

AEROSPACE LAW -
THE REGULATION OF SPACE ACTIVITIES
AND
SPACE EXPLORATION

by

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SUMMARY

This work on "Aerospace Law" examines, from a broad perspective, the rules regulating the activities and exploration in outer space and on celestial bodies.

Chapter One discusses the concepts of "space law" and "aerospace law", as well as the sources of space law. The relationship between international law and space law is also examined.

The legal regimes applicable to airspace and outer space are quite different. Hence the need for the demarcation of these two mediums. Chapter Two looks at the various theories of demarcation as well as the "functional approach" to this problem.

Chapter Three sets out the legal status of outer space - the medium in which space activities and exploration are carried out. Aspects such as the "freedom of outer space", "peaceful uses of outer space" and "pollution" are discussed.

Both astronauts and space objects are instrumental in the success of space experiments. Protection of astronauts and recovery of space objects are discussed in Chapter Four.

The one aspect of space law which may be most important to the layman is "liability for damage arising out of space activities". Chapter Five examines various aspects of international liability for such damages.

Satellites have become an essential part of scientific investigations in space and on earth. Chapter Six examines the regulation of satellite activity giving particular attention to "remote sensing", "direct broadcasting" and the "geostationary orbit".

Certain selected aspects of the settlement of disputes arising out of space activities are discussed in Chapter Seven.

Chapter Eight examines some problems which are presently of particular significance as a result of advancement in space technology (eg. the Space Shuttle and the conquest of the moon) which could endanger the very existence of mankind (eg. "Star Wars").

PREFACE

The notion of "aerospace law" goes beyond the wildest dreams of our ancestors of a century ago and sometimes even beyond the comprehension of our more recent counterparts.

Laymen and students alike enquire, upon hearing of the title of the present work: "Is there a law of outer space?" One reply that usually jolts their minds from the airy-fairy science-fiction attitude to outer space and the related law, to one of blunt reality is: "Of course. What would happen if the Space Shuttle or some other space object crashed in your home town causing loss of lives and millions of rands of damage? What law would apply?"

However, "aerospace law" goes beyond providing for relief in respect of damages arising out of space activities. Radio and television broadcasts, telegraph, telephone and remote sensing, which form part of our everyday lives, are also regulated by the rules of space law.

While a large portion of the world's population is still grappling with inter-race relations, inter-state relations and clashes between factions at an international level, I have come to accept that the human race is one family, one unit. We should therefore strive to ensure that this "family" functions harmoniously with its environment

(consisting of the earth, on the lower plane, and the solar system, universe and galaxies, on the higher plane) ; and possibly even with the interaction with anything at all that may exist outside the hemispheres of earth.

My interest in space law stemmed from this broad outlook towards the world, its peoples and its environment.

I wish to record my humblest gratitude and appreciation to my supervisor, Professor Ramanlal Soni, for the invaluable assistance and direction, and without whose help so much could not have been achieved so soon. I must add that I have benefitted greatly from his expertise and proficiency especially in the field of international law.

I am grateful to my parents for enabling me to persue that which they were unable to, and also for their constant support and encouragement.

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SELECTED ABBREVIATIONS

<u>AJIL</u>	<u>American Journal of International Law</u>
<u>Chicago Convention</u>	Convention on International Civil Aviation
<u>CLP</u>	<u>Current Legal Problems</u>
<u>ICJ Reports</u>	Reports of Judgements, Advisory Opinions and Orders of the International Court of Justice
<u>ICLQ</u>	<u>International and Comparative Law Quarterly</u>
<u>Liability Convention</u>	Convention on International Liability for Damage Caused by Space Objects
<u>Moon Treaty</u>	Agreement Governing the Activities of States on the Moon and Other Celestial Bodies
<u>NYIL</u>	<u>Netherlands Yearbook on International Law</u>
<u>Rescue Agreement</u>	Agreement on the Rescue of Astronauts, the Return of Astronauts and Return of Objects Launched into Outer Space

Registration Convention Convention on Registration of Objects
Launched into Outer Space

Space Treaty Treaty on the Principles Governing the
Activities of States in the Exploration
and Use of Outer Space, Including the
Moon and Other Celestial Bodies

