiating States favored the socialist model of economic and social relations, while other States were committed to the free enterprise system.

Fifth, perceptions varied as to the uses to which remote sensing ought to be put. Some States saw fact-gathering from outer space as a tool to be used along with other means to assure a greater degree of national security in the event of possible aggressive threats or actions. Others preferred to focus more on the non-military aspects of monitoring, such as gathering information relating to crops, environmental conditions, fishery resources, location of aircraft and maritime vessels, mapping, scientific inquiry, weather conditions, and, in general, situations of an economic, social, and commercial nature.

During the years of negotiations, while full-scale fact-gathering activities were being conducted, it became evident that very substantial benefits were resulting from such activities. The recognition of this fact tended to modify and reduce the influence of political and socio-economic considerations on the outlooks of the negotiators. In the end practical considerations, particularly in the economic, commercial, and security areas prevailed.

Key Issues

Of all the issues necessitating a mature outlook on the part of the negotiators the most crucial was that of the role of national sovereignty. In an area where high technology has shortened the distance between peoples and countries ("high tech-high touch"), it was becoming evident that a view of absolute national rights, built upon the assumption that a reference to national sovereignty could exclude from within a State's borders the fact-gathering capabilities of powerful sensing devices, was both impractical and impossible. In short, science and technology had eliminated the policy option of national privacy built on the contention of national sovereignty. This outlook was replaced by that of "open skies", which, paradoxically was also supported by the view that a fact-gathering State could engage in sensing by virtue of its national sovereignty.

The 1986 Principles having decreed that remote sensing activities "shall be carried out,"¹⁵ and that such activities "shall be conducted,"¹⁶ and having defined "remote sensing activities,"¹⁷ as well as having referred to remote sensing activities in Principles IV, V, VI, X, XI, XII, and XIV and to programs of remote sensing in Principle IX and to carrying out of remote sensing of the Earth in Principle XII, focused on the subject of access.

15. Principle II, U.N. Doc. A/AC.105/ 370 Annex I at 12 (1986).

16. *Id.* at Principle III.

17. *Id.* at Principle I (e).

Principle XII effected an accommodation between the sovereign rights of a sensed State and the sovereign rights of a sensing State. This Principle referred to "primary data" and "processed data", which had been defined in Principle I. Following the production¹⁸ of such data pursuant to Principle XII, which principle supports the right of a sensing State to engage in fact-gathering of such data, the sensed State is accorded rights of access to this data. This provision acknowledges the sovereign right of the sensed State to such data. Principle XII provides: "The sensed State shall have access to them on a non-discriminatory basis and on reasonable cost terms."¹⁹ Further, this Principle in keeping with the sovereignty of a sensed State, provides "The sensed State shall also have access to the available analyzed information²⁰ concerning the territory under its jurisdiction in the possession of any State participating in remote sensing activities on the same basis and terms, taking particularly into account the needs and interests of the developing countries."²¹

The 1986 Principles do not use the expressions "disseminate" or "dissemination" of data or information acquired by a fact-gathering State. However, pursuant to Principle X, a participating State which comes into possession of phenomena harmful to a State or States is required to "disclose" this to the States concerned.²² Further, Principle XI uses the expression "transmit".²³ Here there is a duty on the part of the fact gatherer to transmit data and information to a concerned State on natural disasters.

With these provisions in mind it seems evident that, in referring to the right of a sensed State to have access to the identified product of remote sensing when acquired by another State, there is a right of dissemination. Such access or dissemination is not unconditional. This fact again reflects the tension between the national sovereignty of the sensed and sensing States.

Thus, the special needs of developing countries were formally affirmed in Principles, II, IX, XII, and XIII. Further, sensing States committed themselves in Principles II and IV not to discriminate by reason of the economic, social, scientific, and technological developmental conditions of States. Further, all States, developing or advanced, were,

18. Principle XII begins: "As soon as the primary data and the processed data concerning the territory under its jurisdiction are produced..." *Id.* at Principle XII.

19. *Id.*

20. This term was defined in Principle I (d). *Id.* at Principle I (d).

21. U.N. Doc., *supra* note 15, at 12.

22. *Id.*

23. *Id.*

pursuant to Principle XII, to have access to sensing product "on a non-discriminatory basis and on reasonable cost terms".²⁴

Further, access to or dissemination of the sensing product was not restricted either to advanced or to developing countries on the basis of the resolution obtained by state of the art cameras or other sophisticated sensing devices. Thus, since there were no physical measurement limitations contained in the Principles, any State could acquire data or information down to 5 m or an even finer resolution if it were available.

The key issue of "open skies" as opposed to a sovereign right of more or less absolute privacy was resolved in favor of the former. This meant that a sensed State could not insist on a right to grant either consent or prior consent as a condition for fact-gathering by another State. Since the sensed State could not claim such limitations this meant that the sensed State was not able to establish a basis for denying the dissemination of the work product of remote sensing.

However, this approach did not necessarily resolve the question whether a State which was to be monitored was entitled to prior notice from the fact-gathering State. Although a prior notice provision was not incorporated into the 1986 Principles, it had been a key proposal of many of the developing countries during the COPUOS negotiations.

If prior notice could not be agreed on, the question arose whether the Principles should make provision for prior consultation between the sensing State and the sensed State. This issue, as so many that were before the negotiators, produced opposing outlooks respecting the sovereign rights of the sensing and sensed State. On this subject Principle XIII, borrowing from Article 9 of the 1967 Principles Treaty,²⁵ mandated consultations in certain situations. Principle III stated that remote sensing activities were to be conducted in accordance with the 1967 Treaty, as well as the Charter of the United Nations and the relevant instruments of the International Telecommunication Union. Principle V of the 1986 Principles also requires States engaging in remote sensing activities to "promote international co-operation in these activities."²⁶ Principle XIII also calls for the promotion and intensifying of international co-operation between sensing and sensed countries.

Consensus could not be reached requiring *prior* consultation. It is clear, nonetheless, that a State considering that it is a likely subject of foreign remote sensing has a right, and without restrictions, to "*request*" that consultations take place and that the requested State "*shall*" enter

24. *Id.*

25. The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, 18 U.S.T. 2410; T.I.A.S. No. 6347; 610 U.N.T.S. 205.

26. U.N. Doc., *supra* note 15, at 12.

into consultations with a State whose territory is sensed..."²⁷ This language does not conclusively determine the right of the sensed State to have *prior* consultations. The absence of the term "prior" before "sensed" or the introduction of an equivalent expression, such as "about to be sensed," produces the conclusion that prior consultations are not required. This view can be justified on practical grounds. Many remote sensing launches could be prevented from taking place if consultations were required, including a resolution of possibly contending outlooks of several States, prior to such launches. At this time this problem can be resolved, even though not to the complete satisfaction of the sensed State, by calling upon the sensing State to inform it of what has transpired. This fall-back position is in fact one supported in 1985 by Argentina, which earlier had been supportive of major restriction on the sensing country.²⁸

Another key issue, also directly related to national concerns about sovereignty, involved the traditional outlooks of developing countries over full and permanent sovereignty respecting wealth and natural resources. During the negotiations there was no disposition to challenge this formula as it applied to wealth and natural resources situated within the territorial boundaries of a State. The developing countries, having been the chief proponents of national, *e.g.*, permanent sovereignty over natural resources, were the express beneficiaries of the sympathetic provisions of Principle IV. However, at one point the question was raised whether the principle of territorial sovereignty should extend, as some of the developing countries urged, to the product of the fact-gathering process, *e.g.*, to the primary data, processed data, and analyzed information defined in Principle I.

During the negotiations consensus was reached and confirmed in Principle IV that remote sensing activities were not to be "conducted in a manner detrimental to the legitimate rights and interest of the sensed State."²⁹ This assurance was associated by some States with the claim that a sensed State must have the right to give its consent prior to the dissemination of any information or data concerning natural resources to anyone, including a third State. This was the position taken, for example, by Turkey in 1986 at the moment when consensus was reached by the Legal Sub-Committee.³⁰ This claim for a unilateral and exclusive right to have free access to the work product of the sensing process, which would have denied to the sensing State the right to effect dissemination of such materials, was not acceptable. It was accompanied by the claim that sensed States should have the first right to such materials, *i.e.*, before any

27. *Id.* Italics added.

28. U.N. Doc. A/AC.105/C.2/SR.423, at 3 (1985).

29. U.N. Doc., *supra* note 15, at 12.

30. U.N. Doc. A/AC.105/C.2/SR.449, at 5 (1986).

other country, but not a claim of exclusive availability to the sensed State. This outlook also failed to gain the consensus of the negotiators. All of the foregoing proposals were directly associated with the principle of national sovereignty.

One of the great contributions of the Principles was to reject the notion of absolute national sovereignty relating to the sensing process and the work product resulting from it. Rather, agreement was reached that national sovereignty was to be applied in such a manner as to facilitate international co-operation and to contribute to the goals of a world community. The negotiators in refusing to impose constraints based on extreme views of sovereignty refused to impose specific prohibitions on the sensing process. Since such limitations were not prescribed sensing countries were free to engage in sensing activities.

Another key issue confronting the members of COPUOS related to the definitions set forth in Principle I. There was general agreement that all parties would be protected through adequate definitions of primary data, processed data, and analyzed information. While admitting the imperfections that might result from even the most finely honed definitions, and thus willing to accord the definitions in Principle I the required consensus, still it was observed that such concepts as "liability" and "access to data" would not be meaningful in absence of definitions.³¹ A similar outlook was voiced by the representative of the Soviet Union. He expressed concern over the precision employed in the general drafting of the Principles. In his view, unfortunate precedents would be avoided through the clear definition of the legal principles applicable to "the dissemination of data obtained by one State concerning the territory of another".³² Every effort was made to select terms possessing clear meanings, including use of expressions previously considered and accepted in the international agreements which had been drafted in COPUOS and which are now in force.

The formulation of a principle on international responsibility succeeded only after long negotiations in which all member of COPUOS made their views known. This resulted from a common awareness of the intrusive nature of fact-gathering and from the fact that Article 6 of the 1967 Principles Treaty was premised on the participation of States, international intergovernmental organizations, and non-governmental entities in space activities, including fact-gathering and the subsequent dissemination of the product.

The negotiations on international responsibility were much influenced by a Brazilian proposal of February 8, 1982.³³ It read: "A

31. Intervention of the Representative of the United Kingdom, U.N. Doc. A/AC.105/C.2/SR.423, at 6 (1985).

32. U.N. Doc. A/AC.105/C.2/SR.405, at 11, (1984).

33. U.N. Doc A/AC.105/305 Annex I, at 20, (1982).

State conducting remote sensing activities on Earth shall be held internationally responsible for the dissemination of any primary data or analyzed information that adversely affects the interests of a sensed State".³⁴ In its final form Principle XIV provided: "States operating remote sensing satellites shall bear international responsibility for their activities and assure that such activities are conducted in accordance with these principles and the norms of international law, irrespective of whether such activities are carried out by governmental or non-governmental entities or through international organizations to which such States are parties".³⁵ Principle XIV while accepting the main theme of the Brazilian proposal made no reference to "primary data," "analyzed information," or "dissemination". It substituted "international responsibility" for "internationally responsible". It also added the further assurance that the principle of "State responsibility" had application to remote sensing activities. Nonetheless, the Brazilian submission was important in its establishment of protective assurances against possible harms resulting from remote sensing. It also contributed very materially to the accommodation of varying outlooks and rendered acceptable the Principles in their entirety.

It is possible to imagine a number of situations in which the principles of international responsibility could be invoked as a result of the monitoring process. The satellite carrying the remote sensing activity might itself get out of control and cause harm either in outer space, in air space, or on the Earth. There could be erroneous acquisitions of primary data through some kind of failure in sensing equipment. This could result in the dissemination of incorrect information to the detriment of those who relied on it. Processed data might also be improperly processed so that information at variance with the true facts would be used to the detriment of the user. The transposition of primary data and processed data into analyzed information could also experience error productive of harm to the user. Moreover the user could engage in activities causing harms to third persons adversely affected by the conduct of the user. These situations could have adverse consequences in such areas as weather forecasting, agricultural conditions, forest monitoring, and even the incorrect appraisal of disaster situations.

The negotiators were more inclined to address general concerns than specific harms. For example, the Yugoslavian representative took the position that the free dissemination of information should "not jeopardize the sovereignty and legitimate interests of States, particularly in respect to their natural resources".³⁶ The same approach was taken by Uruguay. It called for international liability where "dissemination of

34. *Id.*

35. Principle II, *supra* note 15, at 12.

36. U.N. Doc. A/AC.105/C.2/SR.418, at 5, (1985).

data and information by the sensing State...[caused] detriment to the sensed State".³⁷ Principle XIV has applicability to all of the rights and duties contained in the 1986 Principles.

Thus, international responsibility takes into account the antecedent condition of harms or damages to persons or to property. It also presents the practical problem of identifying the manner of effecting monetary compensation to those who have experienced detriment from remote sensing activity.

Principle XIV went further than restating the applicability of the international law of international responsibility. It stipulated that this principle "is without prejudice to the applicability of the norms of international law on State responsibility for remote sensing activities".³⁸ This meant that the traditional principle of international law requiring a State to protect aliens from either an act or omission on the part of its governmental organs was applicable to remote-sensing activities. This would include the wrongful act of an official which would make the latter's country responsible to the State of the injured alien.³⁹ It could also encompass the wrongful act of a citizen of the affected State, in the event there were a duty on the part of the State to inhibit or control the wrongful action of its national.⁴⁰ The provision in Principle XIV relating to responsibility, both international and State, was much favored by non-launching States. The record of the negotiations demonstrates that without this Principle, and absent the provision for dispute resolution contained in Principle XV, the achievement of consensus would have been next to impossible.

One contention, advanced by Nigeria, which was rejected in the consensus process, would have imposed a condition of liability on a sensing State, which liability would have come under the heading of international responsibility, not only for sensing another country, but also for a "disclosure of the data obtained to other States. Such data should be communicated solely to the sensed States".⁴¹ This proposal would have imposed liability as a result of the mere disclosure of data. It was a much more extreme proposal than the conventional ones calling for liability arising out of sensing activities when it could be demonstrated that some kind of harm or damage was produced as a result of the dissemination of such data or information.

37. U.N. Doc. A/AC.105/C.2/SR.421 at 3, (1985).

38. U.N. Doc., *supra* note 15, at 12.

39. J.L. Brierly, *The Law of Nations*, 284-290 (6th ed. 1963).

40. *Id.* at 289.

41. U.N. Doc., note 14, at 4.

In the discussion relating to responsibility such terms as harms, damages, and liability were put forward. From the national positions advanced, particularly during 1985 and 1986, it was not always evident that these terms, when associated with responsibility, were fully understood. There should not be confusion on these matters. The international legal principle of international responsibility refers to the condition of being internationally responsible for having caused harm. Such harm can produce damage, destruction of property, or in a non-material sense, *i.e.*, violation of personal integrity such as damage to the reputation of an individual. Such damage can be measured in monetary terms, and then is frequently referred to as "damages". Where such harm or damage occurs there is created a liability to pay compensation to the adversely affected person or entity. Where such harm or damage results from international space activities, the rights and duties of the affected parties are governed by Article 6 of the 1967 Principles Treaty, by the 1972 Liability for Damages Convention, and by Principle XIV of the 1986 General Assembly Resolution.

Under the foregoing circumstances the international legal rule of State responsibility can also be invoked. This means that an injured person or entity of one country can look to the State of a foreign national for compensation where that national has failed to conform to the laws of the second State, including meeting the requisite international standard. Pursuant to Principle XIV the same rule applies to a State when it is a member of an international intergovernmental organization and the organization is at fault.

The legal rights and duties spelled out in Principle XIV must be associated with the dispute resolving procedures identified in Principle XV. They constitute a protective package for those who may experience harms resulting from remote-sensing activities.

The foregoing issues and assurances must be understood in the context of the sovereignty of the sensing and sensed States. During the negotiations it became evident that the space-resource States were going to continue to engage in fact-gathering via satellite despite the protestations and excessive limits sought by the sensed countries. During this period it was also evident that the sensed States, no less than the sensing countries, were deriving very substantial benefits from the product of sensing activities. Under these circumstances the countries engaged in an "open skies" policy could not be prevented from the implementation of this policy. This meant that the protesting countries would have to find means to advance their interests as best they could. The response was the accommodation contained in Principles XIV and XV. At the present time this outcome has been accepted as a practical one. Both groups of States are benefiting from it.

Lesser Issues Raised During the Negotiations

A large number of concerns were identified during the lengthy negotiations. They were either resolved in the Principles, were not

considered to be important enough to require inclusion, or they fell beyond the concerns of COPUOS with scientific and commercial fact-gathering.

Among the lesser issues were: (1) the protection of non-governmental entities to engage in remote-sensing activities;⁴² (2) whether dissemination of the product of remote sensing could be limited through the establishment of standards based on camera quality and the resolution of the primary data acquired in the sensing process; (3) the legal form to be given to the Principles, *e.g.*, treaty, temporary or provisional legal instrument, equitable legal regulations⁴³ or even a modified General Assembly Resolution to be worked out in the future; (4) a further clarification of the special status of developing countries; (5) additional inquiry into the land-based aspects of remote sensing; (6) whether commercialization might be productive of armed conflict;⁴⁴ (7) whether the Principles should include a provision prohibiting the use of remote sensing for military purposes;⁴⁵ (8) additional information to be supplied pursuant to Principle IX to the Secretary-General of the United Nations;⁴⁶ (9) whether "renumeration" in the form of "monetary or other compensation" should be paid by the sensing State to a sensed State for the "resources" in the form of data and information acquired by a sensing

42. For example, the Soviet delegate at one point emphasized that, under the rule of international responsibility, sensing States were to be accountable "for all aspects of their remote sensing activities, including their possible harmful effects." Further, it was urged that the provisions relating to the obligations of non-governmental entities were inadequate since they did not sufficiently protect sensed States "from the possible adverse consequences of the activities of non-governmental entities." U.N. Doc. A/AC.105/C.2/SR.434, at 4 (1986).

43. View of the Mexican representative. U.N. Doc., *supra* note 14, at 5.

44. Observation of the representative of Nigeria. *Id.*, at 4. The Nigerian delegate also said: "Remote sensing without prior consultation with the sensed State was diametrically opposed to the concept of international co-operation in the peaceful uses of outer space." *Id.* This may be contrasted with the view put forward by the representative of Chile who was not opposed to the commercialization of space activities "provided that clear and detailed criteria were laid down to regulate it." U.N. Doc. A/AC.105/C.2/SR.443, at 5, (1986).

45. Statement of the representative of Cuba. U.N. Doc., *supra* note 28, at 7.

46. The representative of Turkey suggested that the notice should describe the technical characteristics of the program to include the nature, probable duration and objectives, geographical area covered, and any significant modifications introduced during its implementation. Further, it was suggested that the foregoing information should be disseminated without delay. U.N. Doc., *supra* note 30, at 4.

State;⁴⁷ (10) the status to be accorded and the meaning to be given to the making of a unilateral declaration by a member of COPUOS, described by that member as an "understanding" of a key term found in Principle I, namely that the term "primary data" was to be construed to mean "basic data taken at any single point in time, whether transmitted to the ground or not;"⁴⁸ (11) and in the same vein the significance to be accorded an "interpretation" of Principle IV and XIV made on the same day consensus was announced in the Legal Sub-Committee.

On April 11, 1986 the representative of the Soviet Union stated that Principles IV and XIV "should be interpreted as highlighting the need for States to ensure that all remote-sensing activities bearing on the territory of a foreign country, or not falling within the jurisdiction of any State, were conducted in accordance with the adopted principles, regardless of whether those activities were undertaken by governmental bodies or non-governmental entities. Furthermore, a State engaging in remote-sensing activities must bear international responsibility therefor in the event of damage due to the type of activity, in accordance with the draft principles and the legitimate rights and interests of the sensed State".⁴⁹ In fact the quoted "interpretation" merely recited the substance of the two principles and added nothing new or of consequence to their formal terms. However, an interesting point was raised: Can States offer an "interpretation" of a consensus determination, and, if so, what legal significance should be accorded to such an effort?

While other States urged, during the long negotiations, the acceptance of national preferences, which presumably were abandoned through their joining in the consensus, the Soviet approach may be novel, since while it joined in the consensus, it also offered what it termed an "interpretation". However, it may be possible to characterize the Soviet statement as merely placing a focus on the language of the two principles, rather than a real interpretation, which would have had to take a stance extending beyond the support given to the Principles.

Another issue that attracted attention dealt with the means to assure that the benefits derived from remote sensing activities would be distributed widely, and particularly to potential users having vital needs for the product of the sensing process. Thus, the Chilean representative called for the application of the Common Heritage of Mankind principle contained in the 1979 Moon Agreement Governing the Activities of States

47. Comment made by the representative of Chile. U.N. Doc., *supra* note 36, at 3.

48. Statement made by the representative of Kenya. U.N. Doc., *supra* note 14, at 2.

49. U.N. Doc., *supra* note 30, at 2.

on the Moon and Other Celestial Bodies.⁵⁰ In his words, "all people, without discrimination, must have access to the benefits of space technology".⁵¹

Even at the moment just preceeding the proclamation of consensus there were expressions of dissatisfaction concerning the way in which both major and lesser issues had been treated. The spirit of compromise was frequently invoked by representatives who expressed ongoing concerns.⁵²

Representative of the outlook of States which had stressed the importance of national sovereignty over natural resources was the statement on April 11, 1986 of Ecuador. Its delegate explained that Principle XIV did not contain adequate guarantees to ensure respect for a State's sovereignty over its natural resources.⁵³ He was also not satisfied with provisions dealing with or not taking into account "the responsibility of States carrying out remote-sensing activities, or the right of sensed States to require prior approval before such activities were carried out and to have priority access to their results".⁵⁴ Additionally, he expressed concern over the terms of Principle XV "since clear reference had not been made to the legal instruments that should be invoked in the event of a dispute".⁵⁵ This observation was made in the face of the terms of Principle III which referred to the U.N. Charter, several Principles referring to the 1967 Principles Treaty, relevant instruments of the ITU, and mention of Article IX of the 1975 Registration Convention.⁵⁶

Other representatives referred to the inadequacy of the provisions of some of the Principles. Thus, the delegate of Turkey on the last day of the session of the Legal Sub-Committee was critical of Principle IX on the grounds it did not specify "exactly when the Secretary-General of the United Nations should be informed".⁵⁷ He preferred a provision requiring the Secretary-General to disseminate the information received by him "without delay" and further, that the State "carrying out remote-

50. U.N. Doc. A/34/20 Annex 2, at 33, (1979); 18 *ILM* 1434 (1979).

51. U.N. Doc., *supra* note 36, at 3.

52. U.N. Doc., *supra* note 30, at 3.

53. *Id.*

54. *Id.*

55. U.N. Doc., *supra* note 30, at 4.

56. 28 U.S.T. 695, T.I.A.S. No 8480.

