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out of human activities in outer space

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## **In Memoriam**

### **Tribute to Professor Dr. Daan Goedhuis**

Professor Dr. Daan Goedhuis, prominent international scholar, professor, negotiator and attorney, former Secretary-General of the International Air Transport Association (IATA), member of the International Institute of Space Law, the International Law Association as well as the Editorial Board of this Law Journal and numerous other associations, passed away at the age of 90 on 5 October 1995.

This is yet another loss of one of the giants in the field of space law. As a "member" of that first generation of space lawyers who established the framework for the successful development of space law into a separate branch of international law, Professor Goedhuis will be remembered for his devotion, dedication and commitment to the field. Truly his immense contribution to the field is evidenced by his numerous writings and teachings that certainly will be viewed as lasting contributions to be studied and analysed by future generations of space lawyers and policy-makers.

Indeed, his charm and character as well as his irreplaceable wit and commitment will be sorely missed by the international space law community who revered him as a pioneer of innovative legal thinking and analysis of space law. It is truly with great remorse that we see the passing of another great scholar. Words alone, however, cannot express the virtues of this great individual. Thus we may only pay tribute to this giant as he will be forever missed by the international community.

*N. Jasentuliyana*

Director, United Nations Office for Outer Space Affairs  
President, International Institute of Space Law

# FINANCING AND INSURANCE ASPECTS OF SPACECRAFT

I.H.Ph. Diederiks-Verschoor\*

## *Introduction*

As commercial activities in space continue to develop, financing of space activities becomes more and more diverse. In the beginning, the launching of satellites was only initiated and financed by a few states which were involved in space activities. With the increasing number of states developing satellites especially for telecommunications, and with the increasing influence of private commercial activities, financing of spacecraft has become a complicated issue.

1. First, the state itself may finance the space project. For instance, the Russian space station Mir had been financed by the former Soviet Union.

2. States may finance a space project by their cooperative endeavor, as is the case with the US-Canadian-European space station. In the construction of such a project, private companies could participate in production.

3. A private company may construct a satellite through its own means, either because the necessary financing is available, or because the private company is borrowing the money from a creditor with or without security, e.g., by bank financing.

Additionally, a joint venture of firms is also possible. A recent example is the alliance formed to provide regional satellite services by six Asian firms. The participants are Philippines Long Distance Telephone Co., PT Indosat of Indonesia, Singapore Telecom and Telekom Malaysia, which have already signed the agreement, and the Communications Authority of Thailand and Jabatan Telekom Brunei, which are expected to join in the near future. The six companies are also members of the Association of South East Asian Nations (ASEAN).<sup>1</sup>

An actual example regarding private companies is Globalstar, for instance, which intends to launch its first satellites in 1997. Globalstar has a 56-satellite constellation scheduled to provide fixed and mobile telephone services worldwide. \$250 million was financed by a bank for its global mobile telephone system. Now Globalstar needs to raise about \$600 million for the \$2 billion low-earth orbit satellite venture through external funding.<sup>2</sup>

4. Moreover a private company could ask the state to subsidize the project or to support it in another way.

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<sup>1</sup> SPACE NEWS, No. 4, 1995.

<sup>2</sup> *Id.* No. 2, 1996.

Finch<sup>3</sup> gives a very clear example. On 16 May 1983, the US President announced his Directive on Commercialisation of Expendable Launch Vehicles (ELV's). The Directive was to encourage the private sector development of commercial launch operations. The policy specified that 'While the government will not subsidize the commercialisation of ELV's it will price the use of its facilities, equipment and services consistent with the goal of encouraging viable commercial ELV launch activity.'

Also promotion of exports or removal of tax liabilities may be a means which the state could support. Mortgages are already in common use in maritime law and in air law. Thus, for instance, in Air Law, the Convention on the International Recognition of Rights in Aircraft, Geneva, 19 June 1948, is well known. During the preparatory discussions of this Geneva Convention, it was evident that the authors intended to create a means of financial support for the air carrier in the form of real security, and that the category of aircraft intended to be covered by the Convention is limited to aircraft intended for use in international air transport.

There is no doubt that this Convention has led to a consensus on a number of important points: the creditor's interests are now adequately safeguarded in all contracting states, priority claims have been defined, and their order of priority is determined by the law of the state in which they are registered. Nonetheless some gaps remain: to begin with, the precise moment when a right in a registered aircraft is validly created has not been fixed; moreover, the Convention only protects agreements between parties, not the obligations arising by virtue of law; finally, the Convention contains nothing on execution procedures or on registering an execution in the record of the contracting State of the aircraft's nationality. Furthermore only 53 states have ratified the Convention and uniform interpretation is also lacking.

Considering the background of the circumstances prevailing at the time when the Convention was concluded, no better result would likely have been achieved, and the Convention may certainly be regarded as an important first step towards establishing sufficient rules. The main principle of the Convention is the protection of the interests of the creditors.

Regarding space law, security rights are also of interest regarding space engines. No central registry exists for the filing of security interests in satellites or transponders. As Sterns and Tennen rightly state:<sup>4</sup> 'The rights of secured creditors are recognized and respected by national laws and international conventions, notwithstanding the fact that the collateral may move from state to state, and also traverse areas which are beyond the limits of national sovereignty. In this respect, the application of security interests to commercial space ventures would appear to be consistent with existing state practice. However, the essential element of a security interest is the right of the creditor to recover possession of and proceed

<sup>3</sup> E.R. FINCH JR. AND A.L. MOORE, *ASTROBUSINESS* 57 (1985).

<sup>4</sup> P.M. Sterns and L.I. Tennen, *Security Interests and Creditors' Remedies in the Law of Outer Space*, 33 *PROC. COLLOQ. L. OUTER SPACE* 102-120, at 115 (1990).



against the debtor's collateral to apply towards satisfaction of an outstanding obligation which is in default.' I agree fully with their opinion that 'Space objects are distinct from other types of mobile collateral in that aircraft and maritime vessels routinely must enter the territory of states, and thereby are subject to attachment by local judicial process. Space objects may not be recoverable in the ordinary sense, or at least not at a cost which would justify the election of that remedy. Nevertheless, available property rights of a commercial space venture may supply adequate security to attract and protect potential creditors.'

An outstanding lawyer, the late John T. Stewart does not suggest any particular path to follow in addressing security interests in space launch vehicles. But he observes that perhaps a mortgage convention for space activity investors would be considered according to the example of the mortgage convention in aviation.<sup>5</sup> He mentions that 'Private capital will be forthcoming as it must support and seek profit from space activities. With such investment will come the concern traditionally associated with protecting "security interests." The desires to record such interests for the protection of the investor will be a natural result of the infusion of private capital into the space environment.' In my opinion it may be worthwhile to consider this proposal.

Moreover, insurance policies reducing the financial risks will make parties more willing to finance. Obtaining bank financing depends on the profits earned by use of the satellites. Financing has been requested for mobile and broadband satellite projects but also for direct broadcast television satellites, commercial Earth imaging spacecraft, and regional and international communications satellites.

For traditional geostationary communications satellite projects, it is not so difficult to get financing as this market has been established. But sometimes revenues will not be available for many years, and thus it is difficult to judge the value of projects. Also the increasing frequency of launching satellites and therefore the increased technical knowledge and experience make investing in satellites also more secure. Therefore the rules of the different contracts are very important; the more so, as leasing of satellites, just as leasing of ships and aircraft, becomes more and more frequent.

Sterns and Tennen<sup>6</sup> point out correctly that what is necessary is a proper registry which could clarify which law would be applied to a particular transaction. The Registration Convention fails on this point. They propose that the same provision as in maritime and air law could be applied in space, namely that the law of the state of registry of the object would control the rights and obligations of the parties to a secured transaction. In this manner, the parties to the transaction as well as third parties would not be subject to conflicting and confusing choice of law questions.

<sup>5</sup> John T. Stewart, *Should there be a mortgage convention for space activity investors?*, 25 PROC. COLLOQ. L. OUTER SPACE 251-259, 257 (1982).

<sup>6</sup> See note 4, at 117.

In considering the Registration Convention, Nesgos<sup>7</sup> raises the question as to whether it is reasonable to impose registration obligations under the Convention on the provider of the launch vehicle or the component parts of the space object. Nesgos observes also that 'Many of the satellite and other space hardware projects that have been launched involved various types of financing. A number of national projects have been supported by export financing, such as Brazil's Brasilsat, Mexico's Morelos and Indonesia's Palapa telecommunications projects. Construction financing has been used for commercial projects such as Orion, SPACELAB, Asiasat and APT Satellite.'

Given the fact that the launching and the activity of a satellite is forming a greater risk than the activities of ships and aircraft, the insurance rules are of greater importance.

State responsibility according to the 1972 Liability Convention for damage caused on the surface of the earth was relevant to the Skylab which came down over Australia in July 1979, and the Cosmos 954 satellite which disintegrated over Canada in 1978.<sup>8</sup> A collision occurred when the Shuttle Challenger was hit by a tiny piece of paint, originating from a Delta rocket and measuring only 0.2 mm. in diameter.<sup>9</sup> State responsibility has not been invoked in connection with third party liability arising directly from a launch. Recently a Chinese rocket exploded wounding several third persons. The compensation for this damage will mostly be paid by insurers or the state of registration.

More than one state may be involved in launching a space object according to Art. I of the Registration Convention of 1975, namely, the state that launches or procures the launching and the state from whose territory or facility a space object is launched.

The insurance policy could also cover the pre-launch activities, the launch activities and the activities of the satellite in orbit. Transponders could be insured separately but could also be insured as a part of the satellite.

Dr. Catalano Sgrosso gives an excellent survey about the main types of insurance policies:

An insurance policy relevant to the pre-launch phase provides the coverage of all the risks which could happen from the beginning of the realisation of the space program right to the carrying out of the

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<sup>7</sup> P.D. Nesgos, *Commercial Space Law: Practical Examples Relating to Contracts, Insurance and Finance*, UNCOPUOS/INTERNATIONAL INSTITUTE OF SPACE LAW, SYMPOSIUM ON COMMERCIAL ACTIVITIES IN SPACE, 37 PROC. COLLOQ. L. OUTER SPACE 305 (1995).

<sup>8</sup> I.H.Ph. Diederiks-Verschoor, *Similarities with and differences between air and space law primarily in the field of private international law*, 172 R.C.A.D.I. 349, 350 (1982).

<sup>9</sup> E. Vitt, *Die Gefahren der Weltraumtrümmer: neue Entwicklungen und Erkenntnisse*, 36 ZLW 249-260 (1987). See also HE Qizhi, *Space Law and the Environment*, in SPACE LAW - DEVELOPMENT AND SCOPE 159-174 (N. Jasentuliyana, ed., 1992).

launch. It particularly refers to possible accidents which may happen during the production of the satellite and of its systems and sub-systems, during the phase of storage -- which is rather long-lasting because of the problems which can affect the predisposition of the launch -- during the phase of transportation of the satellite from the place of production to the launch site and finally during the placing of the satellite on the launching vehicle.

The launch phase is without doubt the most delicate in the whole space program, and the gravity of the risks determines a higher premium level compared to the two other mentioned coverage forms: the phase lasts from three to six months. The relevant policy considers a variety of different risks: faults in the launching vehicle, trouble during the separation of the satellite from the various stages of the vehicle, the risk of the satellite not reaching its established orbit and finally the problems which may occur during the preparation for the operative life and the control of the satellite's efficiency. The launch policy may be divided into two completely separate parts: one concerning the risks prior to the separation of the satellite from the launching vehicle, and the second one concerning the risks subsequent to the separation.<sup>10</sup>

According to Article 1(b) of the Liability Convention of 1972 the term 'launching' includes attempted launching.<sup>11</sup>

Finally, the phase of life in orbit requires a specific coverage which represents insurance on the satellite's life. Sgrosso observes that it begins at the end of the phase for verifying the satellite's operative capacities and that the length of its duration may vary.<sup>12</sup>

As Nesgos observes,

financial institutions lending to a satellite operator will almost invariably expect to be granted a security interest or mortgage in the satellite as long as their loan remains outstanding. Moreover, the interest expected is generally a first priority security interest superior to any other right in the satellite. This assignment entitles the financial institutions, upon the occurrence of a default under the terms of the loan agreement (such as failure to pay an installment of principal or other breach of covenant), to exercise an array of remedies, including constructive repossession of the

<sup>10</sup> Dr. G. Catalano Sgrosso, *Insurance Implications about Commercial and Industrial Activities in Outer Space*, 36 PROC. COLLOQ. L. OUTER SPACE 187-205 (1993).

<sup>11</sup> For the meaning of launch activities, see Bin Cheng, *International Responsibility and Liability for Launch Activities*, 20 AIR & SPACE L. 297-310 (No. 6, 1995).

<sup>12</sup> See note 10.

collateral. This superior right conflicts with insurers' rights to salvage to the extent of any loss paid under the policy.<sup>13</sup>

It is of great importance that complete information is provided by the company or owner to the lender or insurer because it is not possible for them to know and to control all possible risks.

The financing of spacecraft is very much linked to insurance. According to Gangloff<sup>14</sup> only 50% of the satellites costs are insured. The average value of the satellites is 75 million dollars, whereas the annual premia are not more than 65 million dollars. Gangloff mentions that from 1980 to 1994 the insurance of spacecraft presented a credit balance of 240 million dollars. It is well-known that 1994 was a very bad year for space activities because of several accidents with satellites. The insurers had to pay 769 million dollars whereas the premia were only 534 million dollars.

According to the journal "Space News", space insurance premiums have been declining since the mid-1980s, when they shot up from less than 10 percent to around 25 percent following a string of launch failures. For the past three years, insurance rates have been relatively stable, hovering around 17 percent, depending on the rocket and the satellite seeking coverage.<sup>15</sup>

After suffering heavy losses in 1994, the space insurance industry bounced back strongly in 1995 and now is substantially in the black, space insurance officials say.

Riding a wave of successful launches and trouble-free in-orbit operation of insured satellites, insurers took in a record \$786 million from premiums in 1995 and paid out about \$238 million in claims.

The space insurance industry has netted an average between \$800 million and \$850 million over the past 13 years when premiums collected are matched against the claims paid out.

The health of the space insurance industry is directly dependent on the health of the most active commercial launch vehicles. In 1995, Lockheed Martin's Atlas and Arianespace's Ariane rockets each had record years -- Atlas posted 12 and Ariane 11 successful launches and no failures.

For 1996, space insurers are bracing for another active launch year and forecast that total insurance premia may approach \$1 billion. Ariane has scheduled 12 launches, and Atlas is forecasting eight or nine launches.

An interesting case is the following. The satellite of Korea Telecom of Seoul was placed some 6,350 kilometers short of its intended orbit after

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<sup>13</sup> P.D. Nesgos, *Trends in the Acquisition and Financing of Space Projects: Insurance Implications*, 8TH ASSICURAZIONE GENERALI INTERNATIONAL CONFERENCE ON SPACE INSURANCE (Venice, 1995).

<sup>14</sup> J. Gangloff, *L'Assurance aviation et spatiale situation vue en 1995*, in 3 MÉLANGES PIERRE VELLAS, RECHERCHES ET RÉALISATIONS 665-668 (1995).

<sup>15</sup> SPACE NEWS, No. 23, 1994.

a 5 August 1995 launch aboard a McDonnell Douglas Delta 2 rocket whose strap-on booster failed to separate from the body of the rocket.

The satellite's owners were forced to use on-board fuel to place the spacecraft in geostationary transfer orbit. The fuel was supposed to have been used to stabilize the satellite in its orbital position. As a result, Koreasat 1's intended 10-year orbital life has been cut in half, to about five years, according to Korea Telecom and insurance officials.

Under the \$104 million insurance policy signed with a group of insurers in Britain, Germany, Italy and elsewhere, Korea Telecom would be entitled to receive the full \$104 million if the satellite's capacity is cut by more than 50 percent. In Koreasat 1's case, the insurance policy was for a period of 9 years of in-orbit performance.

Insurance underwriters have argued that Koreasat 1 should not be declared a total loss because it still has five years of service potential.

They are threatening to take possession of the orbiting Koreasat 1 satellite and then sell it to the highest bidder unless its owner, Korea Telecom, drops its demand for payment of the full \$104 million insurance claim.<sup>16</sup>

Thus this was one of the cases in which partial loss occurred. The comment of Nesgos, expert in space financing on such cases is interesting. He observes:

The issue becomes more complicated in the event of a partial loss. In this case, the financial institutions could still claim a superior right to the collateral and, in the event of a default under the credit facility exercise their rights to the entire satellite. Perhaps the best way to address the potential conflict that could arise would be for the insurers to require that the financial institutions partially release their security interest in that portion of the satellite for which a partial loss has been paid, thereby enabling the insurers to recover maximum salvage value with respect to that portion of the satellite.<sup>17</sup>

The destruction of the Apstar 2 satellite on a Chinese Long March rocket is expected to cause insurance for the upcoming launch of AsiaSat 2 on the same rocket to be significantly more expensive. The disaster also caused a shortage of satellite capacity for television broadcasters in the Asia Pacific region.<sup>18</sup>

The Washington-based International Telecommunications Satellite Organization (Intelsat) stated that it had purchased about \$2 billion in coverage for 10 satellite launches between 1995 and 1997. Intelsat asserted that it was paying about \$185 million in premiums to cover the launch of the satellites.

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<sup>16</sup> *Id.* No. 46, 1995.

<sup>17</sup> See note 13.

<sup>18</sup> SPACE NEWS (No. 6, 1995).

Intelsat's insurance package covers only the period beginning with ignition of the launch vehicle and ends with the separation of the satellite from the rocket's upper stage. The consortium is thus insuring an event that lasts about 20 minutes per launch.<sup>19</sup>

It is interesting to note that in this last contract the time of the launching has been mentioned exactly. Different opinions exist on the exact starting point, and it is desirable to mention the time of the launching in the contract.

The 6 December 1995 launch of the French Telecom 2C and India's Insat. 2C spacecraft aboard an Ariane 44L rocket from the Guiana Space Center was insured for about \$420 million, making it the largest gamble on a single launch in space insurance history.<sup>20</sup>

Just as for ships and in aviation, leasing of spacecraft is becoming more and more common. There is even news that Kazakhstan will lease its mammoth Baikonur cosmodrome to Russia. A Western delegation has judged it to be in fairly good condition.

Leasing of satellites started in the United States in the 1980's. Investment tax credits made leases particularly attractive. Nowadays, also commission foreign sales corporation leases are popular.

The equipment is very costly and with the increasing need for satellites for commercial use leasing is a good economical solution. As in aviation<sup>21</sup> an agreement between the State of Registry of an aircraft and the State of the operator could be concluded.

Nesgos states that there is a difference between lease financing of transponders versus the entire satellite.<sup>22</sup> Every lease financing of communication satellites in the USA has involved one or more transponders, even in the case of all transponders on a single satellite. Ownership of a transponder includes dedicated components and shared ownership of other components of the satellite. Satellites have been financed on a transponder-by-transponder basis for regulatory, economic and financial reasons.

The difference of leasing of satellites and aircraft is that leasing of satellites is less frequent and that satellites are a greater risk, also in view of the time of activity.

The lease contract in itself being a financial agreement will not differ much from the usual lease contract. However as mentioned before a difference will be made between the lease of the satellite itself and the lease of transponders.

Brumberg is of the opinion that in view of financing space activities a broader definition of space law will be needed, including more than just those international and domestic laws that directly affect space activities.

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<sup>19</sup> *Id.* No. 2, 1995.

<sup>20</sup> *Id.* No. 47, 1995.

<sup>21</sup> *Cf.* Art. 83 bis of the Chicago Convention.

<sup>22</sup> Peter D. Nesgos, *Commission FSC's on the Final Frontier: Special Considerations for Satellites and Transponders*, THE FSC/DISC TAX ASSOCIATION, 5TH ANNUAL FSC CROSS-BORDER LEASING CONFERENCE 1-2 (New York, April 21, 1994).

Companies involved in space activities are concerned with a number of legal areas. In his article he discusses the law of business finance for start-up companies in the US.<sup>23</sup>

A State that avails of the possibility of leasing of transponders is Columbia. Columbia's lease of the NASA transponders runs until 1997, with an option for a four-year extension.<sup>24</sup>

Columbia has licensed 15 satellite receiving facilities in four countries, including 12 in the United States and one each in Korea, Japan and England. The newest teleport that will receive and transmit signals via Columbia's transponders, is located near London.

In case of breakdowns of transponders, the liability of the satellite operator is always precluded. The lessee can only derive his rights to assure the functioning of his satellite communication system, from the provisions laid down in his transponder lease contract.<sup>25</sup>

When seeking optimal protection against breakdowns, one should lease a non-preemptible protected or restorable transponder. In this case, the user cannot be preempted by others, and in case of a transponder failure, the satellite operator ensures the functioning of the system by placing an assigned restoration transponder at his disposal. The satellite operator provides him with another transponder from the reserve capacity or if not available, a preemptible transponder. In the latter case the lessee of a preemptible transponder is preempted from use of his transponder and has to stop transmitting to the satellite within an indicated amount of time. So the lessee of a protected or restorable transponder will be ensured of the functioning of his system.

In order to avoid the regulatory impediments that may arise regarding the lease financing of an entire satellite, the transaction should be structured based on individual transponders. Nesgos observes that 'it is important that the Lease Agreement includes express provisions obliging the lessee to use the transponders in compliance with the Transponder Purchase and Service Agreements and applicable law including any authorization relating to the transponder issued by any governmental authority having jurisdiction over the transponder, the satellite and the lessee.'<sup>26</sup>

Where the transponders on the satellite are financed in a single transaction, particular care must be taken in drafting the remedy which

<sup>23</sup> Bruce S. Brumberg, *Financing Space Activities*, 28 PROC. COLLOQ. L. OUTER SPACE 215-219 (1985).

<sup>24</sup> SPACE NEWS, No. 6, 1994.

<sup>25</sup> Cf. Van der Heyden, Tuinder, De Vries, *A Typical Transponder Lease; Preemptory Rights; Liability of Satellite Operators for Breakdowns*, INTERNATIONAL BAR ASSOCIATION, (COMMITTEE Z), 8TH CONFERENCE OF THE SECTION ON BUSINESS LAW'S COMMITTEE ON OUTER SPACE (London, 1987). For a definition of transponder, see also P.D. Nesgos, *Commission FSCs on the Final Frontier: Special Considerations for Satellites and Transponders*, FSC/DISC TAX ASSOCIATION, 5TH FSC CROSS-BORDER LEASING CONFERENCE (New York, 1994).

<sup>26</sup> P.D. NESGOS, *EQUIPMENT LEASING (SATELLITES AND TRANSPONDERS*, ch. 29, at 13) (preliminary draft, Matthew Bender & Co., 1992).

entitles the lessor to control and operate the satellite. If this remedy is to be exercised, the lessee must be required to assist the lessor in obtaining any necessary regulatory approvals. As regards the condition of the satellite, representations and warranties should be made by the lessee as to the compliance with transponder performance specifications, the orbital position of the satellite and the amount of onboard station-keeping fuel.

It is unlikely that a lessee would carry liability insurance for satellite transponders. Once positioned in space, a geostationary satellite will remain in orbit indefinitely (hundreds of years) as it will be moved to a higher orbit after the end of its useful life. Therefore, the likelihood of a satellite impacting the earth is remote. Nevertheless we have to keep in mind the Soviet Cosmos Satellite 954, which crashed in Canada on 18 December 1978, causing damage not to individual persons but to the environment, the Skylab, which came down over Australia in July 1979 and the Chinese Satellite Fanhui Shi Weixing-1 (FSW-1) which came down on 11 March 1996 into the southern part of the waters of the Atlantic Ocean.<sup>27</sup>

Less remote, but still quite unlikely, is a satellite's collision with a neighbouring satellite. While liability for damage resulting from electromagnetic or radiofrequency interference caused by transponders may be of some concern, such liability is excluded in space insurance policies.<sup>28</sup>

Regarding transponder financing, Nesgos concludes that three factors have contributed to the deviation from the usual practice in equipment lease financing which expects and requires full insurance namely:

1. the remote possibility of third party liability and the reliability of satellites and transponders once in-orbit.
2. the traditional high cost of in-orbit insurance which is low relative to launch insurance, as it has not reflected actual loss experience.
3. most transponder financing has involved lessees with generally strong credit standings.<sup>29</sup>

The ability of the lessee to pay in the event of a catastrophic loss not covered by insurance is important.

In conclusion, it could be stated that the financing of spacecraft will be supported by the insurance companies through leasing contracts for satellites and transponders. Because of the great risks associated with space launches, it will be necessary for the insurance companies to cooperate and be informed timely about scientific developments. Developing practice will assist reaching equilibrium between the insurance premium and the compensation paid for such damage.

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<sup>27</sup> I.H.Ph. Diederiks-Verschoor, *Similarities with and differences between air and space law primarily in the field of private international law*, 172 R.C.A.D.I. 349-350 (1982).

