

Space Debris: the academic world and the world of practical affairs

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Introduction

Part I of this paper addresses the academic aspects of the topic of reference, focusing on the author's teaching and research experience at the University of Buenos Aires. The objective of these courses and research projects was to create awareness among the law students (both undergraduate and postgraduate) of the risks originating from space debris which are likely to have an impact upon the environment. The latter term is taken *lato sensu*, thus including the earth and space environment. These experiences included "mock trials" in which students took active part and showed skill in their presentations and judgments.

Part II is concerned with the different views put forward, in light of the

conclusions reached at Unispace III (IISL Workshop on Space Law in the Twenty-first Century), the 69th Conference of the ILA (London 2000), the IISL Colloquium on the Law of Outer Space (Rio 2000) and other recent meetings on the subject. Likewise, the main stages involved in the elaboration of the 1994 ILA International Instrument on Space Debris, and its aftermath, will be reviewed briefly.

Part III is essentially involved with the practical aspects of the question and deals, *inter alia*, with the - sometimes confronted - views of international lawyers and scientific experts on the need to have more specific rules on the matter and the political and other obstacles standing in the way of agreement. It also discusses the advantages and drawbacks of amending the Space Treaties in force to include rules on space debris.

P A R T 1: the teaching/research experience at the Buenos Aires University

1.1 Protection of the ozone layer

Since 1987 the present writer has been holding special courses at the Faculty of Law of the University of Buenos Aires dealing with Environmental Risks and the Protection of the Earth and Space Environments in general. The teaching experience focused, mainly, on the protection of stratospheric ozone and the risks arising from space debris.

Throughout these courses the accent is, naturally, placed on the legal, economic and political aspects of both topics. However, in view of the interdisciplinary nature of the subject, experts within the scientific field are invited to give their views. From the first stages, the Argentine scientist, Prof. Humberto Ricciardi, acted as technical consultant and as invited speaker to these courses, a role he equally carried out within the ILA Space Law Committee, together with Professors Rex and Perek. The interdisciplinary approach was considered essential given the state of the art which requires lawyers and scientists to work jointly in order to provide realistic proposals followed by effective legislation.

At the outset, the courses in question addressed the different international instruments relating to the protection of the atmosphere, such as the 1989 Ottawa Declaration of Experts on the matter, and the degree of acceptance of the treaties concerning the protection of the ozone layer, such as the Vienna Convention of 1985 which provided a framework and adopted general principles for further,

more stringent regulations to ensue. On this point the attention was drawn to the 1987 Montreal Protocol -which undoubtedly implied the creation of new law - and the subsequent measures adopted by the parties regarding the phasing out of substances that depleted the ozone layer as well as the addition of new controlled substances and the shortening of deadlines for eradicating certain products, such as CFCs and HCFCs. The way in which these so-called "amendments" were adopted at the Conference of the Parties and the greater celerity of the adjustment mechanisms for entering into force were a topic of particular interest to students and members of the present writer's chair of international law alike. The idea was already widely accepted in those days that, in the field of the protection of the environment, mankind could afford no further risks.

As time went by, a general conclusion stemmed from these courses which saw the response of the international community to the risks arising from the use of certain compounds containing bromine and chlorine as timely and effective. Moreover, the reaction to the restrictions on the production and use of a number of substances largely responsible for the thinning of the ozone layer revealed a sense of what is known today as "inter-generation responsibility". An attitude of the kind - which means, in no uncertain terms, a restriction of a country's sovereign right to produce whatever it decides to within its national boundaries - would have been unthinkable in the first half of the XX century when ideas based on "absolute sovereignty" dominated the field of international relations. A further conclusion, agreed upon more recently, was that the quest to protect the ozone

had been, so far, more successful than the efforts directed to other fields of environmental concern, such as climate change and biodiversity. The reasons, in fact, are not difficult to trace. Nowadays, by means of space technologies, it is possible to measure the depletion of the ozone layer with accuracy. Earth observation satellites are able to provide reliable information on the alterations of the levels of stratospheric ozone at different times of the year and in every part of the ozone layer. Hence, the scope of the problem can be measured and the damage becomes more "tangible". This, in turn, helps to create public awareness. Such the conclusions, from the courses and research activities at the University of Buenos Aires, which were totally consistent with those drawn at a similar course given by the present writer at TULANE University during October and November 2000

To sum up, in the world of today the international and domestic regulations governing the protection of stratospheric ozone may be seen as an encouraging example to be applied in various fields of concern to the international community. Pride of place on this list should be given to the legal aspects of space debris.