57. U.N. Doc. *supra* note 30, at 4.

sensing activities must make such information available to the sensed State".⁵⁸

The Turkish representative was also critical of Principles IV and XII. With respect to the former he favored a sensing State's being obliged to obtain the consent of the sensed State "before any information or data obtained concerning that State's natural resources were made available to international organizations or public or private bodies in other States. Failing such consent, the state carrying out those activities should, at the very least, inform the sensed State of the bodies to which those data had been communicated".⁵⁹ Concerning Principle XII he urged that it was lacking in detail respecting situations where unilateral determinations had been made by the sensing State of objectives and geographical areas to be sensed. In his view where such a condition developed "the sensed State should be given free access to the information concerning the territory under its jurisdiction".⁶⁰ The meaning of the foregoing is not clear, and no time was available for clarification. The term "free" in its normal usage would mean without cost to the sensed State. However, it may have been used in the context of "freedom of access". In any event, Principle XII clearly prescribed that a sensed State was entitled to both primary data and processed data "on a non-discriminatory basis and on reasonable cost terms".⁶¹

It is possible that the suggested distinction between key and lesser issues may produce different views as to what is in fact a central issue as opposed to less important ones. Further, in some substantive areas the differences are not so much in kind as a matter of degree, such as the adequacy of dispute resolution procedures. Additionally, other scholars may, after carefully reviewing the record of the negotiations, find issues which have not been mentioned above. Even so, the ultimate fact is that through the process of accommodation and compromise the major issues were resolved in the sense they were included in the 15 Principles. By comparison the lesser issues did not receive the same kind of recognition, except to the extent they overlapped the principal issues.

It should also be observed that the circumstances of compromise, which was much referred to by the participants in the negotiations, as well as by scholarly commentators, did not inhibit the participating States from expressing regret and criticism as to the substantive terms of the Principles even at the moment of their adoption.

This criticism was not stilled with the approval of the Principles in General Assembly Resolution 41/65. Thus, during the March-April

58. *Id.*

59. *Id.*

60. *Id.*

61. U.N. Doc., *supra* note 15, at 12.

1987 session of the Legal Sub-Committee's discussions on nuclear power sources, attention was drawn to the need to clarify rights and duties relating to international responsibility. This term, as it related to "liability", "damage", and "compensation for damage" became the topic of considerable commentary. This has produced the impression that there may be a need for further clarification of how the relevant language of the Principles Treaty, the Liability for Damages Convention,⁶² and the 1986 Remote Sensing Principles is to be construed.⁶³

A critical reason for obtaining consensus on the 1986 Principles was the expectation of advantage derived from the possession of data and information. This outlook was reflected in observations put forward during the June, 1987 meeting of COPUOS. On this occasion the representative of Cuba, taking a position favored by the Group of 77, called for access by developing countries to the benefits derived from outer space.⁶⁴ This was supported by Indonesia.⁶⁵ At this meeting of COPUOS, which considered the establishment of future agenda items, the Indian representative called for a continuing assessment of remote sensing so that there could be a follow-up on the 1986 Principles. Other countries favored continuing remote sensing as an agenda item so that there might be new efforts to develop a more detailed legal regime to govern remote sensing.⁶⁶ The Indian representative urged that the Legal Sub-Committee be authorized to begin the "task of gradually evolving a framework of international legal norms for the orderly conduct of those activities".⁶⁷ During this session of COPUOS there were expressions of satisfaction respecting the content of the 1986 Principles. Such expression came from countries which had indicated some concerns during the 1986 session of COPUOS.

The Scientific and Technical Sub-Committee also gave attention to remote sensing in its February 1987 session. Here the needs of developing countries and concerns over full and permanent sovereignty on the part of all States and peoples over their wealth and natural resources were stressed.⁶⁸ Reference was also made to the legitimate rights and interests of sensed States, as well as the terms of Principle XII providing for early access on the part of sensed States to data on reasonable cost

62. 24 U.S.T. 2389, T.I.A.S. No. 7762.

63. U.N. Doc. A/C.105/385 Annex I, at 20-21, 25-26, (1987).

64. U.N. Doc. A/AC.105/SR.298, at 6, (1987).

65. U.N. Doc. A/AC.105/SR.304, at 3, (1987).

66. U.N. Doc. A/AC.105/SR.301 at 10, (1987).

67. U.N. Doc., *supra* note 65, at 7.

68. U.N. Doc. A/AC.105/38, at 12, (1987).

terms.⁶⁹ The Sub-Committee favored the retention of remote sensing as an agenda item for the following year.⁷⁰

From the foregoing it can be concluded that those issues characterized as central to the negotiations relating to remote sensing were either expressly set forth in the final Principles or excluded via the consensus process. On the other hand, the lesser issues which were not memorialized in the Principles remain a concern of many countries, and in particular the developing States. Additionally, some of the substantive provisions now present in the Principles, such as national sovereignty over natural resources, remain very much on the political agendas of these States. And, since the Principles were often phrased in general terms, there is an ongoing need to render them somewhat more specific. There are substantial pressures within COPUOS to keep remote sensing on one or more active agendas. If this occurs the States anxious to give the Principles a more positive and enhanced legal standing will be provided with that opportunity. A more formalized and enlarged identification of Principles at the United Nations, would not, of course, derogate from the existing customary international law of remote sensing.

The 1986 Principles Demonstrated That Consensus Can Be Achieved

There were three groupings of States in the long effort to achieve consensus on the remote sensing Principles. First, there were the advanced countries which had made it clear they intended to engage in remote sensing activities throughout the universe. Second, there were the developing countries, which were fearful of the dissemination of data and information relating to their natural resources. Third, there were States more or less sympathetic to both of the foregoing outlooks, but which, on the whole, considered that more was to be gained from sensing and the dissemination of data and information than would be lost. In the end these States consulted self-interest and concluded more was to be gained through an "open skies" approach, but saw opportunities to improve on the Principles. The developing countries can take satisfaction that at least eight of the fifteen Principles accorded substantial benefits to them. Principle II stated that particular consideration should be given to the needs of the developing countries. This assurance was in keeping with the benefits and interests provision of Article 1 of the 1967 Principles Treaty and with Article 11 (7) (d) of the 1979 Moon Agreement.

Principle IV supported the long-held policy of the developing countries relating to national sovereignty over natural resources. Pursuant to Principle V the developing States were to be entitled to participate in sensing activities on an equitable basis. Principle VII granted to developing countries the right to receive technical assistance

69. *Id.*

70. *Id.* at 20.

from participating States. Principle VIII accorded to developing countries the further right to receive technical assistance from the United Nations and relevant international agencies. Principle IX accorded them relevant information upon request. Very importantly, Principle XII assured them of the right to receive primary data and processed data on a non-discriminatory basis and on reasonable cost terms. Finally, Principle XIV imposed the mandates of international responsibility and State responsibility on sensing countries. The assurance relating to international responsibility was based on the provisions of Article 6 of the 1967 Principles Treaty and Article 14 of the 1979 Moon Agreement. Procedures to implement this standard were contained in Principle XV.

At the same time, States able to engage in remote-sensing activities gained by guarantees contained in the Principles, as well as by what was excluded, via the consensus process, from the Principles. Principle V allows the advanced countries to participate in the sensing process with others on mutually acceptable terms. One advanced State will never obtain a monopoly on sensed data or information. It will be a user as well as a supplier of fact and information. Principle VII was also beneficial, since these States were also to have the benefit of technical assistance on mutually acceptable terms. Principle IX stipulates that relevant information is to be made available to the greatest extent feasible and practicable. The free-enterprise countries among the advanced were also benefited by the substance of Principle XIV. This provides that remote-sensing activities can be carried out by non-governmental entities. With this assurance it would be possible for such legal persons to embark on commercial activities having wide-ranging ramifications.

What was not contained in the Principles was as important to sensing countries as their specific terms. Of vast significance was the non-prohibition of the "open skies" preference of advance States. Further, a sensing State was not prohibited from making available to third States the primary data and processed data obtained from the sensed State. This was, of course, subject to the rights of the sensed State as provided in Principle XII.

The United States, which had been one of the strongest proponents of the "open skies" policy made particular reference to what was not contained in the 1986 Principles. Not included was a "prior consent regime for data dissemination".⁷¹ The extension of permanent sovereignty over natural resources did not extend to "information concerning those resources".⁷² Further, there was no restriction on "the use and disposition of analyzed information".⁷³ It was the U.S. position that the Principles had not formulated an "expansion of the scope of the

71. Press Release, U.S.U.N. 173-(86), at 1 (1986).

72. *Id.*

73. *Id.*

law on State responsibility".⁷⁴ Finally, it was observed the Principles had not adopted "other unduly restrictive proposals".⁷⁵ It is indisputable that the tenor of the 1986 Principles was remarkably different from those suggestions that had been received by COPUOS in 1970.

There were many Principles which are extremely beneficial to all countries without regard to their special characteristics. Thus, Principle I broadly identified remote-sensing goals to include "improving natural resources management, land use and the protection of the environment".⁷⁶ This provision focused on "operational applications in which the international community has the greatest interest and stands to derive the greatest benefit from remote sensing".⁷⁷ All States will benefit from the terms of Principle III, which refers to the relevance of international law as well as the UN Charter, the 1967 Principles Treaty, and to the relevant instruments of the International Telecommunication Union.

Principle IV requires that all States be treated on a basis of equality. This provision, as did the preceeding one, found earlier expression in the 1967 Principles Treaty.

Principle VI called for cooperation relating to data collecting, storage stations, and processing and interpretation facilities. Principle X referred to the need to protect the natural environment and to effect disclosures to concerned States of phenomenon harmful to the Earth's natural environment. Principle XI extended the same protections to natural disasters. Principle XIII obliges a sensing State to honor requests to enter into consultations with sensed States to make available opportunities for participation and to enhance mutual benefits. All States will benefit from the terms of Principle XV, for it mandates that disputes arising from the Principles shall be resolved by the processess of peaceful settlement.

The foregoing analysis has taken into account the divergent goals and objectives of negotiators. The same outlook on a larger scale can be found within the members of the UN. The identification of mutual benefits will serve in the long run to favor attitudes of conformity by them.

Legal Status of the Principles

During the COPUOS negotiations it became evident that two critical forces were simultaneously at work. On the one hand, there was a

74. *Id.*

75. *Id.*

76. U.N. Doc., *supra* note 15, at 12.

77. U.S.U.N. note 71, at 1.

concerted effort particularly on the part of some of the developing countries to obtain a legislative code on remote sensing and remote-sensing activities.⁷⁸ In the process they were critical of the manner in which space technology was being employed by private firms which were, along with the governments of the advanced countries, engaged in increasingly more sophisticated remote sensing activities. On the other hand, there was the practical utilization of remote-sensing equipment, coupled with product dissemination which were being accepted as legitimate and beneficial activities. These practices were developing the norms of customary international law, despite the efforts of some of those countries not able to engage in remote-sensing activities to slow down or prevent such activities with the consequent retardation or prevention of the growth of customary law relating to remote-sensing activities.⁷⁹ This view is not shared by all of the scholars who have examined the 1986 Principles.⁸⁰

It is evident that not all of the Principles have the foundation in accepted practice that would qualify them for rules of customary international law, and with respect to these the 1986 General Assembly Resolution could not convert such Principles into customary international law. Moreover, it is also evident that some of the Principles are restatements of existing treaty law, and so are beyond the concerns of customary international law. The principal customary rule found in the Principles is the right of States, international intergovernmental organizations, and non-governmental entities to engage in such sensing activities. Thus, the Principles merely ratified this existing customary activity, and the General Assembly Resolution created no new law but rather simply confirmed and gave greater legitimacy to the customary rules.

78. U.N. Doc., *supra* note 31, at 7. See, in particular, the interventions of the representatives of Cuba and Colombia.

79. For a further analysis of the circumstances, see C.Q. Christol, "The 1986 Remote Sensing Principles: Emerging or Existing Law?". Paper delivered at the 30th International Colloquium on the Law of Outer Space (IISL), Brighton, England, October 16, 1987. (To be published in the *Proceedings of the 30th Colloquium on the Law of Outer Space*, 1988).

80. See, for example, D.S. Myers, "United Nations Activity on Remote Sensing: Legal and Political Implications," Paper prepared for the 30th International Colloquium on the Law of Outer Space (IISL), Brighton, England, October 16, 1987, p. 4. (To be published in the *Proceedings of the 30th Colloquium on the Law of Outer Space*, 1988); H. DeSaussure, "Remote Sensing, the Interaction of Domestic and Municipal Law," Paper presented at the 30th International Colloquium on the Law of Outer Space (IISL), Brighton, England, October 16, 1987. (To be published in the *Proceedings of the 30th Colloquium on the Law of Outer Space*, 1988).

The 1986 Principles as noted above are important for what they did not prohibit. They did not prohibit activities which had been going on for a substantial period of time and which had not gathered an effective opposition on the part of the world community. The Principles accepted the fact that sensing States were committed to the view that they required no consent, including no prior consent from sensed States to engage in sensing. Further, there was no effective prohibition of the wide-ranging dissemination of facts and the sensing product to the entire world. Certainly, there was no requirement in the Principles requiring the sensing State to give access to the sensed State either first, or exclusively, or prior to dissemination to a third State or States. Those practices were well established prior to the 1986 Principles. With the identification of permissible practices, as set forth in the Principles, while at the same time not imposing prohibitions on well-known practices, it can only be concluded that such practices were permissible. Practice, and the acceptance of the practice, has matured such conduct so that it is permissible pursuant to customary international law.

At the present time the disposition of the major space-resource States is to determine how the Principles can be enlarged in their legal sweep, not whether the Principles do or do not have a legal quality. For example, the Soviet Union has accepted the legal right of non-governmental entities to engage in remote-sensing activities, but has indicated it would like to obtain greater specificity as to the "obligation" of such entities to "respect the lawful rights and interests of other States and to protect them from the possible adverse consequences of the activities of non-governmental entities".⁸¹ The Soviet Union has also characterized the remote-sensing negotiations of the Legal Sub-Committee as having contributed in an important way to "the elaboration of space law".⁸² The United States representative also indicated that by accepting the June 1985 Austrian draft, which became the 1986 Principles, there would be "the elaboration of space law".⁸³

It is clear from the negotiating history of the 1986 Principles that they were perceived as having legal significance. With the exception of General Assembly Resolution 39/92 of December 10, 1982 dealing with direct television broadcasting, which failed to obtain unanimity, the remaining space resolutions have led to international agreements. Yet, the 1986 Principles have not become a candidate for formal treaty status. This raises the question: why?

The answer will depend on several considerations. The Principles were the product of consensus, but there were numerous compromises along the way. This could suggest that the consensus was, if not

81. U.N. Doc., *supra* note 42, at 4.

82. U.N. Doc., *supra* note 28, at 5.

83. *Id.* at 6.

substantial, at least so thin that some members of COPUOS have viewed the consensus as conditional and subject to review. It cannot be said that the agreement was a temporary one, but the commentary reviewed above suggest a grudging acceptance of some of the provisions, with the view on the part of developing countries in particular, that there is a need to reinforce the Principles beneficial to them in order to buttress existing assurances and commitments.

If the 1986 Principles were to be put into formal treaty form, it would be necessary for States possessing remote-sensing capabilities to support the agreement.⁸⁴ Their interest would be to allow for the greatest possible freedom in remote-sensing activities, including according access to the product to those able to use such data and information, subject to suitable arrangement to cover the costs. Yet, there remains a fundamental difference of outlook on the part of the fact gatherers and those not equipped to engage in remote sensing. These differences might result in a fairly limited number of treaty ratifiers.

A certain irony became apparent during the lengthy negotiations. During the debates enormous practical progress was being made in effective fact gathering. These practices were those of the space-resource States and their private firms, as well as by the United Nations itself and other international intergovernmental organizations. Thus, by the time the Principles were agreed to their impact was to confirm both existing practices and basic principles already contained in existing space law treaties. This being the case, it could be urged that nothing of substance would be gained by going the treaty route. Support for such an approach might be borrowed from the ongoing dialogue between the United States and the Soviet Union relating to the need for a formal agreement fixing the upper limits of air and space and the lower limits of outer space. In that situation the absence of a formal agreement has not been perceived as limiting valid space activities.

However, as a general proposition, it is much better to have a formal international agreement, even if subject to imperfections based on interpretative considerations, than the more vague and uncertain constraints of customary international law. If it were to be decided to retain the subject of remote sensing on the agenda of COPUOS an opportunity would be provided, and many countries have expressed a substantial interest in such an approach, to review and reorient both the

84. For example, the Soviet Union has indicated that following the approval by the General Assembly of the Principles, this "should be followed by the formulation of an appropriate international agreement." U.N. Doc., *supra* note 30, at 3. The United States, on the other hand, has indicated that "the embodiment of these Principles in a new legal instrument...[was neither] necessary or desirable." U.S.U.N., *supra* note 71, at 2. In offering this view the United States observed that the Principles were "entirely compatible with relevant United States laws and policies." *Id.*

terms of the 1986 Principles and those subjects which were consciously excluded from the Principles.

Whether or not there will be an ongoing review of the 1986 Principles and the customary international law on the subject, the important fact is that there is an international legal regime now in place governing remote-sensing activities. This regime exists despite national statements seeking to clarify the meaning to be given to some of the terms of the Principles. Such national positions need not be of great consequence, but they do exist. For example, Kenya has provided a rendition of what the term "primary data" means to it, namely, "basic data taken at any single point in time, whether transmitted to the ground or not".⁸⁵ And, as previously noted, the Soviet Union announced that the principle of international responsibility applied to States which permitted non-governmental entities to participate in remote-sensing activities.⁸⁶

For the international legal regime on remote-sensing activities to be meaningful it will be necessary for States to adopt implementing legislation. Any legal commitment, no matter what form it may take, involves the acceptance of rights and duties. For these to provide benefits requires domestic responses.

Conclusion

The 1986 Principles mark a constructive approach to a wider and more orderly engagement in remote-sensing activities. They are important in what they say and what they do not contain.

The Principles are memorable in several respects. First, following the departure in 1982 from the consensus process in connection with direct television broadcasts, COPUOS and the General Assembly returned to and affirmed that process in 1986.

Second, 15 years devoted to achieving consensus on the Principles was largely attributable to security concerns and national claims relating to natural resources. During those years a clearer understanding emerged as to the relationship between remote-sensing practices and national security and economic needs.

Third, the drafting process focused in no small part on definitional issues. Success along these lines was significant. This contributed to a willingness to use the United Nations as an instrumentality for the formulation of international legislation.

Fourth, the Principles constructively take into account the benefits and opportunities to explore, exploit, and distribute the increasingly sophisticated resources, ideas, and equipment associated with remote sensing.

85. U.N. Doc., *supra* note 14, at 7.

86. U.N. Doc., *supra* note 30, at 2.

Fifth, much of the substance of the Principles has its foundation in space agreements agreed to in COPUOS, supported by the General Assembly, and binding on a very large number of States.

Sixth, the Principles ratify existing fact-gathering practices. Moreover, they do not impose legal constraints on the right to engage in such practices, which practices have led to the wide-ranging beneficial dissemination of facts and information. Thus, there has been in the Principles a valid and constructive marriage between treaty law and customary international law.

Seventh, although the member of COPUOS gave their unanimous approval to the Principles, some of the members did so in a grudging fashion and without complete enthusiasm. Some expressed the view that there were opportunities for improvement, while others offered clarifications and interpretations. Even so, this has not produced any formal defection from the terms of the Principles. The longer the respective Principles are treated as relevant to and descriptive of international rights and duties, the stronger their authority will become.

Eighth, for the moment there is no overwhelming demand that the Principles be converted into a formal international agreement. While this may become a future reality, and this reality would benefit from prescriptive influences over time, the present situation allows for an ongoing assessment of their impact on remote-sensing activities.

For the moment the debate has been somewhat stilled. Even the best of agreements can become controversial or even unstuck. Perhaps the best long-term approach is to retain remote sensing on the agenda of COPUOS so that efforts can be made to transmit the terms of the Principles into a treaty. In this manner those who may wish to dissent from the Principles can opt out. In considering this approach they may find that they may have nowhere to go. As has been abundantly indicated, they will not find it easy to escape the norms of customary international law.

A. PAST EVENTS

*Reports**Review of the United Nations Work in the Peaceful Uses of Outer Space in 1987**

The General Assembly, at its forty-second session in 1987, adopted two resolutions (42/33 and 42/68) on matters relating to outer space. The resolutions deal with the need to prevent an arms race in outer space and the need to promote international co-operation in the peaceful uses of outer space.