<sup>28</sup> See note 26.

<sup>29</sup> *Id.*



## ARE STRATOSPHERIC PLATFORMS IN AIRSPACE OR OUTER SPACE?

M. Rothblatt\*

### *Description of Stratospheric Platforms*

A stratospheric platform is a structure capable of maintaining its location over a specific portion of the Earth's surface for a multi-year lifetime, at an altitude of approximately 30 kilometers or higher.<sup>1</sup> Such platforms first became practical with the invention and successful demonstration of Corona Ion Engine propulsion technology by Dr. Alfred Wong, Chairman of the Plasma Physics Department at UCLA and Chief Scientist of Sky Station International (SSI).<sup>2</sup> This article is concerned with the application of stratospheric platforms to telecommunications. For this application the stratospheric platforms are equipped with solar power arrays and radio communications equipment. This payload, together with its associated ground infrastructure, enables the stratospheric platform to provide a wide array of wireless telecommunications services, including broadband internet access by portable devices and broadband portable telephony.<sup>3</sup> An application for a global wireless telecommunications network using stratospheric platforms was submitted to the United States Federal Communications Commission (FCC) in early 1996 by SSI.<sup>4</sup>

### *Benefits of Using Stratospheric Platforms*

There are several unique benefits enjoyed by stratospheric platforms as telecommunications relays. These benefits may be summarized as high angles of elevation, short path lengths, low system costs and no environmental impact.

The first benefit is an extraordinarily high angle of elevation with communicators, thus eliminating many losses imposed by terrestrial ground clutter and long paths through rain cells. In a typical configuration, the stratospheric platform will be placed approximately 30

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<sup>1</sup> A. Haig, M. Rothblatt, P. Mahon, C. Patusky, J. Blake, L. Tiedrich, *Petition of Sky Station International to Establish a Global Stratospheric Telecommunications System*, Fed. Comm. Comm'n, March 20, 1996.

<sup>2</sup> *Repairing the Ozone Layer*, POPULAR SCIENCE, January 1995, at 21.

<sup>3</sup> *Internet Access from Outer Space*, TELEMEDIA WEEK, April 1, 1996, at 54.

<sup>4</sup> A. Haig, M. Rothblatt, P. Mahon, C. Patusky, J. Blake, L. Tiedrich, *Application of Sky Station International to for Authority to Construct, Deploy and Operate a Global Stratospheric Telecommunications System*, FCC, March 20, 1996.

kilometers above the target zone of communication. At this altitude, 30 degree or greater angles of elevation will exist across a coverage area of greater than 7500 square kilometers, and angles of elevation will be as high as 90 degrees, on a permanent basis, directly below the stratospheric platform. Between the nadir point and the 30 degree contour, there is a graceful decline of angle of elevation from 90 degrees.

The second benefit is short path lengths, compared to conventional satellite communication systems. The much shorter path length from a stratospheric platform as compared to a conventional satellite platform results in much improved communications margins for an equivalent amount of power. The improved margins facilitate the provision of mobile and portable services and use of vacant frequencies in the millimeter wave band.

A third benefit of stratospheric platforms is a much reduced system cost as compared to satellite networks. Satellite capital costs consist in large part of satellite construction costs, launch costs, and insurance costs. The insurance costs are at least 15% of the sum of satellite construction and launch costs, reflecting the historical failure rates of launching satellite communications systems. Launch costs are, to a first approximation, roughly equal to satellite construction costs. Stratospheric platforms do not require rocket launches since they "float" to location under helium pressure and Corona Ion Engine propulsion. Insurance costs are likely to be negligible since the past 50 years of lighter-than-air craft has been one of a stellar safety record. Accordingly, assuming that stratospheric platforms cost approximately the same as a satellite platform, the stratospheric system cost will be approximately 43% of the satellite system cost. The actual total system cost of a stratospheric system or a satellite system must also consider the number of platforms deployed and the replacement lifetime of each platform. Such calculations and comparisons are beyond the scope of this paper.

A final benefit of stratospheric platforms is a reduced environmental impact as compared to rocket-launched platforms. Large networks of low earth orbit satellites, especially if deployed using solid fuel rockets, have a deleterious effect on the earth's ozone layer.<sup>5</sup> By comparison, the stratospheric platforms, using ambient ions in the stratosphere and neutral helium for buoyancy, present no adverse

<sup>5</sup> "Unfortunately, space programs have themselves been linked to ozone loss. Global industries reach into outer space through the launching industry. Ozone is depleted through solid - but not liquid - fueled rockets. The exhaust often contains hydrochloric acid and the chlorine therein breaks down ozone molecules. The obvious solution is to move from solid back to liquid fuels. This is the recommendation of the March 1990 panel of the National Research Council of the National Academy of Sciences." J. Galloway, *Protecting the Ozone Layer: The 1990 London Revisions to the Montreal Protocol*, in 34 PROC. COLLOQ. L. OUTER SPACE 177, 181 (1992). See also, William J. Broad, *Some Say the Rocket's Red Glare is Eating Away the Ozone Layer*, NEW YORK TIMES, May 14, 1991, B11; Carl Q. Christol, *Stratospheric Ozone, Space Objects and International Environmental Law*, 4J. SPACE L. 23 (1976).

environmental impact. Due to the fragile nature of the earth's ozone layer, and the proven connection with increased skin cancer and other health disorders from its depletion<sup>6</sup>, it would appear reasonable to use non-pollutive telecommunications systems wherever possible.

#### *Regulatory Issues Presented by Stratospheric Platforms*

Stratospheric platforms present three categories of regulatory issues. The first set of issues concerns the jurisdictional competence for stratospheric platforms. Are they in a nation's sovereign airspace or are they in an international *res communes* realm? The second set of issues concern the appropriate telecommunications regulatory framework. Are stratospheric platforms part of the "space services" or all the other services, including terrestrial services, maritime services, and aeronautical services? The third set of issues relates to deployment questions. Which country or countries are empowered to authorize deployment of the platforms, the ground stations, and the telecommunications services?

#### *The Legal Status of the Stratosphere*

It often comes as a surprise that there is no international legal definition concerning where airspace ends and outer space begins. This fact is surprising because the legal regime is very different in airspace and outer space. Airspace is subject to the national sovereignty, and hence the laws, of the nation lying vertically below. Outer space is, by international treaty, not subject to national sovereignty by claim of right or use.<sup>7</sup>

Debates concerning the delimitation of airspace and outer space occur within a venue called the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS). This committee has both a Technical Subcommittee and a Legal Subcommittee. Despite over a decade of study of the matter, neither Subcommittee, nor the parent Committee, has ever agreed on a definition of a boundary between airspace and outer space. For example, in the 1986 Report of the Chairman of the COPOUS Working Group concerned with definitional matters it was said that a number of delegations felt "the establishment of a boundary between airspace and outer space would also be arbitrary as there was no clear scientific basis for fixing at a particular altitude the demarcation between airspace and

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<sup>6</sup> See generally, *Stratospheric Ozone Depletion, Subcommittees on Hazardous Wastes and Toxic Substances and Environmental Protection of the Committee on Environment and Public Works*, U.S. Senate, Joint Hearing, 100th Cong., 2d Sess., March 30, 1988.

<sup>7</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205 (entered into force Oct. 10, 1967).

outer space." It was further observed that "an unnecessary definition or delimitation of outer space would be undesirable and might cause difficulties, including interference with the development of space activities, not hitherto encountered. Such a premature definition and delimitation might also prove inappropriate in the light of continuing technological advances."<sup>8</sup> And as recently as March 1995, the United States advised the COPOUS that "the lack of certainty as to where airspace ends and outer space begins has not impeded the development of activities in either sphere, and we fear that the premature injection of unnecessary law would have precisely that unfortunate effect."<sup>9</sup>

The principal proponent at the UN of a specific boundary between airspace and outer space was the Soviet Union. For several years it had formally submitted proposals seeking a specific boundary.<sup>10</sup> However, since the breakup of the Soviet Union, no further such formal proposals have been forthcoming. The Soviet Union's proposal had been that the boundary be set at around 100-110 kilometers, that being the lowest perigee achieved by orbiting satellites. The Soviet Union's view was countered by other countries because there were satellites whose perigee dipped as low as 90 kilometers, there were rocket-assisted air vehicles that climbed as high as 100 kilometers for brief periods, and the historical practice of air flight and space flight may not be relevant to what the air/space boundary should be.<sup>11</sup>

At the most recent meeting of the COPUOS Legal Subcommittee, during April 1996, there was still no consensus whatsoever as to what the boundary between airspace and outer space was, and whether setting such a boundary was advisable.<sup>12</sup> Among the concerns raised were that the UN

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<sup>8</sup> U.N.G.A., Committee on the Peaceful Uses of Outer Space, Report of the Legal Sub-Committee on the Work of its Twenty-Fifth Session (24 March-11 April 1986)), at 20.

<sup>9</sup> U.N.G.A., Committee on the Peaceful Uses of Outer Space, Legal Subcommittee, Thirty-Fourth Session, March 1995, Statement by U.S. Alternative Representative, Mr. Jeffrey Maughan Maclure.

Referring to the application of Sky Station International to the FCC to create a new Global Stratospheric Telecommunications Service (GSTS) by using a revolutionary technology that holds each of the proposed 250 Sky Station platforms stationary at a 3 km altitude, Professor Gorove states that "this development suggests the necessity of exercising continued caution to avoid premature determination of demarcation lines." See Stephen Gorove, *The Growth of Space Law through the Cases*, 24 J. SPACE L. 4 (1996).

<sup>10</sup> See *supra* note 8.

<sup>11</sup> *Id.*

<sup>12</sup> U.N.G.A., Committee on the Peaceful Uses of Outer Space, Report of the Legal Subcommittee on the Work of its Thirty-Fifth Session (18-28 March 1996), Sec. II, "Matters Relating to the Definition and Delimitation of Outer Space and to the Character and Utilization of the Geostationary Orbit, Including Consideration of Ways and Means to Ensure the Rational and Equitable Use of the Geostationary Orbit Without Prejudice to the Role of the International Telecommunication Union."

should discontinue its "unproductive debate on [whether] the direct and topographical or indirect and functional approach to the definition and delimitation of outer space" is best, that aerospace objects did not lend themselves to be objects which traversed arbitrarily defined boundaries, and that a "functional boundary had been generally acquiesced upon since no State had objected to flights of satellites over its territory."<sup>13</sup>

In summary, after more than ten years of debate, it can be said clearly that: (1) there is no legal boundary between airspace and outer space, and (2) there is no near term likelihood that such a boundary will be established. With regard to stratospheric platforms the situation is that if several years go by and countries worldwide generally have no objection to stratospheric platforms, then by force of common international practice they will be deemed to be in a region of outer space. On the other hand, if each country over which a stratospheric platform is located demands that it authorize the stationing of a stratospheric platform, then by force of common international practice they will be deemed to be in a region of airspace.

Experts have also long opined on the subject of where the airspace ends and outer space begins. Perhaps the greatest treatise ever written on the law of space is the mammoth 1200 page *LAW AND PUBLIC ORDER IN SPACE* by Profs. Myres S. McDougal, Harold D. Lasswell and Ivan A. Vlasic of Yale University.<sup>14</sup> They note in the treatise: "One of the most often asked questions is, 'Where does outer space begin? The briefest, if not entirely satisfactory, reply is that there is no answer which will serve everybody -- that much depends upon who is making the classification for what purposes, and that, therefore, there is more than one answer.'"<sup>15</sup> After a survey of all the different possible answers -- ranging from the 12 mile limit (60,000 feet) at which the human body begins to boil and medical scientists have designated the "space-equivalent altitude" to the 600 mile limit at which collisions between air particles are extremely rare and space scientists have designated the "exosphere" or the "astronomical material frontier" -- the professors concluded: "This survey should serve to indicate the hopelessness of attempts to determine 'scientifically' a boundary between 'outer space' and 'airspace' which would be both precise and valid for all purposes and every contingency. Different sciences have different criteria for defining 'airspace' and 'outer space' and there obviously cannot exist an all-purpose definition that would satisfy the unique requirements of them all. This led an eminent space scientist to conclude that the 'scientific agreement on where space begins is a self-evident impossibility.' Even the boundaries suggested by various scientists for their own special disciplines appear to be subject to change, as new knowledge becomes available."<sup>16</sup>

<sup>13</sup> *Id.* at 15.

<sup>14</sup> MYRES S. MCDUGAL, HAROLD D. LASSWELL, IVAN A. VLASIC, *LAW AND PUBLIC ORDER IN SPACE* (Yale U. Press, 1963).

<sup>15</sup> *Id.* at 33.

<sup>16</sup> *Id.* at 35.

Finally, it might be asked, where *should* the boundary between airspace and outer space be set, *i.e.*, which boundary *would be in the best interests of the peoples of the world*? From a legal standpoint, it is fairly clear that including the stratosphere within the realm of outer space is a more progressive outcome than including it within airspace. There are two main reasons for this conclusion. If the stratosphere is deemed to be part of outer space, then activities in the stratosphere will fall within the purview of the Outer Space Treaty of 1967.<sup>17</sup> This Treaty has a number of progressive provisions which are in the best interests of the world's population. First, the Treaty determines that any damage that occurs to the surface of the earth, or to aircraft in flight, from an outer space object is based on absolute liability.<sup>18</sup> In comparison, damage caused by objects in air space is compensable only of the object in air space was "at fault." Hence, should a stratospheric object ever cause any harm to the earth, the damaged persons will be able to collect compensation more easily, and without having to prove fault, if the stratosphere is deemed to be part of outer space.

Second, the Treaty provides that any object placed in outer space must be used only for peaceful purposes, must be notified to the United Nations and must involve the participation of all countries irrespective of their stage of economic development.<sup>19</sup> Hence, if the stratosphere is part of outer space it will more likely be a region of peaceful development rather than "war games," all countries will have more information about what is going on in the stratosphere, and all countries will be able to better reap economic rewards from stratospheric activities. On the other hand, if the stratosphere were deemed to be part of airspace, then there is no obligation of a country to keep its stratospheric activities peaceful, no obligation of a country to inform even neighboring countries of its stratospheric activities, and no obligation of any country to share the benefits of stratospheric activities with developing countries. Rather clearly, the

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<sup>17</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205 (entered into force Oct. 10, 1967).

<sup>18</sup> Convention on International Liability for Damage Caused by Space Objects, opened for signature March 29, 1972, 24 U.S.T. 2389, T.I.A.S. No. 7762 (entered into force Oct. 9, 1973), explained in the context of aerospace vehicles in M. Rothblatt, *International Liability of the United States for Space Shuttle Operations*, 13 INT'L LAW. 471 (1979). It should be noted that under the Convention on International Liability, citizens can not sue their own government for damage caused by space object. However, if stratospheric platforms are in outer space, and hence space objects, any domestic harm they cause can still be redressed using national laws instead of the Convention on International Liability.

<sup>19</sup> Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205 (entered into force Oct. 10, 1967), Articles I, II and III.

much more progressive result is for the stratosphere to be deemed to be part of outer space, and hence subject to the Outer Space Treaty of 1967.

It should also be noted that a country gains very little, if any, national sovereignty protection from deeming the stratosphere to be part of airspace. Probably the greatest fear is that of telescopic observations. However, telescopic observations that have extraordinary resolution (good enough to see a tennis ball) can be performed from satellites in low earth orbit. Hence, prohibiting stratospheric platforms for observation-related reasons accomplishes nothing. Another reason to exert national sovereignty might be to ensure the safety of the stratospheric platform. However, this objective can be accomplished as a quid-pro-quo for authorizing telecommunications service rights into a country, to the extent it is a concern, and does not require the extreme step of extending national sovereignty into the stratosphere.

In summary, the stratosphere is not part of airspace as legally defined today, because there is no legal boundary for airspace. It will not be possible to get scientists to agree on a boundary between airspace and outer space. The stratosphere is above what scientists call "space-equivalent altitude," and is far above the altitude at which countries seek and obtain overflight permission. Finally, the people of the world will be better off if the stratosphere is deemed subject to the Outer Space Treaty of 1967. For all of these reasons, and the paucity of any counterarguments, it is believed that stratosphere platforms should be considered as in outer space.

#### *Do Stratospheric Platforms Provide Space Services?*

The International Telecommunication Union (ITU) and most national authorities divide radio communication systems into two main categories -- space services and terrestrial services. Different regulatory obligations attach to each general kind of service. The ITU defines Space Radiocommunication as "Any radiocommunication involving the use of one or more space stations or the use of one or more reflecting satellites or other objects in space."<sup>20</sup> Terrestrial Radiocommunication is defined as "Any radiocommunication other than space radiocommunication or radio astronomy."<sup>21</sup> In other words, if it is not a space service, then it is a terrestrial service, so it is key to see whether a stratospheric platform is a "space station," or a "reflecting satellite" or an "object in space." In fact, it will not be necessary to go further than the definition of space station, which the ITU says is "a station located on an object which is beyond, is intended to go beyond, or has been beyond, the major portion of the Earth's atmosphere."<sup>22</sup> It is well accepted by the entire scientific community that

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<sup>20</sup> International Telecommunication Union, Radio Regulations, (Geneva 1979 - 1995), Art. 8.

<sup>21</sup> *Id.*

<sup>22</sup> *Id.*

97% of the mass of the atmosphere is found below 30 kilometers altitude.<sup>23</sup> Hence, it is incontrovertible that a stratospheric platform is beyond "the major portion of the Earth's atmosphere," and is therefore a "space station" within the framework of the ITU. Since the stratospheric platform is a space station, any telecommunications services that it provides are space radiocommunication services.

It should also be noted that under the ITU's rules, stratospheric platforms are not "satellites" because satellite is defined as "a body which revolves around another body of preponderant mass and which has a motion primarily and permanently determined by the force of attraction of that other body."<sup>24</sup> Since the stratospheric platforms do not revolve around the earth, they are not satellites. This point is important because frequencies within the ITU are allocated to specifically defined sub-services, such as Fixed Satellite Service, Mobile Satellite Service, Broadcast Satellite Service, and so on. While Fixed Satellite Service is defined as a space radiocommunication service "between earth stations at given positions, when one or more satellites are used," Mobile Satellite Service is defined as a space radiocommunication service "between mobile earth stations and one or more space stations." Hence, the Fixed Satellite Service must involve a "satellite" while the Mobile Satellite Service (and all other satellite services defined by the ITU) may involve a "space station." Due to the use of millimeter wave frequencies, stratospheric platforms will unavoidably be in the Fixed Satellite Service because propagation conditions are too severe to engineer for reliable mobile reception. In practical use, all parties within the ITU treat the words "satellite" and "space stations" as synonyms.

In point of fact, the word "satellite" is an anachronism due to the fact that the Fixed Satellite Service was defined as Communications Satellite Service at the ITU's Extraordinary Administrative Radio Service in 1963 while all of the other space radiocommunications services were defined at the ITU's World Administrative Radio Conference for Space Telecommunications in 1971. Between 1963 and 1971 the ITU's experts had grown to appreciate the benefits of having a parallel linguistic structure between "earth stations" and "space stations," and hence from 1971 onwards all space services were defined in terms of space stations and earth stations, leaving as a historical artifact the use of the word "satellite" in the definition of the Fixed Satellite Service. However, whether or not a modification occurs, the artifactual inclusion of the word satellite in the definition of Fixed Satellite Service should in no way impede the use of Fixed Satellite Service frequencies by stratospheric space stations because, as mentioned, in everyday practice, the terms satellite and space station are synonymous.

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<sup>23</sup> S. H. LAY & H. TAUBENFIELD, *THE LAW RELATING TO THE ACTIVITIES OF MAN IN SPACE* 6 (1970).

<sup>24</sup> See also, Fed. Comm. Comm'n, 47 CFR Sec. 2.1 (1996).



*National Authorization of Stratospheric Networks*

Insofar as stratospheric networks are defined within the ITU as space radiocommunications services, national authorization procedures would be expected to be no different than for other space radiocommunications services. Specifically, any administration may authorize one or more stratospheric space stations, with earth coverage patterns than extend beyond their own territory, provided that the stratospheric space stations are technically coordinated with any other country using the same frequency bands under ITU procedures. The stratospheric space stations may only communicate with users on the ground in countries which have authorized such users to communicate with the stratospheric space stations. Generally, a country issues a blanket regulation authorizing all type-accepted communications equipment designed for use with a particular space service to be sold. In addition, each country which has a ground station that interconnects with the stratospheric space station, for purposes of tie-in with the internet and other PSTN services, would also specifically authorize each ground station. Such permits are usually granted routinely upon the application to the Ministry of Telecommunication from the intended ground station operator.

*Conclusion*

Stratospheric platforms herald a new age of communications. Such platforms have some of the best attributes of satellite systems, such as wide area coverage, and some of the best attributes of terrestrial systems, such as short path lengths. From a regulatory standpoint, the stratospheric networks are Fixed Satellite Service systems operating under an outer space legal regime. Earth stations accessing the stratospheric platforms, both gateway ground stations and handheld user terminals, will need to be authorized by each country that wants to participate in the global stratospheric network.

## EVENTS OF INTEREST

### A. PAST EVENTS

#### *Reports*

#### *COPUOS S. & T. Subcommittee Makes Progress on Space Debris and a Possible Third UNISPACE Conference*

The Scientific and Technical Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) held its thirty-third annual session at the United Nations Office at Vienna, Austria, from 12-23 February 1996. As a result of the retirement of Professor J. Carver of Australia as Chairman at last year's session after twenty-five years of service,<sup>1</sup> the Subcommittee elected Professor D. Rex of Germany to be the Chairman of the Subcommittee.<sup>2</sup>

At this year's session, the representatives of the following Member States of COPUOS attended the session: Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Cuba, Czech Republic, Ecuador, France, Germany, Greece, Hungary, India, Indonesia, Iran (Islamic Republic of), Iraq, Italy, Japan, Kazakhstan, Lebanon, Mexico, Morocco, Nicaragua, Nigeria, Pakistan, Philippines, Poland, Portugal, Republic of Korea, Romania, Russian Federation, South Africa, Spain, Sudan, Sweden, Syrian Arab Republic, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland and United States of America. In addition to the Member States, representatives of Algeria, Guatemala, Ireland, Jordan, Malaysia, Peru, Saudi Arabia, Slovakia, Tunisia, United Arab Emirates and the League of Arab States also attended the session as observers. Representatives of the Economic and Social Commission for Asia

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<sup>1</sup> See generally, Sanidas, *Scientific and Technical Subcommittee of COPUOS Meets in a Productive Atmosphere*, 23 J. SPACE L. 141 (1995).

<sup>2</sup> The procedural and political steps leading up to the election of Professor Rex were quite interesting. Both Canada and Iran had, at certain points, submitted candidates for the position, the former withdrawing its candidate at the 1995 session of COPUOS. The candidature of Iran was presented as that of the Group of 77. During the first meeting of the Subcommittee, on 6 February, as a result of extensive consultations, Professor Rex was ultimately elected Chairman. However, in the *Report of the Scientific and Technical Subcommittee on the Work of its Thirty-third Session*, in U.N. Doc. A/AC.105/637 of 4 March 1996, at para. 195, the following statement was included:

195. Some delegations noted that the Chairman of the Group of 77, speaking on behalf of the Group of 77, while expressing satisfaction with the election of the present Chairman under agenda item 1, had also expressed the view that the principles of rotation, equitable representation of the various geographical regions and transparency of the office of the Committee and its subsidiary bodies should prevail in future election, as was the case in other bodies in the United Nations system..

and the Pacific (ESCAP), the Economic Commission for Africa (ECA), the World Health Organization (WHO), the United Nations Industrial Development Organization (UNIDO), the International Atomic Energy Agency (IAEA), the Association of Space Explorers (ASE), the European Space Agency (ESA), the Committee on Space Research (COSPAR), the International Astronomical Federation (IAF), and the International Society for Photogrammetry and Remote Sensing (ISPRS) also attended the session.

Pursuant to General Assembly Resolution 50/27 of 6 December 1995, the Subcommittee, during its two-week session, continued its consideration of various issues relating to international cooperation in outer space, including, among others, the implementation of the recommendations of the UNISPACE 82 conference<sup>3</sup> and the United Nations Programme on Space Applications, possible organization of a third UNISPACE conference, and space debris with a specific focus on the measurements of space debris. In addition to these items discussed in detail below, the Subcommittee also continued its consideration of issues related to the remote sensing of the Earth by satellites, nuclear power sources in outer space, the physical and technical attributes of the geostationary orbit, space transportation systems, the Earth environment, life sciences and planetary exploration and astronomy.

As in recent years, this year's session of the Subcommittee took place in a productive atmosphere with no apparent East-West conflicts although North-South differences on economic and development issues remained but were discussed in a constructive manner. As a result, the work of the Subcommittee on many substantive issues took solid steps forward and provided a good basis for future discussions and agreement on many issues. As a backdrop to the work of the Subcommittee at this year's session, the Chairman noted in his opening statement, a recent example of international cooperation in the peaceful uses of outer space, namely the on-going series of Shuttle-Mir docking missions in which astronauts and cosmonauts from around the world are working together towards the ultimate goal of an international space station.