YUN Yearbook of the United Nations

CHAPTER 1

INTRODUCTION

1.1 CONCEPT AND DEFINITION OF SPACE LAW

1.1.1 CONCEPT OF SPACE LAW

The term "Space Law" indicates that the legal material that it covers relates to space and to activities that are related to space. For our purposes it may suffice to define space as "everything beyond the atmosphere of the earth". Thus space contains all heavenly bodies - the moon, the planets, the sun and stars.¹

1.1.2 DEFINITION OF SPACE LAW

Space Law is a body of legal norms which govern national and international law relations arising from space activities (i.e. the use and exploration of outer space and of celestial bodies), as well as the effect of such activities on the rights of individual persons. Space activity entails the placing of any object or instrumentality into orbit around the earth or other celestial body, the motion of such objects and instrumentalities along such orbits or their return therefrom, their landing or staying on celestial bodies and return therefrom.^{1a}

1. J.G.Meitner Astronautics for Science Teachers (1965) op cit at 6. See also Bin Cheng "International Law and High Altitude Flights: Balloons, Rockets and Man-made Satellites" (1957) 6 ICLQ 491.

1a. G.Gal Space Law (1969) op cit at 36.

Space law in the wider sense covers all the national rules which relate to space activities, or its effects, including Constitutional Law, Criminal law and Private International Law. These rules play an important role in the legal assessment of any set of facts connected with space activities.

Space law in the narrower sense regulates international relations connected with space exploration and the use of outer space (remote sensing, telecommunications and meteorology etc.). The 1967 Space Treaty clearly expresses this point by stating that states shall bear international responsibility for national activities in outer space (Article 6) and that the provisions of the Treaty shall apply to the activities of states. (Article 13). Thus the legal materials which may be termed "International Space Law" as opposed to " Space Law" in the wider sense, forms part of Public International Law. The conclusion of international agreements governing space activity as well as the evolution of customary law rules, will increase the scope of International Space Law as against the internal national laws.

The subject-matter of this thesis is Space Law in the narrower sense, that is International Space Law as a part of Public International Law. However some consideration will be given to the national legal effects of some of the problems arising from space activities.

"AEROSPACE LAW"

Regardless of the status of outer space, space craft must first move through territorial airspace to get there, and must move back through the territorial airspace if they are to return to earth. Presently, re-entry into airspace from outer space, and landing require more space horizontally, than does the launch phase of a space flight. Therefore international Space Law needs to include certain rules of international air Law in so far as the successful operation of Space activities encroaches on the domain of airspace: thus the use of the term "aerospace law".

However, by employing the term "aerospace law" it is not intended to create a common body of law applicable to activities of both aircraft and spacecraft. The distinction between international air law and Space Law is necessary as we are dealing with two completely different mediums (airspace, a definable sphere enveloping the earth; and outer space, the limits of which can be expressed in no finite term) and the nature of the activities in each medium also differ.

Further, technological advances may render the physical distinction between airspace and outer space less important, from the point of view of Space Law.

A classic example of this is the American Space Shuttle which is capable of travelling through airspace as a conventional aeroplane and through outerspace as a space craft.² A type of hybrid system between the rules of air law and space law - as a branch of the entire system of Space Law- which would cater for activities of such vehicles, is required.

Presently space traffic through air space is minimal. However with the passage of time states may become involved in space activities and space travel on a larger scale, possibly equivalent to the scale of our present day aviation. The passage of vehicles through air space to reach outer space would then require detailed rules for regulation of such use of airspace. Aerospace Law would eventually encompass such a body of rules. However a period of seven years has passed since the first successful Space Shuttle flight. The foundations to such a system of law should therefore be laid without further delay.