A. Prevention of an Arms Race in Outer Space

The General Assembly, in its resolution 42/33 - which was adopted with near unanimity with only the United States voting against - called upon all States, in particular those with major space capabilities, to take immediate measures to prevent an arms race in outer space, to refrain, in their activities relating to outer space, from actions contrary to the observance of the relevant existing treaties or to the objective of preventing an arms race in outer space. It urged the Soviet Union and the United States to pursue intensively their bilateral negotiations in a constructive spirit for reaching an agreement for preventing an arms race in outer space. It further recognized that the legal regime applicable to outer space, as such, is not sufficient to guarantee the prevention of an arms race in outer space and noted the need to consolidate and reinforce the regime and to enhance its effectiveness. It therefore requested the Conference on Disarmament to consider as a matter of priority the question of preventing an arms race in outer space and to report to the General Assembly in 1988.

The Assembly's recommendations were based on the work of the Conference on Disarmament, which at its 1987 session discussed the question of the prevention of an arms race in outer space through its Ad hoc Committee on the Prevention of an Arms Race in Outer Space. The Ad hoc Committee held extensive discussions on the nature of the arms race

*The views contained herein are those of the author and do not necessarily reflect those of the United Nations.

in outer space and on the existing legal regime applicable to outer space. It further discussed several proposals concerning the prohibition of anti-satellite weapons and the protection of satellites, including the question of verification. The Ad hoc Committee in its conclusions recalled the common interest of mankind in the exploration and use of outer space for peaceful purposes, recognized that the legal regime applicable to outer space needed to be strengthened and noted the importance of strict compliance with existing agreements, both bilateral and multilateral. The report of the Conference on Disarmament is to be found in United Nations document A/42/27.

While the recommendations of the Assembly in resolution 42/33 were based on the work of the Conference on Disarmament, the Assembly also adopted resolution 42/68, based on the work of the Committee on the Peaceful Uses of Outer Space (COPUOS). This resolution urged all States, particularly those with major space capabilities, to contribute actively to the goal of preventing an arms race in outer space as an essential condition for the promotion of international co-operation in the exploration and uses of outer space for peaceful purposes and requested COPUOS to continue to consider, as a matter of priority, ways and means of maintaining outer space for peaceful purposes and report thereon to the General Assembly in 1988.

During the 1987 discussions in COPUOS, the Eastern European countries called for the establishment of a world space organization and an international centre for joint research and technology, and proposed the convening of an international conference to consider outer space problems. They also called on COPUOS to make concrete proposals with a view to conducting a study on broad international co-operation as a means for maintaining outer space for peaceful purposes. Western countries expressed the view that no new international mechanisms were needed, and they did not see the relevance of a study of the type envisaged in order to maintain outer space for peaceful purposes. In their view, proposals on ways and means to maintain outer space for peaceful purposes should be concentrated on revitalizing the work of COPUOS and its subsidiary bodies. There was thus a great divergence of views as to how this matter could be best approached in the COPUOS, and no final agreement was possible.

B. International Co-operation in the Peaceful Uses of Outer Space

On the question relating to peaceful uses of outer space, the General Assembly acted on the basis of considerations and recommendations of COPUOS, its Scientific and Technical Sub-Committee and its Legal Sub-Committee. The reports of these bodies are to be found in United Nations documents A/42/20, A/AC.105/383 and A/AC.105/385, respectively. The important discussions and recommendations of these bodies are summarized below:

(a) Use of Nuclear Power Sources in Outer Space

Consideration was given in the Legal Sub-Committee, through its Working Group, to the elaboration of draft principles relevant to the use of nuclear power sources (NPS), with discussions based on a paper submitted by Canada (A.AC.105/C.2/L.154/Rev.1). It contained five draft principles on: safety assessment and notification, guidelines and criteria for safe use, notification of re-entry, assistance to States and responsibility of States. Based on the discussions, Canada submitted a further revision to its paper (A/AC.105/C.2/L.154/Rev.2), which included two additional principles: applicability of international law and compensation.

The draft principles state that activities involving the use of nuclear power sources in outer space shall be carried out in accordance with international law, including, in particular, the United Nations Charter and 1967 Outer Space Treaty. States launching space objects with nuclear power sources on board shall proceed with a thorough safety assessment prior to launching. When registering with the Secretary-General of the United Nations space objects with nuclear power sources on board, States shall include in their registration, as soon as possible after launching, specific information as to the presence on board a space object of a nuclear power source and its generic classification.

Among the measures called for in the draft principle regarding guidelines and criteria for safe use are: respect for generally accepted international guidelines for radiological protection in all phases of a space mission, endeavour to use a nuclear-safe orbit, use of only highly enriched uranium in reactors, and adherence to the recommendations of the International Convention on Radiological Protection.

According to the draft principles, States launching space objects with nuclear power sources on board shall bear international responsibility for damage caused by those space objects in accordance with Article VII of the Outer Space Treaty and the provisions of the Convention on International Liability for Damage Caused by Space Objects.

While the discussions in the Legal Sub-Committee were not conclusive and they will continue at the Sub-Committee's 1988 session, COPUOS endorsed the results of the discussion which had taken place in the Scientific and Technical Sub-Committee regarding the use of nuclear power sources in outer space.

It underlined the need to elaborate the criteria for the safe use of nuclear power sources in outer space. It also endorsed the view that reactors should not be activated until the space objects carrying them had reached their planned operating orbit. It recommended that the question of whether nuclear reactors in space should use only highly enriched uranium as the fissionable material should be considered further so as to avoid the significant problems arising from breeding or utilizing plutonium.

The Committee felt that nuclear safety should be ensured in all phases of a mission of a space object with nuclear power sources on board, and identified the need to consider possible additional safety criteria that might be necessary to prevent or cope with events other than unplanned re-entry into the atmosphere. It also felt that the Scientific and Technical Sub-Committee should further examine the modalities for assistance to developing countries to improve their ability to cope with problems of radiation caused by any emergency relating to the unplanned re-entry of a space object with a nuclear power source on board.

Also, the Committee reconfirmed the need for guidance to States regarding pre-planning of area monitoring and counter-measures for protection of the population and the environment in case of radioactive contamination of their territory from a nuclear power source carried by a space object.

(b) Definition of Outer Space. Geostationary Orbit

Extensive discussions on matters relating to definition of outer space and the geostationary orbit were held both in COPUOS and its Legal Sub-Committee without agreement on any recommendations.

During those discussions, some representatives, particularly from Eastern Europe, considered the definition and delimitation of outer space as a logical, practical and necessary step in order to achieve a clear distinction between the legal regime of airspace, with its inherent features of State sovereignty, territorial integrity and security, and that of the outer space regime, in which outer space treaties applied. During the discussions in COPUOS, the Soviet Union, in a Working Paper annexed to the report of the Committee, proposed that any launched object be considered as being in outer space when its altitude was 110 km or more above sea level.

Other representatives, particularly from Western countries maintained that the absence of definition and delimitation of outer space had not prevented the observance of the outer space treaties nor had it created any practical problems which had impeded peaceful exploration of outer space. It was asserted that establishing a boundary would arbitrarily subject flying objects to a number of differing legal regimes, and a situation could develop where there was confusion and friction, thereby impeding advancement of space technology.

With regard to the geostationary orbit, many representatives considered that the geostationary orbit formed part of outer space and was subject to the 1967 Outer Space Treaty. As such, the orbit was not subject to national appropriation or claims of sovereignty and all States enjoyed equal rights in its utilization. Others, from equatorial countries, maintained that there was a need to establish a legal regime which would acknowledge the geostationary orbit as a limited natural resource and would recognize the interests of developing countries and the special rights of equatorial countries, such rights and interests having been

restricted "by monopolistic utilization of the orbit by the developed countries, leading to its saturation".

(c) Implementation of UNISPACE 82 Recommendations

The Committee endorsed the recommendations of the new Working Group of the Whole established to evaluate the implementation of the recommendations of UNISPACE 82.

These recommendations include the establishment of a programme of higher education on space-related activities; the adoption of short-term emergency measures to implement the United Nations Space Applications Programme by requesting States contributing in kind to increase their training programmes and fellowships; greater interaction among experimental and theoretical scientists for the promotion of wider application of the results of scientific research; and encouragement to non-governmental organizations to co-ordinate space activities of scientific organizations.

On the suggestion of the Working Group, the Committee also recommended that Member States report annually on techniques resulting from medical studies carried out in outer space, and that the Outer Space Affairs Division carry out a survey of existing space information services with a view to establishing an international information system. The Division would also be asked to update its report on existing training centres at the regional level, as well as to prepare a report on measures necessary for improving educational systems in developing countries regarding the use of space technology.

(d) Other Matters and New Agenda Items

The General Assembly also noted that the COPUOS, particularly through its Scientific and Technical Sub-Committee, had dealt with questions relating to remote sensing, space transportation systems and space medicine and requested that these discussions be continued in 1988. It also requested the Scientific and Technical Sub-Committee to consider matters relating to the geosphere-biosphere programme and microgravity experiments in space. It further endorsed the 1988-89 work plan of the United Nations Programme on Space Applications, which is a technical assistance programme emphasizing education and training in space applications for the benefit of developing countries.

The General Assembly also requested that a new item be agreed upon for consideration in the Legal Sub-Committee at its 1988 session. Governments of the "Group of 77" developing countries have proposed that "consideration of the legal aspects relating to the access of States to the benefits derived from the exploration and utilization of outer space" should be a new item for the Legal Sub-Committee. Others, including the United Kingdom, felt that the question of enhanced co-operation between States in the event of accident or emergency on board a manned space object endangering the lives or health of the crew would be an appropriate

item. Still other Governments, including Czechoslovakia, felt that the legal status of a spacecraft crew, in particular with respect to the conditions governing manned space flights, could become a new item. Canada, France, the Netherlands and Sweden proposed the question of improving the procedure for the registration of space objects as a new Legal Sub-Committee item.

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*The 25th Session of the Scientific and Technical Sub-Committee of the United Nations Committee on the Peaceful Uses of Outer Space, 16-26 February 1988 **

The Scientific and Technical Sub-Committee, one of two sub-committees established by the UN Committee on the Peaceful Uses of Outer Space (COPUOS) with the same composition of 53 Member States as COPUOS itself, held its 25th session in New York from 16 to 26 February 1988. Guided by its long-standing Chairman, Professor *John H. Carver* of Australia, the Sub-Committee succeeded in advancing its deliberations particularly in three areas on which this body was already concentrating at its last session in 1987.¹

The first of these areas covers two important items of the agenda, namely "UN Programme on Space Applications and the Co-ordination of Space Activities within the United Nations System", and "Implementation of the recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82)". The work of a special Working Group of the Whole, established in 1987 to evaluate the implementation of the UNISPACE 82 conclusions was mostly related to this area.

The second area includes a number of specific items of the agenda, the most prominent being the Use of Nuclear Power Sources in Outer Space, for the consideration of which a special Working Group has also been established.

Finally, the 25th session of the Sub-Committee recorded further progress in the efforts to increase the scientific and technical content of the discussions through specialized symposia and presentations on outstanding achievements and prospects in the field of space exploration and space applications.

The results of work of the 25th session of the Sub-Committee in these main areas are described in greater detail below.

* The views expressed herein are those of the author and do not necessarily reflect those of the United Nations.

1. See the assessment of the 24th session of the Scientific and Technical Sub-Committee published in this journal, 15 J. SPACE L. 43-50 (1987).

1. UN Programme on Space Applications and Implementation of the
UNISPACE 82 Recommendations

The United Nations Programme on Space Applications has been on of the top priorities of COPUOS and its Scientific and Technical Sub-Committee for many years. Established following the First UN Conference on the Exploration and Peaceful Uses of Outer Space, this Programme has been promoting practical applications of space technology, particularly in the field of remote sensing, satellite communications and satellite meteorology, for the benefit of the developing countries. Following the recommendations of the Second UN Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82), the General Assembly, in its resolution 37/90 of 10 December 1982, directed this Programme to the following objectives: (a) Promotion of greater exchange of actual experiences with specific applications; (b) Promotion of greater co-operation in space science and technology between developed and developing countries as well as among developing countries; (c) Development of a fellowship programme for in-depth training of space technologists and application specialists; (d) Organization of seminars on advanced space applications and new system developments; (e) Stimulation of the growth of indigenous nuclei and an autonomous technological base in space technology in developing countries; (f) Dissemination, through panel meetings and seminars, of information on new and advanced technology and applications, with emphasis on their relevance and implications for developing countries; (g) Provision or arrangements for provision of technical advisory services on space applications projects.

On the basis of these directives the Sub-Committee has discussed regularly the achievements of the Programme and approved the programme of activities outlined by the Expert on Space Applications in his reports. Again this year, his report² listed the existing opportunities for long-range fellowships for in-depth training, a number of the UN workshops, training courses, seminars, and meetings of experts, as well as activities in the field of promoting greater co-operation in space science and technology.

The programme of seminars and other meetings for 1988, as approved by the Sub-Committee, consists of six meetings of this kind, which are to be devoted mostly to different areas of remote sensing applications, communications systems and space information systems. In addition, a UN International Meeting of Experts on Space Science and Technology and its Applications with Emphasis on Education for Educators is scheduled for 1988.³

2. U.N. Doc. A/AC.105/396 and Corr.1.

3. See the list of these actions in para. 34 of the Report of the Scientific and Technical Sub-Committee on the Work of its Twenty-fifth session, U.N. Doc. A/AC.105/409, at 8-9.

Similarly, the Sub-Committee took note of the outlook of the Programme for 1989 which will also include six seminars and other meetings.⁴

During the years following UNISPACE 82, the UN Space Applications Programme recorded quite an impressive growth and, as stated by the Sub-Committee, was carried out satisfactorily, notwithstanding the financial constraints which were the consequence of the overall financial situation of the United Nations. After several years of cuts, the regular budget of the Programme has been restored to its original level for 1988. However, since the Programme also depends, to a large extent, on the support of Member States, the Sub-Committee appealed once again to them to support the Programme through voluntary contributions.⁵

The effectiveness of the UN Space Applications Programme also depends very much on the co-operation and support of all of the organizations and bodies of the United Nations System and other international organizations working in space related fields. Indeed, several specialized agencies, such as FAO, UNESCO, WMO and ITU have effectively participated in the Programme for many years.

The input of other international organizations, such as ESA, Intelsat, Intersputnik and Inmarsat is also substantive. The Sub-Committee, therefore, reiterated its stress on the necessity of ensuring continuous and effective consultations and co-ordination in the field of outer space activities among organizations within the UN system and the avoidance of duplication of activities. Regarding resources, the Sub-Committee reaffirmed its view that the United Nations should seek the support of UNDP and other international funding institutions.⁶

The need for an effective co-ordination of space activities within the UN system, of course, does not concern only the activities under the UN Space Applications Programme, but includes the implementation of all recommendations of UNISPACE 82. This is why every year an Inter-Agency Meeting on Outer Space Activities is convened by the UN Administrative Committee on Co-ordination. In 1987, such a meeting was held in London and hosted by the International Maritime Organization (IMO). The report from the meeting was before the Sub-Committee,⁷ as well as a report of the Secretary-General entitled "Co-ordination of outer space activities within the United Nations systems: programmes of work for 1988 and 1989 and future years."⁸ At this Inter-Agency Meeting, a special *ad hoc* group was established to undertake an in-depth review of remote sensing applications within the United Nations system.

The questions relating to international co-operation, particularly those included in the UN Programme on Space Applications, were also

4. *Id.* paras. 37-38, at 9-10.

5. *Id.* para 27, at 7.

6. *Id.* paras.48-49, at 11-12

7. See U.N. Doc. ACC/1987/PG/13

8. See U.N.Doc. A/AC.105/389.

discussed in the Working Group of the Whole which held its second session during the Sub-Committee session. At its first session in 1987, this Working Group requested the elaboration of several studies and reports⁹ and this request was endorsed by COPUOS and the General Assembly in its resolution 42/68 of 2 December 1987. All these documents,¹⁰ which were prepared well in advance before the session by the Outer Space Affairs Division of the UN Secretariat, some of them in co-operation with other international organizations, particularly with COSPAR and IAF, were before the Sub-Committee and the Working Group. However, they attracted only a few rather general comments.

The working Group, acting under the Chairmanship of Mr. *Carlos Amorin* (Uruguay), formulated a set of new directives relating to recommendations of UNISPACE 82 which have still not been fully implemented. Some of these directives are addressed to COPUOS for further action.¹¹ Finally, the Working Group expressed the opinion that it should be reconvened during the 26th session of the Scientific and Technical Sub-Committee in 1989.¹²

During the discussion of the items concerning the UN Programme on Space Applications and the Implementation of the Recommendations of UNISPACE 82, the idea of creating a world space organization with its own charter, to serve as a centre for co-ordinating the implementation of joint projects in the peaceful conquest of outer space, was advanced by the delegation of the USSR and supported by other delegations of the Socialist countries. This idea was elaborated in greater detail in a new document which was before the Sub-Committee¹³ and in which both the functions and some institutional aspects of such an agency were developed. In this connection the proposal for establishing an international space centre to provide assistance to developing countries in the field of scientific and technological development was also reiterated by these delegations.

However, these proposals did not meet with support from other delegations. The position of developing countries was reflected in a question raised by one delegation of this group as to whether the interests of developing countries would be fully taken into account by such an organization. The delegations of the Western countries which expressed their views generally felt that there was no need for new international machinery and that the proposals were vague.¹⁴

9. See paras 11 to 13 of U.N. Doc. A/AC.105/383, Annex II, at 28-30.

10. They are listed in para 22 of the Sub-Committee report, see U.N.Doc.A/AC105/409, at 6.

11. See paras. 4 to 5 of the Report of the Working Group of the Whole in U.N. Doc A/AC.105/409, Annex II. at 25-27

12. *Id.* para 15, at 31.

13. See U.N.Doc. A/AC.105/407 and A/AC.105/401/Add.3

14. See the arguments summarized in para.20 of U.N. Doc.A/AC.105/409, at 5.

2. Progress in Matters Relating to the Use of Nuclear Power Sources in Outer Space and Other Specific Items of the Sub-Committee's Agenda

Amongst the points which have been in the forefront of the Sub-Committee's interest during recent years, the most significant place now probably belongs to the "Use of Nuclear Power Sources" (NPS). In the group of specific issues, it is also the only one for which a special Working Group was established. This body, which had previously held sessions in 1979, 1980, 1981, 1984 and 1985, was reconvened for its sixth session in 1988 and acted again under the chairmanship of the Sub-Committee Chairman, Professor *John H. Carver* of Australia. Experts of 20 States Members of the Sub-Committee participated in the deliberations of the Working Group.

On the basis of a number of documents submitted to the session,¹⁵ which were supplemented by the views expressed at the session, the Working Group considered again the dilemma of a complete dispersal (burn-up) of the fuel of a nuclear reactor versus intact re-entry of nuclear reactor. At the end, however, the Working Group stated that the feasibility and safety aspects of the two concepts require further investigation.¹⁶

At this year's session, however, a new problem was brought to the attention of the Working Group, namely the possibility of a collision between a space object carrying an NPS on board, either in operation or in a disposal orbit after operation, with a particle of space debris. Since the probability of such a collision may become considerable in view of the long orbital lifetimes of NPS, the Working Group encouraged national studies of this issue and invited Member States to present the results thereof to the Scientific and Technical Sub-Committee.¹⁷

The Working Group also expressed, or took note of, a number of other opinions relating to the issues under consideration. Nevertheless it did not come to precise conclusions on any of these problems. Some experts, particularly Professor *Dietrich Rex* of the Federal Republic of Germany, informed the Working Group about further studies which are being undertaken and suggested that more time and effort were needed to deal with these questions. In recognition of this state of affairs, an agreement was reached on reconvening the Working Group during the 26th session of the Sub-Committee in 1989.

In addition to the Use of NPS, some other specific points were also discussed at the session of the Sub-Committee. But the deliberations on these points were relatively short and did not lead to any particular results. Thus, e.g., under the heading "Matters relating to Remote Sensing

15. See the Working Paper submitted by the Federal Republic of Germany (doc. A/AC.105/C.1/WG.5/1988/WP.1) and the Working papers submitted by Canada (doc. A/AC.105/C.1/WG.5/1988/WP.2 and 3).

16. See para. 7 of the Report of the Working Group in U.N. Doc. A/AC.105/409, Annex III, at 29.

17. *Id.* paras. 8-10, at 30.

of the Earth by Satellites, Including, Inter Alia, Applications for Developing Countries", delegations mostly reviewed the national and co-operative programmes in this field. Only one Working Paper was submitted to the Sub-Committee on this point of the agenda, in which the USSR reaffirmed its readiness to expand all-round co-operation with all interested countries and informed other countries about the activities of the Soviet organization Soyuzkarta specializing in this field.¹⁸

In its conclusions on this point, the Sub-Committee reiterated its view, already stressed in the 1987 report that "remote sensing from outer space should be carried out, taking into account the fundamental urgent need to provide appropriate and non-discriminatory assistance to meet the needs of the developing countries." The point "Remote Sensing" will be retained on the Sub-Committee agenda as a priority item.

As usual, the point "Questions Relating to Space Transportation Systems and Their Implications for Future Activities in Space" offered to delegations the opportunity to review the national and co-operative programmes in this area, most of them fairly promising.²⁰

For the purpose of the "Examination of the Physical Nature and Technical Attributes of the Geostationary Orbit",²¹ the Secretariat provided a new study which updated the original study on the subject produced in 1977 and four Addenda to this study published in subsequent years.²² This was done upon the request of the Sub-Committee and COPUOS with the assistance of *Dr. L. Perek*, *Dr. P. Lala* and *Dr. L. Sehnal* of the Astronomical Institute of the Czechoslovak Academy of Sciences.²³

During the discussion, only a few delegations commented on the study. Some of them praised this study as a contribution "to dispel doubts about this topic", while some delegations from the equatorial countries commented that "the study had omitted an operational definition of the geostationary orbit." They also noted with concern that the study reiterated the "exponential" increase in objects launched into the geostationary orbit.²⁴

3. Scientific and Technical Content of the Sub-Committee's Work

The trend to increasing the scientific and technical content of the discussions in the Sub-Committee, which began a few years ago, continued

18. See doc. A/AC.105/C.1/1988/WP.1.

20. See para 63 in U.N. Doc. A/AC.105/409, at 14-16.

21. The full title of this point reads: "Examination of the Physical Nature and Technical Attributes of the Geostationary Orbit. Examination of its utilization and applications, including, inter alia, in the field of space communications, as well as other questions relating to space communications developments, taking particular account of the needs and interests of developing countries."