#### Themes and Presentations

At this year's session as in previous sessions, COSPAR and IAF organized a symposium on the theme "Utilization of micro- and small satellites for the expansion of low-cost space activities, taking into particular account the special needs of developing countries". The symposium included technical presentations on the experiences of various countries and organizations in this area, including presentations by Chile, Republic of Korea, Spain, France, United States, Brazil, South Africa, ESA, and the International Academy of Astronautics. For the thirty-fourth session of the Subcommittee in 1997, the Subcommittee recommended that the theme, "Space systems for direct broadcasting and global information systems for space research" should be fixed for special attention.

<sup>3</sup> For a complete record of the recommendations and conclusions of UNISPACE 82, see generally, *List of Conclusions and Recommendations of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82)*, U.N. Doc. A/CONF.101/11/Corr.1 of 2 November 1982.

Other presentations on various themes were also given during the course of this year's session with a view to enhancing discussions on relevant issues before the Subcommittee. These included presentations from Austria on the geospace global mapping project, India on the Indian Remote Sensing satellite, Morocco on remote sensing, cartography and mapping, Poland on the CESAR project<sup>4</sup>, the Russian Federation on space transportation systems, the United Kingdom of Great Britain and Northern Ireland on safety principles for nuclear power sources in space, the Association of Space Explorers (ASE) on the X-Prize for the development of a reusable, single-stage, suborbital vehicle, the International Astronomical Union (IAU) on solar reflectors and astronomy, ISPRS on new commercial remote sensing satellites, and the International Space University on small satellite design projects.

As was the case in previous sessions, other presentations on the complex issue of space debris were also given by the United Kingdom of Great Britain and Northern Ireland, the Russian Federation, the United States of America, Germany, and ESA.<sup>5</sup>

#### Implementation of the Recommendations of UNISPACE 82 and United Nations Programme on Space Applications

As has been the accepted practice of the Subcommittee, it continued its joint consideration of the Implementation of the Recommendations of UNISPACE 82 and the United Nations Programme on Space Applications. The mandate of the Programme on Space Applications covers six major areas: provision of long-term fellowships; organization of training courses, workshops, symposia and conferences; provision of technical advisory services; development of indigenous capability at the local level; provision of space information and promotion of greater cooperation in space science and technology.<sup>6</sup> Of the above, one of the major objectives of the Programme on Space Applications is assisting developing countries by providing access to information on the use of space technology that will further their economic and social development thereby furthering the objectives set out by Secretary-General Boutros-Boutros Ghali in An Agenda for Development. To this end, the Programme organizes short-term training courses, workshops and symposia on the applications of space technology for economic and social development as well as administering fellowships for long-term education in space-related disciplines. Currently, the fellowships are available in Brazil, China and at various institutions of the

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<sup>4</sup> CESAR stands for the Small Central European Satellite of Advanced Research.

<sup>5</sup> For further details on these presentations, see generally, *Report of the Scientific and Technical Subcommittee*, *supra* note 2, at paras. 16-19 and *Scientific and Technical Presentations to the Scientific and Technical Subcommittee at its Thirty-Third Session*, U.N. Doc. A/AC.105/638 of 7 May 1996.

<sup>6</sup> The mandate of the Programme was expanded by General Assembly Resolution 37/90 of 10 December 1982, which took into account the recommendations of UNISPACE 82.

European Space Agency. The Programme also provides developing countries, on request, with advice on the organization and planning of national and regional space applications programmes.

*a. Programme on Space Applications Activities*

The Subcommittee noted that in 1995 and 1996, the Programme had successfully conducted three international training courses (in Sweden, Gabon, and Italy), four workshops (in Zimbabwe, Norway, Italy and Sri Lanka), one regional conference (in Mexico) one symposium (in Austria) and one meeting of experts (in Spain). These activities concentrated on a wide variety of themes including the remote sensing for educators, the use of ERS-1 data for the mapping and inventory of natural resources in Africa, the development of educational curricula for the Regional Centres for Space Science and Technology Education, the applications of space techniques to combat natural disasters, space technology for health care, space technology for sustainable development, and basic space science.

The Subcommittee also approved the proposed activities of the Programme for 1996 including meetings on spin-off benefits of space technology, microwave remote sensing applications, remote sensing education, space technology for the prevention and mitigation of the effects of disasters, development and dissemination of space technology, basic space science, small satellite missions, space technology and applications in the developing world, and the second regional conference on space technology for sustainable development in Africa.

The Subcommittee further recommended the approval of activities for 1997 covering the themes of remote sensing education for educators, small satellites, communications and information technology for development, ERS data applications, and space technology as a tool for cleaning and rehabilitating the environment. While appreciating the results achieved by the Programme on Space Applications and looking forward to future results, the Subcommittee reiterated its concern that in order to continue this heavy load of activities, the resources available to the Programme would have to be augmented through voluntary contributions.

*b. Programme on Space Applications Support for Regional Space Efforts*

The Subcommittee also noted that the Programme continued to provide consulting services in support of regional space efforts, including, (i) assistance to the Government of Ecuador in promoting the regional operation, administration and funding of the remote sensing receiving station at Cotapaxi; (ii) assistance to the Government of Chile in its follow-up, as *pro tempore* secretariat, of the recommendations of the Second Space Conference of the Americas; (iii) assistance to the Government of Korea in the growth of the Asia-Pacific Satellite Communications Council; (iv) collaboration with ESA on the implementation of a project entitled COPINE;<sup>7</sup>

<sup>7</sup> The COPINE project is designed to address one of the recommendations of the Dakar Regional Conference on Space Technology for Sustainable Development in Africa, held in October 1993 regarding the urgent need to establish an efficient

(v) collaboration with ESA and the Department for Development Support and Management Services of the United Nations in follow-up activities related to the recommendations of the November 1995 Training Course on Applications of ERS-1 Data for Natural Resources, Renewable Energy and the Environment; and (vi) collaboration with ESA on follow-up activities relating to the series of workshops on basic space science.

The Programme on Space Applications continues to contribute to the promotion of cooperation in space science and technology and related fields at the regional level through the establishment of regional Centres for Space Science and Technology Education in developing countries. One of the many objectives of these Centres is to reinforce cooperation among developing countries as well as between the industrialized and developing countries at the regional level with an emphasis on the education of university professors in developing countries who can then pass this knowledge and acquired skills on to large numbers of students.<sup>8</sup>

At this year's session, a major development with regard to the Centres was the fact that the General Assembly, in resolution 50/27 of 6 December 1995 endorsed the recommendation of COPUOS that the centres be established on the basis of affiliation to the United Nations as early as possible, and that such affiliation would provide the centers with the necessary recognition and strengthen the possibilities of attracting donors and of establishing academic relationships with national and international space-related institutions.<sup>9</sup> The Subcommittee noted that during consideration of the item on international cooperation in the peaceful uses of outer space by the Fourth Committee of the General Assembly in November 1995, Brazil and Mexico informed that Committee that they had reached agreement on all aspects relating to the establishment of the Centre for the Latin American and Caribbean region. The Subcommittee also noted that the Regional Centre for Asia and the Pacific had been inaugurated in India in November 1995 and that the first education programme would begin in April 1996.

With regard to the regional Centre for Africa, the Subcommittee noted that the commitments of both Morocco and Nigeria favored the establishment, operation and long-term sustainability of a centre in that region; the former for French-speaking African countries and the latter for English-speaking African countries. With regard to the Centre in the region covered by the Economic and Social Commission for Western Asia (ESCWA), the Subcommittee took note of discussions on the establishment of the Centre and noted that the Syrian Arab Republic had indicated its interest in hosting the Centre.

With regard to Europe, the Subcommittee noted the offers of Greece, Romania and some other Member States to host or serve as a node for such a

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communications network among African and European professionals and scientists at national, continental and intercontinental levels. *Report of the Scientific and Technical Subcommittee*, *supra* note 2, at para. 33 (d).

<sup>8</sup> See generally, Sanidas, *supra* note 1, at 143-44.

<sup>9</sup> *Report of the Scientific and Technical Subcommittee*, *supra* note 2, at para. 45.

Centre. During consultations held during the session, the delegations of Bulgaria, Greece, Poland, Romania, and Turkey agreed that instead of establishing a centralized institution, it would be more appropriate to establish an educational system consisting of a network of space science and technology education institutions. Moreover, the activities of each member of the network would be in harmony with the relevant existing institutions in Europe.

#### UNISPACE Conference

In accordance with the General Assembly resolution 50/27, in both the Subcommittee and Working Group of the Whole, the Subcommittee continued to discuss the possible holding of a third UNISPACE conference. The General Assembly had agreed that the third United Nations Conference on the Exploration and the Peaceful Uses of Outer Space could be convened before the turn of the present century, and that, prior to recommending a date for the Conference, there should be a consensus recommendation on the agenda, venue and funding of the Conference. Furthermore, the General Assembly recommended that the Subcommittee should continue the work it had conducted at its thirty-second session.<sup>10</sup> The aim of the work was to complete the development and refinement of a framework that would allow an evaluation of proposals by the Committee at its thirty-ninth session, and that this framework should allow for the consideration of all possibilities of achieving the final objectives of such a Conference. The Subcommittee was also charged with considering all issues associated with the possible convening of a third UNISPACE Conference including its technical and political objectives, a detailed and sharply focused agenda, funding, timing and other organizational aspects as well as whether the objectives of such a conference could be achieved by other means. Ultimately, it was the task of the Committee to make a final recommendation to the General Assembly at the current session.

During discussions held in the framework of the Working Group of the Whole,<sup>11</sup> numerous ideas and suggestions were made. Initially, the Working Group reported on the objectives of a possible third UNISPACE Conference. In their view, the basic objective would be to promote effective means of using space technology to assist in the solution of problems of regional or global significance and to strengthen the capabilities of Member States, in particular developing countries, to use the applications of space research for economic, social and cultural development. To achieve this objective, the conference should include a review of recent developments in space activities, including advances in space technology, new economic and social applications, and economic factors limiting the development of space technology and its applications.

Other objectives cited by the Working Group of the Whole of the Subcommittee included the elaborating in advance by developing countries

<sup>10</sup> The results of those discussions are detailed in Sanidas *supra* note 1, at 147.

<sup>11</sup> The report of the Working Group of the Whole can be found in Annex II of the *Report of the Scientific and Technical Subcommittee*, *supra* note 2.

of their needs for space applications for development purposes as well as the possibility of considering ways of expediting the use of space applications in Member States to promote sustainable development. The Conference could also address various issues related to education, training and technical assistance in space science and technology and their applications aimed at the development of indigenous capabilities. Ultimately, the proposed conference could serve as a valuable forum for increasing awareness of the general public regarding the benefits of space technology and critical evaluation of the value of space activities.

In terms of organization, the Working Group of the Whole considered different alternative means to achieve the objectives for such a Conference. Above all, it was felt that the organization of the Conference should permit the participation of all States Members of the United Nations. In this regard, the objectives set out for a third UNISPACE conference could be better achieved if the Working Group examined space activity and international cooperation as a whole, and, if during the preparatory phase, the forums provided by specialized groups and other regional or international conferences, symposia and meetings are utilized to define a few focused themes to be dealt with by the Conference. When agreement to convene the Conference was reached, it was felt that the Committee should work with and involve major organizations as these organizations may be the best or most appropriate route to achieve the desired results.

The Working Group of the Whole was able to come to an understanding that if a Conference were to be convened the following ideas would apply: (i) Ensure the participation of all countries; (ii) Allow for the consideration of issues related to international cooperation on the development and utilization of space science and technology and in particular, allow for the evaluation of the major development areas where space could make substantive and cost-effective contribution; (iii) Avoid duplication and repetition with UNISPACE II and any organized activities of the Programme on Space Applications; (iv) Convene regional conferences or events to discuss matters of particular relevance or concern to a particular region; (v) Draw on available resources, infrastructure and services of the Committee and its subcommittees; and (vi) The outline of an agenda for any conference would be detailed following agreement on the holding of a third UNISPACE.

The Working Group of the Whole noted that if COPUOS intensified its work, several of the issues for a third UNISPACE could be addressed in that framework and that by inviting contributions from a number of groups that specialize in the field of space science or technology such as the Space Agency Forum, the Committee on Earth Observation, IAF, COSPAR, and the Inter-Agency Space Debris Coordination Committee, to review scientific and technological developments, the Committee could be provided with a valuable view of the current status and the expected developments in relevant fields. Therefore, specialized groups with requisite expertise and experience should be invited to participate in preparing realistic goals for a third UNISPACE so that such a conference would add to and complement the activities of these other bodies.

Other ideas for consideration included an appropriate meeting of COPUOS held in conjunction with a World Space Exhibition, an ad hoc special session of COPUOS open to all States with a focus on technical



cooperation for the application of space science and technology to development, a Conference convened in 1998, before the fifty-third session of the General Assembly, and a special session of COPUOS open to all Member States at the ministerial level, among others.<sup>12</sup>

### Space Debris

The Subcommittee, at its 1996 session, continued, on a priority basis, its consideration of the agenda item on space debris. The Subcommittee heard special presentations on space debris by experts from France, Germany, Russian Federation, United Kingdom, United States and ESA. This, together with the report prepared by the Secretariat on various steps taken by space agencies for reducing the growth or damage potential of space debris and with information on national research on space debris, provided in advance by several Member States contributed to the success of the session with regard to its consideration of this agenda item.

The Subcommittee agreed that consideration of space debris was important, and that international cooperation was needed to expand appropriate and affordable strategies to minimize the potential of space debris on future space missions. Of significant importance at this year's session was the agreement by the Subcommittee that the Inter-Agency Space Debris Coordination Committee should be invited to give a presentation at next year's session of the Subcommittee.

The most important aspect of the Subcommittee's consideration of space debris at this year's session was that it began its discussions and preparation of its technical report pursuant to its multi-year work plan adopted at the 1995 session of the Subcommittee.<sup>13</sup> In this regard, in the context of the multi-year work plan during the time-span 1996-98, the Subcommittee agreed to focus in a flexible manner, on understanding aspects of research relevant to space debris, including debris measurement techniques; mathematical modelling of the debris environment; characterizing the space debris environment; and measures to mitigate the risks of space debris, including spacecraft design measures to protect against space debris. The report for 1996 concentrated on measurements of space debris.<sup>14</sup> In terms of substance the report discussed different types of space debris measurement techniques including ground-based measurements, optical measurements and space-based measurements as well as efforts in the field of cataloguing the orbital population as well as databases on space debris. Within the context of measuring the space

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<sup>12</sup> For further details on these and other ideas for consideration, see Annex II, *id.* at paras. 37-43.

<sup>13</sup> See generally, Sanidas, *supra* note 1, at 144-45.

<sup>14</sup> The technical report for this year's session of the Subcommittee can be found in *Report of the Scientific and Technical Subcommittee*, *supra* note 2, at paras. 97-138.

debris environment, the Subcommittee also included a section on the effects of the space debris environment on the operation of space systems.<sup>15</sup>

Although highly technical, this year's consideration of space debris was quite interesting and thanks to the efforts of the Chairman, an expert in the study of space debris, in coordinating the work of the numerous experts in the field in attendance, significant progress was made on this highly complex issue. This certainly bodes well for future consideration of space debris by the Subcommittee especially as the technical report is to be carried forward and updated with the ultimate objective of accumulating advice and guidance so that a common understanding of the problem is achieved. Once such an understanding is achieved, it shall serve as the basis for further deliberations on the matter

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<sup>15</sup> By way of reference, the 1996 installment of the technical report was outlined in the following manner:

1. Measurements of space debris
  - 1.1 Ground-based measurements
    - 1.1.1 Radar measurements
    - 1.1.2 Optical Measurements
  - 1.2 Space-based measurements
    - 1.2.1 Retrieved Surfaces and impact detectors
    - 1.2.2 Radar and optical measurements from space
    - 1.2.3 Infrared measurements from space
  - 1.3 Cataloguing and database
  - 1.4 Effects of the space debris environment on the operation of space systems
    - 1.4.1 Effects of large debris objects on the operation of space systems
    - 1.4.2 Effects of small debris objects on the operation of space systems
      - 1.4.2.1 Damage to surface or subsystems
      - 1.4.2.2 Effects of space debris on manned space operations

This section, as contained in the 1996 report will be followed by the sections on modelling and mitigation measures that were preliminarily outlined at this year's session:

2. Modelling of space debris environment and risk assessment
  - 2.1 Methods of modelling of the debris environment
    - 2.1.1 Spatial distribution and its time evolution
    - 2.1.2 Collision probabilities
    - 2.1.3 Effects of collisions
  - 2.2 Comparison of the results of short-term and long-term models
3. Space debris mitigation measures
  - 3.1 Reduction of the debris increase in time
    - 3.1.1 Avoidance of mission-related objects
    - 3.1.2 Improving structural integrity of space objects (explosion, prevention, etc.)
    - 3.1.2 De-orbiting and reorbiting of space objects
  - 3.2 Protection strategies
    - 3.2.1 Shielding
    - 3.2.2 Collision avoidance
  - 3.3 Effectiveness of mitigation measures.

by COPUOS. The Subcommittee agreed to continue its consideration of the item at its next session.

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**"Outer Space Benefits Resolution" Nearing Finalization:  
Report of Progress in COPUOS Legal Subcommittee**

*I. Introduction*

On 18 March 1996, the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) convened its thirty-fifth session at the United Nations Office at Vienna. The two-week session, which ended ahead of schedule, on 28 April, was chaired once again by Mr. Václav Mikulka of the Czech Republic.

The session was attended by 44 of the 61 States members of the Subcommittee, namely: Argentina, Australia, Austria, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Cuba, Czech Republic, Ecuador, Egypt, France, Germany, India, Indonesia, Iran (Islamic Republic of), Iraq, Italy, Japan, Kazakhstan, Lebanon, Mexico, Morocco, Nigeria, Pakistan, Philippines, Poland, Republic of Korea, Romania, Russian Federation, South Africa, Spain, Sudan, Sweden, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, United States of America, Uruguay, Venezuela and Viet Nam. It was also attended by four specialized agencies and other international organizations (International Atomic Energy Agency (IAEA), International Telecommunication Union (ITU), the European Space Agency (ESA) and the International Astronautical Federation (IAF)), as well as five observers (Malaysia, Saudi Arabia, Slovakia, Thailand and the League of Arab States).

Pursuant to the recommendations of the thirty-fourth session of the Legal Subcommittee,<sup>1</sup> the thirty-eighth session of COPUOS (held in June 1995),<sup>2</sup> which were endorsed by the General Assembly at its 50th session (December 1995),<sup>3</sup> the Legal Subcommittee considered the following three substantive items on its agenda:

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

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<sup>1</sup> See *Report of the Legal Subcommittee on the Work of its Thirty-Fourth Session (27 March-7 April 1995)*, U.N. Doc. A/AC.105/607 (19 Apr. 1995) [hereinafter LSC 34th].

<sup>2</sup> See *Report of the Committee on the Peaceful Uses of Outer Space*, U.N. GAOR, 50th Sess., Supp. No. 20, U.N. Doc. A/50/20.

<sup>3</sup> See A/Res/50/27 (5 Feb. 1996).

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

(III) Consideration of the legal aspects related to the application of the principle that the exploration and utilization of outer space should be carried out for the benefit and in the interests of all States, taking into particular account the needs of developing countries (agenda item 5).

The Legal Subcommittee also had, for the first time, "Other Matters" as an agenda item.

## II. *Discussion on Substantive Agenda Items*

### (a) Item 3. "Question of Review and Possible Revision of the Principles Relevant to the Use of Nuclear Power Sources in Outer Space"<sup>4</sup>

This year, as was the case last year, the Working Group on this item was not re-established.<sup>5</sup> Delegations re-iterated the views they had expressed on this item in 1995. The delegations believed that the Legal Subcommittee should await the results of the discussions on this matter in the Scientific and Technical Subcommittee before taking any action of its own. The Working Group once again decided to suspend discussion of this item for one year, pending the results of the discussions on this matter in the Scientific and Technical Subcommittee's 1997 session. If the S&T debate showed progress, only then would the Legal Subcommittee reconvene the Working Group on this item next year. The item would, however, be maintained on the agenda of the Legal Subcommittee so that States could continue the debate in the Plenary.

### (b) Item 4. "Matters Relating to the Definition and Delimitation of Outer Space and to the Character and Utilization of the Geostationary Orbit, Including Consideration of Ways and Means to Ensure the Rational and Equitable Use of the Geostationary Orbit without Prejudice to the Role of the International Telecommunications Union"

The Working Group on this item was re-established, under the Chairmanship of *Mr. Eugenio Maria Curia*, the representative of Argentina. As in previous years, the Subcommittee discussed two issues under this

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<sup>4</sup> The Principles Relevant to the Use of Nuclear Power Sources in Outer Space were adopted by G.A. Res. 47/68 (14 Dec. 1992). They can be found in *United Nations Treaties and Principles on Outer Space*, U.N. Doc. A/AC.105/572 (Mar. 1994).

<sup>5</sup> See J.S. Thaker, *UN Legal Subcommittee on Space Makes Progress on Definition/Delimitation Issue*, 23 J. SPACE L., 149, at 150-51 (1995) [hereinafter Thaker] for a description of the debate on this item during the 1995 session of the Legal Subcommittee.

agenda item: "Question of the definition and delimitation of outer space" and "Question of the geostationary orbit."

At the 1995 session of the Subcommittee, the Working Group agreed to a final version of a "Questionnaire on Possible Legal Issues With Regard to Aerospace Objects",<sup>6</sup> that was circulated amongst States Members of the Committee on the Peaceful Uses of Outer Space for their preliminary views. During 1995-96, replies were received from nine States (the Czech Republic, Germany, Iraq, Italy, Mexico, Pakistan, Philippines, Republic of Korea and Russian Federation), and these were reproduced in the document "Questionnaire on possible legal issues with regard to aerospace objects: replies from Member States" (A/AC.105/635 and Add. 1 and 2).

At the 1996 session of the Subcommittee, the Working Group concentrated its discussion on these replies. Considering the low number of responses to the questionnaire, the debate was short. Subsequently, the Subcommittee recommended that the Secretariat encourage those Member States that had not submitted a response to the questionnaire to do so, and that, it should prepare a comprehensive analysis of all replies, in time for the 1997 session of the Subcommittee, in order to assist the Working Group in its deliberations.

With respect to the second matter, that of the geostationary orbit, Colombia submitted a new paper entitled, "Some considerations concerning the utilization of the geostationary satellite orbit" (A/AC.105/C.2/L.200 and Corr. 1 of 15 March 1996),<sup>7</sup> at the current session of the Subcommittee. The paper adopts a different approach from that reflected in Colombia's previous working paper on the subject,<sup>8</sup> submitted in 1993.<sup>9</sup> It takes account of the views expressed at previous sessions of the Working Group, the Subcommittee and the Committee, and omits statements of self-evident principles and avoids arguments regarding matters such as the definition of the geostationary orbit.

The paper quotes various paragraphs of General Assembly resolution 50/27 which demonstrate the competence of the COPUOS and its Subcommittees to discuss the subject of the GSO without prejudice to ITU's role in the matter.<sup>10</sup> Further, it notes that the ITU, through its Radio Regulations, has been setting guidelines for the use of the GSO and radio frequencies in accordance with the principles contained in Article 44 of its Constitution, and that, since 1977, orbital positions, frequencies and services in the GSO have been planned so as to guarantee equitable access

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<sup>6</sup> See 23 J. Space L. 223 (1995), and Thaker, *id.* at 152.

<sup>7</sup> See *Report of the Legal Subcommittee on the Work of its Thirty-Fifth Session (18-28 March 1996)*, U.N. Doc. A/AC.105/639 (11 Apr. 1996), at annex III A [hereinafter LSC 35th].

<sup>8</sup> "Geostationary satellite orbit", U.N. Doc. A/AC.105/C.2/L.192.

<sup>9</sup> See Thaker, *supra* note 5, at 152-153.