2. See *infra* Chapter 8

1.3 SOURCES OF SPACE LAW

As Space Law in its narrower sense will be regarded as a part of international law, its sources, like those of other parts of international law, can be :

- (a) International treaties
- (b) Customary law
- (c) General principles of law
- (d) Judicial decisions
- (e) Academic writings³

1.3.1 INTERNATIONAL TREATIES

Resolutions of the United Nations General Assembly are one of the types of lawmaking treaties. "Lawmaking treaties create general norms for the future conduct of the parties in terms of legal propositions, and the obligations are basically the same for all parties."^{3a}

3. For sources see Akehurst A Modern Introduction to International Law (1977) 30-47; Ian Brownlie Principles of Public International Law (1979) 1-32; G. Gal Space Law (1969) 41-6; Grieg International Law (1976) 5-51; N.A. Maryan Green International Law - Law of Peace (1982) 1 et seq ; J.G. Starke An Introduction to International Law (1972) 34-6.

3a. Brownlie, supra note 3, op cit at 12.

UNGA Resolutions 1721 (XVI), December 20, 1961 and 1962 (XVIII), December 13, 1963,⁴ provided the basis

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4. In December 1963, the UNGA unanimously adopted Resolution 1962 (XVIII) declaring the Legal Principles Governing the Activities in Outer Space. During the debates on the resolution certain comments were made pertaining to the significance of UNGA Resolutions that formulate general rules of conduct for states, as a source of law. The delegate for the UK stated: "Although, as stated by the USSR delegation, resolutions of the General Assembly were not - save in exceptional cases provided for in the Charter - binding upon member states - a resolution, if adopted unanimously, would be most authoritative." A/C 105/C 2/SR 17(17.4.63) p9. The Indian delegate stated : "A declaration had moral force and, when adopted unanimously, was generally accepted as part of international law." A/C 105/C 2SR/22 (24.6.63) p10. However, under article 18 of the UN Charter, resolutions of the General Assembly only require a two-thirds majority. Thus legally and constitutionally, no special virtue attaches to an unanimous vote, even though it may be politically significant. The US delegate stated: "...when a General Assembly resolution proclaimed principles of international law - as Resolution 1721(XVI)

for the first multilateral Space Law Treaty.

had done -and was adopted unanimously, it represented the law as generally accepted in the international community." NAC 105/PV 15(14.9.62) p28. See Johnson "The Effect of Resolutions of the General Assembly of the United Nations" (1956) 32 BYIL 97; D.J.Harris *infra* note 12, 55 et seq ; Bin Cheng, *infra* note 14.

Unlike maritime law which evolved over the centuries, Space Law required early regulation by Treaty. One of the most important sources of Space Law, Treaty on the Principles governing the Activities of States in the Exploration and Use of Outer Space, including the moon and other Celestial Bodies (The Space Treaty) was unanimously accepted by UNGA Resolution No 2222 (XXI), on 19 December 1966.⁵

The Space Treaty was followed by the Agreement on the Rescue of Astronauts, the Return of Astronauts and Return of Objects launched into Outer Space⁶ which was adopted by UNGA Resolution No: 2345 (XXII), December 1967.

The Convention on Registration of Objects launched into Outer Space⁷ (adopted by Resolution No 3235 (XXIX) of November 1974) and the Convention on International Liability for Damage caused by Space Objects⁸ (adopted by Resolution 2777 (XXVI) of December 1971), are also important sources of Space-treaty Law.

Almost ten years of discussions preceded the acceptance of the Agreement Governing the Activities of States

5. (1966) YUN at 41

6. For text see (1967) YUN 33-5

7. For text see (1974) 28 YUN 63-4

8. For text see (1971) 25 YUN 52-5

on the Moon and other Celestial bodies.⁹ Resolution 34 (68) of December 1982 accepted the Principles Governing the use of states of Artificial Earth Satellites for International Direct Television Broadcasting.

ITU¹⁰ Radio Regulations contain provisions which affect space telecommunications. Sources of Space Law can also be found in bilateral, multilateral and regional treaties governing the various forms of international co-operation in the field of space exploration.

1.3.2 International Customary Law

There are differing views as to whether customary law rules have already evolved in Space Law. Previously for the creation of valid International Customary Law two conditions must be fulfilled, i.e. long lasting practice and general application. However, in the case of an emerging field like Space Law these conditions cannot be satisfied. Further, although there are presently only two states actively involved in space activities, viz. United States and USSR, the other States are more than spectators. As possible victims of Space activities the latter states are thus participants in international practice by their conduct in

9. For text see (1979) 33 YUN 110-4

10. International Telecommunications Union.

given cases, that is either by protesting or failing to protest. As Maryan Green states: " State practice can be shown not only by acts but also by attitudes, including an omission to act¹¹."