22. See U.N. Doc A/AC.105/203 and Add. 1-4.

23. See U.N. Doc. A/AC/105/404.

24. See para. 69 in U.N. Doc A/AC.105/409, at 16.

during the 25th session with the consideration of four scientific points, namely "Matters Relating to Life Sciences, Including Space Medicine", "Progress in the Geosphere-Biosphere (Global Change) Programme", "Matters Relating to Planetary Exploration" and "Matters Relating to Astronomy". The deliberations on these items raised some points of major interest.

Thus on the topic of Life Sciences, the Sub-Committee heard excellent presentations by experts from the USSR and the United States (Academician *Oleg G. Gazenko*, Director of the Institute of Biomedical Problems of the USSR and *Dr. A. Nicogossian*, Director of the NASA Life Sciences Programme).

Another special presentation was made to the Sub-Committee on progress in the Geosphere-Biosphere Programme (*Dr. S. I. Rasool*, National Center for Scientific Research, France, on behalf of COSPAR and IAF). The Sub-Committee noted the progress and the planning of this programme of international co-operation for the 1990's. The importance of assessing global changes in the climate and their impact on life on Earth, as well as the recent observations of the stratospheric ozone hole over Antarctica and the need for further studies of this phenomenon were brought to the attention of the Sub-Committee.

On the topic of planetary exploration, the Sub-Committee noted the continuing work towards investigations of other planets, asteroids and comets. It also took note of plans for detailed mapping of Venus, to probe the atmosphere of Jupiter and ultimately to return samples of the Martian surface to Earth, all these endeavors being developed with a high degree of international co-operation.²⁵

Last, but not least, a symposium was held during the 25th session of the Sub-Committee, as in previous years, this time on "Microgravity Experiments in Space and Their Applications." Carefully prepared by COSPAR and IAF and chaired by the representatives of both these non-governmental organizations closely co-operating with COPUOS, *Dr. H. Friedman* for COSPAR and *Dr. Jerry Grey* for IAF, this symposium consisted of two parts. During the first part, *M. Avernier* of NASA, USA, discussed the subject "Closed Life Support Systems for Long-Duration Space Missions" and *H. Walter* of ESA dealt with "Materials Sciences in Space." During the second part, Academician *Oleg G. Gazenko* of the Institute of Biomedical Problems, USSR, discussed "Potential Applications of Recent Space Station Life Sciences Experiments" and *K. Matthes* for the Federal Ministry for Research and Technology, the Federal Republic of Germany, spoke about "Products of Space Processing Research."

In its report, the Sub-Committee expressed appreciation to COSPAR and IAF for the very instructive symposium as well as the exhibition organized by the Federal Republic of Germany in co-operation

25. In conjunction with these points a number of presentations offered by experts from individual countries were also made, amongst them by the representative of the USSR *Glavkosmos N. Semenov* on the Mir space station and by Astronaut *B. O'Connor*, NASA, USA, on manned space flight.

with COSPAR under the theme.²⁶ The Sub-Committee also fixed the theme for special attention at the 1989 session which reads: "Space Technology as an Instrument for Combating Environmental Problems, Particularly those of Developing Countries." This theme would relate to problems such as desertification, deforestation, floods, erosion, and pest infestation which are of particular interest to developing countries. Subject to the approval of COPUOS, COSPAR and IAF should be invited again to arrange this symposium with as wide a participation as possible. They have also to arrange another special presentation on progress in the geosphere-biosphere (global change) programme.²⁷

The report of the Scientific and Technical Sub-Committee will be discussed during the 31st session of COPUOS to be held in New York, 13 to 24 June 1988, and the next session of the Sub-Committee is scheduled from 13 to 24 February 1989.²⁸

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*The 27th Session of the Legal Sub-Committee of the UN Committee on the Peaceful Uses of Outer Space, 14-31 March 1988**

The 27th session of the Legal Sub-Committee of the UN Committee on the Peaceful Uses of Outer Space (COPUOS) took place in Geneva from 14 to 31 March 1988. After marking time at last year's somewhat unproductive session,¹ the Sub-Committee perked up a bit this year and advanced on at least two fronts: the use of nuclear power sources in outer space and the selection of a new agenda item; on three other questions little if any progress was made.

Nuclear Power Sources

This was the ninth consecutive year the Sub-Committee considered this subject (the third under the title of "The Elaboration of Draft Principles Relevant to the Use of Nuclear Power Sources in Outer Space"), and again the Canadians, the original sponsors of this item, took the lead in inching it forward. As that delegation had done last year, it introduced

26. See para. 87 in doc. A/AC.105/409, at 19.

27. *Id.*, paras 93 (g) and 94, at 20-21.

28. *Id.*, para 95, at 21.

* The views expressed herein are those of the author and do not necessarily reflect those of the United Nations.

1. See Szasz, *The 26th Session of the Legal Sub-Committee of the UN Committee on the Peaceful Uses of Outer Space, 16 March- 3 April 1987*, 15 J. SPACE L. 50-56 (1987).

at the beginning of the session a new version of a working paper containing a complete set of principles,² which built on the text it had submitted at the end of the previous session³ but also reflected the results of some consultations since then, and at the end of the session the Canadians once more updated their draft⁴ to reflect the discussions that had taken place during the session, principally in a Working Group.⁵ Otherwise only the Chinese contributed two short papers.⁶

The initial Canadian paper contained seven draft principles, of which two (on notification of re-entry, and on assistance to states) were resubmitted in the form on which a tentative consensus had been reached at the 25th session, and two (on the applicability of international law, and on compensation) had been added at the 26th session. The final paper contained eleven, including two that had been proposed by China. Following is a brief account of the evolution of the later list:

1. Applicability of international law: Originally proposed by Sweden at the 26th session, this principle achieved at the 1988 session a consensus text.⁷

2. Notification of the presence on board a space object of a nuclear power source: This principle constitutes the second half of the former one on "Safety assessment and notification", and was slightly modified by the Canadians as a result of the Working Group debate,⁸ particularly in defining which state is to be responsible for the notification.

3. Guidelines and criteria for safe use: Consisting of nine paragraphs, this principle is the longest and most detailed, containing a mixture of rules relating to the design of the reactor or other power source and those relating to the orbit the satellite is to maintain; the Canadians modified it slightly consequent on this year's debate.

4. Safety assessment: This principle reproduces essentially unchanged the first half of former principle 2.

2. U.N. Doc. A/AC.105/C.2/L.154/Rev.3, reproduced in Annex III.A.1 of the Report of the Legal Sub-Committee (of COPUOS) on the Work of its Twenty-seventh Session (A/AC.105/411) (hereinafter referred to as the 1988 Report).

3. U.N. Doc. A/AC.105/C.2/L.154/Rev.2, reproduced in Annex III.A.2 of the Report of the Legal Sub-Committee (of COPUOS) on the Work of its Twenty-sixth Session (A/AC.105/385) (1987 Report).

4. U.N. Doc. A/AC.105/C.2/L.154/Rev.4, reproduced in Annex III.A.4 of the 1988 Report.

5. 1988 Report, Annex I.

6. U.N. Docs. A/AC.105/C.2/L.164 and L.165, reproduced in Annex III.A.2 and 3 of the 1988 Report.

7. 1988 Report, Annex I, para.8.

8. *Id.*, paras.10-17.

5. Notification of re-entry: As tentative consensus on this principle had been achieved at the 25th session,⁹ it received no substantive consideration this year. However, the addition of a new paragraph was suggested to govern the interaction between this principle and the 1986 Vienna [IAEA] Convention on Early Notification of a Nuclear Accident.¹⁰

6. Consultations: This is a new principle, first proposed as a part of principle 5, and closely related to it.

7. Assistance to States: As with respect to principle 5, this one was also left unchanged from the wording established at the 25th session,¹¹ but the addition of a new paragraph was proposed to govern the interaction between this principle and the 1986 Vienna [IAEA] Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.¹²

8. Responsibility of States: Aside from minor wording changes and the break-up of one of the original paragraphs, the draft of the principle was not substantially altered this year.

9. Compensation: After extensive debate in the Working Group, the Canadians slightly altered the draft of this principle, by somewhat expanding two out of four paragraphs, and entirely deleting a rather repetitious fifth, the references to the 1967 Space Treaty¹³ and the 1972 Liability Convention¹⁴ were largely maintained.

10. Settlement of disputes: As proposed by China, a new principle was tentatively added.

11. Relation with international treaties: Again proposed by China, this new principle was tentatively added.

9. U.N.Doc. A/AC.105/370 and Corr.1, Annex II, paras.5.1-5.3.

10. XXV:6 I.L.M. 1370; I.A.E.A. Doc. GC(SPL.I)/2, Annex II.

11. U.N.Doc. A/AC.105/370 and Corr.1, Annex II, paras 5.4-5.5.

12. XXV: 6 I.L.M. 1376; I.A.E.A. Doc. GC(SPL.I)/2, Annex III.

13. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, 27 January 1967, 18 U.S.T. 2410, T.I.A.S. 6347, 610 U.N.T.S. 205 (entered into force: October 10 1967). Set out in *The United Nations Treaties on Outer Space* (U.N. Publication Sales No. E.84.I.10, New York, 1984) (The Space Treaties Booklet).

14. Convention on International Liability for Damage Caused by Space Objects, 29 March 1972, 24 U.S.T. 2389, T.I.A.S. 7762, General Assembly resolution 2777(XXVI) of 29 November 1971 (entered into force: 1 September 1972). Set out in the Space Treaties Booklet.

Noting the close connection between the work on this subject by the two COPUOS Sub-Committees, it was suggested that in the future the corresponding Working Group of the Scientific and Technical Sub-Committee be allocated more meetings so that it might provide solutions to problems impeding the work of the Legal Sub-Committee.¹⁵

Definition of Outer Space

Having achieved maturity last year when it had been on the agenda for 21 years (though during four of these it was not actually considered), this part-item remains coupled under one heading with the one referred to below, as "Matters Relating to the Definition and Delimitation of Outer Space..." No progress at all was made on this subject, as to which no new papers were introduced, as a consequence of which the only texts referred to were three working papers the Soviet Union had introduced in 1979, 1983 and 1987.¹⁶ Once more the old arguments were rehashed, asserting on the one hand and denying on the other the importance, timeliness and urgency of this matter and the practical possibility of dealing with it at all.¹⁷

Geostationary Orbit

Twinned since 1978 with the just-mentioned subject, this part-item is formally referred to as "Matters Relating to...the Character and Utilization of the Geostationary Orbit, including Ways and Means to Ensure the Rational and Equitable Use of the Geostationary Orbit Without Prejudice to the Role of the International Telecommunication Union." Here too no new papers were introduced, so that consideration was based on four working papers that had originally been submitted in 1984 and 1986, and a 1985 letter from ITU;¹⁸ in addition, a brief portion of this year's report of the Scientific and Technical Sub-Committee was noted.¹⁹

Here again the old arguments were rehearsed, on the one hand asserting that the geostationary orbit was an integral part of outer space entirely governed by the principles of the 1967 Space Treaty, and on the other pointing to the unique aspects of this orbit that might justify some departure from the general regime.²⁰ The Chairman of the Working Group

15. 1988 Report, paras. 27-28.

16. U.N. Docs. A/AC.105/L.112, A/AC.105/C.2/L.139 and A/AC.105/L.168, reproduced in Annex III.B.1, 2 and 7 of the 1988 Report.

17. 1988 Report, Annex II, paras. 6-11.

18. U.N. Docs. A/AC.105/C.2/L.147, L.153 and L.155, WG/DEF-GSO (1986)/WP.1 and A/AC.105/360, reproduced in Annex III.B.3, 4, 5, 6 and 8 of the 1988 Report.

19. U.N. Doc. A/AC.105/409 and Corr.1, paras. 67-72.

20. 1988 Report, Annex II, paras.12-19.

on this agenda item attempted to advance consideration off dead-center by once more establishing an open-ended working party of Friends of the Chairman, which formulated two rather anodyne paragraphs under the heading of "Equitable Access."²¹

Although that text was generally accepted by the Friends as a "valid basis for further negotiations within the context of a legal regime to be developed for the geostationary orbit," a number of delegations distanced themselves from that proposal, presumably because it would call for taking account of the special needs and the geographical situation of certain countries.²²

New Agenda Item

As in 1987, the third substantive item on the agenda was the choice of a new item, to replace the remote sensing one completed at the 25th session. This time the search took place under the formidable title: "Finalization of the Choice of a New Item for the Agenda, Taking into Account the Proposal Made by the Group of 77 and Other Proposals, in Order to Begin its Consideration at the Sub-Committee's Twenty-seventh Session", agreed to at the last session of the General Assembly.²³

Fortunately the delegation of Austria, which had led extensive consultations on this matter since the last Sub-Committee session, and particularly since the 42nd session of the General Assembly, immediately introduced a proposal as to the title of a new item, on which a large measure of agreement had already been achieved, *i.e.*: "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 interest of all states, taking into particular account the needs of developing countries."²⁴ Although some dissatisfaction was expressed on the ground that the item appeared too restrictive and of interest primarily to the developing countries, the latter pointed out that they too had compromised their original proposal.²⁵ Finally consensus was achieved on the new item, without any change, but with the understanding that interested delegations would be entitled to raise "the legal aspects related to developments in the exploration and utilization of outer space" during the traditional "general exchange of views", starting at the 28th session.²⁶ Indeed, in spite of the pious wish that had been incorporated by the General Assembly into the title of this year's item, no substantive discussion on the newly adopted one took place in 1988.

21. *Id.*, para. 20.

22. *Id.*, paras. 20-21.

23. General Assembly resolution 42/68 of 2 December 1987, para .5.

24. 1988 Report, paras. 41 and 48.

25. U.N. Doc. A/AC.105/C.2/L.162, reproduced in Annex III.C.4 of the 1987 Report.

26. 1988 Report, para. 49.

Enhancing the Work of the Sub-Committee

As part of the compromise required to achieve a consensus on the new agenda item, it was also agreed that at the current session three meetings would be set aside to discuss the working methods of the Sub-Committee.²⁷ This subject is one that has been of concern to several Western delegations for some time, and particularly to the United States.²⁸ The questions that were discussed in relation to this subject and the arguments that were expressed were largely the same as in previous years, and in particular in 1987.

Shortening of sessions

- (1) The reduction of sessions to two weeks²⁹ --a proposal now resisted on the additional ground that a third agenda item had just been agreed on.

Interaction with COPUOS and its other Sub-Committee

- (2) The holding of fully or partially concurrent sessions of COPUOS and of both of its Sub-Committees;³⁰
- (3) That enhancement of the efficiency of the Legal Sub-Committee should be considered in conjunction with that of COPUOS itself and its other Sub-Committee;³¹
- (4) Improvements in the interaction between the two COPUOS Sub-Committees.³²

Procedural improvements

- (5) The elimination of the "general exchange of views";³³

27. *Id.*, paras. 42 and 50.

28. 1987 Report, paras. 12 and 45. See also *op.cit. supra* note 1, at 55-56.

29. 1988 Report, paras. 53 and 60.

30. *Id.*, paras. 53 and 63.

31. *Id.*, para. 57.

32. *Id.*, para. 66.

33. *Id.*, paras. 54, 61 and 68. It was pointed out that the Sub-Committee had just decided (see *supra* at note 26) that certain subjects might specifically be raised during the general exchange of views.

(6) Periodic reviews of various agenda items, suspending or terminating consideration of any on which only limited progress was detected;³⁴

(7) Making maximum use of the meeting time available, by avoiding late starts and early adjournments;³⁵

(8) Undertaking in-depth technical discussions and reviews of some legal issues in the course of Sub-Committee sessions.³⁶

At the conclusion of this debate some delegations suggested that all these proposals be analyzed by the secretariat for further consideration in the Sub-Committee and perhaps in COPUOS.³⁷ Other delegations opposed this, in part on the ground that they considered that the general working arrangements of the Sub-Committee were satisfactory.³⁸ On this inconclusive note the debate ended for the session--though more than likely these questions will be revived in the future. Indeed, it is probable that until the Sub-Committee is again assigned some substantive item on which it feels it should and can make urgent progress, the present procedural malaise will continue.

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34. Id., para. 56.

35. Id., paras. 58 and 59.

36. Id., para. 65.

37. Id., para. 72.

38. Id., para. 70.

*Comments**U.S. National Space Policy Comprehensively Revised: A Commentary**1. Introduction*

On January 5, 1988 President Ronald Reagan signed a National Security Decision Directive (NSDD) that constitutes a major overhaul of U.S. national space policy. The unclassified content of the NSDD and a 15-point Commercial Space Initiative were released by the White House on February 11, 1988. Supplementing these new policy releases, Dr. James C. Fletcher released a statement at a press conference on February 18, 1988, highlighting the Administration's 1989 NASA Budget Proposal to the U.S. Congress. This commentary draws on all three sources and a press conference, held at the White House February 11, 1988, involving Dr. Fletcher, Commerce Secretary C. William Verity, and Transportation Secretary James Burnley, to present a consolidated recapitulation of the new space policy.

The policy revisions resulted from a five-month interagency review that considered previous Presidential decisions, the National Commission on Space report, and the implications of the failures of the Space Shuttle and national expendable launch vehicles (ELVs). The new policy framework addresses three functional sectors: (1) the Federal Civil Sector, (2) the National Security Sector, and (3) the nongovernmental Commercial Sector. Close coordination, cooperation, and information and technology exchange are to be maintained among the sectors to avoid unnecessary duplication and to promote attainment of U.S. National Space Goals. It may be a fatal flaw that the approach ignores the "Congressional Sector."

2. National Goals and Principles

Acknowledging that leadership in an increasingly competitive international environment does not require U.S. preeminence in all areas and disciplines, the policy asserts that the United States will maintain preeminence in key areas crucial to our national security, scientific, technical, economic, and foreign policy goals. Overall U.S. space goals are:

1. strengthen the security of the United States;
2. obtain scientific, technological, and economic benefits for the general population and improve the quality of life on Earth through space-related activities;
3. encourage continuing U.S. private sector investment in space-related activities;
4. promote international cooperative activities taking into account security, foreign policy, scientific and economic interests of the nation;
5. cooperate with other nations in maintaining the freedom of space for all activities that enhance the security and welfare of mankind; and, as a long-range goal,
6. expand human presence and activity beyond Earth orbit into the solar system.

National goals will be pursued in accordance with these principles:

- A.- The United States is committed to the exploration and use of outer space by all nations for peaceful purposes and for the benefit of all mankind. "Peaceful purposes" allow for activities in pursuit of national security goals.
- B.- The United States will pursue activities in space in support of its inherent right of self defense and its defense commitments to its allies.
- C.- The United States rejects any claims to sovereignty by any nation over outer space or celestial bodies, or any portion thereof, and rejects any limitations on the fundamental right of sovereign nations to acquire data from space.
- D.- The space systems of any nation are national property with the right of passage through and operation in space without interference; purposeful interference with space systems shall be viewed as an infringement on sovereign rights.
- E.- The commercial use and exploration of space technologies and systems is encouraged for national economic benefit without direct federal subsidy; commercial activities must be consistent with security interests, and domestic and international legal obligations.
- F.- The United States shall encourage other countries to engage in free and fair trade in commercial space goods and services.
- G.- The United States will conduct international cooperative space-related activities that are expected to achieve sufficient scientific, political, economic, or national security benefits for the nation, and will seek mutually beneficial international participation in its space-related programs.

COMMENT: It is unusual that a major policy revision would appear in the eighth year of a President's administration, but the disruption and economic losses suffered by the United States space community in the last two years (1986-88) compelled a major review. A notable aspect of this review is the inclusion of several major new elements beyond those necessary to address the national space transportation issues which have dominated concerns in recent years. A new goal was enunciated in number 6, above, explicitly opening the active consideration of lunar revisit, manned Mars exploration, and consideration of permanent manned presence in the solar system beyond Earth orbit. A specially stressed feature in the policy, first appearing in principle E, above, is the explicit declaration that all commercial activities will be pursued "without direct federal subsidy." This phrase appears no less than ten times in the White House Fact Sheet dated February 11. The other goals and policies are reminiscent of the July 4, 1982 Presidential policy declaration, and involve only shifts in emphasis, but not major substantive changes. The principle at F, above, is a newly recorded de facto principle that will very likely be dependent on reciprocal consideration of foreign attitude. Other changes and additions were incorporated in subordinate policy areas, more in the nature of operating guidelines; they are discussed below.

3. *Federal Civil Space Sector Policy*

Activities in the federal civil sector (non-defense federal agencies) shall contribute significantly to enhancing the nation's science, technology, economy, pride, sense of well being and direction, as well as U.S. world prestige and leadership. Civil sector activities shall comprise a balanced strategy of research, development, applications, and technology for space science, exploration, and appropriate applications.

The objectives of the U.S. civil space sector shall be to:

- 1 - expand knowledge of the Earth, its environment, the solar system and the universe;
- 2 - create opportunities to use space through research and experimentation in advanced technology and systems;
- 3 - develop space technology for civil applications and, where appropriate, make such technology available to the commercial sector;
- 4 - preserve U.S. preeminence in critical aspects of space science, applications, technology, and manned spaceflight;
- 5 - establish a permanently manned presence in space; and
- 6 - engage in international cooperative efforts that further U.S. space goals.