<sup>10</sup> *Supra* note 3, paras. 4, 6 and 17.

for all countries. The document then lists the frequency bands and services planned for which countries have been allotted orbital positions.<sup>11</sup>

The paper asserts that more precise criteria are needed with respect to the many still unplanned frequency bands and services, with regard to which access to orbital positions is still at present provided on a "first come, first served" basis. The Colombian position is that this procedure is "unfair when it (involves) the possibility of access to a specific orbital position at the same time and with the use of the same frequencies by a developing country and a developed country, or by a country that as yet had no access to the orbit as against one which had."<sup>12</sup>

The paper states, therefore, that a draft text prepared by the Legal Subcommittee with regard to the use of the GSO should recommend the following principles:<sup>13</sup>

(a) When the need arises for processes of coordination between countries, due to possible radio-electronic interference in respect of bands and services not planned by ITU using geostationary satellites, the countries involved in such coordination processes shall take into account the fact that access to the geostationary satellite orbit must take place, *inter alia*, in an equitable manner and that, consequently, when a developed country and a developing country have equal claims to access to the same orbital position or neighbouring positions, or when a country which has already had access and another which has not yet had access have equal claims, the developed country or the country which has already had access to the geostationary orbit shall, in the coordination procedure, offer all possibilities for the other country to have access to the orbital position and the frequencies desired, or have such access with the minimum of operational restrictions possible;

(b) The claim of countries to use frequencies and to occupy geostationary orbital positions in the cases provided for above shall be exercised under the conditions set forth in the ITU Radio Regulations and, in any event, account shall be taken of the provisions of Resolution 18 of the 1994 Kyoto Conference to guarantee effective use of the geostationary orbit;

(c) Best efforts shall be made by the satellite "launching State" to remove space debris and spent satellites from the geostationary satellite orbit to disposal orbits shortly before the end of the useful lives of satellites, in order to ensure the effective and economical use of this orbit.

<sup>11</sup> See LSC 35th, *supra* note 7, at 30.

<sup>12</sup> Summary Record of the 590th Meeting, U.N. Doc. A/AC.105/C.2/SR.590 at 9.

<sup>13</sup> LSC 35th, *supra* note 7, at 31.

The reference to ITU regulations, especially to Resolution 18 of the 1994 Kyoto Conference, in the working paper provoked a very productive debate, with several Member States making substantive comments. As a result, the Subcommittee asked the Secretariat, in cooperation with the ITU Secretariat, to provide for the next session of the Subcommittee, an analysis of the compatibility of the approach contained in the Colombian working paper with the existing rules and procedures of ITU relating to the use of the geostationary orbit.

During the debate, delegations re-iterated their previous positions on this topic, with the developed countries pointing out that the Legal Subcommittee did not have a mandate to formulate principles of law or a special legal regime for the Geostationary Orbit. They stated that the ITU had been quite successful in dealing with various aspects of the rational and equitable use of the Orbit and it was necessary to avoid any possible conflict with the ITU and the Subcommittee. The developed countries maintained that since the Orbit was an integral part of outer space, the legal regime established by the 1967 Outer Space Treaty<sup>14</sup> adequately covered activities in and related to the geostationary orbit.

The developing countries, however, were of the opinion that the Subcommittee did have a mandate to develop new principles, and that its work was complementary, and not contradictory, to that being carried out by the ITU. Most developing countries agreed that the Orbit was a part of outer space.<sup>15</sup> They firmly believed, however, that the Orbit's special characteristics and features, and the fact that it was a limited natural resource,<sup>16</sup> which was in danger of becoming saturated, required the creation of a *sui generis* regulatory regime to ensure equitable access to the Orbit.

(c) Item 5. "Consideration of the Legal Aspects Related to the Application of the Principle that the Exploration and Utilization of Outer Space Should be Carried out for the Benefit and in the Interests of all States, Taking into Particular Account the Needs of Developing Countries"

The Working Group on this item was re-established, under the Chairmanship of *Mr. Raimundo González*, the representative of Chile. Of the three substantive items on the agenda, the greatest progress was made on this item. On the basis of the discussions held during the 1995 session of the Legal Subcommittee, the developing countries and France and Germany submitted revised versions of their documents (A/AC.105/C.2/L.182/Rev.3

<sup>14</sup> 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 General Assembly in resolution 2222 (XXI) of 19 December 1966, *opened for signature* at London, Moscow and Washington on 27 January 1967, *entered into force* on 10 October 1967, 610 UNTS 205; 18 UST 2410, TIAS 6347; 6 ILM 386 (1967).

<sup>15</sup> Ecuador, however, re-iterated its position that since outer space had not so far been delimited, it could not be affirmed that the Geostationary Orbit was a part of outer space.

<sup>16</sup> This fact being recognized in the ITU treaties.

and A/AC.105/C.2/L.197/Rev.1, respectively).<sup>17</sup> The latter paper more-or-less reflected the previous version. However, the paper presented by the developing countries was substantially different, in that it substantially resembled the French and German document. This, perhaps, was the catalyst that provided a breakthrough in the debate on the matter. After a paragraph-by-paragraph discussion of both papers, and intensive informal discussions by the sponsors of the papers, the latter succeeded in agreeing on a consolidated text, with only a few disputed elements that were placed in square brackets.

The text was submitted as an informal working paper of the Chairman of the Working Group, and annexed to the report.<sup>18</sup> The Working Group closed its meeting with a general feeling that the text could be finalized and sent to the General Assembly for adoption as a resolution by the next session of the Subcommittee, in 1997, if not sooner, at the Committee's meeting in June 1996.

### III. Other Matters

Under its new agenda item on "Other Matters", the Legal Subcommittee discussed two topics. The first issue was that of the records of the Subcommittee. Due to the financial difficulties facing the Organization, the Subcommittee, following the example set by the Committee at its 1995 session,<sup>19</sup> decided that, at its subsequent sessions, it will use verbatim unedited transcripts, in lieu of summary records. The second matter related to the working methods of the Subcommittee. The Subcommittee recognized that improvements in its working methods had been achieved, through the flexible approach to its work schedule. Some delegations, however, advocated additional measures, such as a reduction in the duration of sessions, but no agreement was reached in this regard. It was acknowledged that, for the time being, as much as could be done had been achieved in the Subcommittee's approach to improving its working methods, and any additional measures that could be necessarily taken would be now in the hands of the Committee.

### IV. New Items for the Agenda

In accordance with the Subcommittee's recommendation, made at its session in 1995,<sup>20</sup> the Chairman of the Subcommittee conducted informal

<sup>17</sup> LSC 35th, *supra* note 7, at Annex III, Part B and Part C.

<sup>18</sup> See "Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interests of all States, Taking into Particular Account the Needs of Developing Countries", U.N. Doc. A/AC.105/C.2/L.202 (27 Mar. 1996), in *id.* at 36.

<sup>19</sup> See M. Sanidas & J. Thaker, *Third Unispace Conference Possible by Turn of Century: Agreement at 38th Session of United Nations Committee on Space*, 23 J. Space L. 157, 163 (1995) [hereinafter Sanidas & Thaker].

<sup>20</sup> Thaker, *supra* note 5 at 156.



open-ended consultations with all members of the Subcommittee, "with a view to identifying, on the basis of consensus, a subject or a list of subjects that might be considered, in the future, for inclusion in the agenda of the Subcommittee".

The following topics were discussed:

- (a) status of the five outer space treaties;
- (b) commercial aspects of space activities;
- (c) review of existing norms of international law applicable to space debris;
- (d) legal aspects of space debris;
- (e) comparative review of the principles of international space law and international environmental law.

The States that had suggested topics (a), (c), and (e) submitted unofficial background notes to explain their proposals, and these were annexed to the report. The topic suggested by the Czech Republic, on a review of existing norms applicable to space debris, received strong support from many delegations, but no agreement was reached. Further discussions on a new topic for the Legal Subcommittee's agenda are expected to take place when the Committee meets, in June.

#### V. *Space Law Symposium*

The International Institute of Space Law (IISL), in collaboration with the European Centre for Space Law (ECSL) organized a space law Symposium on the Protection of the Space Environment, at the end of the first day's session of the Legal Subcommittee's meeting.

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### *COPUOS Session Agrees on UNISPACE III: Adopts Declaration on "Outer Space Benefits"*

#### I. *Introduction*

The United Nations Committee on the Peaceful Uses of Outer Space had a very successful thirty-ninth session. In this landmark meeting, it reached agreement on the holding of UNISPACE III, and it adopted the "Outer Space Benefits" Declaration. The Committee met at the United Nations Office at Vienna, Austria from 3 to 14 June 1996, under the Chairmanship of Ambassador Peter Hohenfellner of Austria. The principal items on its agenda were consideration of the work of its two Subcommittees.<sup>1</sup> The Committee also considered the items "ways and

<sup>1</sup> The Scientific and Technical Subcommittee met in Vienna from 12-23 February 1996, and the Legal Subcommittee met in Vienna from 18-28 March 1996. See U.N. Doc. A/AC.105/637 (4 March 1996) for the report of the S&T Subcommittee, and U.N. Doc. A/AC.105/639 (11 April 1996) for the report of the Legal Subcommittee, respectively. Detailed reports of the proceedings of these meetings can be found elsewhere in this issue of the JOURNAL OF SPACE LAW.

means of maintaining outer space for peaceful purposes" and "spin-off benefits of space technology".

## 2. UNISPACE III

At its session in 1995, the Committee had agreed that a third UNISPACE conference "could be held before the turn of the current century."<sup>2</sup> The 50th Session of the General Assembly endorsed this time line.<sup>3</sup> The General Assembly also agreed that, on the basis of the work to be conducted at the Scientific & Technical Subcommittee's 33rd session in February 1996,<sup>4</sup> the 1996 session of the Committee was to consider all issues related to the possible convening of such a conference, with a view to making a final recommendation to the General Assembly.

Therefore, this year, the Committee continued its consideration of the matter. It agreed that a Special Session of the Committee open to all Members of the United Nations (UNISPACE III), should be convened at the United Nations Office at Vienna, preferably in 1999,<sup>5</sup> and that it would be for a period of up to 10 days.

The Committee further agreed that it would act as the Preparatory Committee for UNISPACE III and that the Scientific and Technical Subcommittee would act as the Advisory Committee. The Office for Outer Space Affairs would act as the executive secretariat. The Committee requested the Advisory Committee to work out the organizational aspects of the third UNISPACE and a schedule of events, such as workshops, poster sessions, trade exhibitions and other related activities, taking into account the need to have the widest possible participation, including that of private industry. On the basis of the work of the Advisory Committee, the Committee, at its session in 1997, would begin its work as the Preparatory Committee for UNISPACE III.

## 3. Outer Space Benefits Declaration

The Committee again considered the work accomplished during the Legal Subcommittee on the subject of outer space benefits.<sup>6</sup> The Committee

<sup>2</sup> See M.W. Sanidas & J.S. Thaker, *Third UNISPACE Conference Possible by Turn of Century: Agreement at 38th Session of United Nations Committee on Space*, 23 J. SPACE L. 157, at 162 (1995) [hereinafter Sanidas & Thaker].

<sup>3</sup> See G.A. Res. 50/27 (5 Feb. 96) at para. 32.

<sup>4</sup> For a report on the work of this session, and a detailed discussion on the third Unispace, see the article by M. Sanidas, printed elsewhere in this issue of the Journal of Space Law.

<sup>5</sup> The date preferred is 1999, unless progress towards agreeing on an agenda at the 34th session of the Scientific & Technical Subcommittee, in 1997, made it more appropriate to consider the year 2000.

<sup>6</sup> 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 interests of all States, taking into particular account the needs of developing countries". See J. Thaker, "'Outer Space Benefits' Resolution Nearing Finalization: Report of Progress at 35th Session of UN Legal Subcommittee

took note of the useful and constructive discussions of the Working Group on this agenda item, based on working papers submitted by two groups of States.<sup>7</sup> The Committee also noted that the Chairman of the Working Group had submitted a working paper containing a consolidated text produced by the sponsors of working papers L.182/Rev.3 and L.197/Rev. 1, as a result of extensive informal consultations. During the course of the session, the Chairman of the Working Group on item 5, Mr. R. González, conducted informal consultations with members of the Committee, with a view to reaching a consensus agreement on the consolidated text. As a result, the Committee recommended that the General Assembly, at its fifty-first session, adopt the declaration on international cooperation in the exploration and use of outer space for the benefit and in the interests of all States, taking into particular account the needs of developing countries.

#### 4. *United Nations Programme on Space Applications*

In considering the work of the Space Applications Programme, the Committee expressed its satisfaction with the Programme as implemented by the United Nations Office for Outer Space Affairs and, particularly, by the United Nations Expert on Space Applications. The Committee, however, once again expressed its concern over the still limited financial resources available for carrying out the Programme, and it appealed to Member States to support the Programme through voluntary contributions. The Committee also approved the proposed programme for the rest of 1996 and also for 1997, that included training courses, workshops, symposia, and regional conferences on various subjects, for persons from developing countries, and fellowships for qualified applicants for advanced study in the area of space science and technology and space applications. The Committee also noted that the Programme was continuing its technical advisory services to various governments for various international and regional activities.

Finally, the Committee noted that the Centre for Space Science and Technology Education in Asia and the Pacific had been inaugurated in India in November 1995, that participation in the governing board of the Centre and its activities would be open to Member States in the region and that, in due course and upon approval by its governing board, the Centre would grow into a network of nodes enabling it to fully utilize the resources and potential of the region. The Committee noted with satisfaction that the first education programme of the Centre had begun in April 1996.<sup>8</sup> The Committee also noted that the offers and commitments of Morocco and Nigeria favoured the early establishment, operation and long-term sustainability of a centre for space science and technology education in Morocco for French-speaking African countries and such a centre in Nigeria for English-speaking African countries. Both countries were

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*on Space (18-28 March 1996)*", printed elsewhere in this issue of the JOURNAL OF SPACE LAW [hereinafter Thaker].

<sup>7</sup> U.N. Doc. A/AC.105/C.2/L.182/Rev.3, submitted by Brazil, Chile, Colombia, Cuba, Egypt, Iraq, Mexico, Nigeria, Pakistan, Philippines, Uruguay and Venezuela, and U.N. Doc. A/AC.105/C.2/L.197/Rev. 1, sponsored by Germany and France.

<sup>8</sup> Post-graduate course in remote sensing and geographic information systems, from 1 Apr.--31 Dec. 1996.

finalizing cooperation agreements that would be entered into by the Member States concerned later in 1996. The Committee also noted that the Governments of Brazil and Mexico had informed the General Assembly at its fiftieth session that they were nearing agreement on all aspects relating to the centre for the Latin America and Caribbean region.

#### 5. *Space Debris*

The Committee noted with satisfaction that, at its session this year, the Scientific and Technical Subcommittee had conducted its work based on the multi-year work plan, which the Subcommittee had adopted at its thirty-second session to address specific topics relating to space debris to be covered during the period 1996-1998. The Subcommittee worked, at its session this year, on the topic of measurements of space debris. The Committee noted that the Subcommittee's technical report on space debris would be updated each year, leading to an accumulation of advice and guidance, in order to establish a common understanding that could serve as the basis for further deliberations of the Committee on the matter.

#### 6. *Methods of Work of the Committee and its Subsidiary Bodies*

The Working Group of the Whole, under the Chairmanship of Ambassador Peter Hohenfellner, reconvened to consider the working methods of the Committee and its subsidiary bodies. On the question of the organization of its work, taking into account the proposals before it, the Working Group agreed that the following matters relating to the working methods of the Committee and its subsidiary bodies be examined: a) composition and election of the bureaux of the Committee and its subsidiary bodies, and the issue of rotation; b) issues regarding rules of procedure; c) working methods of the Committee, the records of the Committee and its Legal Subcommittee and new agenda items; d) duration of sessions; and e) other issues, including rationalization and improvement of working methods. The question of consensus was also discussed.

At the first meeting of the Working Group, the Director of the Office for Outer Space Affairs made a statement, giving an overview of the origins of the Committee, the history, basis and application of the consensus procedure in the Committee and the General Assembly, the history and workings of the offices of the Committee and its two Subcommittees, a brief comparative analysis of the bureaux of other General Assembly committees and a general explanation on the issues of duration of sessions and records of the Committee and its two Subcommittees.

With regard to the bureaux, some delegations expressed the view that the Cold War had affected the composition of the bureaux of the Committee and its Subcommittees, and that it was time to re-organize the offices in the light of the new existing international political realities.<sup>9</sup>

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<sup>9</sup> The Committee's bureau consists of a Chairman, Vice-Chairman and a Rapporteur. These posts have always been held by Austria, Romania and Brazil, resp. Both Subcommittees have only one office, that of Chairman. In the Legal Subcommittee, the Chairman's post was held by Poland, from 1962-1982,

They felt that the officers should be elected on the basis of the principles of equitable geographical representation and rotation. Other delegations expressed the view that the existing structure of the bureaux was acceptable and that there was no need for a change. Differing views were held by delegations, with regard to the question of duration of sessions of the Committee and its subsidiary bodies, as well. Some want the length of sessions to be reduced and others want to retain the status quo, that of reducing the length of sessions on an ad hoc basis, where necessary. With regard to the matter of consensus, there was general agreement that in the past decision-making by consensus had served the Committee well and that it continued to do so, considering the specialized nature of its work. It should therefore be retained. However, some delegations questioned the validity of consensus when applied to procedural matters, and one delegation was of the view that consensus should not be identified with unanimity or used to block general agreements.

During the debate, the Committee also noted that the Chairman of the Legal Subcommittee had conducted further open-ended, informal consultations with all members of the Subcommittee on the working methods of the Subcommittee, including the consideration of possible new items for its agenda.<sup>10</sup> The Committee endorsed the recommendation of the Legal Subcommittee that, beginning with its session in 1997, it should be provided with verbatim (unedited) transcripts of its sessions in lieu of summary records. In addition, it recommended that the Subcommittee should continue its informal consultations with a view to coming up with a list of annotated items agreed upon by consensus that could be considered by the Committee at its fortieth session for inclusion in the agenda of the Subcommittee. The Committee agreed that each proposed item would have a multi-year work plan that would address, among other things, the objectives of the work to be undertaken, any reports to be provided by the Secretariat and Member States and the possible end-product.

The Committee entrusted its Chairman to undertake inter-sessional informal consultations among the members of the Committee with the aim of reaching consensus decisions before the next session of the Committee on the modalities of establishing a new composition of bureaux, keeping in view the principles of equitable geographical representation and rotation. The Committee further recommended that all proposals made by delegations and groups of delegations including the need for agenda restructuring and an examination of session duration would be fully taken into account in the framework of these informal consultations.

#### 7. *Ways and Means of Maintaining Outer Space for Peaceful Purposes*

With regard to this item, it was the firm belief of the members of the Committee that present efforts should be continued that would strengthen the role of the Committee in maintaining outer space for peaceful purposes. As in previous sessions, this year's session was once again marked by the different views of Member States with regard to the

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Czechoslovakia, from 1983-1992 and the Czech Republic, since then. In the Scientific and Technical Subcommittee, until 1995, when Germany took over, the Chairman's post has always been held by Australia.

<sup>10</sup> See Thaker, *supra* note 6 for details.

prevention of the arms race. Some delegations again expressed the view that the Committee should complement and contribute to the work being done in the Conference of Disarmament and in the First Committee of the General Assembly, while other delegations indicating that such contact with other disarmament bodies was inappropriate.

#### 8. *Spin-off Benefits of Space Technology*

The Committee agreed that spin-offs of space technology were yielding substantial benefits in many fields. The importance of these benefits was growing rapidly. Many member States were making efforts to develop spin-off benefits and disseminate information on such activities to interested countries. The Committee agreed that there was a need to examine ways of strengthening and enhancing international cooperation in the field of spin-off benefits of space technology. This could be done by, *inter alia*, improving the access of all countries, especially developing countries, to spin-offs. In this regard, the Committee expressed satisfaction that the Programme on Space Applications had organized the United Nations/United States of America International Conference on Spin-off Benefits of Space Technology: Challenges and Opportunities, held at Colorado Springs, United States, in April 1996.

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#### *BEIJING IISL COLLOQUIUM ON THE LAW OF OUTER SPACE*

##### Introduction

The 39th Colloquium on the Law of Outer Space was opened by the President, *Dr. N. Jasentuliyana*, on Tuesday 8 October 1996. The colloquium was attended by 50-60 persons, and many excellent papers were presented. A round-up discussion session was again organized and provided a useful opportunity for the exchange of views on topical space law issues; this session was so well attended that many had to stand outside the conference room to participate!

The colloquium also hosted the finals of the Fifth Manfred Lachs Space Law Moot Court Competition. The competition was made possible with the help of the Chinese Foreign Ministry, the University of Beijing, KLM Royal Dutch Airlines, Air China, the European Centre for Space Law (ECSL), the Association of US Members of the IISL (AUSMIISL) and NASA. Preliminary competitions had been organized in Europe and in the USA, and the winners of those preliminaries met in the final round in Beijing. The University of Helsinki (Finland) - who also participated in the 1994 Finals in Jerusalem - and the University of Wyoming (USA) competed in the case "*Parlivia v. Californium et al.*", concerning liability for commercial space endeavours. The honourable court was composed of *Judge Chr. Weeramantry* (President) *Judge G. Herczegh* and *Judge V. Vereshchetin* of the International Court of Justice. The team of the University of Helsinki won the competition. Its members were *Satu Heikkilä* and *Anna Markkanen*. The members of the University of Wyoming team were *Bastiaan Coebergh*

and *Joseph Richer*. The case was written by *Pamela Meredith*. The case and the written briefs will be published in the IISL Proceedings. Each team also served as rapporteur for one of the sessions of the Colloquium. The final of the sixth Competition will be held in Turin, October 1997, after regional preliminaries to be held in the Spring of 1997 in Europe, the USA and, for the first time, Asia. The case, which deals with Very High Resolution (VHR) remote sensing systems, was written by *Harry Tuinder*, *Marco Ferrazzani* and *Frans von der Dunk*, and has been distributed to the various universities.

Session 1: The Legal Status of Property Rights on the Moon and Other Celestial Bodies.

Chairman: *Dr. He Qizhi* (China); Rapporteurs: *Ms. A. Markkanen* and *Ms. S. Heikkilä* (University of Helsinki Moot Court Team, Finland)

Chairman *He Qizhi* opened the first session by stating that this issue is of growing interest for mankind; the return to the moon is inevitable, and this time man will not only visit the moon, but will also carry out further research and use its natural resources.

The first speaker was *Dr. E. Fasan* (Austria), who presented his paper "*Dominium Lunae, Proprietas Lunae*." After having explained the different schools for the legal status of the moon and other celestial bodies (*res nullius, res omnium, res extra commercium,...*), he recalled that the Moon Agreement has been accepted by very few States, even though the UN General Assembly has called upon States to sign and to ratify the Agreement. At the same time the possible revision of the text of the Agreement is at least postponed. The author believes that it is vital to clarify the issue of the status of the moon, which currently hampers the progress of space travel to the moon and other celestial bodies. It is necessary to reconcile the interest of those States which can reach the moon and want to exploit its natural resources on the one hand, and the common interest of all nations in an appropriate sharing of those resources on the other. He pointed out that it would be detrimental to mankind if due to an unclear legal situation the hiatus in expeditions would be extended too long, as well as it would be illogical to protect the natural resources of the moon more strictly than those on Earth.

The second speaker was *Amb. A.A. Cocca* (Argentina), on "Property Rights on the Moon and Celestial Bodies". He provided an extensive doctrinal overview of the subject, and noted the importance of the Outer Space Treaty and the Moon Agreement for the analysis of the legal regime of the moon. *Dr. Cocca* stated that the subject of space law is humankind as a whole, and that the benefits obtained belong to humankind, which embodies all human beings, a *condominium*. He proposed that, since there is no sovereignty on the moon and other celestial bodies, an international agency invested with sufficient authority, jurisdiction and control, should be created to organize and protect the free and full enjoyment of the common patrimony.

*Dr. H. van Traa-Engelman* (The Netherlands) advocated "Clearness regarding Property Rights on the Moon and Other Celestial Bodies". She emphasized that private enterprises will only be motivated to engage in space activities if the legal environment accommodates specific rights, such as property rights in general, and intellectual property rights in particular. She analysed the Outer Space Treaty and the Moon Agreement in

relation to the subject. Regarding property rights, she noted that Article 8 of the Outer Space Treaty establishes the conditions for a legal regime based on quasi-territoriality, and that an intergovernmental agreement such as the one on the manned space station may solve questions of property rights connected with the commercial exploitation of the natural resources of the moon. She then observed that Article 11(2) of the Moon Agreement provides more clearness than the Outer Space Treaty, since it specifically prohibits appropriation of natural resources of the moon and other celestial bodies of any kind by anybody, while at the same time offering enterprises the possibility to establish property rights on natural resources when they are removed from the moon (unless the Article 11(5) provision regarding an international regime might be regarded as a *moratorium* on the exploitation of natural resources). She suggested that this problem might be solved by attaching an Understanding to the Moon Agreement, ensuring that whatever legal regime ultimately comes into being, the ability and right of states and private enterprises to use and exploit the natural resources of the moon will be recognized if carried out in accordance with the purposes as expressed in Article 11(7) of the Moon Agreement.