1.2 Space debris

The risk arising from space debris continues to be a topic of unquestionable interest in the above-mentioned course in Buenos Aires, which unfolds over the span of four months every academic year. The initial stages of these courses coincided with the decision taken on the international level by the International Law Association which instructed its Space Law Committee to take up the issue of debris and pollution arising from

activities in outer space (62nd Conference, Seoul 1986) and to start elaborating principles and guidelines on this topic (63rd Conference, Warsaw 1988) to be discussed at the ILA 64th Conference (Queensland 1990).

The subject continued to be on the ILA's agenda for the next Conference (Cairo 1992) and, finally, on the occasion of the 66th ILA Conference (Buenos Aires 1994) an International Instrument on the Protection of the Environment from Damage caused by Space Debris was adopted by the Plenary Session¹. To date, and to the best of our knowledge, this is the first - and possibly the only - draft international instrument regulating the risks and consequences of space debris. Shortly after its adoption in 1994 this document was introduced by Professor Böckstiegel, then Chairman of the ILA Space Law Committee, to the Legal Subcommittee of COPUOS and to the Full Committee.

Noteworthy, for their implications, were the discussions registered during the courses at the University of Buenos Aires in connection with the various provisions of the ILA Instrument on Space Debris. In the first place, there was almost general agreement in the sense that article IX of the 1967 Space Treaty was not consistent with the present international scenario. Particular emphasis was given to the provisions on international responsibility and liability, to the different obligations embodied in that text, both of a general and particular nature, and to the dispute settlement mechanisms which were intended to ensure a prompt and amicable reparation for damage caused by space debris².

In addition to the teaching, a number of research projects were conducted within

this framework. In 1995 the University of Buenos Aires appointed the present writer as director of a three-year project³ entitled *EL RIESGO AMBIENTAL Y SU REGULACION. DERECHO INTERNACIONAL Y COMPARADO. OZONO ESTRATOSFÉRICO Y ESPACIO ULTRATERRESTRE*, which ran parallel with the course and in which assistant professors and junior lawyers participated actively. At the end of 1998 a book was published in Buenos Aires, under that same title, by the present writer, dealing with space debris - which reflected the different stages of the work of the ILA Space Law Committee on this matter. Likewise, in Part II of the book addressing the protection of the atmosphere, a chapter was included on the legal aspects of the protection of the ozone layer under international and comparative law. This book also includes three chapters written by the author's assistant professors, namely doctors Griselda Capaldo, Martín Moncayo von Hase and Alejandro Iza⁴.

Both the above described course and new research projects are presently underway. Under the title *INTERNATIONAL LAW AND COMMERCIAL ACTIVITIES IN OUTER SPACE* ("*El Derecho Internacional ante las actividades comerciales en el espacio ultraterrestre*") the University of Buenos Aires is sponsoring a new project which has a number of chapters in common with the work carried out by Cologne University, under the direction of Prof. Böckstiegel, known to the world as PROJECT 2001⁵. It coincides as well with the present work of the ILA Space Law Committee on "Review of the Space Treaties in View of Commercial Space Activities"⁶ and, in addition, has areas in common with the work carried out in Brazil by José Monserrat Filho at the Sociedade

Brasileira de Direito Aeroespacial and other institutions in that country, particularly in the field of remote sensing⁷.

The course in Buenos Aires has been repeated every year, since its establishment, to date. Thus, new modalities are introduced periodically, such as negotiation and mediation practices, treaty-drafting exercises, and for the last five years, mock trials were arranged where participants were given different roles. The striking feature of these simulated trials is that -unlike other competitions of the kind - the simulated dispute is tried and a judgment (or award, depending on the kind of tribunal chosen for the occasion) is also delivered. In this practice, participants show skills in the various roles assigned, namely litigation, judging or carrying out administrative functions. Part of the students (who have no specific role in the trial) become the "critics" of the whole event. This means evaluating the oral presentations, the soundness of the judgment or award and the performance of the Secretariat and its staff as well as of the Press Office in charge of issuing *communiqués* in several languages.

Some of those students have later taken part in the "Jessup" competition, representing the University of Buenos Aires, and have fared remarkably well. For these reasons, the organisation of mock trials is expected to continue in our future courses as well as in those concerning "Space Telecommunications", also held at the University of Buenos Aires along similar lines. One of the targets is, of course, to be involved in the IISL Manfred Lachs competition.

P A R T 2: Reactions to the space debris issue.