COMMENT: These civil sector goals draw heavily from the objectives recited in the NAS Act of 1958, sec. 102(c), except that item no. 5 is a major addition, reflecting the national commitment to an orbital space station and the extension of man's presence and activity beyond Earth orbit.

4. *Federal Civil Space Sector Guidelines*

The White House also issued guidelines on February 11 for the federal agencies along with implementing actions. Agencies are directed to use the guidelines and actions as guidance on priorities, including preparation, review, and execution of budgets for space activities, within the overall resource and policy guidance provided by the President. Within 120 days (i.e. by June 10, 1988) affected government agencies are to review current policies for consistency with the new directive and, where necessary, establish appropriate policies to implement the new general policies and practices. Included among the guidelines and implementing actions are:

- a. NASA continues to lead in advancing space science, exploration and applications through research, technology, development and related operations;
- b. NOAA will gather data, conduct research, and make predictions about the Earth's environment;
- c. DoT will license and promote commercial launch operations which support civil sector operations. DoT is the lead agency within the government for developing, coordinating, and articulating federal policy and regulatory guidance for U.S. commercial launch activities in consultation with DoD, State, NASA, and other concerned agencies; all executive

- agencies shall assist DoT in carrying out its responsibilities, as set forth in the Commercial Space Launch Act of 1984 and Executive Order 12465;
- d. NASA will collaborate with other agencies to achieve a balanced program of research, exploration and experimentation in:
 - astrophysical phenomena and evolution of the universe;
 - the Earth, its environment, and its relationship to the Sun;
 - the origin and evolution of our solar system;
 - fundamental physical, chemical, and biological processes;
 - effects of the space environment on human beings; and
 - factors affecting the origin and spread of life in the universe.
 - e. NASA is to conduct a balanced program of manned and unmanned exploration;
 - f. NASA is to begin a systematic development of technologies necessary to support future manned missions to and beyond Earth orbit. This technology program (*Pathfinder*) will be oriented toward a Presidential decision on a focused program of manned exploration of the solar system.
 - g. NASA will continue unmanned exploration, achieving scientific objectives where human presence is undesirable or unnecessary, exploring realms where the risks or costs of life support are unacceptable, and providing vital data to support future manned missions.
 - h. NASA is to achieve a permanent manned presence in space by the mid 1990s. The NASA Space Station in Earth orbit shall:
 - contribute to critical elements of U.S. preeminence in manned space-flight;
 - provide support and stability to scientific and technological investigations;
 - provide early benefits in materials and life sciences;
 - promote commercial sector experimentation preparatory to independent commercial activity;
 - provide opportunities for commercial sector participation; and
 - contribute to expanding human presence and activity beyond Earth orbit into the solar system.
 - i. NASA and other agencies shall pursue the identification and development of space applications and promote private sector development and implementation of applications.
 - j. NASA will seek to ensure its capability to conduct selected critical missions through a mix of assured access to space, on-orbit sparing, advanced automation techniques, redundancy and other suitable measures.
 - k. Agencies may enter cooperative R&D agreements on space applications with firms advancing the relevant state-of-the-art.
 - l. Department of Commerce will manage federal civil operational remote sensing (RS) to: (1) consolidate federal needs for civil RS products to be met by the civil or the commercial sector; (2) identify needed civil RS R&D objectives; and (3) provide for regulation of commercial sector operational RS systems in coordination with other agencies.
 - m. NASA will maintain the STS fleet capability; maintain sustainable STS flight rates to provide for effective planning and budgeting of government

space programs; pursue appropriate enhancements to STS operational capabilities, upper stages, and systems for deploying, servicing, and retrieving spacecraft as national and user requirements are defined.

- n. The United States will foster increased international cooperation in civil space activities. The Senior Interagency Group (SIG) on Space, Working Group on Space Science Cooperation with the USSR, is responsible for oversight of civil cooperation with the USSR. No cooperative activity with the USSR shall be initiated until an interagency review has been completed. U.S. cooperation in civil space activities will:
- be consistent with U.S. technology transfer laws, regulations, Executive Orders, and presidential directives;
 - support public, nondiscriminatory direct readout of data from federal systems to foreign ground stations and the provision of data to foreign users under specified conditions; and
 - be conducted to protect the commercial value of intellectual property developed with federal support.

5. *Commercial Space Sector Policy*

The U.S. Government shall not preclude or deter continuing development of a separate, nongovernmental commercial space sector. Governmental space sectors shall purchase commercially available space goods and services to the fullest extent feasible and shall not conduct activities with potential commercial applications except for national security or public safety reasons. Commercial sector activities shall be supervised and regulated only to the extent required by (1) law; (2) national security; (3) international obligations and (4) public safety.

6. *Commercial Space Sector Guidelines*

Federal agencies and departments are directed to work cooperatively to foster the growth of commercial use of space. A Commercial Space Working Group of the Economic Policy Council (EPC) has been established to coordinate commercial space issues; SIG (Space) will coordinate development and implementation of overall national space policy. Agencies are to facilitate commercial sector access to appropriate U.S. space-related hardware and facilities, and encourage commercial entities to undertake commercial space ventures. Without providing any direct federal subsidies, the government space sectors' participants will:

1. use commercially available goods and services to the fullest extent feasible. ("Commercially available" means currently offered commercially or could be supplied in response to a government service procurement request. "Feasible" means that such goods and services meet mission requirements in a cost-effective manner.)
2. enter into appropriate cooperative agreements to encourage and advance commercial sector basic research, development, and operations while protecting the commercial value of intellectual properties developed.
3. provide for use of appropriate government facilities on a reimbursable basis.

4. identify, eliminate or propose for elimination, applicable portions of U.S. laws and regulations that unnecessarily impede commercial space sector activities.
5. encourage free trade in commercial space activities.
6. provide for timely transfer of government developed space technology in a manner that protects its commercial value, consistent with national security.
7. price government provided goods and services consistent with OMB Circular A-25.

The Department of Commerce will commission a study of commercial RS systems and future needs. Elements of the study are elaborated and its results are to include (another) action plan on the best alternatives for future RS actions identified during the study.

COMMENTS: There is relatively little new in this sector of the policy guidelines; what is relevant is the degree of focus and detail now being addressed to the commercial sector. The new study of RS future alternatives is another in a long series; this effort may well result in studying U.S. commercial remote sensing to death. Throughout the White House statements, the words "commercial" and "private" are used interchangeably, without distinction.

7. National Security Space Sector Policy

The United States will conduct space activities necessary to national defense. Space activities which contribute to national security objectives by:

- deterring, or if necessary, defending against attack;
- assuring that forces of hostile nations cannot prevent our own use of space;
- negating, if necessary, hostile space systems; and
- enhancing operations of U.S. and allied forces.

Consistent with treaty obligations, the national security space program shall support such functions as command and control communications, navigation, environmental monitoring, warning, and surveillance (including research and development programs which support these functions).

8. National Security Space Sector Guidelines

DoD will develop, operate and maintain an assured mission capability through an appropriate mix of robust satellite control, assured access to space, on-orbit sparing, proliferation, reconstitution or other means. The national security space program, including data dissemination, shall be conducted in accordance with Executive Orders and directives for protection of security information and commensurate with missions performed and security measures necessary to protect related space activities. DoD will ensure that the military space program incorporates the support requirements of the Strategic Defense Initiative (SDI).

DoD may use unmanned and manned systems appropriate to mission requirements, distributing payloads among launch systems and launch sites to minimize the impact on mission requirements of a system or launch site loss. The robustness of satellite system control capability will be enhanced through a mix of satellite autonomy and survivable command and control, processing, and data dissemination systems. DoD will study means of support for future contingency launch capabilities. DoD will develop, operate, and maintain space systems and develop plans and architectures to meet requirements of operational land, sea, and air forces.

With reference to space control, the directive states that:

1. DoD will do what is necessary to ensure its freedom of action in space; this requires a combination of antisatellite, survivability, and surveillance capabilities.
2. DoD will develop and deploy a robust and comprehensive ASAT capability with programs as required and with initial operational capability at the earliest possible date.
3. DoD will plan for and ensure survivability of selected critical national security space assets.
4. The United States will develop and maintain an integrated attack warning, notification, verification, and contingency reaction capability to detect effectively and react to threats to the U.S. space systems.
5. DoD will, consistent with treaty obligations, conduct research, development, and planning to be prepared to acquire and deploy space weapons systems for strategic defense should national security conditions dictate.

The new directive, signed by the President on January 5, 1988, notes that:

- the primary forum for negotiations on nuclear and space arms is the Nuclear and Space Arms Talks (NST) with the Soviet Union in Geneva;
- instructions to the U.S. Delegation will be consistent with this National Space Policy directive, established legal obligations, and additional guidance by the President;
- the United States will continue to consult with its allies on these negotiations and ensure that any resulting agreements enhance the security of the United States and its allies; and
- any discussions on arms control relating to activities in space in forums other than the NST must be consistent with, and subordinate to, the foregoing activities and objectives.

COMMENT: There is no element of the published space defense policy that can be defined as totally new, although the refinement of elements of the national security space sector policy clearly shows that considerable attention has been devoted to this area in recent years. The assured access to space emphasis, now apparent, is a direct consequence of the cumulative failures of manned and unmanned launchers in 1986. The policy of a "mixed fleet" had already emerged with reference to U.S. Air Force programs when the Titan ELV program was renewed in late 1985, and the medium launch vehicle (MLV or

Delta II) was committed to production in 1987. The firmly asserted policy to establish and deploy an operational antisatellite system still has congressional funding hurdles to clear. While the White House is committed to putting an antisatellite capability in place, the Congress, repeatedly dabbling in this and other executive management areas, insists on withholding funding because of concerns about impact on arms control negotiations. The Congress is becoming increasingly its own worst enemy through constant programmatic interference in the discharge of executive branch functions. U.S. foreign relations, national security management, and national economic management are increasingly subjected to majority voting in committee decisions, rather than being conducted on an integrated basis by the elected executive. Such inconsistent, unpredictable and erratic government policy management denies the executive the power to control the course of government and leaves Congress responsible for more and more of the ineptness of governmental management.

9. *Inter-Sector Policies, Guidelines and Implementing Procedures*

The U.S. Government agencies will maintain and coordinate separate national security and civil operational space systems where differing needs of the sectors dictate. The U.S. Government will:

1. encourage development of commercial earth imaging systems competitive with or superior to foreign civil or commercial RS systems;
2. discuss RS issues and activities with foreign governments operating or regulating private operation of RS systems; and
3. continue an R&D effort to improve RS technologies.

Assured access to space, sufficient to achieve all U.S. space goals, is a key element of the national space policy; U.S. space transportation systems must provide a balanced, robust, and flexible capability with resiliency to allow continued operations despite failures in a single system. The goals of U.S. space transportation policy are:

1. achieve and maintain safe and reliable access to, transportation in, and return from space;
2. exploit the unique attributes of manned and unmanned launch and recovery systems;
3. encourage development and use of U.S. commercial sector space transportation capabilities without direct federal subsidy; and
4. reduce the costs of space transportation and related services.

The U.S. Government will continue R&D efforts for advanced space communication technologies, which, when used for commercial purposes, will be without direct federal subsidy.

The United States will prohibit or control, as appropriate, exports of materials that would make a significant contribution to a foreign country's strategic military missile programs. Certain U.S. friends and allies will be exempted from this policy, subject to appropriate non-transfer and end use assurances.

The United States will consider and, as appropriate, formulate policy positions on arms control measures governing activities in space and will conduct negotiations on such measures only if they are: (a) equitable, (b) effectively verifiable, and (c) enhancing the security of the United States and its allies.

All U.S. space sectors will seek to minimize the creation of space debris; design and operations of space tests, experiments and systems will strive to minimize or reduce accumulation of space debris consistent with mission requirements and cost effectiveness.

To implement these policies:

- Normal interagency procedures will be used wherever possible to coordinate enunciated policies.
- The Senior Interagency Group (SIG) on Space will continue to meet in order to: (1) provide a forum for federal agency policy reviews; (2) review and advise on proposed changes to national space policy; and (3) provide for orderly and rapid referral of space policy issues to the President for decisions as necessary. SIG (Space) will be chaired by a member of the National Security Council staff and will be participated in by representatives of the State, Defense, Commerce and Transportation Departments, the Director of Central Intelligence (DCI), Organization of the Joint Chiefs of Staff, the U.S. Arms Control and Disarmament Agency, NASA, the Office of Management and Budget, and the White House Office of Science and Technology Policy (OSTP). Other executive agencies or departments will participate as meeting agendas will dictate.
- Launch priority will be provided for national security missions as implemented by NASA/DoD agreements; launches necessary to preserve and protect human life in space shall have the highest priority except in times of national security emergency. As between NASA and DoD, mission management is the responsibility of the mission agency. NASA will not maintain an expendable launch vehicle (ELV) adjunct to the Shuttle (STS). NASA will provide others with STS launch services only when payloads: (1) must be man-tended; (2) require unique capabilities of the STS; or (3) STS launch is important for national security or foreign policy purposes. Commercial or foreign payloads will not be launched on government-owned or operated ELV systems except for national security or foreign policy reasons. Civil government agencies will encourage a domestic commercial launch industry for necessary ELV launch services by contracting for such services from the commercial sector. NASA and DoD are to continue to pursue new launch and launch support concepts aimed at improving cost effectiveness, responsiveness, capability, reliability, availability, maintainability and flexibility.
- The U.S. Government will have priority use of government facilities and support services to meet national security and critical mission requirements; the government will make all reasonable efforts to minimize impacts on commercial operations. A series of special and detailed provisions list governmental guidelines for roles and actions of agencies related to the use of, support of, and conduct of commercial launch operations.

- The United States will work to stem the flow of advanced western space technology to unauthorized destinations; executive departments and agencies will be fully responsible for protecting against adverse technology transfer in the conduct of their programs. Sales of U.S. space hardware, software, and related technologies for use in foreign space projects will be consistent with relevant international and bilateral agreements and arrangements.
- A task force of the Commercial Space Working Group, in cooperation with OSTP, will conduct a feasibility study of alternate methods for encouraging, without direct federal subsidy, commercial sector capital funding of U.S. space infrastructure such as ground facilities, launcher developments, and orbital assembly and test facilities. Coordinated terms of reference for this study shall be presented to the EPC and SIG (Space).
- Under National Security Council staff approved terms of reference, an interagency group, chaired by State, will provide recommendations on implementation of the Space Debris Policy set forth in the directive.

COMMENT: The inter-sector policies, guidelines, and procedures above clearly demonstrate how complex and inextricably interwoven in national affairs our national space policy has become. With each successive elaboration of Presidential policy declarations, which have been appearing in the past decade on 3 to 4 year centers, the scope expands, the complexity increases, and the decentralization of policy making and decision making persists. Before the end of this century, the United States must consider the essential step of creation of a cabinet level agency to deal with aerospace policy, plans, programs, and potential. The influence of space activities on the national defense, the national economy, national educational systems, foreign relations and the well being of mankind in general continues to grow. Polycentric policy making, erratic annual program funding decisions, process oriented goal setting rather than objective, measurable goal setting, and lack of a federal authority to integrate our national and international space programs will continue to exacerbate the situation. The nation must come to grips with its federal management needs soon or valuable time will be lost, resources will be wasted, false starts and unproductive programs will occur, and U.S. national interests will not be served effectively. Perhaps a new executive administration in 1989 will be willing to frontally address these issues and reassess the U.S. Government's "national system architecture" for management of our national space policy.

10. *The 15-Point Commercial Space Initiative*

In a separate White House Fact Sheet, released also on February 11, 1988, the President announced a comprehensive "Space Policy and Commercial Space Initiative to Begin the Next Century." The President's program has three components:

- (1) establishing a long-range goal to expand human presence and activity beyond Earth orbit into the solar system;
- (2) creating opportunities for U.S. commerce in space; and

- (3) continuing our national commitment to a permanently manned space station.

The Fact Sheet explains that the President is requesting \$100 million in NASA's 1989 budget for a major new technology development program, Project *Pathfinder*, that is intended to make possible manned or unmanned missions beyond Earth's orbit. Project *Pathfinder* will be organized with four major focuses: (1) exploration technology; (2) operations technology; (3) humans in space technology; and (4) transfer vehicle technology. Topics to be studied include: humans in the space environment, closed loop life support, aerobraking, orbital transfer and maneuvering, cryogenic propellant storage and handling, and large-scale space operations. These studies will provide a base for decisions on long-term goals. The following 15-point program is being established to pursue three goals: (1) promoting a strong U.S. commercial presence in space; (2) assuring existence of a highway to space; and (3) building a solid technology and talent base. Topically the plan includes:

1. a private sector space facility for research and space manufacturing;
2. a private sector "Spacehab", expanding on-board STS crew work volume 400%;
3. a National Microgravity Research Board, to be established;
4. availability of STS external tanks for use on orbit;
5. some measure of commercialization of the space station;
6. increased future privatization of the space station;
7. encouragement of commercial remote sensing systems;
8. increased civil government use of commercial ELV services;
9. insurance relief for commercial launch providers -
 - proposing a \$200,000 cap on noneconomic damage awards;
 - DoT limits on liability for damage to government property;
 - waiver of damages caused by government agent's willful misconduct;
10. consideration of establishing privately owned launch ranges;
11. launch vouchers for displaced research payloads moved from STS to ELVs;
12. aggressive technology spin-off from federal programs -
 - research entities retain intellectual property rights;
 - technologies and patents available in a central library, and
 - maximized contractor flexibility and innovation in NASA contracts;
13. federal employee sabbaticals to put expertise in schools;
14. major expansion of education assistance programs; and
15. extension of critical technology protection authority to NASA.

Each of these 15 points is elaborated in the White House Fact Sheet, and additional discussion is included concerning continuing the U.S. national commitment to the space station, enhancing U.S. space leadership, and a recapitulation of the federal agency roles, the multiple sector definitions, assuring access to space, and the future handling of remote sensing.

COMMENT: This is a major new approach to space program management by the federal government. One could regret that it comes at the end rather than at the outset of an administration; because of its timing, its implementation

will rest on those not its authors. It may also be regretted that the policy has been promulgated by the White House, recommending many changes requiring legislative action and response, without a full opportunity for concerned committees to review and receive comments on the proposals. The President can certainly ask for \$100 million funding for Project *Pathfinder*, it remains to be seen how a Democratic Congress will react. An executive who chooses to adopt and promulgate national policy in current circumstances with very limited congressional consultation does neither himself nor the nation a service. Such action is more likely to elicit criticism, stir debate, raise and then dash hopes of a new era in space policy, and in the end very little is accomplished. The almost total silence of the national media in connection with this policy, despite its dramatic content, is ominous. No one, least of all Congress, appears to be excited about this major overhaul of the national space policy of the United States. In future years, it is unlikely that students will be able to find reference to the comprehensive space policy initiatives promulgated late in the second Reagan administration. Unfortunately, they may be too late. The success or failure of these policies will be largely in the hands of persons not now known to us, because the U.S. national election in November 1988 will put a totally new administration in office in January 1989. The future of the U.S. national space program will be in the hands of that yet-to-be-selected administration.

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*The Strategic Defense Initiative: What if the United States Terminates its Program to Defend Itself? **

President Reagan proposed on March 23, 1983 that the United States commence research into a defense program that would protect the United States and its allies against nuclear weapons. This initiative referred to as SDI, was subjected to immediate attack by numerous critics and commentators. Why was this proposal made, and what if the United States decides not to proceed with the program? These questions are addressed here.

Nuclear weapons are deployed as military threats - operating in this sense both in peacetime, for the purposes of mutual deterrence, and in wartime, to establish expected limitations on the conduct of warfare.

* The statements in this commentary are entirely those of the author and not to be attributed to the United States Government or to Georgetown University.

The nuclear weapons are, in the military sense, threats by their possessors against the possibility of an attack with such weapons. They provide the means for retaliation in kind - the means to respond with the equivalent or greater destructive force, hence create the mutual recognition of effective, and enforceable deterrence. If the Soviet Union were to launch a first strike, it must either have ample weapons in reserve, and be capable of launching them, or else exhaust its weapons in first striking the United States. If the weapons were exhausted, the United States would have no other targets, hence no other choice but to retaliate against the cities of the Soviet Union, changing the course of the war fighting strategy, and obviously a difficult decision to make.

The balancing of the strategic offensive nuclear weapons however is presumably supported by the Anti-Ballistic Missile (or ABM) Treaty. The two sides have undertaken in this agreement to limit the weapons to defending either their capital cities or the launching sites of their weapons. But the balancing feature in the ABM Treaty reaches only to the missiles of the SALT I agreements: *i.e.*, the missiles targeted upon the territory of each country, the land-based intercontinental ballistic missiles with a range of 3300 miles or more, and the submarine launched ballistic missiles. All other ballistic missiles and all cruise missiles (air-borne as opposed to ballistic) are outside the coverage of the SALT I-ABM treaty system.

1. Is the Present Balancing System Working?

The present balancing of nuclear weapons is only partially stable in part because modernization - research, development and unverifiable testing of more effective or more numerous weapons - could not be included among the prohibitions. Because prohibitions were dependent upon adequate verification to assure compliance, inherent limitations exist on the control elements, unless measures beyond the national technical means can be adopted and are comparably effective.

We can only speculate whether the balancing under the present system has prevented nuclear war. It is probable that the agreements operate to prevent a nuclear first strike, or, at least, that they provide the process in which the weapons achieve this goal. But they have not prevented aggression, or the use of military force for a variety of political goals.

A further problem lies in the weapons that are not covered by the agreements - the chemical, biological and mass destruction weapons in general (which include radiation weapons).