The last speaker of this session was *Dr. L. Tennen* (USA), who presented a paper written with *Dr. P. Sterns* and *Mr. G.H. Stine* (USA), on "Preliminary Jurisprudential Observations Concerning Property Rights on the Moon and Other Celestial Bodies in the Commercial Space Age". Regarding the non-appropriation principle, the authors noted that although the principle might inhibit commercial development, it also prevents armed conflict, and therefore at this time its abandonment does not appear justified. Nevertheless, rules must be established regarding the manner in which rights in property may be acquired and maintained. The authors then addressed the Moon Treaty and noted that some sort of jurisprudential framework is required, and that the right to use and exploit space should not be restricted to those who today have technological capabilities. Appropriate safeguards must be devised to protect the natural environment of celestial bodies and to prevent interference by one entity with the activities of another. They also emphasized the importance of effective dispute settlement. Concerning liability, the authors raised the question whether a limited liability regime should be applied to space activities, and mentioned the example of US domestic law where *de facto* limited liability is achieved by requiring insurance and reciprocal waivers. Finally, regarding the creation of settlements on the moon, the authors stressed the importance of the principle of autonomy.

#### Session 2: Cases and Methods of Dispute Settlement in Space Law.

Chairman: *Prof. K.-H. Böckstiegel* (Germany); Rapporteur: *Ms. D. Crowther* (ECSL, France)

In his introduction to the session, Prof. Böckstiegel mentioned that over the years space activities have become more and more commercial, thus involving private enterprise. This means that different interests and opinions are at stake, and the result of these differences is the occurrence of disputes. States may be parties to disputes, but more often private enterprises will be involved. There are two major problems: first we need to know which rules apply to the disputes, and second there is a need for reporting on the cases that occur.



The first paper on "Liability for Copyright Infringement in the Case of TV transmission via Satellite (Essel Vision's Claim on Intersputnik)" was presented by *Dr. V. Veschunov* (Russia), and was written in cooperation with *Dr. G. Zhukov* (Russia). Essel Vision had claimed before the Bombay High Court that Intersputnik was jointly responsible with Asian United Media (AUM) for the breach of copyright of programmes transmitted via satellite, while Intersputnik had merely provided the technical means for AUM to broadcast the programmes and had nothing to do with the content of those programmes. The legal question therefore is whether the owner of telecommunication facilities is responsible for copyright matters in principle, including for the content of programmes and copyright observance by the programme customer. Dr. Veschunov stated that the international conventions dealing with programmes transmitted by satellite service providers/operators do not impose liability on them for the breach of third parties' rights. This solution was also confirmed in the contract between Intersputnik and AUM, which stipulates that Intersputnik shall not be liable for any copyright matters. It was noted that this contract also provides for a detailed arbitration procedure for any disputes that may arise between Intersputnik and AUM. In the author's view, this case indicates that negotiations on intellectual property rights will become more and more difficult, and also that arbitration is certainly the preferred way to settle this kind of disputes.

*Dr. M. Hoskova* (Germany/Czech Rep.) presented her paper entitled "Tendencies of Dispute Settlement in Present Eastern European Space Law". She analyzed different mechanisms of dispute settlement by analysing four categories of space cooperation agreements: (a) agreements with former COMECON states as parties (f.i. agreements between Russia and Germany, Japan, the USA or CNES, and agreements entered into by the CIS, such as the Minsk and Tashkent agreements), (b) agreements between international organisations and former COMECON states, such as those involving ESA and Intersputnik, (c) agreements between an international organization and Russian legal persons, and (d) agreements between legal persons. The analyses show that (1) consultation and (2) arbitration are the preferred means to resolve disputes. According to Dr. Hoskova, this general policy is aimed at safeguarding the implementation of common projects and at continuity of cooperation. She concluded that "informal problem management" continues to play its dominant role.

A third paper on "Cases and Disputes Settlement in Space Law", written by *Dr. H. Safavi* (Iran), was summarised by *Dr. P. Sterns* (USA). It compared various methods of dispute settlement in air and space law, and suggested that international space law needs to be supplemented. The author specifically proposed a new international convention with rules and procedures to safeguard the security of spaceflight and to prevent the commitment of criminal acts against spacecraft, astronauts, passengers and cargo, and the establishment of an independent international organization for the management of outer space activities.

Session 3: Legal Aspects of Sharing Benefits from the Conduct of Space Activities.

Chairman: *Dr. S. Doyle* (USA); Rapporteurs: *Mr. B. Coebergh* and *Mr. J. Richer* (University of Wyoming Moot Court Team, USA)

The first paper in this session was written by *Mr. M. Fomtchenko* and *Mr. A. Movlyav* (Russia) and presented by the latter. It addressed "High Resolution Remote Sensing: New Aspects and Problems". The authors noted that the popularity of high resolution remote sensing is increasing and its field of application widening. Although there is no uniform definition for "high resolution remote sensing data", the authors held that it concerned data with a ground spatial resolution of less than two meters. The current and prospective situation of distribution of high resolution remote sensing data were addressed, as well as the creation of a specialized international organization. Space data will not only be used by governments, but also by non-governmental institutions and individuals, and the tendency of commercialization in this area must be noted. Legal regulation of the distribution of data is required, and the authors stressed that such legislation should protect legal rights and interests of not only governments but also private persons. The authors held that the time has come for the institutionalization of international cooperation in remote sensing, and that the most attractive models for such an institution are those used by Inmarsat, Intelsat, or ICAO. The first two provide an example of foundation documents and operation agreements, while the latter is a model for proper work organization for distribution of information and consulting for a wide array of questions.

"Sharing of Remote Sensing Data Concerning Environmental Protection for Public Benefit" was the topic presented by *Prof. G. Catalano Sgrosso* (Italy). The 1996 UNCOPUOS Draft Resolution entitled "Declaration on International Co-operation in the Exploration and Use of Outer Space for the Benefit and in the Interests of All States, Taking into Particular Account the Needs of the Developing Countries" states that outer space benefits can be enjoyed by all countries, especially the developing ones, only as a result of strengthened international cooperation. The author held that the environment should be seen as a specific field of international cooperation, as environmental protection is one of the most urgent problems in the modern world. Remote sensing allows faster, more effective, and at times less expensive intervention. Starting from the UN Principles on remote sensing, the author focused on the legal problem of how satellite data concerning the protection of the earth's environment can be distributed and used for the benefit of all states. After studying the policies of distribution and commercialization of data in the USA, France, ESA, and the EU, she concluded that the practice in this area is at present different from one country to the other. The USA have a policy of free access, often free of cost. This is favourable to the users, but has the purpose of ensuring the pre-eminence of the USA in the field. The French policy is more selective and aims at making the users participate in financing the costs of the observation systems. Many ESA member states have adopted a policy of data distribution which acknowledges the necessity of covering part of their financial investment in the Earth observation systems and also recognizes the necessity to maximize the return of investments in a non-monetary sense. The author concluded that the general public has been awakened by a possible deterioration of the

earth's environment and that the need to coordinate space activities is increasing

Next, *Ms M.A. Roberts* (USA) presented her extensively researched paper on "US Remote Sensing Data from Earth Observation - Law, Policy, and Practice". She gave an overview of the history and current situation of NASA's practice on distributing earth remote sensing data. NASA and the USA adhere to a uniform policy for all international participants: open, non-discriminatory data distribution to all scientific users at the cost of reproduction and distribution. This would maximize the use of the data and would also provide an easily recognizable tax payer return on NASA's investment. One basis for this policy is the "Open Skies" principle, affirmed in Article 2 of the 1967 Outer Space Treaty. The USA continues to assert this principle. Other nations dispute the theory, invoking a right of "national privacy" or "the sovereign right of a state to be let alone." The USA also tried to strike a balance between private sector commercial interests and scientific research goals in its LANDSAT system, but this has proven to be difficult. In 1984, Congress enacted the Land Remote Sensing Commercialization Act which mandated non-discriminatory access to LANDSAT data, even for private sector operators. In 1992, Congress repealed this Act in favor of the Land Remote Sensing Policy Act, which gave management of LANDSAT 7 to NASA and the DoD (Department of Defense). The goal of the USA is the accomplishment of a broad-based global Earth remote sensing program - one that fully utilizes all resources.

*Mr. J. Huang* (ICAO, Canada) addressed the issue "Sharing Benefits of the Global Navigation Satellite System within the Framework of ICAO". The USA and the Russian Federation have developed the Global Positioning System (GPS) and the Global Orbiting Navigation System (GLONOS). The author indicated that the development of Global Navigation Satellite Systems (GNSS) will bring a profound change to air navigation and greatly promote the safety and efficiency of civil aviation. Two major legal issues are presented: (1) state sovereignty in national airspace; (2) control over air navigation facilities. The options presented to the ICAO expert panel concerning the control issue were: establishment of a new agency (similar to INMARSAT) or leave the status quo and leave control to private arrangements laid down in contracts. A legal framework, preferably under the auspices of ICAO, is necessary in order to assure universal accessibility, reliability and continuity of GNSS services. The author recalled that under the Chicago Convention, ICAO has the power to make recommendations but these are non-binding. Nevertheless, this power may serve as a future legal basis for review. There are various possible roles ICAO could play: a judicial body, an administrator, or an arbitrator. The author concluded that ICAO may, within its institutional structure and competence, implement the principle that the exploration and use of outer space shall be carried out for the benefit and interest of all countries.

The next speaker was *Prof. M. Nakamura* (Japan), who presented his paper "Review of Article I of the Outer Space Treaty". The author analyzed and re-interpreted article I of the Outer Space Treaty from the viewpoint of sharing benefits from space activities. The article includes two significant provisions as to sharing benefits from space activities: "for the benefit and in the interests of all countries" and "the province of all mankind." Prof. Nakamura recalled that it is very difficult for many developing countries to employ the freedoms outlined in article I OST because they do not have

the scientific skills and economic power. For these countries, international cooperation is needed to exercise these rights. Such cooperation, however, is not clearly defined in the OST. The legal contents of the Moon Agreement are much stricter, especially since it takes into account the equity between present and future generations. The ITU's IFRB maintains a radio frequencies registration system according to the "first come, first served" principle. Many developing countries are worried about the possible exhaustion of radio frequencies by developed countries if this system is also applied to space communications. The developing countries argue that the GSO and radio frequencies are "limited natural resources" and therefore the principle of "equitable access" has been established instead of the principle of "first come, first served." Through this ITU regime, the "freedom principle" in Article I OST has obtained a more positive interpretation: every state has the right to begin space activities at any time when it acquires the technical and economical capability.

*Prof. H.A. Wassenbergh* (The Netherlands) presented his views on "The International Regulation of an Equitable Utilisation of Natural Outer Space Resources", and proposed that the international community should develop a new public international space law because the current legal structure is obsolete. The 1967 Outer Space Treaty was a product of the Cold War and is not well-suited to contemporary post-Cold War conditions. The author held that the space treaties regulate states, while they should regulate activities; nationality is on the decline. States can only regulate public interests, not private interests. Under any new approach however, governments must still be concerned with safety, security, navigation, the environment, and other public concerns. But commercially profitable activities should be left to private enterprise. On the topic of benefit-sharing, Prof. Wassenbergh raised the question "what are benefits"? In his view, elements constituting benefits include the ability to buy anything manufactured in space and access to information and technology. He seriously questioned the "Common Heritage of Mankind" concept; if it is a "heritage", then mankind will not benefit from it until all mankind is dead! In space, there is no legitimate share for each country; the only basis for sharing would be competitive strength and the weak states would die. Interstate competition should be replaced with competition among private enterprises. Corporations can cross borders and form cross-border alliances. Nationality is of little relevance. Finally, the author observed that the 1996 "Space Benefits" Declaration is a "should" document; it implores ethical conduct but is unenforceable.

*Prof. J.F. Galloway* (USA) then presented his paper "Privatizing an International Cooperative? The Case of Intelsat". In the present situation of privatization and commercialization, Intelsat must adapt to the competitive environment and needs to be reorganized. The author observed that some of Intelsat's services can be privatized and made subject to market forces, while other services which are more collective in nature will have to be organized differently. For example, collective goods, such as defense, are not suitable for privatization. The collective goods provided by Intelsat include satellite service to remote areas. The author believes that as competition among satellite systems and between satellite and fiber optic systems heats up, Intelsat will become just another actor in the global communications market. The emergence of IRIDIUM, a private LEO provider,

and Inmarsat's ICO Global Communications, a quasi-public entity, foreshadow the competition to come.

Mr. D.J. O'Donnell (USA) then discussed his paper entitled "Benefit Sharing: The Municipal Model". He proposed that benefit sharing as mandated by the Outer Space Treaty and the Moon Agreement should be accomplished by an international trustee agency. The Lunar Economic Development Authority (LEDA), a municipal authority modeled after the Castle Rock, Colorado, USA government, could serve as a relevant space governance paradigm. The author held that the current space law treaty system will fall under its own weight, and that the international community needs to set up a municipal entity to administer common resources at the source. The UN should have a role, but while UNCOPUOS works well as a "Senate", it would, according to the author, not be an effective executive organ. LEDA would function as less than a town, but more than a space agency. Mr. O'Donnell believed it would provide a mechanism for distributing common resources and managing risks and provide legal certainty in space development.

A paper on "Brazilian-Chinese Space Cooperation: an Analysis of its Legal Performance" was presented by Mr. J. Monserrat (Brazil). The author indicated that although the Brazilian-Chinese cooperative space endeavour has experienced some setbacks, the two nations have learned from their mistakes and move forward. CBERS 1 and 2 were plagued with problems, but the process is maturing despite the delays. Brazil has now proposed CBERS 3. The first satellite could be launched by 1998 and the second by 2000. According to Mr. Monserrat, the bilateral agreements between the two nations have maintained different levels of respect; China has fulfilled the agreements better than Brazil. A two-year paralysis was caused by obvious failures on the Brazilian side, but the joint project continues and has good prospects.

Next, Mr. B.L. Smith (France) presented his paper entitled "Towards a Code of Conduct for the Exercise of Intellectual Property Rights (IPR) in Space Activities - Moderation of the Monopoly?". He stated that patent law leads the development of IPR in space. Under the patent clause of the US Constitution, patent holders enjoy a limited temporary monopoly. The US Space Bill of 1990 extends US patent law to US space objects. The Space Station Agreement also provides for patents in space. The author wondered whether there is a conflict between the 1967 Outer Space Treaty's benefit-sharing provisions and the concept of space IPR. If so, this legal uncertainty could deter private investment in commercial space activities. The author proposed to develop a Code of Conduct for space IPR: to promote science, to share benefits, and to develop a single uniform applicable law. To establish legal certainty, space must be treated as a single jurisdiction for IPR purposes. The World Intellectual Property Organization (WIPO) could serve as a single, universal enforcement body or Board of Arbitration for resolving space IPR disputes. Finally, the author noted that any proposed regime must be harmonized with existing treaties and that third-party licensing of space patents should conform with UNCOPUOS' 1996 draft resolution. In his view, the time may have come to consider the creation of a "Space Patent" enforceable under international law.

The last paper in this session was written by Dr. M. Benkő and Dr. K.U. Schrogl (Germany) under the title "The 1996 UN-Declaration on "Space Benefits" - Ending the North-South Debate on Space Cooperation". Dr.

Schrogl gave an extensive overview of the history of this document, and mentioned that the UN General Assembly will vote on the text in December 1996. The authors held that the Declaration provides an authoritative interpretation of the cooperation principle in Article I of the Outer Space Treaty and effectively ends the North-South confrontation in shaping the international order for space activities. They predicted that the impact of the Declaration will be to confirm the freedom of exploration and use of outer space while requiring space-faring nations to conduct their activities for the benefit of all countries. This will foster international space collaboration, and intellectual property rights and freedom of commercial space operations will be secured. States will be free to choose partners, and the North-South debate can be resolved at higher political levels. The authors hoped and predicted that thanks to the 1996 Declaration, the 1999 UNISPACE III conference will be non-political.

#### Session 4: Other Legal Matters

Chairmen: *Prof. T. Kosuge* (Japan) and *Dr. E. Fasan* (Austria); Rapporteurs: *Prof. Y. Hashimoto* (Japan) and *Prof. Abu Bakar Munir* (Malaysia)

The first paper was presented by one of the chairmen of this session, *Prof. T. Kosuge* (Japan). He spoke about "Global Information Infrastructure and Satellite Communication - How to Coordinate the use of GEO and non-GEO". He focused on the development of satellite communication in Asia, and highlighted the benefits of using LEO and the competition among the companies operating in Asia using different systems. He discussed Iridium, Odyssey, Globalstar and ICO, and wondered whether those new communication systems are beneficial at the global level. He concluded that none of the systems clearly stands out from the others, because each has its advantages and disadvantages, and the success of the systems can only be judged after 1998. He recommended that ITU should play a more important role to realize the 1996 Declaration of UNCOPUOS and advocated a policy oriented approach rather than market oriented.

*Prof. M. Komar Kantaatmadja* (Indonesia) spoke on the "Development of Broadcasting Laws Related to Satellite and Cable Television in the Asean Region". She indicated that the Asean member states are currently updating their domestic laws to reflect current space technology, especially in the field of broadcasting (cable and satellite TV). *Prof. Kantaatmadja* considered related regulations in Thailand, Malaysia, Singapore, The Philippines and Indonesia, and focused on two issues: (a) responsible authority, and (b) definition of broadcasting. Some regulations provide the participation of the private sector in broadcasting services, whereas others provide certain guidelines for the content of each program. Those vary per country, depending on the national policy on information distribution, but governments always play an important role in broadcasting in the Asean region. The author concluded that the region is 'broadcast friendly'.

The paper by *Prof. P. Larsen* (USA), entitled "GNSS Interference Testing: Legal Issues" was presented by *Prof. F. Lyall*. *Prof. Larsen* explained the implications of the decision of the US Government of March '96 regarding GPS management policy. In case of interruptions by the government (for the testing of possible illegal use of the GPS system by terrorist or unfriendly forces), the main GPS users may be fairly easily

reached for information. The greater adverse effects of interference testing may be on the more remote civilian users such as surveyors, farmers and recreational users. The author discussed regulatory and liability issues, and then made three recommendations: (1) to schedule intentional interruptions so that they cause as little interference as possible; (2) to establish an effective communication tree to inform virtually all users of interruptions that may affect them; (3) to let potential liability act as a hammer to keep the GPS system operational virtually 100% of the time.

Then *Prof. F. Lyall* (UK) presented his own paper, entitled "Paralysis by Phantom: Problems of the ITU Filing Procedures". He described the present ITU system and its "first come, first served" principle, and the necessity of coordination for newcomers with phantom satellites. He criticised the abuse of the filing procedures and mentioned five major variants of the problem. The problem is currently being attacked by the Radiocommunication Advisory Group (RAG), which has suggested some solutions like due diligence by states in investigating proposals submitted to them, or a returnable or limited filing fee. The author suggested an additional method: recourse to the doctrine of "implied powers", allowing the ITU to refuse notification of systems that are unlikely to be implemented.

The paper written by *Ms. A.M. Balsano* (ESA) and *Ms. I. de Vries* (The Netherlands/Belgium) on "National Patent Laws in Europe and Space Activities", was presented by Ms. de Vries. She argued that European patent laws are not applicable in outer space, and recommended that the problem could be solved by amending the individual national patent laws in Europe, extending their scope to outer space activities like the US has done (US Patent Act of 1990). To date, Germany is the only European country which has made its patent law applicable to ESA registered elements of the Space Station (but not in general to all German space activities). Alternatively, she argued that at the regional level, the European Patent Convention (EPC of 1975/1989) and Community Patent Convention (CPC of 1989, not yet in force) could be amended, or that a Regulation or Directive could be adopted under the European Community Treaty. Action at the international level (WIPO, COPUOS) is also necessary. The authors further considered two questions; first whether patents are available in Europe for inventions made in outer space, and second whether inventions patented in Europe can be protected against unlicensed use in space. The authors concluded that for European patent laws to be applicable to outer space, there must be (a) an explicit provision making the law applicable to space activities, and (b) an appropriate connection between the European country and the space activity concerned.

*Prof. L. Perek* (Czech Republic) spoke on "Space Debris Discussions in the UN in 1996", and gave an extensive report of the deliberations in the Scientific and Technical Subcommittee, the Legal Subcommittee and the Main Committee. The main part of the work of the Scientific and Technical Subcommittee was the preparation of a Technical Report (to be completed in 1998), which includes the following statement: "It is understood that space debris are inactive man-made objects, such as spent upper stages, spent satellites, fragments or parts generated during launch or mission operations, or fragments from explosions and other breakups". Discussion also took place on the reorbiting of geostationary satellites into a disposal orbit, 300 or 500 km far from GEO. Dr. Perek also reported on the present

situation of space debris and encouraged further study for removing debris from orbits. Space system operators' and space agencies' responsibility was also stressed. As for the Legal Subcommittee, debris was not on the agenda, but two of the future agenda items will deal with space debris: "Review of existing norms of international law applicable to space debris", and "Legal aspects of space debris". In the plenary meeting of COPUOS, the importance of debris reduction was recognized. An Inter-Agency Orbital Debris Coordination Committee (IADC) was invited to the next session. Dr. Perek made an appeal to the scientific community and organizations such as IAF, IAA, COSPAR, and IADC to try to find ways for removing space debris from space and to prevent or minimize it, and recommended that all methods should be assessed from the cost-performance as well as the legal point of view.

*Mr. A. Golrounia* and *Prof. M. Bahrami* (Iran) considered "The Draft of the International Law Association for a Convention on Space Debris (Buenos Aires)" and asked whether it can meet the needs of the 21st century. Mr. Golrounia mentioned some of the unclear points in the draft, and suggested appropriate amendments. Those points related to the definition of environment, national registration, the creation of an international regulatory body which can advise newcomers into this space activity field, the updating of useful data like environment hazards, technological abilities, etc. The authors concluded by stressing the need for an international regulatory body and expressed confidence that it will enjoy support from all parties to protect the space environment.

The next speaker was *Prof. Y. Hashimoto* (Japan) who presented his paper "Japanese Space Policy; where is she going?" He introduced the new Japanese Space Policy which was revised in January 1996 and compared it with the 1989 policy (i.e. the 1978 policy amended in 1984 and 1989). The new policy outlines the result of Japanese space development and identifies the future direction and framework for the next 10 years. He concluded that the 1996 policy successfully outlines the continuous and mid-term target of the Space Activities Commission. However, he argued that Japan's long-term vision and philosophy in space activities is not clear. He stressed the necessity of involving public opinion in the policy and law-making process and suggested the Japanese Diet as the appropriate forum.

The paper by *Mr. D. Burnett* and *Mr. D. Lihani* (USA) discussed "US National Space Policy and Bilateral Launch Service Agreements". Mr. Burnett briefly summarized the history of bilateral agreements between the USA and China, Russia and Ukraine, and explained the pricing policy in those agreements. He focused on the agreement between the USA and Ukraine concerning the sea launch project. He also discussed the recent "US National Space Policy", released on 19 September 1996. According to this policy, after the expiration of current space launch service agreements, free and open interaction of market economies will prevail.

An extra paper was then presented by *Mr. R. Oosterlinck* (ESA), on "Tangible and Intangible Property in Outer Space". He stated that property in space is becoming one of the most important issues for the future, not only in the context of classical forms of tangible property (minerals,...) but also of intangible property (orbital slots on the GEO, frequencies,...). In analyzing "tangible property", he gave an overview of Roman law concepts such as "res nullius" and "res communis omnium", and their application to



outer space (property of celestial bodies, resources of the moon, asteroids). He observed that Article 2 of the Outer Space Treaty refers only to national appropriation but is silent as to appropriation by legal or natural persons, and raised the question whether the resources of outer space may be appropriated. In answering this question he analyzed the views of Prof. S. Gorove and Amb. A. Cocca and highlighted the history of article 2, and concluded that no consensus was reached on the matter. He observed that the question of the legal status of resources has become a major concern because mining may become feasible in the near future. On the subject of intangible property in outer space, Mr. Oosterlinck focused on the GEO, the frequency spectrum, and the LEO and MEO. He traced the development of the ITU Conventions and specifically article 33. He illustrated the problem of an "a posteriori" approach put forward by the developing countries by looking at the issue of TONGASAT. As for the frequency spectrum, the author stated that recent developments whereby part of the frequency spectrum have been auctioned tend to pave the way for commercial exploitation of the spectrum. He was of the view that this development presents certain dangers unless appropriate actions are undertaken. He suggested that it would be advisable to develop a set of rules in this field to avoid problems such as those encountered with the GEO. With regard to the LEO and MEO, he mentioned that several companies have started investing money and protecting their intellectual property. The author concluded that some forms of property were introduced by using legal means, and time has therefore come to review the matter, and to settle it in an appropriate legal form.