2.1 COPUOS (Legal Subcommittee)

In the intergovernmental field the topic received some attention at the 39th Session of the UN Legal Subcommittee on the Peaceful Uses of Outer Space, which met from 27 March to 6 April 2000 in Vienna (Doc. A/AC.105/738). In 2001, at the 40th Session of the Legal Subcommittee, the proposals for new items to be considered at the 41st Session in April 2002 were discussed. One of them, made by the delegations of the Czech Republic and Greece (Doc. A/AC.105/763, p.15), was the review of existing norms of international law applicable to space debris.

As is known, the study of the legal aspects of space debris has not yet been included within the terms of reference of the Legal Subcommittee as a separate topic. The feeling of the delegates is clearly perceived: it should be discussed as a new item on this body's agenda. It is generally believed that, in this way, the objective of drawing up a more precise framework for the rules which now govern the subject will be better served.

2.2 The ILA International Instrument on Space Debris

Since the adoption of the Buenos Aires International Instrument on the Protection of the Environment from Damage Caused by Space Debris, at the 66th ILA Conference in 1994, the matter has been kept under permanent review by the Space Law Committee of the Association under the chairmanship of Professor Karl-Heinz Böckstiegel and with the present writer as general rapporteur.

As indicated earlier this document was introduced and explained shortly after the Buenos Aires Conference both at the Legal Subcommittee of COPUOS and at the Full Committee. Thereafter, the Buenos Aires Instrument has been examined at subsequent international and regional meetings, both governmental and private. It was the object of profound analysis during UNISPACE III (Vienna, July 1999) at the Workshop on Space Law in the Twenty-first Century⁸. The Proceedings of this meeting, organised by the IISL and the UN Office for Outer Space Affairs at Vienna, were published in 2000 by the United Nations (New York). During Session 8 of the Workshop, entitled "Maintaining the Space Environment", the Instrument of reference was frequently quoted and scanned from a number of different standpoints. In addition, the subject kept coming up throughout all eight sessions of the Workshop. The overall conclusion was that space debris should be taken up by the Legal Subcommittee of COPUOS without delay and that the ILA Instrument on the subject provided a useful basis for discussion.

Indeed, this conclusion has today gained considerable ground among the publicists of all continents, as may be seen from their writings, and the debates and presentations to the various meetings described in this paper.

The work and discussions of the ILA Space Law Committee in connection with the legal aspects of space debris in today's international context are reflected in Section 3 of the Resolution adopted at the London Conference (Res. 13/2000). This Section reads as follows:

The 69th Conference of the International Law Association

*held in London, United Kingdom,
25-29 July 2000:*

*Having considered the Report of
the Space Law Committee...*

3. Space Debris

*RECALLING the Draft
International Instrument on the
Protection of the Environment
from Damage Caused by Space
Debris adopted by the ILA
Conference in Buenos Aires in
1994;*

*NOTING that space debris
continues to be on the agenda of
COPUOS and the ILA has, in the
statement by the Chairman of the
Space Law Committee to
COPUOS in recent years,
suggested that space debris should
also be placed on the agenda of
the Legal Subcommittee of
COPUOS;*

*TAKING INTO ACCOUNT that
the Report of the Space Law
Committee stresses the need to
keep the topic of space debris
under study;*

*NOTING WITH PLEASURE that
both the Report of the Chairman
of the Legal Subcommittee of
COPUOS to the UNISPACE III
Conference in Vienna in 1999 and
the discussion at the UNISPACE
III reflected the extensive interest
in the examination of legal aspects
of space debris in the Legal
Subcommittee;*

*REQUESTS the Committee to
continue its consideration of the
legal aspects of space debris and*

*of steps that may be appropriate
in following up the Buenos Aires
ILA Draft Convention and in view
of the work of COPUOS related to
the subject.*

P A R T 3: The World of Practical Affairs

Having made earlier reference to the position at the Legal Subcommittee of COPUOS and to the stand of the participants at the different sessions of Unispace III which, to a great extent, favoured the idea of having clearer international rules on space debris, I shall now discuss the views of science.

3.1 The position of the ILA Scientific Consultants vis-à-vis the lawyers

In 1998, at the ILA 68th Conference, the Space Law Committee was instructed to review the Space Treaties having in mind the growing activities of private entities in those areas, and to submit a Report on the subject to the London Conference, in July 2000. This mandate implied a review of four of the five Treaties in force as it was agreed that, for the time being, the Astronauts Agreement would not be included in the terms of reference. In this context the issue of space debris became a *leitmotiv*.