The balancing of weapons must reach further than the nuclear balance of the present arms control agreements if the democratic states are to preserve or protect their systems. If the Soviet Union can threaten the use of nuclear weapons against others, it is in a position to impose its policies on others. But with superiority of nuclear weapons the Soviet Union has weapons that can be used for a political threat. Moreover, the nuclear weapons available for these purposes include those that are not

covered by the arms control agreements - i.e., the only ballistic missiles covered are those that have the range of 3,300 miles or more. This has led to Soviet deployment of shorter range nuclear weapons systems targeted against European states and against countries in the Far East. But such weapons are not deployed in a defensive mode, and they do not address threats from such countries. They are simply threats in themselves.

Finally, the nuclear weapons balancing system does not reach into research or technology development. The arms control agreements could not cover these activities because they could not be monitored for verification or compliance. This means that both the United States and the Soviet Union remain free to carry on research - even SDI - under the agreements.

2. Does the Soviet Union have a strategic defense initiative?
How would it affect the nuclear weapons balance?

There is ample evidence, confirmed in part by Soviet statements, that it has embarked upon a variety of research activities that will enable it to deploy a strategic defense initiative. It has already upgraded other defense systems. The tactical ballistic missile defense systems - that is, the systems aimed at ballistic missiles with ranges less than 3,300 miles, and the defense systems against air strikes, or strikes by cruise missiles, have all been substantially strengthened. The technologies for these defense systems parallel those required for an SDI.

Moreover, there is reliable evidence that the technologies needed for a Soviet Defense Initiative have been the subject of extensive research. A major portion of Soviet defense expenditures has been set aside for such research. Additionally, the research for offensive or strike weaponry as already mentioned is expressly permitted under the SALT agreements and is readily translated into SDI outputs. All of these efforts can be supplemented by the research devoted to improving ABM systems - and though these are limited to land-based systems, they can be made increasingly effective and readily deployed.

It is not possible to separate out the research, technologies and even the weaponry along sharp lines that identify them for control purposes as offensive or strike weapons, or as defensive or retaliatory weapons, or as deterrent as opposed to war fighting weapons. Improved weapons technologies, especially ballistic missiles, afford, increasingly, the opportunity of having threatening weaponry or even first strike weapons available for war fighting, with lowered demands on mobilization and preparedness, so that surprise attacks or more effective threats might be more easily mounted in the future.

If the Soviet Union continues to pursue a defensive initiative, after undertakings to refrain from doing so, and if there is no way that we can assure ourselves by "verification" that it is not doing so, or if it pursues measures that unbalance our present balancing, or if it introduces new weaponry not covered by the arms control agreements, or refuses to refrain from using force aggressively throughout the world, the United

States thereby is under threat of attack in general or a threat against its prestige or influence throughout the world even if a war does not occur. Moreover, such an imbalance would favor the Soviet Union with enormous strategic advantage if war fighting did take place.

Finally, if the Soviet Union engages in such unverifiable SDI related efforts, it stands to gain from these technologies and will quickly be in advance of the United States. This would serve to threaten the United States or other states under conditions in which the threat cannot be countered or opposed. The technologies could open new opportunities for political or technological breakthrough. They would also serve the Soviet Union in other activities such as enhancing the technologies for exploiting outer space generally - and capturing a strategic arena through technological advance. In short, the entire balancing or reciprocating process with the Soviet Union is dynamic - not fixed for all time by existing agreements. It covers only part of the problem about using force in foreign affairs, while it leaves open a wide use of weapons and weapons measures that are not covered, and cannot be covered by agreements based upon promise alone.

3. Is the strategic defense initiative compatible with arms control policy and with the agreements on arms control?
Does it not mean the end of the arms control arrangement involving the ABM Treaty?

The SDI is intended to operate as a research effort. It may provide us with valuable information - e.g. that both our efforts and those of the Soviet Union cannot proceed through defensive measures, or, alternatively, that such measures will strengthen our deterrence strategy and in fact are critical in doing so.

The SDI research is designed at limited cost to assure us several things. We must be assured that a defense system is survivable - i.e., survivable under attack or other use, and can be made survivable without excessive cost. It must tell us that the system is technically feasible and what measures can be taken to assure its operation or invulnerability during hostilities. Finally, it must establish whether the system would be too costly by weighing in what the Soviet Union can do, and what cost, to keep it from working. None of these matters can be determined without making the research effort.

The SDI falls within our arms control effort and policies because the fundamental object for both is to prevent nuclear, or even major, warfare from breaking out between the two countries. But we must bear in mind that the arms control effort presently does not extend to controls over the uses of force, or provide the means to determine when the use of force is permissible, and non-aggressive. Our current arms control agreements extend to weapons that can be covered, through negotiation and stipulation, under the formalized agreements and no more.

Moreover, the problem of verification dogs SDI just as it does other arms control matters. The agreements are useful and supportive of

security only if we and the Soviet Union can monitor and assure ourselves that the other side is complying with the agreements. This we cannot do with regard to research, or with regard to much of the technology, development and testing. Agreements are only a promissory exchange unless they have provisions for the means to make them effective. These provisions in the arms control agreements are those that enable us to verify that the Soviet Union complies with the agreements. If they do not work, the agreements do not work.

Thus the arms control effort based on the ABM treaty and on the nuclear balancing system is useful only as long as the balancing of the strike weapons can be maintained. It is this effort that has not been fully effective, and which is steadily losing its effectiveness and needs strengthening at this time. The agreements can gradually become ineffective, but if this decline is prolonged without attention to overcoming it, we can find ourselves at a point where the Soviet Union is placed in a position to exploit the strategic advantage offered.

Hence the reasons for pursuing SDI as a strategy become increasingly clear. It can extend into research gradually - into technologies with a multi-facet element, with a variety of technological opportunities. And there is still the possibility that SDI is essential because countries like France that are not under arms control and ABM agreements will pursue SDI, and that the Soviet Union will then insist for that reason they (but not us) are justified in pursuing SDI.

4. But is not SDI a "militarization" of outer space?

The Soviet Union claims that the SDI is a part of a pattern of militarization of outer space by the United States. But the Soviet Union unlike the United States, has carried out numerous tests of anti-satellite and other weaponry into outer space. Its ballistic missiles and strategic ballistic missiles are dependent upon space trajectories. Its ABM system must operate into outer space.

Militarization of space is a vague notion. Claims of militarization are largely made for propaganda purposes. Or they may take advantage of uninformed public opinion. The treaties on outer space and general international law do not prohibit putting weapons or military support systems in outer space. The 1967 Outer Space Treaty applies only to nuclear and other mass destruction weapons but not to other weapons. These treaties and this law do not prohibit peacetime and peaceful - i.e., non-aggressive - military activities in outer space, but expressly permit them, (except for militarizing or placing military facilities on the moon or other celestial bodies).

5. Does the SDI program interfere with our policy of deterrence?

It is generally claimed that arms control under the SALT agreements assure mutual deterrence only if each side is in an equal

position to deter the other. But some claim that SDI would interfere with deterrence because it would provide a defense against the use of nuclear weapons - i.e., nullifying their rational use as attack weapons, and therefore upsetting the strategic offensive balance, because the side with such weapons would then have the first-strike capability. However, the costs, the testing and development requirements, the targeting and other activities taken to create and deploy an SDI system for defense systems are substantially different from those in developing even comparable technologies and testing them for a system for first strike or operating as an offensive system.

The claim that the United States would employ the SDI to gain a strategic offensive advantage suggests that the United States would pursue a policy of aggression. Moreover, it presupposes that it would be more effective to use an SDI effort, designed for defensive purposes, than to attend to more effective strategic offensive weapons. Such a claim presupposes that the United States would decide upon aggression, thereby acting contrary to past practice, and inconsistent with its constitutional requirements (*i.e.* deliberative process) for engaging in warfare.

Even a limited defense capability, however, would assist deterrence if it ensures that the weapons protected for retaliation are reasonably secure from attack. And a defensive capability, if war occurs, and deterrence breaks down, provides a damage limiting capacity, available for decision makers, if they so choose, to terminate the conflict before an exchange of intolerable destruction occurs.

SDI thus provides the means to supplement the balancing process of arms control, providing the means to overcome the deficiencies in the arms control balance, or in the balancing process. In this, it would operate as a strategy itself and make the arms process more effective, while enabling the parties, both of whom must be expected to adopt defensive measures, to limit their strategic offensive weapons and the strategic weapons build up (*i.e.*, the "arms race" in those weapons).

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Development of Space Research in Pakistan

Pakistan Space and Upper Atmosphere Research Commission (SUPARCO) has been assigned the responsibility of conducting space research in Pakistan. SUPARCO was first set up as a Committee as early as 1961 and subsequently raised to the status of a Commission in 1981 through a Presidential decree confirmed by the National Assembly and the Senate in 1987. The principal goals of SUPARCO are:

- (1) To promote peaceful applications of space science and technology, particularly in the areas which are of direct concern to Pakistan;
- (2) To keep in contact with national and international agencies and organizations on matters connected with or related to space science and space technology;
- (3) To advise the Government of Pakistan on designing of short as well as long term programmes of space science and space technology and assist in devising policies with regard to issues arising out of developments in space science and technology on the inter-national scene.

SUPARCO made its beginning in 1962 with the launching of sounding rockets, the component assemblies of which were imported. Through these launchings, scientific information like temperature, wind profiles, diffusion coefficients, *etc.* were derived in an altitude range of 20-450 km using scientific payloads such as sodium-thermite grenades, chaff or metallized balloon-borne instrument packages. A large number of these experiments were conducted under bilateral and trilateral international scientific cooperative arrangements with SUPARCO's counterpart foreign agencies: US National Aeronautics and Space Administration (NASA), French Centre National d'Etudes Spatiales (CNES), and the British National Committee of Space Research (BNCSR). The main component of the programme constituted launching of meteorological rockets carrying chaff payloads for measurement of wind fields in the 20-60 km altitude range under International Indian Ocean Expedition Programme supported by US NASA, who made a long term loan of ground equipment including a tracking radar, flight path recording computer and the launching tube to SUPARCO. The scientific information obtained through sounding rocket launchings was also supplied to the World Data Center, Boulder, Colorado, U.S.A.

To obviate the need for importing the sounding rockets and their instrumentation, SUPARCO made a policy decision in the 1960's to set up its own sounding rocket fabrication plant supported by instrumentation laboratories, the latter to produce the instrumentation necessary for conducting space research. Over a period of some 20 years, SUPARCO has developed facilities for fabricating sounding rockets which can lift scientific payloads weighing some 30-50 kg to heights ranging from 200 km to 500 km. A broad variety of instrumentation, both for rocket borne and ground based applications, is designed and assembled at the instrumentation laboratories. The rocket launchings are conducted from a launching station located about 50 km north-west of Karachi, which has the distinction of launching the first ever sounding rocket named 'Rehbar-I' from Pakistan on June 7, 1962. As of now, the launching station has different types of equipment to enable assembly of rockets and payloads, their pre-flight testing, launching and post-launching data gathering.

The use of sounding rockets is not proceeding with the same fervor as in the 1960's and satellites in varying orbits around the Earth and even

interplanetary spacecrafts have replaced them. SUPARCO had to accordingly readjust its programmes to derive benefits from available satellites. Here the emphasis areas are satellite remote sensing for natural resources studies, communication satellites for domestic communications and satellite based scientific studies. SUPARCO has been in the business of application of satellite remote sensing data, for a broad variety of applications, since 1973. At present, it is servicing over 55 national user agencies in one form or another. A large number of studies relating to cropping patterns, areas under different classes of vegetation, snow surveys, waterlogging and salinity and sedimentation in dams have already been completed. The field of applications is constantly being expanded as experience and the needs build up. The picture analysis aids include digital computer-assisted equipment - in one system using mainframe computer and, in the other, a desk top computer. With experience of over one decade in the analysis and applications of satellite remote sensing data, SUPARCO is currently implementing a project for the establishment of a satellite ground station at Islamabad to directly receive imagery data from US LANDSAT, French SPOT and US NOAA series of satellites. The station has a full complement of equipment including digital computers and recorders not only to receive and log the data but also to process it to a level that can be readily used. The station is expected to be operational toward mid 1988. A memorandum of understanding for reception of imagery data from US LANDSAT series of satellites was signed with US National Oceanographic and Atmospheric Administration (NOAA) on November 26, 1984, and negotiations are in an advanced stage for signing a memorandum of understanding to receive data from French SPOT satellite with SPOT-Image of France.

As for the use of communication satellites for domestic communications, SUPARCO has already completed a detailed feasibility study, with the help of a US-based consultant, on a domestic communication system, 'PAKSAT', which aims to cater for 4,800 two-way telephone circuits for long-haul traffic, 2,400 circuits for rural telephony, 2 direct broadcast television channels and a host of networking and data relay needs. Application was made to the International Frequency Registration Board of International Telecommunications Union for allotment of slots in the geostationary orbit and frequencies for up and down links for the 'PAKSAT' system. The allocation has been made on a tentative basis for positioning of satellites at 380E and 410E. The first slot is for broadcasting and the second for in-orbit spare. The frequency band allocated is Ku namely 14/11 GHz. Coordination with certain Administrations who had expressed desire to do so, with a view to resolve the interference problems, is continuing to take place. The findings of SUPARCO based on the performance of the feasibility study would now be placed before the Federal Government of Pakistan for a decision on proceeding further with the work on this project, which may be implemented during the Seventh Five Year Plan period, 1988-1993. Parallel with this work, SUPARCO has also well spent the time in developing microwave components and assemblies, especially antennas of different diameters and types, low

noise amplifiers and down converters, with a view to be able to produce a large number of ground terminals like television receive only (TVRO) terminals for reception of TV signals from the satellites. The TVRO terminals designed and produced by SUPARCO have now been in service for over two years with a satisfactory record. The basic idea is to produce in the long run most of the ground equipment for the 'PAKSAT' project in Pakistan. Why have we emphasized the domestic communication satellite, is a question which is often asked. Pakistan, on account of its geography and terrain features, can best be serviced by a communication satellite to meet its pressing communication needs: telephone, television, radio and networking. Here it would also be relevant to mention that some 70% of the population of Pakistan lives in rural areas comprising over 50,000 villages, a number of which are still lacking in even rudimentary facilities like metalled access roads, clean water, electricity, telecommunications and health care. The 'PAKSAT' project will have the potential to bring the much needed television and telephone services to every nook and corner of Pakistan. TV can not only provide entertainment to the rural population but also education in important fields like agriculture and basic health care. A large number of TVRO's, some even powered by solar cells, would thus come in handy for TV community centres in rural areas.

Other satellite application programmes of SUPARCO are for position mapping, weather monitoring, and calculation of vertical temperature and humidity profiles. New applications would include search and rescue, collection of data from unattended platforms and its relay to a central station, radio location of mobile platforms and crustal dynamics studies.

In the fields of Ionospheric Physics, SUPARCO is conducting research using data on the ionosphere obtained through ground based ionosondes as well as satellites. It is operating three ground stations, one of them has been recently equipped with most up-to-date digital ionosonde, another unit with even more current features is already on order and on its arrival it would also be possible to carry out oblique soundings of the ionosphere. Besides yielding data for basic ionospheric research, these stations also allow calculation of optimum frequencies for specific communication circuits, the information in demand by the users of high frequency radio equipment. To back up a number of scientific studies like ionospheric research, a geomagnetic laboratory obtains signals from proton precession and fluxgate magnetometers, to sense and record the total earth's magnetic field as well as its three components with an accuracy of 0.1 gamma and 1 gamma respectively, on a 24 hour basis. This data is also supplied to the World Data Center, Boulder, Colorado, USA.

The most important aspect of the development programme is human resources of right qualifications and experience. As yet the curriculum of institutions of higher learning in Pakistan is not such that their graduates could be directly engaged in space science and technology. To compensate for this educational deficiency, SUPARCO regularly conducts

an Orientation Programme, lasting 6-8 months, for all scientists and engineers fresh from universities who enter its service, to give them first-hand knowledge of disciplines which are new to them. The Programme will be further strengthened and enlarged in scope and planted in the proposed Aerospace Institute where the scientists and engineers will undergo an intensive two year course and on its successful completion they would be awarded master's degrees in space science or space technology depending upon the entrance qualifications of the individuals. The Aerospace Institute is expected to be fully functional in the next 24 months.

There is no science in isolation. SUPARCO firmly believes in this absolute truth. Deliberate efforts are made on an ongoing basis to establish cooperation and links with both national and international institutions to break isolation. SUPARCO has been maintaining regular liaison with foreign space organizations especially CNES of France, NASA of the U.S., Swedish Space Corporation and the European Space Agency for this purpose. Pakistan has been a member of the United Nations Committee on the Peaceful Uses of Outer Space since 1974. Pakistan is also a member of the Committee on Space Research, known as COSPAR, and in 1986 it was elected as a member of the International Astronautical Federation. SUPARCO has also applied for membership of the International Union for Conservation of Nature and Natural Resources (IUCN). Pakistan participated in the UN Conference on the Peaceful Uses of Outer Space 'UNISPACE 82' held in Vienna, Austria, from 9 to 12 August, 1982, where its delegate was elected as one of the Vice-Presidents of the Conference. Pakistan's contributions in the work of the UN Committee on the Peaceful Uses of Outer Space and its Sub-Committees are well known. Pakistan has been in the forefront to seek resolution of an agenda dealing with activities of States on the Moon and celestial bodies; use by States of artificial Earth satellites for international direct television broadcasting; remote sensing activities conducted by member States from space; use of nuclear power sources in outer space; and the geostationary orbit. It has stressed the need for evolving fail-safe design of nuclear power sources intended to flown on board spacecrafts and elaboration of an international instrument to govern the use of nuclear power sources in outer space covering right from the launching stage to the responsibility of the launching state to the state(s), whose territories may be contaminated as a result of accidental re-entry of spacecraft, for clean-up and compensation. Pakistan believes that the geostationary orbit is an integral part of outer space, thus falling within the purview of 'Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, 1967'. At the same time, it insists that an adequate number of slots in the geostationary orbit should be reserved for the developing countries for meeting their legitimate communication needs. Pakistan also feels that there is a need to define and delimit the outer space as with increasing activities in space, especially involving reusable spacecrafts and future hypersonic air-spacecrafts, the absence of an internationally agreed upon definition may lead to disputes and compromise the sovereignty of states. On the question of remote sensing

of the Earth from space, Pakistan believes in free dissemination of remotely sensed data and its availability to the sensed states on a priority basis. Pakistan firmly opposes extension of the arms race into space as this trend would not only heighten the international tensions, with attendant danger of an open conflagration, but also seriously impede the promotion of peaceful applications of space on an ever-widening international scale. For over one decade, Pakistan has been proposing the establishment of an International Space Agency with a strong mandate which, inter alia, should include necessary measures to bring about a halt to the military activities of states in space and to promote the peaceful applications of space especially for the benefit of the developing countries. Pakistan would continue to make its whole-hearted efforts to bring about increasing cooperation amongst states, especially in the field of science and technology, for peace and social and economic development. This fits very well into what SUPARCO is striving for.

Salim Mehmud
Chairman, SUPARCO
Pakistan

Short Accounts

The 30th Anniversary of the Space Era: International Conferences and Forums

The year of 1987 was marked by many important events and celebrations of jubilees of outstanding performances, some of which are of historical value. The 30th anniversary of the space era is one of them. The beginning of this era was signified by the launching of the first artificial Earth satellite in the Soviet Union in October, 1957. This date was widely celebrated in many countries all over the world. In the USSR many different conferences, films, meetings, books, stamps were devoted to this jubilee. The most culminating point was achieved by two international conferences attended by prominent Soviet and foreign specialists in the field of the exploration and use of outer space.

The first conference which was devoted to the history of aviation and space investigations was held at the end of September, 1987, in Moscow, Star City and Kiev. Such meetings have become traditional since they are annually held and are often of international character. Many scientists who are engaged in various fields of the exploration and use of outer space, and spacemen from different countries who had made flights on board the Soviet space ships and stations, were invited to this conference. Special attention was given to space veterans -- people who laid the foundation of the space era of mankind.

The conference was characterized by an interesting combination of reports which touched upon the history of space investigations, analysed the modern level of the development of space activities, and forecast further prospects of the exploration and use of outer space.

At this conference, prominent scientists and spacemen made reports on different subjects such as: the development of space technology in the Soviet Union; the industrialization of outer space; the main results and further prospects of space investigations; the contribution of space biology and medicine in settling the problems of man's activity in space; the training of spacemen in the Soviet Union, etc.

The second conference held on October 2-4, 1987, can be without exaggeration called an event of unique importance. For the first time, on the initiative of the scientific community, an international forum was held in Moscow under the motto "cooperation in space for the benefit of peace on the Earth". 890 persons from more than 30 countries took part in it. The forum was distinguished by the great variety of problems discussed. Prominent scientists and specialists in different branches of space research, including not only technology but also economy, politics, law, and even trade, made reports at this forum. Spacemen and astronauts from many countries met each other at the forum and discussed their professional problems. All discussions at this forum were of an informal and open character. They were held in the framework of sections and round tables, and were devoted to such problems as space and science, space and economy, space and man, space and ecology, space and international relations.

The main idea of the forum was as follows: outer space must be used for peaceful purposes in the interests and for the benefit of all mankind. The most important task of our day is the prevention of an arms race in space. The participants of the forum supported the idea of proclaiming the year of 1992 as space year.

The greatest attention at the round table "Space and International Relations" was given to the discussion of social, political and legal problems of the exploration and use of outer space. The participants stressed the danger of an arms race in space and the necessity of strict observance of international agreements and in particular the Outer Space Treaty, the ABM Treaty and others. They also pointed out the importance of the improvement of international mechanisms of international cooperation and, in this connection, they discussed the Soviet proposal for the establishment of a World Space Organization.

The participants of the forum signed an appeal in which they pointed out that the peaceful use of outer space was a global problem for all mankind and that the cooperation in outer space among all states met the interests of all mankind.