*Prof. S. Courteix* (France) then presented the last paper in this session, written in cooperation with *Dr. M. Bourély* (France), entitled "National Institutions Responsible for Space Activities: a Comparative Law Approach". Their paper reflects the result of studies carried out by the Center for the Study and Research of Space Law in Paris and the European Centre for Space Law, which will be published. It first describes how states organize their space activities, and then how states intervene in the exercise of these activities. Concerning the first point, Prof. Courteix discussed the institutional framework of the various space agencies. She observed that the structure depends on the political and constitutional framework of the state concerned. In the USA, the deep involvement in space policy of the Department of Defense as well as the Department of State is a consequence of the specific characteristics of space activities. She also observed the trend to establish specialized bodies for space affairs in various states, and described the similarities and differences of those agencies. Regarding the second point, she asserted that states will continue try to keep direct control over certain activities, such as activities related to defense and space research, and recognised the trend of international cooperation in space undertakings between states through bilateral or multilateral agreements.

#### General Discussion Session

On the last morning of the IISL Colloquium, the Chairmen and Rapporteurs of each session gave a short summary of the papers presented and highlighted the issues that in their view merited further discussion. The IISL President, Mr. Jasentuliyana then chaired the discussions. Below, an attempt is made to reflect the points that were raised, but it is of course

impossible to give a complete overview of everything that was said. It is also possible that some comments are omitted, or not reported in their proper context. Nevertheless, it is hoped that this short overview will give an indication of current concerns within the International Institute of Space Law.

#### *Property rights on the moon and other celestial bodies*

The discussions focused on the need of clear regulation before private enterprise would start acting and on the finding that we have to know what to regulate before clear regulations are possible.

*Dr. E. Galloway* was of the opinion that too much emphasis was placed on the regulation of the natural resources of the moon without defining what those natural resources really are. She noted that it is not clear how to make profit on the moon. Although such inventions as solar power satellites may be used to make profit, this is an expensive and risky business. Before we start regulating we have to know the scientific and technical facts. *Prof. J. Galloway* replied that profit can be made from resources brought back from the moon, such as Helium 3. He suggested that first clarification of present science and technology for space development should be sought, before starting the discussion on rights and obligations regarding the moon and other celestial bodies. On the contrary, *Mr. R. Oosterlinck* held that regulation should come first, before exploitation is possible.

*Prof. M. Andem* emphasized the importance of international law and treaties for regulating states as well as the private sector. He stated that clear rules are needed, and that the elaboration of existing treaties would be the best solution. He held the view that space law should not be seen as a separate area of law, but together with all other areas of law, bearing in mind the common heritage of mankind principle. He added that cooperation with scientists is necessary in order to know what to regulate.

*Dr. W. Wirin* noted that although there has been irresponsible exploitation of natural resources on Earth, under space law states remain responsible, and hence must control the activity of private enterprises. On the other hand, some formulation or maximum charge for entrepreneurs is needed so that they can assess the risks of the endeavour; otherwise they will not engage in it. On the other hand, taking risk is inherent to commercial enterprise! He also agreed with *Mr. Oosterlinck* that waiting to know what we can find in outer space before regulating the exploitation simply denies the fact that we can find something in space. *Mr. N. Jasentuliyana* agreed on the need to take into account the interests of the private sector.

*Dr. E. Galloway* concluded these discussions by reminding that only 9 states have ratified the Moon Agreement because of the "common heritage of mankind" principle, and that this principle is NOT included in the Outer Space Treaty, as so many authors wrongly assert. She recommended that action be taken on the issue of the Moon Agreement.

#### *Dispute settlement*

*Dr. Veschunov* recalled that international satellite operators are subjects of public international law. The Brussels Convention of 1974 is important for this issue; it provides that a satellite operator as a provider does not bear responsibility for the possible violation of copyrights. There

are mainly three entities involved in the process of providing a programme: (1) the manufacturer of the programme software, (2) the technical satellite operator, dealing only with the technical transfer of the signal from point to point, and (3) the distributor of the programme. Dr. Veschnov held that only the entities mentioned under (1) and (3) could be held liable. He also recalled that it is not impossible for an international organisation to be sued.

#### *Sharing of benefits from space activities*

*Prof. F. Lyall* recalled that the ITU system of "first come, first served" has been abused because people found out that they can make money out of it. *Mr. M. Nilsen* of Tongasat answered that in 1987, the motivation was that INTELSAT had not properly planned the repartition, and had not considered future needs. The positive impacts after the request of Tonga were transformed in negative ones from 1990 on. He stated that Tongasat was an adequate business solution in that area. *Prof. Lyall* held that among the more than 150 members of the ITU, not all have real needs for orbital positions, and *Mr. R. Oosterlinck* added that a good commercial success is not necessarily a good example of respect for the principle of sharing of benefits! Regarding the idea of a filing fee, *Mr. N. Jasentuliyana* believed that it might be useful, and added that if the fee is returnable, its amount is irrelevant.

Regarding Intelsat, *Prof. J. Galloway* stressed once more that public actors such as Intelsat must be price conscious. If Intelsat is privatized, it would result in an oligopoly. Thus, the Intelsat spin-off should be broken up. *Mr. N. Jasentuliyana* added that small nations will sell their shares in the Intelsat affiliate; this will result in privatization of the satellite market.

#### *Space debris*

*Mr. A. Golrounia* stated that in his view, the only way to realize protection of the environment in outer space is the introduction of fees. Those who launch a satellite could be required to pay a fee for the contamination they generate. The only way to realize this is to have an international forum which could adequately deal with the questions of private enterprises.

*Dr. L. Perek* added that concerning the prevention of pollution, two points must be stressed. The first concerns the participation of launching entities taking measures to limit the pollution. The scientific community is now in a position to check the pollution in outer space, and can thus verify whether regulations have been complied with or not. The adoption of a Code of Conduct between the UN and launching authorities may be an idea. The second point concerns the removal of actual debris from outer space (cleaning). At present, we do not know how to do that. The economic implications of the problem must be taken into account. In conclusion, *Dr. Perek* said that he was confident that cooperation will lead to limitation of debris. *Mr. N. Jasentuliyana* mentioned that technical standards rather than legal standards or SARPs are required to limit debris. *Mr. D. Burnett* proposed that insurance companies could give certificates in order to make sure there is money to clear up. The model already in force for the sea could be applied to outer space. *Dr. Perek* replied that we would first have to determine how much the cleaning of outer space would cost!

*Remote sensing*

*Dr. M. Vivod* (Slovenia) proposed that some form of institutionalization of remote sensing is required.

*Mr. D. Burnett* (USA) expressed his concern that private space enterprises would not particularly welcome competition from a new public international organization. *Mr. N. Jasentuliyana* (UN/Sri Lanka) added that SPOT-Image and other private providers are already developing a world-wide market for space data.

*Mr Vivod* said that he did not specifically urge for a new organization, but only for the need for legislation in this field.

*Legal framework for commercial space activities*

*Prof. H.A. Wassenbergh* (The Netherlands) pointed out that a new approach to international space law is necessary. He illustrated his idea by referring to the Moot Court Competition on space law held the day before; it was striking that three judges of the International Court of Justice could find no solution to the problem (although that was of course not the purpose of the competition). In the case, we saw how the distinction between tort and contract law can be blurred. If absolute liability under the Liability Convention follows a satellite, current space law is inadequate to deal with reality. Therefore, we need new international space law. *Ms. T. Masson-Zwaan* (The Netherlands) reacted by agreeing that space activities are nowadays more commercially oriented, and it would be a good idea to complement existing law, but disagreed that current public international space law should be put aside. Bilateral contracts can supplement and clarify space law. *Prof. Wassenbergh* said that a distinction between governmental tasks and the commercial aspects is required. We can find the same distinction in the aviation field: ICAO adopts SARPs, and the economic problems are regulated through bilateral or open sky agreements. *Dr W. Wirin* (USA) was of the opinion that some restrictions on commercial activity are necessary, but agreed that governmental responsibility and regulation can stifle the emerging space industry.

Hereafter, the 39th Colloquium on the Law of Outer Space was closed on Friday 11 October 1996. The 40th Colloquium and celebration of the 30th anniversary of the Outer Space Treaty will be held in Turin, Italy, from 6-10 October, 1997.\*

*Tanja Masson-Zwaan\*\**

IISL Secretary/ Colloquium Coordinator

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\* Information about the Colloquium, session topics and procedure for the submission of abstracts, as well as the Manfred Lachs Space Law Moot Court Competition may be obtained from the IISL Secretariat, 3-5 rue Mario Nikis, 75015 Paris, France, tel. 33-1-45674260, fax 33-1-42732120.

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## *Comments*

### *The Challenge to Commercial Space Transportation in the 21st Century*

#### *I. Evolution of Space Transportation*

Since this nation began launching payloads into space 30 years ago, the driving force that shaped the space industry was government payloads and missions--military and NASA satellites and a few brave astronauts. Here in 1996, the government is still having a major impact on that industry: astronauts are still braving the hazards of outer space and large scientific satellites are being launched. But now there is a difference--a big difference--from those early days of "the right stuff." The end of the cold war has allowed the commercial space sector to begin to assert itself. Just as the civil sector eclipsed the military segment of the aviation industry, we are seeing the same trends in commercial space in both payloads and launches.

#### *II. The Difficult International Launch Market*

Nevertheless, the international commercial space launch market is an extremely competitive one dominated by a few major participants competing for a still relatively small number of payloads. Alone among the international participants is the US commercial launch industry which must compete without the direct subsidies available in varying measure to all of its competitors. US launch service providers, like all businesses in the US, must cover their costs and make a profit, meet a bottom line, to stay in business. To greater or lesser degree, that is not the case with US industry's international competitors. The playing field is not level; however, there are mechanisms to make it more level while some of the international participants are making the transition to commercial market status.

The most significant competitor for the past several years has been the European Ariane family of rockets. With a modern spaceport at Kourou, Guiana, and an operation geared for commercial operations, combined with an aggressive marketing strategy, Ariane market has been able to capture approximately half the market share of internationally competed launch opportunities since 1991. [In comparison, the US share during that period has been approximately 40% of the launch opportunities in the market.] With the support of its member countries, Ariane has been able to market in a relatively unconstrained manner, as aggressively as required to obtain a large number of launch contracts.

#### *III. US Launch Industry's Window of Opportunity*

The US launch industry is finally making serious efforts to offer improved capability in a cost effective manner. Until last year, industry estimates for launches of large geosynchronous [GEO] satellites were flat and projected possibly even to decline at the end of the decade, providing no real incentive to invest in improvements in launch costs or capabilities.

More recent studies reflect a somewhat improved outlook, however. The Department of Transportation's Commercial Space Transportation Advisory Committee's 1996 GEO launch forecast estimates an annual average of 31 geostationary transfer orbit [GTO] payloads per year through the year 2010.<sup>1</sup> Considering dual manifesting by Ariane, this translates into about 26 GTO launches annually.

From 1996 through the years 2000/2001 the US launch industry has a "window of opportunity" to become more internationally competitive, a window defined by the expiration dates of the space launch trade agreements with Russia [end 2000]<sup>2</sup> and with China<sup>3</sup> and Ukraine [end 2001].<sup>4</sup> And in the expendable launch vehicle [ELV] category, there is evidence that the major US rocket manufacturers are taking steps to improve the capability and cost effectiveness of their rockets. Lockheed-Martin is taking advantage of Russian engine technology to develop a new derivative engine [RD-180] for their Atlas 2AR, with improved capability, higher reliability and lower launch costs than earlier Atlas models. In the first "anchor tenant" agreement ever seen in the US private launch sector, Hughes has contracted with McDonnell-Douglas to launch 10 large HS-601 satellites on a new rocket to be developed, the Delta III, with options for 10 more launches. This is a new, unprecedented ELV development effort being undertaken without guaranteed government business. Both the Atlas 2AR and Delta III could be launching before the end of the decade, well within the aforementioned "window."

The US Air Force is also providing stimulus to the launch industry with its evolved expendable launch vehicle competition. All these initiatives are laudable and necessary to remain competitive in the international market; however, introducing a new launch vehicle is always a risky proposition, even with vast financing and technology resources. The dramatic failure of the first launch of the European Ariane V rocket was a sobering reminder that even with an investment of billions of dollars and the resources of a dozen countries behind it, there is no guarantee of initial success when introducing a new system.

The US small rocket industry is also making efforts to become operational and reliable, although 1995 was a year that was mostly marked by growing pains. The failures of the maiden launches of Lockheed-Martin's Launch Vehicle [LMLV] and EER Systems' Conestoga, and the second failure of Orbital Sciences Pegasus XL marked, in space terms, a perigee for this segment of the industry. However, two recent successful Pegasus XL launches have brightened the picture, and one can expect the LMLV and Conestoga to try

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<sup>1</sup> Commercial Space Transportation Advisory Committee (COMSTAC) Spring 1996 Meeting, *Status Report Technology and Innovation Working Group*, 25 July 1996.

<sup>2</sup> For texts of the U.S.-Russia Commercial Space Launch Services Agreement of September 2, 1993, and of the Jan. 30, 1996 Agreement amending it, see CURRENT DOCUMENTS, *infra*.

<sup>3</sup> For a text of the March 3, 1995 U.S.-China Memorandum of Agreement Regarding International Trade in Commercial Launch Services, see 24 J. SPACE L. 82 (1996).

<sup>4</sup> For a text of the Feb. 21, 1996 U.S.-Ukraine Agreement on Commercial Space Launch Services, see CURRENT DOCUMENTS, *infra*.

again, hopefully with more success. Launching a new rocket is a chancy business, but the US small rocket industry is stepping up to the challenge.

#### *IV. Role of Trade Agreements--Transition Strategy*

Apart from the Europeans, the other players in the international launch market are Russia, China and Ukraine, the so called, economies in transition [EITs] that participate, but within the constraints of separate trade agreements with the United States. The basic purpose of the agreements is to assist the EITs as they transition to market economies and democratic institutions by allowing a limited level of access to the international launch market without causing disruption. This permits EITs the opportunity to take advantage of an area in which they excel: launch services. The underlying premise of the agreements is that EIT launch service providers do not have to pay the same for factors of production as in the US [indeed, do not really know their costs] and can thus offer their services much below normal market levels, certainly below US costs of production. Being able to rely on the support of their own governments, they are not faced with meeting the stringent "bottom line" that US companies are required to do. As an example, it has been anecdotally reported that in 1993 the production costs of a Russian Proton rocket were on the order of 9-12 million dollars. In comparison, the largest US commercial rocket, Atlas 2AS, is generally priced in the 85-100 million dollar range, although it is less capable. The implications are clear: if Russia and the other EITs were unconstrained, they could quickly price all the western rockets out of the international market. To prevent that eventuality each agreement contains a GEO launch quantity limit [15 each for China and Russia and 16 for Ukraine, with a potential increase to 20 each if the market grows sufficiently] and requires pricing of GEO launch services within 15% of the lowest western bid on international competitions. However, there is recognition that as the EIT countries continue their market transition, these conditions will change and at some, hopefully not too distant date, they will have become true market competitors with their own bottom lines to meet.

#### *V. US Manufactured Satellites--That's Our Leverage.*

Those not familiar with the international launch market might wonder what leverage the US has on the EITs and why the same leverage does not apply to Arianespace. It is the view of most customers that the US produces the best communications satellites in the world. The Big Three in the US, [Hughes, Lockheed-Martin and Loral] control approximately 70% of the commercial satellite market. Theirs are the satellites of choice. Should an international competitor with whom we have a space launch trade agreement violate the terms of the agreement, and consultations cannot resolve the dispute, the US Government could exert pressure in a number of ways. If national security is somehow involved, sanctions may be imposed under which an export license for the satellite may be denied [such sanctions were imposed twice during the term of the first US-China agreement]. In other circumstances, a so-called Super 301 action can be initiated which enables the US to act across a broad spectrum of trade activities including sanctions against imports of the disputant. In any

event, the US does have considerable leverage to control EIT access to the international commercial launch market.

Strictly speaking, the US does not have the same leverage on Ariane because the European Space Agency [ESA] members are not considered EITs and do operate somewhat on a commercial basis. There is a widely held view in the US, however, that Ariane launch operations and marketing efforts receive support from ESA member countries that is not available to US launch service providers. This, as mentioned previously, enables the Europeans on any specific transaction to bid as aggressively as is necessary to secure a contract. [However, it is also thought that the levels of European government support to Ariane are less than those provided by EIT governments to their launch service providers.] Earlier efforts to negotiate "rules of the road" with the Europeans regarding commercial space launch services foundered on mutually unacceptable goals of the Europeans and the US. These goals were US insistence on elimination of what were considered unfair European inducements and subsidies for launch vehicle manufacture and operations, and the European insistence on access to the US government payload launch market. Exacerbating the situation was an internal European dispute as to which organization was actually authorized to negotiate such an agreement with the US--ESA or the European Community Commission. After a number of inconclusive meetings in the early 90's the talks halted, and no further negotiations on the matter have taken place.

#### *VI. Impact of Strategic Alliances*

As recently as 1994, space launch trade negotiations were a very straightforward "us or them" proposition. Every launch contract made available to EIT launch services providers was potentially a loss for US or European launch companies. The US launch industry felt squeezed between the pressure of EIT competitors who often seemed to offer subsidized, below-market prices and a flat or declining demand for launch services that made major investment in new or improved vehicles unattractive. However, the market is a dynamic place and before long there was a realization that new vehicles and improvements to current ELVs were not the only means by which the US launch industry might be able to position itself as a strong competitor in the international launch market. There were more than just those two ways to skin that cat, but ways that were unimaginable even five years ago. Strategic partnerships and joint ventures were devised to enable some US corporations to leverage the hardware and technology from Russia and Ukraine to compete more effectively in the international market.

Lockheed-Martin's partnership with RSC Energia and Khrunichev of Russia has resulted in creation of a new joint subsidiary, International Launch Systems [ILS], which markets both the Atlas vehicle and the Proton rocket as a package. With creation of ILS, Lockheed-Martin has embarked on a strategy to capitalize on the synergy of an Atlas-Proton package that could be offered to customers with the dual advantage of very competitive prices and backup launch capability if either system should experience a temporary problem.



One of the most innovative and intriguing strategic partnership ventures was created when Boeing joined with the Ukrainian firm NPO Yuzhnoye, the Norwegian firm Kvaerner and the Russian manufacturer RSC Energia in a venture called Sea Launch Company. In this case, a basic Ukrainian Zenit rocket would have a Russian upper stage added, as well as a payload fairing from Boeing. This rocket would be launched from a modified Norwegian oil platform supported by a command ship and based in Long Beach, California. For orbital launches the platform [self-propelled] would be maneuvered off the coast of California for a launch to the south. For equatorial launches the platform and command ship would proceed to an appropriate location, probably south of Christmas Island in the Pacific Ocean, and launch eastward straight to geosynchronous orbit. Since Boeing, a US corporation, is the largest stockholder, with a significant controlling interest, it will require a launch license from the US Department of Transportation under its statutory authority of Title 49 U.S.C., Subtitle IX. Here again we have a strategic partnership that could not have been imagined a few years ago.

To further complicate the international launch market, in a similar, recent attempt to combine EIT rocket technology with western marketing expertise, Rockwell joined with NPO Yuzhnoye to market the Cyclone launcher manufactured in Ukraine. Shortly after this initiative was undertaken, Boeing acquired the space division of Rockwell--now called Boeing North American--and would now appear to be in the position of marketing two Ukrainian launchers of varying capability. The dynamics of the market seem to be accelerating at an increasing rate. What's next?

#### *VII. Reusable Launch Vehicles: the First Horseless Carriage of Space Transportation*

New expendable launch vehicles will help reduce the cost of access to space, perhaps by a quarter or even a third if the envelope of technology is sufficiently stretched. However, to achieve the radical reductions in cost necessary to open space to a much broader users market, ELV technology will not suffice--a reusable launch vehicle [RLV] seems the most logical answer. In July 1996, Lockheed-Martin was selected to develop the NASA-backed X-33 RLV project. This innovative effort is hoped to produce a replacement for the current Shuttle and truly open space to the economic opportunities, including tourism, that RLV advocates foresee.

It is with RLVs that the cost of access to space, now on the order of \$10,000 per pound to GTO, may be reduced potentially by 90%. An operational RLV would open a wide horizon of commercial space opportunities. When RLVs truly become operational, they may well create a revolution like the first horseless carriage, i.e., the automobile. Against a mature, operational RLV, ELVs are not likely to be able to compete on a cost per pound to orbit basis, although ELVs will remain useful for military or deep space missions. However, an operational RLV is at least a decade away and for now, the focus is more properly on developments in expendable rockets.

The US appears to be taking the RLV program much more seriously than any of its international potential competitors. Let us hope that our efforts in this area help the US regain a dominant position in the international commercial launch market while providing unprecedented

transportation become truly routine and a launch be no more newsworthy than the takeoff of an airliner. The technology seems within our grasp; now do we have the ingenuity and will to make inexpensive space transportation a reality?

RLVs could also drastically change the shape and location of space launch infrastructure. Spaceports would no longer have to be located on a coast to provide a clear, over-water flight path in which expended stages could be dropped. Spaceports could become as ubiquitous as airports. In fact, higher elevation spaceports--near Denver, for instance, would have the advantage that the first 5,280 feet of altitude would already have been reached, a noticeable savings in fuel required over a sea level launch.

#### *VIII. Telecommunications Is Still the Driving Force Affecting Demand For Launch Services*

Telecommunications is still the dominant private sector space activity, but new services undreamed of a decade ago are now being offered in the market. There have been some remarkable new developments. Direct broadcast satellite TV (DBS), with Hughes DirecTV and US Satellite Broadcasting (USSB), are among the first to market with powerful satellites transmitting hundreds of television channels direct to 18 inch dish receivers at subscribers' homes. With over a million of these small receivers sold in 1995 this is the most successful electronic product introduction ever, eclipsing the first year sales of such standbys as videorecorders, personal computers and camcorders.

In addition, the Global Positioning System [GPS] and other geographical positioning and tracking systems are growing in number and diversity. GPS, originally a military system, has rapidly expanded into the civilian commercial world and is expected to become the world-wide choice for civilian air traffic control and navigation. The scope of its applications seems endless, from planes, ships, and trains to autos and individual travellers.

Another important new development in commercial space is the impending deployment of various communications low earth orbit [LEO] constellations. The emergence of global constellations of communications satellites that can provide direct voice communications between hand-held phones or in some systems, a full range of voice, fax and other communications world-wide, will revolutionize communications. A number of these systems have already received Federal Communications Commission licenses for frequency spectrum in which to operate. The best known of the currently proposed constellations are Motorola's Iridium, Loral's Globalstar, TRW's Odyssey and Inmarsat's ICO [Intermediate Circular Orbit] Global. Each of these projects will provide world wide communications service, and each company has sought global strategic investing partners. These are exciting developments and collectively are a principal driving force behind developments in the launch industry.

#### *XI. Into the 21st Century*

As the 20th century draws to a close, the prospects for commercial space seem full of potential to benefit every citizen on the planet. Direct broadcast satellites and LEO communications systems will provide

capabilities to send and receive information that are far beyond anything we've ever experienced or even contemplated. These systems must be deployed into outer space, and we see everywhere new initiatives to develop technology or leverage existing technology to make access to space more efficient and less expensive. New and modified ELVs will provide us short-term help in coping with the expense of access to space, but it is reusable launch vehicles that promise to be the first "horseless carriage" of the launch industry. RLVs will truly open the promise of space to us in the 21st century with benefits to mankind still untold. It is an exciting prospect.

*Richard W. Scott, Jr.\**

### *Case Developments*

A \$1.5 billion antitrust lawsuit -- filed in 1989 by PanAmSat against Comsat, alleging that Comsat, as a signatory to the Intelsat and Inmarsat treaty organizations, violated the Sherman Antitrust Act by engaging in anti-competitive business practices -- was recently dismissed by a U.S. federal court.

In a judgment that could facilitate further access to Europe's media market, the European Court of Justice (ECJ) struck down restraints imposed by Belgian (Flemish and French-speaking) authorities on programming coming from outside the country and held that such restrictions violate European Union legislation under which a broadcaster licensed in one member state has the automatic right to retransmit to other EU nations unless there are "exceptional circumstances" present.

In another decision the ECJ ruled the United Kingdom violated EU broadcasting law by refusing jurisdiction over satellite broadcasters unless their satellite link-up was on U.K. territory, and held that the headquarters of a company and not its "uplink" determines where it is based. As a result of the decision broadcasters based in Britain will now have to apply for U.K. licenses.

### *Short Accounts*

#### *Search for Extraterrestrial Intelligence (SETI): Issues and Policies*

While the question of whether intelligent life exists or may have existed outside our planet has likely been pondered by many people throughout history, the search for evidences of such, in light of the ever-expanding tools and opportunities that scientific and technological developments can provide, have shown more concrete manifestations in recent years.

The protection of radio frequencies needed for listening projects searching for signs of possible Extraterrestrial Intelligence (EI) has been of concern to scientists engaged in such projects already in prior years,

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but it has only been during the last decade or so that a concerted effort was made through the International Academy of Astronautics (IAA) and related institutions, to articulate two drafts, namely, the Declaration of Principles Concerning Activities Following the Detection of Extraterrestrial Intelligence and the Declaration Concerning the Sending of Communications to Extraterrestrial Intelligence. These two Declarations attempt to provide guidance to people and institutions on how to proceed in a case of EI detection and how to send communication to alien civilizations.