In fact, the Chairman of the Scientific and Legal Subcommittee of COPUOS, Professor Dr. Ing. Dietrich Rex - a Consultant to the ILA Space Law Committee, together with Professors Lubos Perek and Humberto Ricciardi - showed significant concern for the problem. In his comments to the Special Reports on each of the Space Treaties⁹ circulated prior to the conclusion of the Final Report for the London Conference

Prof. Rex explained his reasons. One main area of uneasiness was the fact that the 1972 Convention on International Liability for Damage Caused by Space Objects did not cover damage to the environment caused by space debris. Having in mind the huge economic implications of this problem Prof. Rex saw an urgent need for a specific international instrument on this subject which should establish a strict limitation on the generation of further debris -as far as economically feasible- while, at the same time, would avoid obstacles standing in the way of beneficial space utilisation. And this is, indeed, a very difficult balance to strike¹⁰.

The underlying opinion of the ILA Space Law Committee today is that the requirements mentioned by Prof. Rex are largely met by the ILA Instrument on Space Debris. The deficiencies of the 1967 Space Treaty and the 1972 Liability Convention on this question have been extensively analysed during the different stages of the drafting of the Buenos Aires International Instrument to which our readers are hereby referred¹¹.

In today's political scenario it does not appear realistic to recommend amendments to the 1972 Liability Convention to enable its provisions to be extended to damage resulting from space debris. Conversely, it seems sensible to contend, within today's international context, that the Liability Convention should remain as it stands, at least insofar as Article I, on the definition of damage, is concerned.

On the basis of the preparatory work of the ILA Committee circulated prior to the conclusion of the London Report, Prof. Rex voiced his thoughts advocating, in no uncertain terms, that new law should be

created to rule the matter. The reasons advanced by this expert, reflected in the Space Law Committee Report adopted without dissent by the London Conference in July 2000, are sound enough to discard any possibility of amendment of the Liability Convention. Briefly, they are as follows.

First, that damage to the space environment implies a deterioration of regions of outer space around the Earth which may later lead to damages of space assets (as a result of delayed damage). And secondly, that it is technically impossible to trace damage back to an originator, especially in the case of smaller, untraceable debris objects released in large quantities by certain space missions and, predominantly, by private (commercial) space missions. The urgency of governments agreeing on a new instrument (be it a code of conduct, a set of guidelines or a binding convention) appears a sensible response to the rapidly expanding telecommunications market which, as Prof. Rex indicates, will possibly include up to twenty satellite constellations with nearly one thousand satellites together in the Lower Earth Orbits region (LEO)¹².

The shortcomings of article IX of the 1967 Space Treaty to meet the risks arising from space debris in today's world were analysed in width and depth by the ILA Space Law Committee in its various Reports prior to the adoption, in 1994, of the Buenos Aires International Instrument, and its aftermath¹³. The scope of the duties upon States, particularly to hold consultations, embodied in that Article under the extremely flexible formula "to have reason to believe" remains obscure. The Article itself does not go beyond

establishing a duty of international cooperation.

It seems fair to point out that, just as Article V of the 1967 Space Treaty gave way to the 1968 Astronauts Agreement, Articles VI and VII to the 1972 Liability Convention, and Article VIII to the 1975 Registration Convention, there are solid reasons to hold that, following these precedents, Article IX of this Treaty - so rightly referred to as the Treaty on General Principles - ought to be given a more precise meaning within a specific new instrument. The general opinion today is that, within the environmental field, we cannot confront further risks arising from the flexibility of the existing rules of international law. Moreover, having in mind that the commercial sides of space activities are growing in an unprecedented scale, the need for clear rules on space debris is a matter of priority.

Let us now turn to article I of the 1972 Liability Convention which nowadays does not suffice to cover many of the assumptions of environmental risks arising from space activities. Indeed, most of these risks are duly covered by the 1994 ILA International Instrument which - it is to be hoped - will be taken into account by the Legal Subcommittee of COPUOS when this body decides to address this very topical question. This course of action appears far more reasonable - in the mind of the prevailing doctrine - than introducing amendments to the Liability Convention in a world where the political will of the States Parties to move in this direction does not exist.

Indeed, a majority of the members of the ILA Space Law Committee presently feel that the mood of the space powers - that is

to say, those who count with advanced space technologies - is contrary to the revision of any of the Space Treaties in force¹⁴.