E. Kamenetskaya and E. G. Zhukova
Doctors of Laws (USSR)

Seminar on "Open Skies", Washington, DC, November 4, 1987

A seminar on "Open Skies and Observations. Satellites: An Opportunity for U.S. Leadership" was held at the George Washington University on November 4, 1987. It was co-sponsored by the Space Policy Institute of George Washington and Space Age Law and Policy Institute of Philadelphia. The Seminar, chaired by *John Logsdon*, Director of the Space Policy Institute, was convened to discuss the implications for United States leadership in the international sphere of the 1987 Department of Commerce (NOAA) regulations. These regulations implement Title IV of the Landsat Act of 1984 by establishing procedures for licensing of private remote sensing space systems.

In opening remarks, *Colleen Driscoll Sullivan*, Director of the Space Age Law and Policy Institute, discussed the changing international situation with regard to observation satellites since the launching of the French SPOT satellite in February 1986. With SPOT and the Soviet Soyuzkarta organization offering higher resolution remote sensing data for sale commercially, technology is moving the international community toward global open skies.

However, in the United States, the implementation of the Landsat Act has raised two issues: "the jurisdiction scope of the regulations" and "the effect of foreign policy concerns on First Amendment rights." Media representatives, looking toward a possible future mediasat, have called the regulations "unconstitutionally vague" in their use of the terms "national security" and "international obligations." The Seminar speakers went on to discuss the effect of remote sensing policy on U.S. foreign, domestic and economic policies and on strategic and long-term interests.

Peter Zimmerman of the Carnegie Endowment for International Peace discussed the state of remote sensing technology. In the future satellites will have to be optimized to fit the needs of particular markets. There is a growing realization that the United States will be giving away its leadership in this field if it does not support a strong remote sensing program through Landsat.

John McLucas, Chairman of the Board of Questech, discussed the idea of internationalizing commercial remote sensing. An international agency might lease capacity from existing national systems. The United States could call for an international conference to discuss the potential for such an agency.

In his remarks, Congressman *George Brown* (D-CA) recalled the 1955 Open Skies proposal of President Eisenhower. Reconnaissance satellites have contributed to the conclusion of arms control treaties between the U.S. and the Soviet Union: perhaps an international agency could build upon this success. The Congressman proposed steps toward regaining U.S. leadership: a commitment to Landsat; removal of restrictions from media use of the data; transfer of technology from military to civilian uses; and a U.S. call for global open skies conference.

Maj. Gen. Jack Thomas, a Consultant to the Secretary of Defense, discussed national security concerns. There are no problems at the present time and as yet no application has been made for a license under the 1984 Landsat Act. Eventually the national security issue will probably be tested in court.

A report on the Seminar is being issued and will be available along with a Bibliography on Remote Sensing.

Colleen Driscoll Sullivan,
Director,
Space Age Law and Policy Institute

The Common Heritage Institute's 20th Anniversary Colloquium on "The Common Heritage Concept: Past, Present and Future", Villanova, December 11 and 12, 1987.

On December 11 and 12, 1987, in honor of its 20th anniversary, the Common Heritage Institute of Villanova University held a Colloquium on "The Common Heritage Concept: Past, Present and Future." The Colloquium was called to consider the meaning and implications of the common heritage concept and its application to Antarctica, the Oceans and Outer Space. *Arvid Pardo*, the "Father" of the Law of the Sea Conference, recalled his 1967 speech to the United Nations General Assembly in which he encouraged the nations to declare the seabed the "common heritage of mankind."

In the opening session *Dr. Pardo* and *Elisabeth Mann Borgese*, Director of the International Ocean Institute in Malta, discussed the history and application of common heritage as a philosophical concept. It is outside currently operating international law and politics and therefore not in the interest of the more powerful nations who benefit from the status quo. The concept is an exception to the rule and thus, when used and generally accepted in a particular circumstance, establishes precedent, as in the Law of the Sea and the Outer Space treaties. It was noted that the concept has been presented as a rich/poor nation issue rather than as a question of shared rights, benefits and obligations.

Dr. Christopher Joyner of the George Washington University and *Dr. John J. Logue*, Director of the Common Heritage Institute, looked at the common heritage concept as it might be applied to Antarctica. It is open to question as to what extent Antarctica will be commercially valuable. Therefore, *Dr. Joyner* suggested, it might be in the best interest of all that it is maintained as a common heritage area used for scientific inquiry under the protection of the present Antarctica Treaty System.

Dr. Pardo and *Mirian Levering*, Vice President of the Ocean Education Project, discussed the common heritage in terms of the Law of the Sea Treaty. It is in reference to the seabed that the concept of common heritage has been most applied and debated. During the time between

Arvid Pardo's 1967 "common heritage" speech in the United Nations and the signing of the Treaty in 1983, national interests evolved the seabed common heritage away from *Pardo's* use of "present" jurisdiction to the creation of an exclusive economic zone and the protection of special interests.

In the session on the common heritage and outer space, *Dr. Carl Christol* of the University of Southern California noted that there is no definition of "peaceful uses" in reference to outer space. This is a concept which needs to be developed more precisely so that the international community can make decisions on proper uses of space. *Dr. Vladimir Kopal*, Chief of the Outer Space Division of the United Nations, discussed the development of space law and of the concept of common heritage. The common heritage of mankind concept might be made a future item for the agenda of the Legal Subcommittee of COPUOS.

The Colloquium ended with a general desire that the common heritage concept be discussed at similar meetings so that its meaning and application can be further defined and developed. Its use in regard to Antarctica, the Oceans and Outer Space is only one possible aspect of the concept; one based on territorial jurisdiction and resource use. Common heritage might also be applied to other areas, such as culture.

The proceedings of the Colloquium are being published.

Colleen Driscoll Sullivan
Associate Director
Common Heritage Institute
Villanova University

Second International Conference on the Commercial and Industrial Uses of Outer Space, Montreux, Switzerland, 21-25 February 1988.

Space Commerce '88 brought together about 550 participants - government and space agency officials, business executives and scientists - involved in the many and varied activities which are or will be contributing to the commercialization of outer space.

The conference programme covered a variety of commercial issues with respect to outer space development, including space industry, space communications, economics and policies affecting space business. Additional topics addressed launcher procurement, conditions and terms, the usage of new space facilities and the fundamentals of the commercial space scene. Also included were keynote addresses by space agency and industry leaders on the needs of the user industry.

Many speakers raised and addressed the international and legal aspects of commercialization of outer space. For instance, *Mr. Robert Anderson*, Chairman of Rockwell International's Executive Committee, noted that only through both international cooperation and competition could the nations of the world build a broader scientific and technical base, assure wide-ranging, reliable, cost effective access to space and build a work platform in space. He pointed out that no one nation in

isolation can accomplish all that is necessary in space because of the cost and the risks involved. However, he also recognized that cooperation would be difficult to achieve because of the impulse to seek a competitive advantage to serve our national interests. *Mr. Anderson* called for cooperative research projects of wide scope, while safeguarding the intellectual property of the participants.

Mrs. Anna-Marie Hieronimus, Head of the Space Commercialization Office of the European Space Agency (ESA), recalled the resolution adopted by European ministers meeting in The Hague on 10 November 1987, in which the ESA Council had encouraged the private sector to make use of the available capacity, participate in the investments and take over operating responsibilities. She said that the resolution was a new challenge not only to ESA but to European firms, banks and investors as well. *Mrs. Hieronimus* called Space Commerce '88 "a new demonstration of transatlantic friendship" and noted that the papers presented pointed out the similar difficulties and the shared hopes.

Robert. H. Brumley, Deputy General Counsel of the U.S. Department of Commerce, in his address to the participants via communication satellite, discussed the legal aspects of space business. He emphasized that the greatest threat to the stability of the commercial space sector rests in the existing uncertainty with regard to applicable law, regulation and policy. He noted that uncertainty, particularly with regard to national space policy and legal and financial liability, directly affects the availability and cost of both capital and insurance. *Mr. Brumley* noted that the current Administration has taken several affirmative steps toward facilitating the successful privatization of commercial space activities. He expressed his belief that the current legal and regulatory structures, both domestic and international, which affect space-based commercial activities, provide a suitable framework for the continued commercialization of space and that there does not appear to be need for an independent "legal regime" unique to space.

Mr. Mohammed B. Dahbi, Director of Faugere & Jutheu S.A. Paris, presented a paper entitled "Insurance, Safety, and Liability Considerations." He noted that, as a result of privatization and commercialization of launch services, spacecraft liability insurance becomes more and more important. The critical questions concern the limits which can be provided by insurance and the duration of the coverage. At present, it is possible to obtain a limit of 500 to 750 million dollars per insurance. He advocated that the states concerned should agree to assume the liability exceeding that obtainable on the insurance market.

Mr. Stephen F. von Welck, German Society for Foreign Affairs presented his paper "Restrictions on the Export of Space Technology." He noted that increasing commercialization of "dual use" space technology results in a dilemma. Private companies, which have developed this technology, try to sell it on the international markets. Government can prevent or channel these exports only by means of export legislation and administrative procedures. The governments of many industrialized countries are consequently facing major conflicts of interests.

Prof. Alexander I. Dunayev, Chairman of GLAVKOSMOS, in his address at the conference, emphasized the necessity to use space opportunities unretardedly and independently of the success or failure of any national program. He also called for the setting up of a World Space Organization that would assist in the implementation of major international projects of different kinds.

Mr. Andrea Caruso, Director General of EUTELSAT, declared that some of the terms and conditions which are imposed upon the customers for obtaining the launch of a satellite were no longer acceptable. The cost is too high and it is usually paid against a promise of "a best effort" with little or no penalties for the launch supplier in case of significant delay or failure.

Mr. Mark Frazier, Chairman CEO, The Services Group, Arlington, VA., U.S.A., suggested the establishment of international satellite launch centers and to associate them with free ports or free zones to stimulate the development and commercialization of outer space.

The conference was complemented by a major commercial exhibition showing the products of 60 exhibitors from 12 countries: Canada, Japan, France, Great Britain, Germany, Italy, Belgium, Netherlands, Sweden, Switzerland, United States and Soviet Union.

Jerzy Rzymanek
Institute of International Law
Warsaw University

"Environmental Aspects of Activities in Outer Space - State of the Law and Measures of Protection." International Colloquium organized by the Institute of Air and Space Law, Cologne University, held at Cologne, May 16-19, 1988

In 1988, the University of Cologne celebrates its 600th anniversary. One of the events arranged in this context was an International Colloquium about environmental problems in outer space. In an interdisciplinary approach, thirty experts, among them natural scientists, technicians and lawyers, presented their papers.

The discussion concentrated on the problems caused by space debris and the use of nuclear power sources (NPS) in outer space. All speakers agreed that space debris has become a serious threat to space activities and that there is an urgent need for countermeasures. *Prof. Rex* presented the results of a new study elaborated upon request of the German Ministry of Technology. It was shown that there are about 30,000 to 70,000 pieces of debris larger than 1 cm in orbit. In the case of a collision, their average impact velocity will be 5.7 miles per second. The chance of an impact damaging the planned U.S./International Space Station within its lifetime of 30 years is 10.4-19.0%. Although each manned module will have protective shielding weighing 1,750 pounds, only millimeter sized particles can be stopped.

Despite this rather frightening outlook, some good news could also be announced. There seems to be a heightened awareness of the space debris problem. NASA and ESA now have working groups on that subject, national studies are initiated in Germany. In January, the first space debris report was presented to the United Nations (Doc./A/AC.105/403). Design changes to prevent unintentional explosions of rocket upper stages (a main source for debris) have been successfully carried out for the U.S. Delta launcher. *Dr. Flury* reported that similar work for Ariane is on the way. *Lt. Col. Schwetje* said that USAF is also aware of the problem. SDI experiments will be analyzed before launch and redesigned if necessary to alleviate the debris problems. An example was given by *Dr. Perek*, who showed that all debris produced by the Delta 1180 experiment of September 1986 had decayed by November 1987 because a sufficiently low orbit had been chosen. According to *Prof. van den Bergh*, the project "Effect Tower in Space," which would have been troublesome for astronomical observations, could be stopped. Regarding the NPS problem, *Dr. Kopal* reported some success in the work of UN COPUOS.

Countermeasures against space debris were discussed by most speakers. Some proposals were not recommended. A retrieval of debris is, according to *Prof. Rex*, technically not feasible or highly uneconomical. *Dr. Flury* showed that shooting nuclear waste into the sun is not possible. *Dr. Perek* said that keep-out zones around satellites cannot work for technical reasons. Tracking improvements may be possible, but would be very expensive. *Prof. Carver*, *Prof. Rex* and *Dr. Flury* discussed the question of disposal orbits. Such a graveyard orbit was recommended only for the GSO, and only as an interim measure. That concept does not work for lower altitudes. The speakers agreed that steps to be taken should comprise: planned decay of spent parts and old satellites, prevention of explosions in outer space and reservation of outer space for peaceful and useful missions.

Regarding the legal situation, *Prof. Gorove* discussed the shortcomings of the Liability Convention. If there is debris involved, in his opinion the concept of strict liability or of a "negligence *per se*" should be adopted because fault would be too difficult to prove. *Dr. Perek* found also the Registration Convention insufficient. To compute an orbit, six independent elements are needed, but space users only provide the U.N. register with three of them. Orbital changes are not reported. *Dr. Flury* added that additional parameters such as weight and dimensions are needed to predict the decay of a satellite. But changes in the Conventions seem to be unlikely. *Prof. Gorove* felt that neither the USA nor the USSR favored a space debris discussion in COPUOS at this time. However, he suggested that the UN should prepare an appropriate questionnaire addressed to all spacefaring nations and international organizations to find out precisely what environmental protective measures are already being followed in connection with space activities. Such a survey would be most useful in determining the nature and chances of appropriate international action (UN resolution, treaty, etc.) with respect to different environmental hazards.

Prof. Williams found that space law is no longer slow to develop. According to *Judge Sir Robert Jennings*, a new form of customary law is now developing: the "instant custom." The fast progress in the technical world leads in his opinion to crucial changes right to the core of international law. *Judge Lachs* added that customary law of that "instant" kind could fill gaps, when treaties prove to be impossible because of political reasons. But even then, the legal situation regarding environmental protection in outer space is far from satisfactory. In fact, there is urgent need for supplementary rules. The question remains: who will draft them? Customary law is too general to set detailed technical guidelines; and UN COPUOS seems to be too politicized and too slow to react.

A new concept was put forward by *Dr. Jasentuliyana* and *Dr. Reifarh*. Their idea is that space user states should establish an international panel of technical experts. They would issue "Traffic rules" and technical standards for outer space. Such an "evolutionary process" of policy making could be flexible enough to deal with environmental problems. As the space users are also the potential victims of space debris, the common will and interest in finding solutions would lead to practical results.

The interdisciplinary approach of the Cologne Colloquium turned out to be of great advantage. Legal rules in outer space must be technically feasible and also be feasible in terms of costs. As *Prof. Bockstiegel* pointed out in his closing remarks, the dialogue between natural scientists and lawyers is very helpful in order to achieve that goal.

Elmar Vitt

Candidate for a Doctor's Degree in International Law
Cologne University

Other Events

The first international symposium on Europe in Space focusing on technological and industrial cooperation brought together a large international gathering in Strassbourg during April 1988.

Space Challenge '88, the Fourth National Space Symposium, held in Colorado Springs, April 12-15, 1988, dealt with issues involving the U.S./International Space Station, remote sensing, satellite telecommunications, the SDI, East-West launch competition, international cooperation and plans for a Moon base, Mars and beyond.

The Space Law Interest Group of the American Society of International Law met for an informal program organized by *Prof. Stephen Gorove* of the University of Mississippi Law Center on April 23, 1988 during the annual meeting of the Society in Washington, D.C. *Lt. Col. Kenneth Schwetje* (USAF) made a slide presentation and commentary on the new Presidential space policy and *Paul Szasz*, Director of the General Legal Division of the U.N. Secretariat made a report on the recent meeting of the Legal Subcommittee of COPUOS.

U.S. commercial space launch regulations, allocation of space launch risks, considerations for comprehensive space legislation, remote sensing data as legal evidence, and a separate international satellite system and service, were among the topics of discussion during the annual meeting of the AIAA Technical Committee on Legal Aspects of Aeronautics and Astronautics held in Washington, D.C., May 4, 1988.

The new Presidential policy and legislation concerning privatization were selected for presentation by Air/Space America '88 Legal Forum, cosponsored by National University's School of Law and Aerospace Studies in San Diego, May 17, 1988.

Brief News

The Congressional Budget Office in a recent study on long-term funding requirements of the U.S. space program indicated that ambitious goals like a manned mission to Mars or a lunar base would require a NASA budget of over \$30 billion by the year 2000, while current level of funding would require acceptance of higher risks and restructuring of the current program toward unmanned activities....The Subcommittee on Science, Technology and Space of the Senate Commerce Committee held hearings on liability issues faced by the commercial, expendable launch industry.

The recently discovered oldest and most distant galaxy is ten times larger than the size of the Milky Way Galaxy.

The U.K. had decided to review its earlier decision not to take part in the Columbus polar platform project - a part of Europe's contribution to the US/International Space Station....Both China and Japan had successfully launched communications satellites earlier this year....While private U.S. space industry already has contracts for the launch of 20 payloads and may get 10 more by the end of 1988, two American satellite owners have contracts with China to launch their communications satellites.

Videoconferencing provides new opportunities for the legal community for taking depositions, witness testimony and evidence from foreign countries.

A ban on nuclear reactors in earth orbit, proposed by a committee of Soviet space officials and the Federation of American Scientists, would terminate the use of Soviet nuclear-powered RORSAT-s and the American SP-100 pilot project for orbiting nuclear reactors to power strategic defense weapons.

Afghan and French astronauts are expected to participate in a joint international manned space flight with Soviet cosmonauts on the Mir space station....A defunct Soviet nuclear powered reconnaissance satellite, Cosmos 1900, may crash to earth later this year....Kosmolyet, or "space flyer," the Soviet version of a space shuttle, may carry two Soviet cosmonauts into space and use jet engines on its return to earth.

The U.S., U.S.S.R., Canada and France agreed to provide long-term support for a satellite-based system for search and rescue operations.

The recent successful launch of Ariane IV opened the way for its services being offered on a commercial basis.

B. Forthcoming Events

The International Institute of Air and Space Law of Leyden University is organizing a Latin-American Conference on the Law of Air Transport and Outer Space in cooperation with the Universidad Nacional Autonoma de Mexico in Mexico City, August 15-18, 1988.

As already reported in our previous issue, the 31st International Colloquium on the Law of Outer Space will be held in Bangalore, India, Oct. 8-15, 1988, during the 39th Congress of the International Astronautical Federation, the theme of which will be "Space and Humanity." Topics to be discussed will be: 1. Legal Aspects of Maintaining Outer Space for Peaceful Purposes; 2. Space Law and the Problems of Developing Countries; 3. National Space Laws and Bilateral and Regional Space Agreements; and 4. General Issues of Space Law. During the same Congress the International Academy of Astronautics will hold a Symposium on Benefits to Society from Space Activities.

The Belgian Society of International Law is sponsoring an International Colloquium on Telecommunications Satellites and International Law in Brussels, Nov. 8, 1988.

Technospace 88 is to take place in Bordeaux, Dec. 6-9, 1988.

An international conference on Space Commercialization: Roles of Developing Countries, sponsored by the University of Tennessee Space Institute and cosponsored by the United Nations, the American Institute of Aeronautics and Astronautics, and the International Academy of Astronautics, will be held in Nashville, Tennessee, March 5-10, 1989.

Space Shuttle, A Quantum Leap, by George Torres (Presido Press, 1986), pp. 134.

This paperback dedicated to the memory of the *Challenger* crew who lost their lives on January 28, 1986, is an informative, picture-filled analysis of man's growing activities in space. After a Foreword by Astronaut *Mike Collins*, Chapter One, *A Quantum Leap into the Future*, provides an introduction to the book and recaps our accomplishments in space. Mankind has launched hundreds of satellites, sent mechanical visitors to other planets, had men walk on the moon, and developed the Space Transportation System or Space Shuttle. In the last thirty years, the world has learned more about the universe, the solar system, and our own planet than in all previous history combined.

An Era Begins is the heading under which the next three chapters are found. It provides an overview of the early accomplishments of the space age and an examination of the *Mercury* and *Gemini* Programs, the efforts involved in Mankind's Greatest Adventure, landing on the moon. The reader is also informed of the decade of the 1970's when the United States developed Skylab with an opportunity to study-from the view of earth orbit-the earth and the sun, as well as to conduct various scientific, technological, and biomedical experiments under zero gravity. International space exploration took a giant step in July 1975 when U.S. and Soviet astronauts met in space for two days of research and international goodwill.

Chapters five through nine are grouped under the heading of Growing Space Activities, and are entitled The Space Shuttle Opens a New Era, Why Space, The Military Use of Space, Manufacturing in Space, and Scientific Exploration of Space. The early 1980's proved to be the years in which the United States amazed the world by launching the first space shuttle, *Columbia*, a vehicle which ventured into orbit only to return as an airplane. No longer would we see splash downs, for now the runway would be the place for touchdowns. The space shuttle has a capacity far superior to that of earlier launch vehicles. It can launch much bigger, more capable satellites, enables on-orbit satellite repair and servicing, and has widened the prospects of constructing a space station. The shuttle has much larger payload capabilities and is able to return cargo safely to earth whereas earlier launch vehicles could only deliver cargo into orbit.

The military also has a demand for the benefits of space. Better weather information, reliable communications and accurate navigation are vital to a military outfit. The military is responsible for launching many surveillance satellites which provide knowledge of large military movements anywhere in the world. Finally, Strategic Defense Initiative (SDI), seems to be the latest large experiment with space. SDI is a space

based missile defense which could render intercontinental ballistic missiles obsolete, thereby moving away from Mutually Assured Destruction, a doctrine that now exists.