In the first Declaration, institutions and individuals participating in SETI agree to follow certain principles for disseminating information about the detection of EI. These principles include the following:

The discoverer should attempt to verify the evidence regarding the existence of EI before making any public announcement;

Prior to any public announcement the discoverer should promptly inform other observers so that they may seek to confirm the discovery by independent observation;

After concluding that the discovery appears to be credible evidence of EI, the discoverer should inform observers and the U.N. Secretary General and a number of designated institutions, including the International Telecommunication Union, the Committee on Space Research of the International Council of Scientific Unions, the International Astronautical Federation, the International Academy of Astronautics, the International Institute of Space Law, Commission 51 of the International Astronomical Union, and Commission J of the International Radio Science Union;

The SETI Committee of IAA should conduct a continuing review of the procedures for the detection of EI and the subsequent handling of the data.

Unlike the first Declaration, which is an open-ended statement of individuals and institutions, the second Declaration is by States interested in subscribing to the Declaration. Under it, the States agree that international consultations should be initiated in the U.N. Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and within other governmental and non-governmental organizations, to determine whether a message should be sent and what the contents of the message should be. The Declaration states that this matter should be considered by the U.N. General Assembly based upon the recommendation of UNCOPUOS and that no communication should be sent by any State until appropriate international consultations have taken place.

During the recent meeting of the IAA's SETI Committee in Beijing, three notable papers\* elaborated on the two Declarations drawing attention to the lack of progress with respect to official governmental adherence or support, the likely difficulties of enforcement and other legal, as well as philosophical and religious issues. They did not oppose the second Declaration's idea that the U.N. General Assembly should be the competent body to act on behalf of Humankind, if and when the momentous occasion

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\* S.E. Doyle, *Post-Detection Global Institutional Arrangements*, IAA-96-IAA.9.2.13; Francis Lyall, *Communications With Extra-terrestrial Intelligence: A New Dimension of Space Law*, IAA-96-IAA.9.2.04; Patricia M. Sterns, *SETI and Space Law: Jurisprudential and Philosophical Considerations for Humankind in Relation to Extraterrestrial Life*, IAA-96-IAA.9.2.08.

arises calling for a response to a communication received from an extraterrestrial civilization.

### *Congressional Notes*

Public Law 104-204, 110 Stat. 2874, contains NASA Authorization for the fiscal year ending Sept. 30, 1997. Under it, authorization is given, *inter alia*, for necessary expenses: (a) in the conduct and support of *human space flight* research and development activities; (b) in the conduct and support of *science, aeronautics and technology* research and development activities; (c) in carrying out *mission support* for human space flight programs, and science, aeronautics, and technology programs. Notwithstanding the limitations on the availability of funds when amounts are provided for full funding for the Tracking and Data Relay Satellite (TDRS) replenishment program, such amount available for such activity shall remain available until expended. Several proposals which were parts of the bills approved by the House or Senate, do not appear in the enactment.

### *Executive Actions*

The U.S. Presidential Decision Directive released on Sept. 19, 1996\* provides special space guidelines in the fields of civilian activities, those involving national security interests, and in the commercial and intersector areas. Among others, the policy instructs NASA to seek to privatize or commercialize its space communications operations no later than 2005. The Department of Energy is required to maintain the necessary capability needed to support space missions which may require the use of space nuclear power systems (much as required by the Cassini mission to Saturn) but nuclear reactors are not to be used in Earth orbit without specific presidential approval. Also, the Office of Science and Technology Policy and the National Security Council are instructed to assess possible commercial use of space nuclear systems.

President Clinton's 1994 policy placed no restrictions on collection of imagery, except in cases involving U.S. national security interests. However, because of its unique relationship with the U.S., reportedly, special exception will be made for Israel which demanded that privately owned satellites capable of taking pictures with 3-meter resolution or better be barred from imaging Israeli territory.

### *Domestic Telecommunications Developments*

The FCC has already been engaged in a small number of spectrum auctions through which it distributed thousands of licenses and has taken in more than \$20 billion in auction revenue for the U.S. Treasury. In January the FCC auctioned off two direct-to-home broadcasting licenses. The direct broadcast satellite slots had been assigned to the U.S. by international agreement. Auctions speed up the licensing process, they are more efficient than comparative hearings which can take a long time to

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\* For excerpts of the Directive, please see CURRENT DOCUMENTS, *infra*.

resolve and discourage speculators that take part in lotteries. However, auctions may run into real problems if used for international services.

### *International Developments*

While still subject to modification, outlines of a memorandum of understanding governing *U.S.-Russian cooperation on the international space station* emerged in the course of Vice President Gore's economic and technical cooperation mission to Russia on July 16, 1996. The understanding is expected to pave the way for completion of intergovernmental and other agency-level agreements that are expected to govern space station cooperation among the United States, Russia, member states of ESA, Japan, and Canada.

Under an agreement signed *January 30, 1996* amending the September 1993 *U.S.-Russia Commercial Space Launch Services Agreement*, Russia has the opportunity through the year 2000 to win contracts up to fifteen launches (in addition to the INMARSAT 3 satellite) to geosynchronous earth orbit, currently the most frequently used orbit for commercial satellites.\* Should the market for commercial space launch services expand over the next few years, the amended Agreement provides Russia with the possibility to win up to four additional launch contracts. The amendments also create new guidelines for Russia's participation in the growing market for launching commercial satellites to low earth orbit. The amended U.S.-Russia Agreement is similar in its main provisions to the U.S. commercial space launch agreement with China\*\* and to the commercial space launch agreement the U.S. recently negotiated with Ukraine.\*\*\*

Existing bilateral launch agreements between the United States and Ukraine, China and Russia will be replaced when they expire by free and fair trade in commercial launch services after the turn of the century according to the U.S. Presidential Decision Directive released on Sept. 19, 1996.

U.S. and Russian space agencies met for a joint incremental design review to discuss, *inter alia*, the roles and responsibilities of station crew members and the issue of command. They decided that an American will be the *first commander* of the international space station but subsequent commanders may well be Russian cosmonauts.

Space station construction is to begin in November 1997 with launch of a Russian-built core module called the *Functional Cargo Block*.

Countries which increased their *space expenditures in 1995* include Finland, France, Italy, the Netherlands, Spain, Sweden, and Switzerland; at the same time, Canada, the European Space Agency, Germany, Great Britain, Japan, Norway, and the United States reduced theirs.

The *ITU Council*, the governing body of the ITU between Plenipotentiary Conferences concluded its 1996 Session on June 28 after

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\* For more details of the U.S.-Russia Agreement of Jan. 30, 1996 amending the Commercial Space Launch Services Agreement of Sept. 2, 1993, see CURRENT DOCUMENTS, *infra*.

\*\* For a text of the U.S.-China Agreement, see 24 J. SPACE L. 82 (1996).

\*\*\* More details of the U.S.-Ukraine Agreement of Feb. 21, 1996 on Commercial Space Launch Services, appear in CURRENT DOCUMENTS, *infra*.

giving the green light for the ITU to play, in the future, a role in humanitarian affairs. It confirmed the ITU as the technical coordinator for the implementation of a new draft Convention the aim of which is to facilitate the rapid deployment and effective use of telecommunication equipment in disaster-struck areas by reducing, and whenever possible, removing, regulatory barriers and strengthening transboundary cooperation between States. An intergovernmental conference will be convened in 1997 to adopt the draft Convention.

The U.S., European, and French space agencies are considering the development of a joint *crew-rescue* vehicle for the international space station.

A Canadian company, *Akjuut Aerospace* and the *Scientific and Technology Center of Moscow* agreed to launch Russian Start rockets from Spaceport Canada in Churchill range, Manitoba. This is the first time that a country delivers one of its orbital rocket launchers to a foreign country's launch site.

*Americas Telecom 96*, whose main theme was "Telecommunications and Sustainable Development -- From Potential to Growth," took place on June 10-15, 1996 in Rio de Janeiro.

The International Academy of Astronautics and Politecnico di Torino hosted a *Symposium on Outer- and Extra-Solar Missions* which are feasible with near-term technology in Turin, Italy, June 25-27, 1996.

The inaugural constitutional meetings of *WorldTel Ltd.* were held on July 15-18, 1996 in London. WorldTel has been formed to improve and develop basic telecommunications' infrastructures and resources by creating an effective new model for cooperation between investors, commercial organizations and nations in the developing world.

The International Law Association at its Helsinki Conference in August 1996 requested the Space Law Committee to elaborate a revised Draft Convention on the *Settlement of Disputes related to Space Activities* and to submit that draft with commentary to the 68th Conference in Taipei.

The *Fifth Satel Conseil Satcom Symposium*, held in Paris, September 4-6, 1996 focused on key issues concerning the satellites' role in the globalization of telecommunications, the development of digital technology, multimedia and interactivity, and the most promising markets for the early 21st century.

An International Conference on *Small Satellites: Missions and Technology*, organized by the U.N., the Instituto Nacional de Tecnica Aerospacial and ESA on September 9-13, 1996, included a session on regional developments and commercial as well as legal aspects.

The first-ever *World Telecommunication Policy Forum*, hosted by the ITU was held on October 21-23, 1996 and dealt with the political, socioeconomic and regulatory issues surrounding the planned introduction of Global Mobile Personal Communications by Satellite.

The III Space Conference of the Americas, meeting in Punta del Este, Uruguay, focused on "Technology, Education and the Environment."

The IAA organized and DARA, the German Space Agency, together with other German space organizations, co-sponsored an IAA Symposium on *Small Satellites for Earth Observation* on November 4-8, 1996 in Berlin, Germany.

*Alcatel Telecom* has signed a launch services contract with *Arianespace* for three WorldStar satellites -- AfriStar-1, AsiaStar-1 and

CaribStar-1 -- to be owned and operated by *WorldSpace Inc.* which will offer direct-to-people multimedia transmissions to be received from the WorldStar satellites by a new generation of low-cost personal, portable receivers. The three geostationary satellites will be launched between mid-1998 and mid-1999 by Arianespace and are expected to serve over four billion people in the emerging markets of Africa, the Middle East, Asia, Latin America and the Caribbean.

Washington based *WorldSpace* plans to beam direct radio broadcasts via a constellation of three WorldStar satellites to listeners in Africa, Asia, Latin America and the Caribbean. Completion of the control center for the satellites to be operated by Alcatel Espace in Toulouse, France is expected in late 1997.

#### *Manfred Lachs Space Law Moot Court Competition*

The finals of the 5th Manfred Lachs Space Law Moot Court Competition were held in Beijing, October 10, 1996 between the teams of the University of Helsinki (Finland) and of the University of Wyoming (USA) and was won by the University of Helsinki. The adjudicating judges were Judge Chr. Weeramantry (President), Judge G. Herczegh and Judge V. Vereshchetin of the International Court of Justice. The case and written briefs will be published in the IISL Proceedings. Next year's final will be held in Turin, Italy, during the IISL Colloquium, October 6-10, 1997.\*

#### *Other Events*

In a transaction valued at \$3 billion, *Hughes Electronics Corp.* agreed to buy *PanAmSat Corp.* in a move linking their satellites to beam cable-television and telephone transmission world-wide.

*Boeing* signed an agreement to buy Rockwell's aerospace and defense divisions, including its rocket engine production, space shuttle operations and international space station work for NASA.

The Institute of Air and Space Law of McGill University and the Canadian Bar Association held a conference on "Air and Space Law Challenges -- Confronting Tomorrow" in Montreal, Oct. 25-27, 1996. The subjects of the Space Law part of the program included privatization and commercialization of space applications, remote sensing via satellites, and benefits from outer space. The fifth European Centre for Space Law Practitioners' Forum took place in Paris, Oct. 28, 1996 and dealt with current legal issues, and the commercialization of remote sensing data.

#### *Brief News*

The *Hubble* space telescope may have spotted the most distant objects ever recorded, the first generation of stars as they may have formed about fourteen billion years ago. A servicing of the Hubble, scheduled for February 1997 by installation of two new instruments, is expected to increase the telescope current speed and efficiency by 100 times. The Next Generation Space Telescope (NGST), a successor to Hubble which is a relic

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\* For more details, see text, at pp. 137-38, *supra*.



of 1970's technology, would be bigger, lighter and cheaper than Hubble. It would fly 1 million miles from Earth and could be launched by 2010.

NASA scientists have found fossil evidence of simple ancient microbes on a chunk of Martian rock indicating that microscopic life may have existed on Mars more than three billion years ago. British researchers also reported similar findings in a considerably younger Martian meteorite recovered from the Earth's South Pole. Scientists also reported evidence that life existed on Earth more than 3.8 billion years ago -- or at least 300 million years earlier than previously believed.

An image of Jupiter's moon Europa taken on June 27 by the *Galileo* spacecraft suggests that the moon has water and possibly life. Also imagery acquired during *Galileo's* June 27 flyby of Jupiter's giant moon *Ganymede* showed huge ice ridges, volcanic craters and valleys.

NASA chose Lockheed Martin to build the experimental X-33, which is expected to lead to completely reusable rocketships to replace the four space shuttles. The wedge-shaped craft called *VentureStar* would take off vertically and land horizontally much like an airplane. NASA hopes the new craft will reduce launch costs to a fraction of what they are for the shuttle and will be able to land and take off again in a few days rather than in four months as is required for the shuttle. Lockheed Martin would conduct a dozen or so unmanned, suborbital test flights up to March 15, 1999 and then the company and investors will have to determine whether it is economically feasible to proceed with the development and building of a twice-as-large, operational, reusable launch vehicle (RLV) system estimated to cost between \$5 to \$8 billion. Once operational around 2006 or 2007, the RLVs could be used to carry crews or supplies to the international space station.

NASA awarded 7 billion dollars to the *U.S. Space Alliance*, a joint enterprise of Rockwell International and Lockheed Martin, to take over the day-to-day operations of the shuttle.

NASA is taking a fresh look at the commercial viability of solar-power satellites that could permit affordable gathering of energy in space for Earth.

*Shannon Lucid* was brought home by the space shuttle *Atlantis* from the Russian space station *Mir*, after spending a record-breaking 188 days in space, more than any woman or any American. Inside one of the solid-fuel boosters of the same shuttle NASA found a two-by-one-half-inch wrench of unknown origin after the spent rocket was retrieved.

NASA's promise for a working laboratory in space by 2002 may be broken as design deficiencies and funding delays in the U.S. and Russia cause construction setbacks for the international space station.

The *Cassini* spacecraft bound to Saturn in late 1997 will carry a CD-ROM comprising a list of signatures. More than 300,000 people have already submitted their signatures to NASA's Jet Propulsion Laboratory in Pasadena, California which will accept signatures until January 1, 1997 or when the total reaches 1 million, whichever comes first. Since *Cassini* will not return to Earth after the end of its mission sometimes around 2008, it probably will wonder the solar system for eternity carrying what could be immortal signatures.

Due to excessive costs, the Clinton administration abandoned President Bush's commitment to put U.S. astronauts on Mars by 2019 in favor of *sustained robotic presense* on the red planet by 2000.

The *Mars Global Surveyor* has been launched in November to be followed by the *Mars Pathfinder* spacecraft in December 1996.

Because of the potential threat that some of the several thousand comets and asteroids whose orbits intersect the Earth's orbit may strike the Earth and cause major destruction, the *U.S. Air Force* has started considering what assets would be needed for the construction of a planetary defense system.

*Orbital Sciences Corp.* of Dulles, Va., contracted to install a satellite-based automatic vehicle location system for the New York City and the Chicago transit systems.

The upper stage of a *Pegasus* rocket launched in 1994, exploded on June 3, 1996 breaking up into 577 pieces of debris, rivaling the 489 fragments created by the explosion of an Ariane rocket in 1986.

A French defense satellite was damaged on July 24, 1996 by a suitcase-sized piece of an old Ariane rocket that had broken up into about 500 fragments which were left in space since November 1986. This was the first time that two objects tracked by ground radar have collided. On August 8, France's Ariane 4 rocket successfully launched two European Communications satellites into geostationary orbit. A Russian *Soyuz* capsule, carrying a crew of three, including France's first female astronaut, successfully docked with the Mir space station on August 19.

On November 17, 1996, the debris of the Russian Mars 96 spacecraft launched from Baikonur, carrying capsules of radioactive plutonium for energy generation came crashing back into the Pacific near Easter Island after its fourth stage rocket malfunctioned.

Arianespace and Aerospatiale together with the Russian RKA and the Samara Space Centre have founded *Starsem*, a French company, to commercially operate the Soyuz launch vehicle.

The liftoff of *Adeos* remote sensing satellite was the fourth successful launch for Japan's H2 launch vehicle. The Space Station Operations Facility which is to play a key role in system operation and experiment support for the Japanese Experiment Module (JEM) under the International Space Station Program, has now been completed at the Tsukuba Space Center. Japan now has five astronauts, and NASDA is determined to further promote its manned space activities. Japan is constructing the Planet B orbiter for launch to Mars in 1998.

NASDA's Tracking and Data Acquisition Department has conducted a *Space Debris Observing System* Study which included the use of Middle and Upper Atmosphere Radar operated by Kyoto University.

The Hughes-built *Apstar 1A* satellite owned by APT Satellite Co. Ltd. of Hong Kong was successfully placed in geostationary orbit by a Chinese Long March 3 rocket on July 3. Despite several past Long March failures, including the Feb. 15 explosion of a Long March 3B carrying an Intelsat satellite, China plans further commercial launches.

There has been a growing demand in the *Near East* for mobile telephony and direct-broadcast television services.

Tajikistan has become the 137th and Bosnia and Herzegovina the 138th member of INTELSAT.

## B. FORTHCOMING EVENTS

A conference on *Satellite Applications in Oil/Gas and Mining* is scheduled for February 25-28 in Singapore.

The 1997 International Conference on *Mobile Planetary Robots and Rover Roundup* will take place Jan. 29 - Feb.1, 1997 in Santa Monica, California.

The International Space University will sponsor a conference on *New Space Markets* on May 26-28, 1997 in Strasbourg, France.

The 12th *Man in Space Symposium* sponsored by the IAA and NASA is planned for June 8-13, 1997 in Washington, D.C. and will deal with the Future of Humans in Space.

The next session of the *ITU Council* will be held in Geneva on June 18-27, 1997.

*Asia TELECOM 97* will take place in Singapore, on June 9-14, 1997. This will be followed by *TELECOM Interactive 97*, in Geneva, on September 8-14 1997.

As already reported, the 1997 *IISL Colloquium* will take place during the 48th International Astronautical Congress in *Turin, Italy*, October 6-10, 1997 on the theme "*Celebrating the 30th Anniversary of the Outer Space Treaty of 1967.*" The following sessions are planned:

Session 1: Background and History of the Outer Space Treaty.

(Invited papers only).

Chairmen: *N. Hosenball (USA)* and *A.A. Cocca (Argentina)*.

Session 2: Concepts of space law and the Outer Space Treaty. (A session to explore the concepts of law contained in the Outer Space Treaty and the elaboration of those concepts as contained in the subsequent international treaties and agreements in space law).

Chairmen: *E. Galloway (USA)* and *G. Catalano Sgrosso (Italy)*.

Session 3: Applications and Implementation of the Outer Space Treaty. (A session to explore the problems and realities of applying and implementing the Outer Space Treaty and the basic provisions of space law therein).

Chairmen: *S. Doyle (USA)* and *G. Lafferranderie (France)*.

Session 4: The future applications of the Outer Space Treaty. (Examination of the Treaty from a 21st century perspective; should the Treaty be amended, supplemented or otherwise reinforced?).

Co-chairmen: *K.-H. Böckstiegel (Germany)* and *A. Terekhov (Russian Federation)*.

*Africa TELECOM 98*, will be held in Midrand, South Africa, on May 4-10, 1998, and the next *WORLD TELECOM 99* in Geneva, on October 10-17, 1999.

*Asian Aerospace '98* will take place on February 24-March 1, 1998 at the Changi Convention Centre in Singapore.

## BOOK REVIEWS/NOTICES\*

### REVIEWS

CASES ON SPACE LAW, TEXTS, COMMENTS AND REFERENCES by Stephen Gorove (Journal of Space Law Inc., Space Law and Policy Books Ser. No.1, 1996), (Lib. Cong. Cat. Card. No.96-75983; ISBN 0-9651748-0-8), pp. 221.

The importance of this book arises from the fact that it is the very first separate collection of significant judicial decisions, both domestic and foreign, in the field of space law. It is presented in an easily accessible form which can be used not only as a companion booklet to a treatise by students in class but also as a quick desk reference by practicing attorneys, judges and policy makers. It covers leading court cases arranged under the broad headings of Sovereignty and Jurisdiction, Torts, Contracts, Environment, Antitrust, Taxation and Intellectual Property. This is followed by a section of additional cases involving Satellite Communications, Insurance and other areas of the law, and is rounded out by relevant comments, analyses, and references to the cases.

Professor Stephen Gorove's name hardly needs any introduction. He is well-known throughout the world as the author of over 200 space law articles and of such pioneering works as *SPACE LAW: ITS CHALLENGES AND PROSPECTS* (1977); *THE SPACE SHUTTLE AND THE LAW* (1980); *THE TEACHING OF SPACE LAW AROUND THE WORLD* (1986); *DEVELOPMENTS IN SPACE LAW: ISSUES AND POLICIES* (1991); *UNITED STATES SPACE LAW - NATIONAL AND INTERNATIONAL REGULATION* (1982-1996). Professor Gorove is a member of the International Academy of Astronautics, a representative of the International Astronautical Federation before the U.N. Committee on the Peaceful Uses of Outer Space, a long-time Vice-President of the International Institute of Space Law, and a Chairman of the Editorial Board of the *JOURNAL OF SPACE LAW*, the only legal periodical in the world dealing exclusively with the legal issues arising out of human activities in outer space.

The author states that it is his firm belief that the number and importance of judicial decisions dealing with space law will undoubtedly increase in the twenty-first century, which is expected to witness such events as the routine use of an international space station, the establishment of manned outposts on the moon, missions to Mars and conceivably to other planets and, last but not least, the steady increase in commercial space activities. This reviewer shares this belief and regards this book an indispensable addition to the space law literature. Indeed, this book may very well be viewed as the seminal work which takes us from

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\* Edited by Michael A. Gorove, Attorney at Law, Associate Editor, *J. SPACE L.*

the second millenium, when space law and its antecedent principles was born, to the third millenium, when space law will come of age and mature.

*Martine Rothblatt*, Attorney at Law  
Executive Vice President, Sky Station International Inc.  
Washington, D.C.

AMERICAN SPACE LAW: INTERNATIONAL AND DOMESTIC, by NATHAN C. GOLDMAN (2d ed., Univelt 1996), pp. 488.

The author, an attorney and an adjunct professor of Space Law at South Texas College of Law, states that the first edition of this book was conceived around a two-era model of space law. The first era was the Classical Period characterized by the overshadowing image of the U.S.-Soviet space race (1957-1979) with a pro-state and a pro-victim orientation. The second phase covered the Modern Period (1979-1990) during which more and more nations became involved in space and private enterprise assumed an increasing role in this activity.

What is new in the second edition is Chapter 6, which focuses on the third era characterized by the end of the Cold War, the reemergence of public international law and a welcome attitude toward private activity in outer space. Added to the second edition are developments in private international space law and a brief review of domestic space laws of other nations. Also, an expanded Chapter 12 is devoted to glimpses of issues which may arise beyond the "Space Station" and "Beyond Humankind."

While less than half of the book (229 pp.) contains a textual discussion (the rest being devoted to appendices, notes and bibliography), and only three chapters appear to contain new information, the book is a well researched study based on a vast space law literature in which the author, relying mostly on opinions of well-known experts, draws attention to the ambiguities, uncertainties and lacunae in space law.

What is rather cumbersome, however, for anyone attempting to follow the book is the fact that all the notes are placed at the very end of a long list of appendices rather than at the bottom of each relevant page or immediately after each chapter, which would have facilitated the reader's job in following the textual presentations, particularly when additional statements and elaborations were included in the annotations.

BUILDING CONFIDENCE IN OUTER SPACE ACTIVITIES: CSBMs AND EARTH-TO-SPACE MONITORING, edited by Pericles Gasparini Alves (UNIDIR, Dartmouth 1996), pp. 357.

This study was initiated and organized by the United Nations Institute for Disarmament Research (UNIDIR) in Geneva with the financial support of the Institute for Space and Terrestrial Sciences and the Ministry of External Affairs, Canada and the Centre National d'Etudes Spaciales, France.

In light of the foregoing setting, it is not surprising to find that most of the contributions come from people associated with the

aforementioned organizations. One of the refreshing exceptions appears to be a chapter by Ralph Chipman and Nandasiri Jasentuliyana of the United Nations devoted to a discussion of international political issues which may arise in monitoring outer space activities. In its politico-legal setting, the authors touch upon the Registration Convention, and issues concerning nuclear space systems, space debris, military space activities, and aspects of international cooperation in space tracking.