3.2 The IISL Rio Colloquium (2000)

The following perceptions and suggestions are a summary based on the present writer's Report for the Yearbook on International Environmental Law, published by Oxford University Press in 2001 and covering the year 2000.

The 43rd International Colloquium of the IISL, held in Rio de Janeiro in October 2000, made a number of valuable contributions to the development of different areas of space law - some of them of a highly sensitive nature. Yet, no truly original proposals were agreed upon concerning the legal and related aspects of space debris. This problem was brought up at most working sessions of the Rio Colloquium in connection with other questions and some suggestions supported the idea of moving towards more specific rules on the matter. However, a number of these suggestions encountered opposition from the scientists, particularly from NASA¹⁵.

The topic was addressed, in particular, in Session 1 dealing with "*Law and Ethics of Space Activities in the New Millennium*", chaired by Dr. Monserrat Filho and the present writer, and also at Session 4 involving "*Other Legal Matters*", chaired by L. Tennen and S. Ospina.

Session 1 highlighted the now widely accepted idea of having more precise rules on space debris as a matter of urgency. Special reference was made by some of the participants to the 1994

Buenos Aires International Instrument of the ILA as a useful working tool for governments to begin discussing the question. In this sense mention should be made of the the papers by Motoko Uchitomi (Japan), Tulio Ortiz Cetrá and Sandra Negro (Argentina), and Jose Monserrat Filho (Brazil)¹⁶.

Session 4 revealed divergent opinions between those advocating specific rules on space debris (mostly lawyers) and those against it (predominantly scientists). One of the papers discussed a possible updating, and ensuing amendment, of the Liability Convention to cover damage originated by space debris¹⁷. Another suggestion was the creation of a common fund to which all space-faring states would contribute in order to cover damage caused by small particles.

Naturally, this position is referring to second generation debris which, as a consequence of collision between two or more man-made satellites (active or abandoned), generates small particles which are extremely difficult to detect from Earth. This difficulty, however, is no more than a technical limitation because, as science and technology advance, every day it becomes easier to trace particles of the kind, in spite of their diminute sizes.

As to the idea of amending the Liability Convention to include damage arising from space debris - a point which has been dealt with earlier in this paper - the general view today is that the topic is far too broad to be encompassed in a Convention which deals with responsibility and liability for **all** space activities. Rather, it should be addressed in a separate international instrument. The shortcomings of article IX of the

1967 Space Treaty and Article I of the Liability Convention were the very reason for the ILA to start work on an International Instrument dealing specifically with space debris.

Moreover, all of us are aware of the difficulties involved in the amendment of an international convention. This would necessarily lead to different groups of States Parties -accepting or rejecting the amendment- with the ensuing complexities arising from this situation. Furthermore, in the words of Bin Cheng¹⁸, the moment does not appear propitious for the amendment of the Space Treaties, the political will of the space-faring countries is lacking and there does not seem to be a perceived need among them for changes in the definition of damage provided by the 1972 Liability Convention. Conversely, time seems ripe to move towards the adoption of a specific instrument. To which one may add, of course, as a first step, the inclusion of this topic on the agenda of the Legal Subcommittee of COPUOS.

Turning back to Session 4 of the IISL Rio Colloquium, let us now have a look at the position advanced by a scientist. The General Counsel of NASA, Edward A. Frankle, Esq. in his presentation to the meeting, entitled "*International Regulation of Orbital Debris*", underlined the necessity of further studies on the question of mitigation. He also made detailed comments on the impossibility of determining today whether the source of an impact on an active satellite is debris originating from a man-made space object or whether it is a natural element such as a meteorite or part thereof. Furthermore, this expert appears skeptical on the effectiveness of a legal instrument to encourage space-

faring countries to implement debris mitigation standards.

This reasoning is reminiscent of the lengthy interdisciplinary discussion between the Rapporteur of the ILA Space Law Committee and its Scientific Consultants on the need to include rules on responsibility and liability within the international instrument on space debris which was being drafted. The scientists, led by Professors Rex and Ricciardi, were totally against the inclusion of any such rules for reasons similar to those put forward by Edward A. Frankle in October 2000 in Rio¹⁹. The lawyers, conversely, were all for the inclusion of rules of the kind and supported the idea of following the model provided by the previous Space Treaties where rules on international responsibility and liability were written in. At the end of the day, the Chairman of the ILA Space Law Committee provided a pragmatic reason which set the pattern: it was far easier to delete unwanted provisions at a later stage - if deemed unnecessary - than try to include them by means of an amendment in the years to come.