Manufacturing in space promises many benefits for the future from the shuttle project and the space program as a whole. In zero gravity, sedimentation and thermal convection which hamper manufacturing on earth, are non-existent. Containerless processing has already been proven feasible. The potential for medical breakthroughs is enormous. Spacelab, a general purpose laboratory which fits in the shuttle's cargo bay, is intended to allow researchers to perform research that cannot be done on earth. The space shuttle will also expand man's ability to explore the universe as never before.

The final chapter explores plans and visions for the future. A space station is the next step to establishing a permanent presence in space. Due to the ability to routinely transport material and people to and from a space station, this goal is certainly within reach today. The author concludes with information regarding prospects for manned settlement of the solar system.

After the textual material, the book contains some appendices and finally a glossary that defines many of the acronyms used in the space program.

The Telecommunications Deregulation Sourcebook, edited by Stuart N. Brotman (Artech House, 1987), pp. 342.

This reference book compiles landmark regulatory agency and court opinions concerning deregulation in the telecommunications field. Serving as either a research guide or a handy desk-book, this volume sets forth the advances and regressions of past deregulation.

Divided into four major parts, the sourcebook seeks to give the reader a comprehensive workable framework of relevant studies, pronouncements and regulatory decisions. Part 1, entitled "Broadcasting" begins with those opinions justifying major steps toward the deregulation of radio and television. Mini-digests follow case styles, giving the researcher a brief synopsis of the opinion. Part 2 concerns "Cable Vision and New Video Media." The growth of these industries quickly outstripped the dated regulations which sought to control them. This is illustrated by the excerpts chosen for this section. Following the same format as in Part 1, opinions concerning Low Power Television (LPTV), Master Antenna Television (MATV), Subscription Television (STV), and Direct Broadcast Satellites (DBST) as well as competition and rate regulation are included.

Turning next to "Common Carriers", Part 3 speaks of the deregulation of telephone facilities, satellite usage and computer access with relation to the telecommunication industry.

Part 4 consists of 2 appendices. Appendix A is entitled "Deregulation of Technical Standards" and illustrates the Federal

Communications Commission's attempt to eliminate the regulations which serve no useful purpose. Appendix B sets forth two excerpts of dissenting opinions which, in its editor's opinion, showed the role dissenting views have in molding major policy decisions.

Each section's excerpts have been carefully chosen and edited to avoid redundancy, dated reference and cumbersome footnotes. The purpose of the sourcebook is to make itself useful to a broad range of readers from industry management to communications lawyer and student of the field.

Further, this volume attempts to show where deregulation may be headed by its arrangement of its excerpts in chronological order. Most of the sources place great emphasis on letting the marketplace determine policy. The implication of the editor is clear - the future of the telecommunications industry lies in competition, which cannot exist in harmony with regulation.

Radiodetermination Satellite Services and Standards, by Martin A. Rothblatt (Artech House, Inc. 1987), pp. 187.

In four short chapters, *Martin A. Rothblatt*, President of Geostar Corporation, provides the reader with a concise description of the Radiodetermination Satellite Service (RDSS) along with its design, management and applications.

The first chapter explains exactly what RDSS is and what it does. Mainly, RDSS is a series of radiocommunications and computational techniques allowing users to determine their geographical position. A person in a given part of the world can, through the use of RDSS, locate and determine positions and objects anywhere in the world.

The particular advantages of RDSS over similar services, such as cellular radio, include lower operating costs, better positioning accuracy along with better voice communication. The chapter concludes with the twenty year development history of RDSS.

In dealing with the general RDSS system design (Chapter 2) of RDSS, the author reviews the information flows and communication theory, as well as its positioning theory and accuracy. Apart from the general system design the space-segment, control-segment and user-segment designs are also dealt with in detail.

The third chapter covers issues that arise in the management of the RDSS System: how to manage more than one RDSS system in the same coverage area as well as how to control traffic and prevent interferences, as may arise with systems, such as fixed microwave service, radio astronomy and other satellite services.

How practical and to what use can RDSS be applied? What segments of society will benefit from RDSS? These are the questions that the last chapter addresses. General benefits from RDSS to society include: two-way contact between aircraft and ground controllers, the ability of navigation flight crews to determine their position, their desired location and surveillance, and the ability of controllers to determine the location

of an aircraft in the sky. Benefits to the maritime community include improvements in vessel traffic services, positioning information, fishing area identification, oil spill tracking, rig positioning and many more.

Personal RDSS and its advantages over similiar technology in the land-mobile context and RDSS application to law enforcement ranging from receiving police calls to maintaining moment-to-moment station information and police resources for command control purposes are highlighted. Also explored are the promise of RDSS to make more comprehensive, accurate and economical quantitative population studies, and hazardous material control.

This book sums up by describing RDSS as an international liaison between entities of different countries and exploring international uses, such as commerce, peace and arms control monitoring.

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U.S COMMERCIAL SPACE TRANSPORTATION RISK ALLOCATION AND
INSURANCE - AN AIAA POSITION PAPER*

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* Submitted by the AIAA Technical Committee on Legal Aspects of Aeronautics and Astronautics, Prepared by the Subcommittee on Allocation of Space Launch Risks and Approved by the AIAA Board of Directors, January 1988. The list of Committee and Subcommittee members has been omitted.

Summary and Conclusion

A commercially viable U.S. space transportation industry is essential to a viable and competitive U.S. space industry.

Space transportation involves the potential for significant risks of damage to property and injury to people. Although a significant portion of these risks should be insurable at reasonable cost, the so-called maximum possible launch incident could result in third-party liability claims, as well as damage to Government property, well in excess of available insurance capacity.

The assumption by the U.S. commercial space industry of such an uninsurable maximum possible liability exposure constitutes a potentially disabling financial burden.

To foster and encourage a U.S. commercial space transportation industry that can be effectively competitive with European and other non-U.S. launch service providers, it is necessary to develop a commercially-tolerable approach to the allocation of these launch operations liability risks. The solution recommended in this paper would allocate these liability risks on the basis of those that are commercially insurable at reasonable premiums, as determined by governmental authority, and those that are in excess of such insurance capacity. The level of reasonably-available commercial insurance would be prescribed by the Government, taking into account applicable risk factors, and paid for by the commercial sector with the Government as a cost-free named beneficiary. The excess-of-insurance liability risks would be assumed or contained by the U.S. Government, either through indemnity, a cap on liability or, possibly, some combination of Government-provided insurance of last resort and indemnity or cap of liability in excess of the insured risk.

Such a distribution of launch liability risks is essential to encourage and promote a vigorous and competitive commercial space transportation industry, particularly in the initial phase of its efforts to regain U.S. leadership in space transportation.

I. Introduction

The United States must have an assured means of access to space if we are to achieve our national security and commercial space program goals. An assured means of access to space on reasonable terms and with a commercially manageable approach to the allocation of certain risks of liability is the sine qua non for a viable and competitive U.S. commercial space program.

For more than a quarter century, the United States enjoyed continuous access to outer space. This assured access provided our country with many benefits in areas such as national security, the balance of trade, technical

and scientific leadership, national prestige, and enhanced economic development. Sole reliance was placed on the National Aeronautics and Space Administration (NASA) to provide access to space for civil government and commercial missions. The Challenger accident changed all of this.

Since the Challenger accident there has been a major reassessment of the means for satisfying America's future space transportation needs. In order to broaden the base of available space transportation systems and guarantee that our country will never again lose—even temporarily—its "assured access to space", private industry has been encouraged by a major shift in Government launch policy to accept the challenge of providing launch services to customers on a commercial basis. At least five U.S. companies have already accepted this challenge, and the first of a potentially large number of commercial launch services agreements has already been signed.

As with any new industry, the commercial space transportation industry has a number of problems it must face and overcome to be successful. There is, however, one major problem that is beyond the ability of the industry to solve by itself, and which if left unresolved could make the long-term provision of space launch services on a commercial basis by American companies economically impractical and commercially inadvisable. This is the problem of how to allocate in a commercially reasonable manner the risks associated with space launch operations.

This paper identifies the critical policy issues and suggests solutions for achieving a viable and competitive long-term commercial space launch industry and for furthering in the national interest an assured access-to-space capability necessary to a strong U.S. space program.

II. Background

NASA provided such access to space on a routine, cost-reimbursable basis for more than 20 years, first with expendable launch vehicles and then with the Shuttle. This was accomplished using a proven risk management framework where the level of risk borne by the commercial parties did not exceed the amount of available insurance at commercially reasonable premium rates.

To achieve this result, NASA and the commercial parties allocated the risks involved in the following manner: NASA required, generally, the commercial party to obtain the maximum available third-party liability insurance at reasonable cost, with the Government as a named insured to protect it, at no cost, against any such claims that might arise out of the launch process. In return for this free coverage, the Govern-

ment, pursuant to Section 308 of the NASA Act, assumed responsibility for third-party liability risks in excess of the commercially available insurance limits. This industry-Government risk management solution apportioned the risk in such a manner that the commercial party which benefited from the launch was responsible, through insurance coverage, for what was considered the probable maximum loss, with the Government assuming the potential but extremely unlikely excess-of-insurance liability risk of the maximum possible loss.

A series of U.S. policy decisions over the past three years has shifted responsibility for providing space transportation to commercial users to the private sector, but without making this private insurance/Government indemnity risk allocation approach, or some variation, available to the new commercial space transportation providers. These decisions are embodied in: (1) Executive Order 12465 of February 24, 1984, designating the Department of Transportation as the lead Government agency to encourage and facilitate commercial expendable launch vehicle activities; (2) the Commercial Space Launch Act of 1984 (Public Law 98-575), which codified E.O. 12465 and also gave the Office of Commercial Space Transportation the responsibility to license and regulate the activities of the U.S. commercial launch operators; and (3) the President's August 15, 1986 Statement announcing the Government's intention to rely on the private sector as the primary source for furnishing U.S. launch services for commercial and foreign satellites. This statement announced that NASA would no longer be in the business of launching commercial satellites, with the exception of those that are Shuttle-unique.

Following the August 1986 statement, several Government agencies, including the Department of Transportation, the Department of Defense and NASA, undertook important actions to support the development of a U.S. commercial launch industry. Primary among these were necessary actions under the provisions of the 1984 Act to permit the U.S. industry to utilize certain Government-owned and operated launch facilities and services that were essential to support the industry's commercial space transportation efforts.

A critical step in achieving a viable and competitive U.S. launch industry is the development and execution of appropriate agreements between the Government and each of the commercial launch operators for use of these Government facilities and services on fair and reasonable terms. As with any agreement of this nature, an important feature is the allocation of risks among the parties—in this case the commercial industry and the Government. Although the Air Force has issued a "model agreement" and at least one commercial launch

operator has signed such an agreement, critical policy issues concerning the allocation of risks in the event of potential catastrophic third-party liability claims and of loss or damage to Government facilities remain to be satisfactorily resolved.

III. The Risks and Potential Liabilities

The launching of any commercial or government payload into space by means of a vehicle carrying several hundred tons of explosive propellants involves the potential for significant damage to property and injury to people. While these risks may be reduced by sound launch operations management, they cannot be eliminated. The nature of these operations thus exposes both the U.S. Government and the commercial provider of space transportation services to very significant potential liabilities and monetary losses in the event of a launch mishap. Liability may arise not only for direct damage caused by the faulty launch operation but also for indirect or "consequential" damages associated with the mishap, such as monetary damages for the loss of use of property while it is being repaired or replaced.

There are two classes of liability which may arise from a launch accident:

"Third-Party" Liability: This is legal liability to those individuals, corporations or other entities who had no involvement in the launch activities. Examples of such liability would include property damage suffered by a property owner when part of an errant launch vehicle, destroyed for range safety reasons, falls on his property, or injury to individuals or live-stock resulting from the breathing of toxic fumes from the propellants of a destroyed launch vehicle.

"First and Second-Party" Liability: This is liability for injury or damage to employees and property of the Government and/or the commercial space transportation provider resulting from the launch process. One example of such liability would be the destruction of Government launch facilities caused by the explosion of a launch vehicle on or near the launch pad. This type of liability potential extends to the contractors and subcontractors of the Government and the commercial launch company, and its payload customer, and covers the launch pad, associated facilities and other Government property at the launch site (and that of the Government's contractors and subcontractors), the launch vehicle, its associated upper stages and the other property of the launch provider and its contractors and subcontractors, and the satellite payload(s).

IV. The Problem

In any given commercial launch, the accumulation of risks of liability for both third-party injury/damage

and for damage to Government or private property can easily exceed the maximum amount of insurance coverage available on the world market to the commercial launcher at reasonable cost. Launch activities also carry some risks for which no insurance is available today on the world market, such as latent environmental hazards.

Although the total accumulation of risks associated with a launch can well exceed the maximum level of reasonably-available insurance on the world market, insurance industry sources indicate that substantial commercial liability insurance capacity, at reasonable premiums, can be obtained under appropriate circumstances. Previous experience indicates that third-party liability insurance in the range of \$500 million per launch may be secured worldwide. There is also, potentially, a substantial amount of insurance capacity to underwrite the risk of damage to U.S. Government property. Nonetheless, the "maximum possible" damage to Government property and to third parties that could result from a U.S. commercial launch could exceed even these substantial levels of insurance capacity. There is no certainty, however, that such significant amounts of insurance can be secured or maintained at the time of a commercial launch. This uninsurable risk potential is highlighted by terms of the U.S. Air Force Model Expendable Launch Vehicle Commercialization Agreement which requires the commercial launch operator to assume both the insurable and uninsurable risks of liability to third parties and for damage to Government property that may result from a launch.

V. Historic Risk Allocation Precedents

Historically, NASA, as the principal provider of U.S. launch services to the commercial sector until the Challenger tragedy, took a quite different approach to the allocation of the risks associated with a commercial launch from that embodied in the Air Force model agreement. As noted above, pursuant to special legislative authority, NASA, as a general rule, required the purchaser of the Government-provided launch service to acquire at no cost to the Government a prescribed level of third-party liability insurance to protect the Government, in return for which NASA indemnified the purchaser to the extent total liability exceeded the available insurance; a commercially reasonable quid pro quo.

With respect to the potential for damage to Government property that might arise out of a commercial launch, NASA waived any right to claim against the party procuring the launch service. In fact, a comprehensive scheme of cross-waiver of rights to recover for damage to the properties of both the Government and the party ordering the launch services, as well as that of

their respective contractors and subcontractors, was required by NASA.

VI. Foreign Competition

Foreign launch competitors have in their launch services arrangements with their customers consistently followed the NASA precedent. The risk of third-party liability beyond available levels of insurance is assumed by these competitors through a combination of customer-provided or paid-for insurance, in some cases with guaranteed availability and cost, coupled with indemnification in excess of the available insurance coverage. With respect to the potential for damage to launch facilities and associated properties, these foreign competitors follow the NASA precedent of comprehensive cross-waivers which relieve all of the parties involved in the launch activity, both Government and private, of any liability to each other for damage to their respective properties.

VII. Results

The emerging U.S. commercial launch industry is today compelled to accept these risks to avoid losing a large amount of potential business. In so doing, the industry is assuming the very low probability but nevertheless uninsurable "maximum possible" risks, both under the Air Force model contract and in launch services arrangements with their customers. The result is that the U.S. commercial space transportation industry, as it is attempting to gain momentum and financial viability and thereby contribute to restoring our Nation's assured access to space, finds itself financially and institutionally vulnerable. One catastrophic launch accident could leave a launch company facing a billion dollars of liability claims over the maximum amount of available insurance. It is unlikely that the commercial industry can, on a continuous basis, provide unlimited indemnification protection both to its customers and, in some cases, to the U.S. Government without running substantial, and potentially disabling, financial risks. As a result, Boards of Directors could with some justification decide that the return is no longer worth the continuing risk to the capital structure of their respective companies.

VIII. Potential Alternative Solutions

In order to manage and distribute the risks associated with commercial space launch operations, it is necessary to distinguish: (1) "probable maximum" loss from (2) the "maximum possible" loss that can arise from a launch. The probable maximum loss is most likely within the amount of reasonably available liability

insurance. The maximum possible loss involves that extraordinary incident which rarely, if ever, occurs. The conceptual maximum possible loss will likely exceed available liability insurance at reasonable cost.

To protect the interests of (1) the third party, i.e., the general public, (2) the Government, and (3) the payload owner, manufacturers and the provider of space launch services, it is proposed that the risks between the industry and the Government (on behalf of the general public) for third-party liability and damage to Government property be allocated on a layered or "horizontal" basis. As now required under the Air Force model agreement, the commercial space launch services provider would assume responsibility for the first layer of risk, up to the maximum amount of reasonably available liability insurance, at no cost to the Government, with the Government, as well as the customers and contractors and subcontractors of the launch services provider, as named insured. This insurance could provide the following types of coverage, with the specific amount of insurance per launch to be determined by the Government, taking into account the risk characteristics of the particular launch vehicle and other related factors:

- (1) Third-party liability insurance, which would cover any reasonably foreseeable loss to the public, based upon the experience of the past 30 years of launch vehicle operation by all nations.
- (2) Insurance for damage to Government property, which would be payable to the Government as a named insured.

Assuming significant levels of insurance capacity are available, the total probable maximum risks of third-party liability and damage to Government property would most likely be covered; the space launch services providers, their contractors, subcontractors and customers, and the U.S. Government are "named insureds" against this probable maximum loss by insurance paid for by the commercial users. The second layer of risk, that which could not be commercially insured at reasonable cost, would then be assumed or contained by the Government pursuant to existing or new legislative authority, as necessary, or, alternatively, limited by law or treaty to prescribed levels of total industry exposure. The United States taxpayers, who have derived and will continue to derive benefits from a successful and viable U.S. commercial space effort, will benefit by the protection afforded by the insurance coverage obtained at no cost to the Government against probable losses, in return for which the commercial users should be protected from potential disabling liability which could undermine the continued availability and expansion of these programs. Such a distribution of risk seems reasonable and fair to all concerned:

the Nation, the taxpayers and the emerging commercial launch industry.

The mechanism by which the Government would assume, or contain, the commercially uninsurable risk is not specifically dealt with in this position paper. There are precedents for a Government indemnity, such as that granted by Congress to NASA to permit it to indemnify, as well as provide commercial insurance to, the users of the space shuttle, and any other Government space vehicle (Public Law No. 96-48, October 1, 1979, 42 U.S.C. 2458b). There is also the precedent of the Price-Anderson Act of 1957 (Act of September 2, 1957, Public Law No. 85-256, 71 Stat. 576-77, as amended, 42 U.S.C. 2110 (1970)), which capped the public liability of nuclear reactor licenses and authorized the Government to indemnify up to that cap to the extent private insurance capacity was unavailable. Special insurance pooling arrangements were established to optimize the private insurance capacity. There is also the precedent of the subsequent, and most recent, revisions to Price-Anderson, which maintain a cap on liability but increase the level of private insurance protection through retrospective premium assessments on the commercial licensees.

Whether an indemnity approach, a liability cap approach, or some combination of Government-provided insurance of last resort plus indemnity or cap in excess of the sum of private and Government insurance, is the most appropriate specific protective mechanism against commercially uninsurable risk is, as noted above, not the subject of this position paper. The policy conclusion of this paper is that the commercially uninsurable risks must be contained by some appropriate Government action if the ELV industry is to be viable and competitive.

IX. Key Requirements for Achieving a Solution

Implementation of the risk allocation proposed in this paper would require the following conditions, some of which, it is recognized, may require specific legislative action:

- The commercial space launch services provider obtains, at reasonable cost, liability insurance coverage to the limits of the probable maximum injury and/or damage to third parties and to Government property, in which the Government is a named insured at no cost to it.
- All launch participants accept reciprocal cross-waivers of claims.
- The U.S. Government provides some appropriate form of protection for third-party liability claims in excess of the prescribed limits of liability insurance available at reasonable cost.

- The U.S. Government self-insures its property losses above the prescribed maximum insurance coverage available at reasonable cost.

Adequate commercial insurance capacity to cover the potential probable maximum loss is a key requirement. Such capacity may be achievable through conventional methods of aggregated coverages or through a centrally-managed underwriting facility that might be similar in structure to that previously developed by NASA for the Shuttle program with the insurance industry. Objectives of insurance arrangements would include:

- availability of the maximum insurance capacity at reasonable cost;
- equitable distribution of coverage among those at risk;
- efficient administration of claims; and
- support of U.S. Government officials statutorily responsible for determining the level and quality of insurance coverage of space launch operations.

X. Benefits

Reasonable allocation of launch operation risks through adoption of one of the alternative proposed solutions described above generates several significant benefits:

1. Development of a strong, economically viable and internationally competitive space transportation industry will provide the foundation for the "assured access to space" needed to meet our country's goals in space.
2. Provision of very substantial insurance protection for the U.S. Government, at no cost to it, covering liability for injury and/or damage to third parties and to Government personnel and property up to the "maximum probable" loss, will protect the Government from any losses associated with commercial space launch operations in all foreseeable circumstances.
3. Government assumption or limitation of uninsurable very low probability risks will remove a major road-block endangering full development of the commercial space transportation industry.
4. The attractiveness to American industry in utilizing space for commercial purposes will be enhanced, to the benefit of our international balance of trade, and to the Government, which will be able to purchase launch vehicle services for its own needs at lower unit prices.

The United States, its taxpayers, and the commercial space industry will all mutually benefit from a reasonable and fair allocation of space launch operation risks. The industry will provide substantial benefits directly to

the Government at the industry's expense as a quid pro quo to the Government's acceptance in the public interest of a very low probability of some excess liability at a future date, but at no current cost to the Government.

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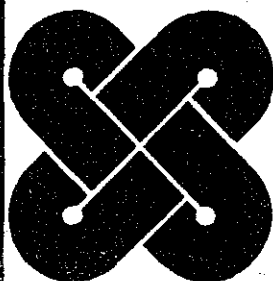
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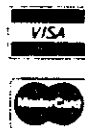
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