A second exception is another legally oriented elaboration made by Laurance Beau of the French Ministry of Foreign Affairs who presents a general overview of existing proposals of confidence and security building measures associated with earth-to-space tracking.

It is understandable -- but rather unfortunate especially from the viewpoint of the book's scope and coverage -- that the reports and papers listed which served as the basis of the bulk of research underlying this study appeared to be exclusively limited to U.N. materials.

THE USE OF AIRSPACE AND OUTER SPACE FOR ALL MANKIND IN THE 21ST CENTURY, EDITED BY CHIA-JUI CHENG (Kluwer Law International 1995), pp. 353.

Organized by leading universities and institutes in Taipei, Leiden, Montreal and Tokyo, this hardcover book contains the Proceedings of the International Conference on Air Transport and Space Application in a New World held in Tokyo, from 2-5 June 1993.

Two chapters out of six in this collection of papers are devoted to the field of space law and cover some of the legal and political aspects of commercial space activities (Ch. 3), and the exploration, exploitation and use of outer space, celestial bodies and resources (Ch. 5). Discussed topics by well-known specialists in Chapter Three include: "Policy and Legal Implications of Asia-Pacific Space Cooperation" (*He Qizhi*), "Satellite Communications Systems and Legal Issues in the Asia-Pacific Region" (*Toshio Kosuge*), and "US Space Law: The Practical Implications of Recent Case Law Developments on Minimization of Litigation" (*Rachel B. Trinder*). Chapter Five also carries contributions by leading authorities on such topics as: "Ensuring Equal Access to the Benefits of Space Technology for All Countries" (Nandasiri Jasentuliyana), "Cooperation and Competition in Space Transportation" (*H. Peter van Fenema*), and "Legal Problems of Manned Space Flight" (*Stephen Gorove*).

In addition to the two chapters devoted to space law issues, there also is a contribution on the "Settlement of Disputes in Air and Space Law" (*Pablo Mendes de Leon*).

It is not possible within the confines of a brief review to elaborate in more detail on the aforementioned scholarly presentations, whether they are confined to the Asia-Pacific region, address issues of importance for developing nations or touch upon problems that policy makers are likely to face in connection with future space transportation or the anticipated increase in the frequency of manned space flight. For the practitioner engaged in litigation, Ms. Trinder's survey of American case law with full citations will likely provide a useful reading opportunity.

While the book has no index, it does have a combined table of cases covering both air and space law. This will no doubt be a welcome attraction to interested lawyers.

### NOTICES

SPACE LAW -- A BIBLIOGRAPHY, U.N. OFFICE OF OUTER SPACE AFFAIRS VIENNA (United Nations, New York 1996), pp. 219.

This useful compilation encompasses subject and author indices of papers published in the Proceedings of the Colloquia of the International Institute of Space Law (IISL) from its first (1958) to its thirty-seventh sessions. The book contains hundreds of subject matter entries which should substantially facilitate the work of researchers in finding papers dealing with the same legal topic without having to browse through the Contents Tables of thirty-seven volumes of IISL Proceedings.

ORGANIZING FOR THE USE OF SPACE: HISTORICAL PERSPECTIVES ON A PERSISTENT ISSUE, edited by ROGER D. LAUNIUS, AAS History Ser. Vol. 18, Univelt 1995), pp. 220.

Most of the papers comprising this volume were presented at the 40th Annual Meeting of the American Astronautical Society (AAS) November 17, 1993 in San Francisco, California. They contain accounts of policy making developments by competent historians mainly in the early years of space exploration. Apart from reviews of civilian-oriented space related efforts, the reader may also gain insights into the creation of military space organizations, including that of the Strategic Defense Initiative Office.

UNITED STATES SPACE FOUNDATION, THE 10TH NATIONAL SPACE SYMPOSIUM PROCEEDINGS REPORTS (Beth Ann Lipskin *et al.* eds., Univelt 1995), pp. 214.

In line with its main goal to facilitate meaningful interaction at many levels among leaders and decision makers in government, business and industry, the United States Space Foundation once more brought together at its 10th National Space Symposium and Space Commerce '94 some of the world's foremost authorities and decision makers, including President Clinton, the Governor of Colorado, the heads of NASA and ESA, as well as leaders of many other domestic and foreign institutions, several astronauts, and famous scientists, like Edward Teller and Norman Augustine.

The informal discussions which took place April 5-7, 1994 in Colorado Springs contain a wealth of information on a wide range of topics, including space commercialization, the international space station, competitive launch capabilities, supporting life on planet earth, national security space issues, earth and space observations, just to mention a few. Important points made by the speakers are frequently highlighted to facilitate an easier overview by the reader.

STRATEGIES FOR MARS: A GUIDE TO HUMAN EXPLORATION, edited by Carol R. Stoker & Carter Emmart (Am. Astronautical Soc'y, Sci. & Tech. Ser., Vol. 86, Univelt 1996), pp. 619.

A wide range of issues relevant to the human exploration of Mars is presented in this paperback by a score of solid contributions. Among the issues are some fundamental questions, such as why should humans explore Mars, what are the ways and modes of getting there, and how can humans live and work there. The book does not address legal issues *per se* but it is unlikely that lawyers would argue with the editors' basic tenet that the biggest hurdle to human exploration is "developing the political and popular will to go."

SPACE SAFETY AND RESCUE 1993, AND SPACE SAFETY AND RESCUE 1994, edited by Gloria W. Heath (Am. Astronautical Soc'y, Science & Technology Ser., Vols. 87 and 88, Univelt, 1996), pp. 332 and pp. 314.

Both of these paperbacks are collections of scientific and technical presentations during the sessions of the 26th and 27th Safety and Rescue Symposia, organized by the International Academy of Astronautics in 1993 and 1994, respectively. Notwithstanding their scientific and technical orientation, many papers may be read with benefit even by non-scientists for a fuller appreciation of the complexities involved in space safety and rescue endeavors. Less technical from a legal perspective is the paper in the 1994 edition by *Derek E. Lang*, dealing with risk management program for commercial space transportation and focusing on the practices of the Office of Commercial Space Transportation within the U.S. Department of Transportation (DOT). In the author's view, risk assessment is a major component of DOT's licensing and regulatory decisions and DOT's risk management program has successfully accommodated commercial space transportation activities.



## RECENT PUBLICATIONS\*

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- ALVES, PÉRICLES GASPARINI (ED.), BUILDING CONFIDENCE IN OUTER SPACE ACTIVITIES: CSBMS AND EARTH-TO-SPACE MONITORING (Ashgate 1996).
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#### D. Official Publications

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- Final Acts of WARC-95. In 1996, *approval* by Switzerland.
- Instruments amending the Constitution and the Convention of the ITU (Geneva, 1992) Kyoto 1994. In 1996, *ratification* by Australia, Bhutan, Côte d'Ivoire, Egypt, Indonesia, Italy, Madagascar, Morocco, Netherlands, Papua New Guinea, Philippines, Singapore, Spain, Switzerland, Thailand, the Vatican City State, and Viet Nam. *Acceptance* by Finland.
- International Telecommunication Regulations (Melbourne, 1988). In 1996, *approval* by Greece.
- Optional Protocol on the Compulsory Settlement of Disputes Relating to the Constitution and the Convention of the ITU and to the Administrative Regulations (Geneva, 1992). In 1996, *ratifications* by Egypt, Indonesia, Italy, Madagascar, Philippines, and Viet Nam. *Acceptances* by Finland, Netherlands.
- U.S.-Canada Agreement Concerning Mission Specialists for Space Shuttle Flights, with Implementing Agreement. Effected by Exchange of Notes at Ottawa Aug. 31, 1995 and May 17, 1996. Entered into Force, May 17, 1996.

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- U.S.-Russia Agreement Amending the September 1993 U.S.-Russia Commercial Space Launch Agreement, Washington, D.C., January 30, 1996.
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*BUILDING CONFIDENCE IN OUTER SPACE ACTIVITIES: CSBMS AND EARTH-TO-SPACE MONITORING (Pérides Gasparini Alves ed., Dartmouth 1996).*

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*Microsatellites and Small Satellites: Current Projects and Future Perspectives for International Cooperation, Doc. A/AC.105/611.*

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# CURRENT DOCUMENTS

## IV.

### THE WHITE HOUSE

#### National Science and Technology Council

#### FACT SHEET

#### NATIONAL SPACE POLICY (Released September 19, 1996)

#### (Excerpts)

##### Introduction ...

- (2) The goals of the U.S. space program are to:
- (a) Enhance knowledge of the Earth, the solar system and the universe through human and robotic exploration;
  - (b) Strengthen and maintain the national security of the United States;
  - (c) Enhance the economic competitiveness, and scientific and technical capabilities of the United States;
  - (d) Encourage State, local and private sector investment in, and use of space technologies;
  - (e) Promote international cooperation to further U.S. domestic, national security, and foreign policies.
- (3) 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 humanity. "Peaceful purposes" allow defense and intelligence-related activities in pursuit of national security and other goals. 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. The United States considers the space systems of any nation to be national property with the right of passage through and operations in space without interference. Purposeful interference with space systems shall be viewed as an infringement on sovereign rights....
- (5) The National Science and Technology Council (NSTC) is the principal forum for resolving issues related to national space policy...

##### Civil Space Guidelines

- (1) The National Aeronautics and Space Administration is the lead agency for research and development in civil space activities....
- (3)... (c) ... NASA will undertake:

---

\* For Documents I, II and III, see 24 J. SPACE L. 79-95 (1996).



(i) a sustained program to support a robotic presence on the surface of Mars by year 2000 for the purposes of scientific research, exploration and technology development; ...

(iv) a program of long-term observation, research and analysis of the Earth's land, oceans, atmosphere and their interactions, including continual measurements from the Earth observing System by 1998.

(d) In carrying out these activities, NASA will develop new and innovative space technologies and smaller more capable spacecraft to improve the performance and lower the cost of future space missions.

(4) In the conduct of these research and development programs, NASA will:... (f) Seek to privatize or commercialize its space communications operations no later than 2005....

(5) The Department of Commerce (DoC), through the National Oceanic and Atmospheric Administration (NOAA), has the lead responsibility for managing Federal space-based civil operational Earth observations necessary to meet civil requirements. In this role, the DoC, in coordination with other appropriate agencies, will:...

(c) .... in accordance with current policy and Public Law 102-555 provide for the regulation and licensing of the operation of private sector remote sensing systems....

#### National Security Space Guidelines

(1) The United States will conduct those space activities necessary for national security....

(6) Defense Space Sector Guidelines ...

(h) The United States will pursue a ballistic missile defense program to provide for: enhanced theater missile defense capability later this decade; a national missile defense deployment readiness program as a hedge against the emergence of a long-range ballistic missile threat to the United States; and an advanced technology program to provide options for improvements to planned and deployed defenses.

(7) Intelligence Space Sector Guidelines:...

(h)... (i)...theUnited States conducts satellite photoreconnaissance for peaceful purposes, including intelligence collection and monitoring arms control agreements....

#### Commercial Space Guidelines ...

(5) Free and fair trade in commercial space launch services is a goal of the United States. In support of this goal, the United States will implement, at the expiration of current space launch agreements, a strategy for transitioning from negotiated trade in launch services towards a trade environment characterized by the free and open interaction of market economies. The U.S. Trade Representative, in coordination with the Office of Science and Technology Policy and the National Economic Council will develop a strategy to guide this implementation....

#### Intersector Guidelines

The following paragraphs identify priority intersector guidance to support major United States space policy objectives....

(f)... (I) NASA and the Department of State will negotiate changes in the existing legal framework for International Space Station cooperation to include Russia in the program along with the United States, Europe, Japan, and Canada...

(2) Space Transportation

(a) Assuring reliable and affordable access to space through U.S. space transportation capabilities is fundamental to achieving national space policy goals. Therefore, the United States will:...

(iv) Foster technology development and demonstration to support a future decision on the development of next generation reusable space transportation systems that greatly reduce the cost of access to space; ...

(b) The Department of Transportation (DoT) is the lead agency within the Federal government for regulatory guidance pertaining to commercial space transportation activities,...

(3) Space-based Earth Observation

(a) The United States requires a continuing capability for space-based Earth observation to provide information useful for protecting public health, safety, and national security....

(c) The U. S. Government will seek mutually beneficial cooperation with U.S. commercial and other national and international Earth observation system developers and operators, to: ...

(ii) develop U.S. Government civil Earth observing systems in coordination with other national and international systems to ensure the efficient collection and dissemination of the widest possible set of environmental measurements;...

(4) Nonproliferation, Export, Controls, and Technology Transfer

(a) ....Consistent with U.S. nonproliferation policy, the United States will continue to oppose missile programs of proliferation concern and will exercise particular restraint in missile-related cooperation....

(b) The United States will maintain its general policy of not supporting the development or acquisition of space launch vehicle systems in non-MTCR states....

(5) Arms Control

...The Arms control and Disarmament Agency (ACDA) is the principal agency within the Federal government for arms control matters....

(6) Space Nuclear Power

The Department of Energy will maintain the necessary capability to support space missions which may require the use of space nuclear power systems- U.S. Government agency proposals for international cooperation involving space nuclear power systems are subject to normal interagency review procedures. Space nuclear reactors will not be used in Earth orbit without specific approval by the President or his designee. Such requests for approval will take into account public safety, economic considerations, international treaty obligations, and U.S. national security and foreign policy interests. The Office of Science and Technology Policy, in coordination with the NSC staff, will examine the existing approval

process, including measures to address possible commercial use of space nuclear systems.

(7) Space Debris

(a) The United States will seek to minimize the creation of space debris. NASA, the Intelligence Community, and the DoD, in cooperation with the private sector, will develop design guidelines for future government procurements of spacecraft, launch vehicles, and services. The design operation of space tests, experiments and systems, will minimize or reduce accumulation of space debris consistent with mission and cost effectiveness.

(b) It is in the interest of the U.S. Government to ensure that space debris minimization practices are applied by other spacefaring nations and international organizations. The U.S. Government will take a leadership role in international fora to adopt policies and practices aimed at debris minimization and will cooperate internationally in the exchange of information on debris research and the identification of debris mitigation options.

(8) Government Pricing

The price charged for the use of U.S. Government facilities, equipment, and service, will be based on the following principles:

(a) Prices charged to U.S. private sector, state and local government activists for the use of U.S. Government facilities, equipment, and services will be based on costs consistent with Federal guidelines, applicable statutes and the commercial guidelines contained within the policy. The U.S. Government will not seek to recover design and development costs or investments associated with any existing facilities or new facilities required to meet U.S. Government needs and to which the U.S. Government retains title....

V.

AGREEMENT BETWEEN THE  
GOVERNMENT OF THE UNITED STATES OF AMERICA AND  
THE GOVERNMENT OF THE RUSSIAN FEDERATION  
TO AMEND THE

"Agreement Between the Government of the United States of America and  
the Government of the Russian Federation Regarding International Trade in  
Commercial Space Launch Services"

The Government of the United States of America and the Government of the Russian Federation hereby agree, with respect to the *Agreement Between the Government of the United States of America and the Government of the Russian Federation Regarding International Trade in Commercial Space Launch Services*, signed in Washington, D.C. on September 2, 1993, as follows:

1. the provisions of that agreement are hereby amended as provided in the attached Appendix; and
2. the requirement for a review of implementation of that agreement under Article IX, paragraph 2, is deemed to have been met.

DONE at Washington this 30th day of January, 1996, in duplicate in the English and Russian languages, both texts being equally authentic.

FOR THE GOVERNMENT OF  
THE UNITED STATES OF AMERICA:

  
\_\_\_\_\_

FOR THE GOVERNMENT OF  
THE RUSSIAN FEDERATION:

  
\_\_\_\_\_

THE WHITE HOUSE  
Office of the Vice President

---

January 30, 1996

U.S.-Russia Joint Commission  
on Economic and Technological Cooperation

U.S.-Russia Commercial Space Launch Agreement

Vice President Al Gore and Russian Prime Minister Viktor Chernomyrdin signed an agreement amending the September 1993 U.S.-Russia Commercial Space Launch Agreement. The negotiations on these amendments were conducted under the leadership of the Office of the U.S. Trade Representative and the Russian Space Agency. The amendments take effect immediately.

The amendments allow Russia to increase its participation in the international commercial space launch market. The new quantitative limits and pricing guidelines put in place by the amendments will continue to ensure that Russia's participation in that market will be non-disruptive.

Under the amended Agreement, Russia has the opportunity through 2000 to win contracts for up to fifteen launches (in addition to the INMARSAT 3 satellite) to geosynchronous earth orbit, currently the most frequently used orbit for commercial satellites. Should the market for commercial space launch services expand over the next few years, the amended Agreement provides Russia with the possibility to win up to four additional launch contracts. Modifying the Agreement in this manner should benefit the U.S. economy through new investments by U.S. firms in both domestic launch capabilities and joint ventures with Russian enterprises. In addition, the amended Agreement will further diversify the supply of launch services available to the \$4 billion U.S. satellite industry, allowing that industry to maintain its world leadership position.

Other amendments to the Agreement ease the numerical limit on how far below comparable market economy launch prices Russian providers may price their launches. At the same time, however, the amendments add mechanisms to make Russian price-setting more transparent. The amendments also create new guidelines for Russia's participation in the growing market for launching commercial satellites to low earth orbit.

The amended U.S.-Russia Agreement is now similar in its main provisions to the U.S. commercial space launch agreement with China and to the commercial space launch agreement the U.S. recently negotiated with Ukraine. All three agreements are designed to be transitional measures allowing for the non-disruptive entry of the space launch industries of economies in transition into the market for internationally competed commercial space launches.

**FACT SHEET****Amended U.S. - Russia Commercial Space Launch Agreement****SCOPE**

- The Agreement applies to commercial space launch services for international customers to geosynchronous earth orbit (GEO), to geosynchronous transfer orbit (GTO), and to other orbits and suborbital launches.

**GEO MARKET PARTICIPATION**

- Russia will be allowed up to fifteen contracts (in addition to the INMARSAT 3 satellite) for launches to GEO.
- If the market for commercial space launch services improves significantly beyond current expectations, Russia will be allowed up to four additional contracts for launches to GEO.

**LEO MARKET PARTICIPATION**

- In the case of the initial deployment of LEO telecommunications constellations, the U.S. will assess whether the participation by Russia, China and Ukraine in the deployment of any single LEO constellation is greater than the participation of market-economy launch providers.

**PRICING**

- Contractual terms and conditions, including the price, for both GEO and LEO, offered by Russian space launch service providers must be comparable to the terms and conditions offered by market economy countries.
- When a Russian bid for GEO space launch services is greater than 15% below the price offered by market economy countries, the U.S. may request special consultations.
- In the case of a Russian bid which is greater than 15% below the price offered by market economy countries, U.S. and Russian analyses of the reasons for the low price will be guided by a specific set of price comparability factors.

**CONSULTATIONS**

- The U.S. and Russia will consult annually regarding the Agreement and developments in the international market for commercial launch services.
- In addition, either the U.S. or Russia may request special consultations within 30 days on matters of particular concern, including prevailing international market conditions.

**TECHNOLOGY CONTROLS AND EXPORT LICENSES**

- The U.S. and Ukraine will negotiate appropriate technology safeguard agreements to facilitate the control of the transfer of missile technology.
- U.S. export licenses will be reviewed on a case-by-case basis, consistent with U.S. law and regulations.

**FAIR PRACTICES**

- The Agreement prohibits inducements and unfair business practices. It also prohibits grants or subsidies that distort the production or operation cost for commercial space launch systems.

**LENGTH OF AGREEMENT**

- The Agreement is in effect until December 31, 2000.

## VI.

## THE WHITE HOUSE

Office of the Press Secretary

For Immediate Release

February 21, 1996

## STATEMENT BY THE PRESS SECRETARY

U.S.-Ukraine Agreement on  
Commercial Space Launch Services

Vice President Gore and President of Ukraine Leonid Kuchma signed today the U.S.-Ukraine Agreement regarding International Trade in Commercial Space Launch Services. Vice President Gore welcomed the Agreement as a sign of the growing ties between the United States and Ukraine, noting that cooperation in this important high-technology industry will benefit both countries. He added that the Agreement further diversifies the supply of launch services available to the U.S. satellite industry and would allow that industry to maintain its world leadership position.

The Agreement paves the way for Ukraine to enter the international space launch market in a non-disruptive fashion. Ukraine will have the opportunity to provide commercial space launches to geosynchronous earth orbit (GEO), currently the most frequently used orbit for commercial satellites, as well as to low earth orbit (LEO), a rapidly growing market.

Ukraine has the opportunity to win contracts for five launches to GEO. In addition, Ukraine will be able to provide up to 11 more GEO launches for use by a U.S.-Ukrainian joint venture, such as the Boeing-led "Sea Launch" venture. Should the market for GEO commercial space launch services expand over the next four years, the Agreement provides Ukraine with the possibility of winning up to four additional launch contracts, three of which would be reserved for a U.S.-Ukrainian joint venture.

The Agreement establishes guidelines for Ukraine's participation in the market for launching commercial satellites to low earth orbit. It also stipulates that prices provided by Ukrainian space launch services will be comparable to those offered by the United States or other market economy countries.

The Agreement entered into force upon signature and will expire at the end of 2001.

# # #



## FACT SHEET

SCOPE

- The Agreement applies to commercial space launch services for international customers to geosynchronous earth orbit (GEO), to geosynchronous transfer orbit (GTO), and to low earth orbit (LEO).
- The Agreement allows the commercial use only of the Zenit and Tsyklon launch vehicles, and their upgrades.

GEOMARKET PARTICIPATION

- Ukraine will be allowed up to five launches to geosynchronous orbit.
- Eleven additional launches are available for exclusive use by a qualified U.S.-Ukrainian joint venture.
- If the market improves significantly beyond current expectations, Ukraine will be allowed one additional launch. Under such circumstances, the qualified U.S.-Ukrainian joint venture will also be allowed up to 3 additional launches.
- To qualify as a joint venture:
  - the U.S. partner must maintain control in fact;
  - the U.S. must be the source of a significant share of the goods and services employed in any launch;
  - a majority of the goods and services, including financing and insurance, must originate in market-economy countries,
  - the joint venture must receive a launch license from the U.S. Department of Transportation.

LEO MARKET PARTICIPATION

- In the case of the initial deployment of LEO telecommunications constellations, the U.S. will assess whether the participation by the Ukraine, China and Russia in the deployment of any single LEO constellation is greater than the participation of market-economy launch providers.

#### PRICING

- Contractual terms and conditions, including the price, for both GEO and LEO, provided by Ukrainian space launch services must be comparable to the terms and conditions offered by market economy countries.
- When a Ukrainian bid for GEO space launch services is more than 15% below the price offered by market economy countries, the U.S. may request special consultations.

#### CONSULTATIONS

- The U.S. and Ukraine will consult annually regarding the agreement and developments in the international market for commercial launch services.
- In addition, either the U.S. or Ukraine may request special consultations within 30 days on matters of particular concern, including prevailing international market conditions.

#### TECHNOLOGY CONTROLS AND EXPORT LICENSES

- The U.S. and Ukraine will negotiate a Technology Safeguard Agreement to facilitate the control of the transfer of missile technology.
- The U.S. and Ukraine recognize that a relationship exists between this Agreement and Ukraine's fulfillment of its obligations regarding the transfer of missile equipment and technology.
- U.S. export licenses will be reviewed on a case-by-case basis, consistent with the U.S. law and regulations.

#### FAIR PRACTICES

- The Agreement prohibits inducements and unfair business practices. It also prohibits grants, subsidies or credits that distort the production or cost for commercial space launch systems.

#### LENGTH OF AGREEMENT

- It is in effect until December 31, 2001.

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Stephen Gorove, a holder of fellowships from Harvard, Oxford and Yale, received his J.S.D. and Ph.D. degrees from Yale. Prior to joining the Law Faculty of the University of Mississippi in 1965 as Chairman of the Graduate Law Program and Professor of Law, he taught as Professor of Law in Colorado, Ohio and New York. He is the author many books and over 200 articles. His books include: *SPACE LAW: ITS CHALLENGES AND PROSPECTS* (1977); *THE SPACE SHUTTLE AND THE LAW* (1980); *THE TEACHING OF SPACE LAW AROUND THE WORLD* (1986); *DEVELOPMENTS IN SPACE LAW: ISSUES AND POLICIES* (1991); *UNITED STATES SPACE LAW - NATIONAL AND INTERNATIONAL REGULATION* (1982-1996). He is a member of the International Academy of Astronautics and a representative of the International Astronautical Federation before the U.N. Committee on the Peaceful Uses of Outer Space. He serves as Chairman of the Editorial Board of the *JOURNAL OF SPACE LAW*.

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