Be that as it may, and in spite of the sometimes sharp -albeit constructive- disagreement between lawyers and scientists which surfaced once again in 2000 in Rio, the interdisciplinary treatment of space debris issues and their implications seems the most sensible course of action for providing practical and well thought out solutions. It appears today as a well-defined trend in most environmental studies and reflects a realistic and adequate equilibrium to bridge the gap between the academic world and the world of practical affairs.

¹ See the Reports of the ILA Space Law Committee on this topic, particularly the REPORT OF THE 64th CONFERENCE (Queensland 1990), REPORT OF THE 65th CONFERENCE (Cairo 1992) and REPORT OF THE 66th CONFERENCE (BUENOS AIRES 1994). The subject continues under permanent review of the ILA Space Law Committee. See also REPORT OF THE 67th CONFERENCE (Helsinki 1996), REPORT OF THE 68th CONFERENCE (Taipei 1998) and REPORT OF THE 69th CONFERENCE (London 2000).

² The ILA International Instrument on the Protection of the Environment from Damage Caused by Space Debris is published in REPORT OF THE SIXTY-SIXTH CONFERENCE OF THE ILA, Buenos Aires 1994. Likewise, in Proceedings of the WORKSHOP ON SPACE LAW IN THE TWENTY-FIRST CENTURY, Unispace III, Technical Forum, July 1999, at p. 208.

³ THE REGULATION OF ENVIRONMENTAL RISKS IN INTERNATIONAL AND COMPARATIVE LAW: STRATOSPHERIC OZONE - OUTER SPACE.

⁴ See, by the present writer, EL RIESGO AMBIENTAL Y SU REGULACION. DERECHO INTERNACIONAL Y COMPARADO, with a Preface by Lord Slynn of Hadley, published by Abeledo Perrot, Buenos Aires 1998.

⁵ An International Colloquium on "The Legal Framework for Commercial Uses of Outer Space" held in Cologne in May 2001 formally marked the end of Project 2001.

⁶ The Final Report on this topic will be submitted to the 70th ILA Conference, New Delhi, April 2002.

⁷ In April 2000 a meeting entitled X Simposio Internacional sobre Sensoriamento Remoto was held in Foz do Iguaçu, Brazil. It was organised by the Instituto Nacional de Pesquisas Espaciais (INPE) and the Sociedade Brasileira de Direito Aeroespacial. It was mainly involved with the scientific aspects of remote sensing but included a Round Table on the legal aspects of this activity in which Professor Monserrat Filho and the present writer were panelists.

⁸ See note 2 supra.

⁹ *The Special Reports were prepared by Profs. Stephan Hobe (1967 Space Treaty), Maureen Williams (1972 Liability Convention), Vladimir Kopal (1975 Registration Convention) and Frans von der Dunk (1979 Moon Agreement).*

¹⁰ *See REVIEW OF SPACE LAW TREATIES IN VIEW OF COMMERCIAL SPACE ACTIVITIES, by the present writer, in REPORT OF THE SIXTY-NINTH CONFERENCE OF THE ILA, London 2000, pp.571-603, at p.580.*

¹¹ *See REPORTS OF THE ILA CONFERENCES: Queensland (1990), Cairo (1992), Buenos Aires (1994), Helsinki (1996), Taipei (1998) and London (2000).*

¹² *Op.cit. in note 10, p. 581.*

¹³ *See ILA REPORTS listed in note 1.*

¹⁴ *See, inter alia, the views of Bin Cheng, Vladimir Kopal and the present writer in REPORT OF THE 69TH CONFERENCE OF THE ILA, Space Law Committee, London 2000.*

¹⁵ *See Proceedings of the 43rd Colloquium on the Law of Outer Space, AIAA, Rio 2000 (all 4 working sessions).*

¹⁶ *This point was discussed in more detail in the present writer's Report on Space Debris, YEARBOOK OF INTERNATIONAL ENVIRONMENTAL LAW, Vol. XI, 2000, Oxford University Press.*

¹⁷ *See Mercedes Esquivel de Cocca, op. cit. in note 15, pp. 359 et seq.*

¹⁸ *See ILA Report, London 2000; also B.in Cheng's book STUDIES IN INTERNATIONAL SPACE LAW, Clarendon Press Oxford 1997, chapter on the Commercial Development of Space, at p.666..*

¹⁹ *See Report of the Space Law Committee in REPORT OF THE SIXTY-SIXTH CONFERENCE OF THE ILA, Buenos Aires 1994.*