A new rule of customary law based on recent practice of States may however emerge rapidly , as expressed by Judge Lachs in his opinion in the North Sea Continental Shelf Cases¹² where he gives the example of the rapid emergence of a customary rule. He states that "... the first instruments that man sent into outer space traversed the airspace of States and circled above them in outer space, yet the launching states sought no permission, nor did the other states protest. This is how the freedom of movement into outer space, and in it, came to be established and recognised as law within a remarkably short period of time¹³"

A similar view was expressed by Bin Cheng who stated: " International Customary Law requires only one single constitutive element, namely, the opinio juris of States. This does not mean that usage is not a normal element of rules of international customary law, but usage, instead of being a constitutive and indispensable element, merely provides evidence of the existence and contents

11. International Law- Law of Peace at Pl4

12. (1969) I.C.J. Reports P3 cited by D.J.Harris Cases and Materials on International Law (1979) 34 n 44

13. Ibid

of the underlying rule and of the requisite opinio juris¹⁴,

He further adds: "There is no reason why a new opinio juris may not grow overnight between states so that a new rule of international customary law (or unwritten international law) comes into existence instantly"¹⁵

However the above views merely relate to the evolution of the sui generis customary law rules of space law. The general principles of international customary law rules which regulate relationship among states will also be binding upon states in the area of Space activities. This would include rules relating to sovereignty, state liability and prohibition of aggression, in so far as they are not in conflict with the principles specifically laid down for regulation of space activities.

1.3.3 General Principles of Law

In addition to treaties and custom as sources of Space Law, the general principles of law which may be derived from valid International Treaties or customary law rules (besides those specifically dealing with Space activities) are also sources of International Space Law. Article 3 of the Space Treaty supports this statement by providing that "States, Parties to the Treaty, shall carry on activities in the exploration and use of outer space...

14. Bin Cheng "United Nations Resolutions on Outer Space: "Instant" International Customary Law?(1965) 5 Indian Journal of International Law 23-48, at 45.

15. Ibid op cit at 46

in accordance with international law, including the Charter of the United Nations..."

However 'when there are lacunae in the law, neither covered by customary international law nor treaty law, "general principles of law recognised by civilised nations" are called to aid'.¹⁶

16. Ramanlal Soni Control of Marine Pollution in International Law (1980) at 90. Article 53 of the Vienna Convention provides: " A treaty is void if, at the time of its conclusion, it conflicts with a peremptory norm of general international law." According to Article 53 a peremptory norm is "a norm accepted and recognised by the international community if states as a whole." Thus international treaties on space law would be void , for instance, if they permitted aggression. See Akehurst op cit 46-7.

1.3.4 JUDICIAL DECISIONS

Presently there are no judicial decisions specifically on space law. The judicial decisions pertaining to the other branches of international law may however be regarded as a "subsidiary source" of space law.

Although, in terms of Article 59 of the Statute of the ICJ, "the decision of the court has no binding effect except between the parties and in respect of that particular case", Article 38 (1) (d) considers such decisions "subsidiary means for the determination of rules of law".

1.3.5 ACADEMIC WRITINGS

Since space law lacks judicial decisions, academic writings (i.e. "the teachings of the most highly qualified publicists of the various nations"¹⁷) are an important subsidiary source of space law.

In some areas of space law, especially where the law is uncertain, academic writings have an important role to play in developing the law, and may even influence the practice of states (eg. in the demarcation of the boundary between airspace and outer space ¹⁸).

17. Art. 38 (1) (d) of the ICJ Statute

18. See Chapter 2 infra

1.4 VALIDITY OF INTERNATIONAL LAW IN OUTER SPACE

It is often contended that when the first Soviet ¹⁹ Sputniks were launched into space, the consent of other states (especially underlying states) was not sought. However at that time sui generis rules for regulation of such activities were not specifically laid down so the question whether such launching required the consent of other states or not was meaningless.

Practical realities made it obvious that some form of regulation was necessary to fill this legal vacuum as science and technology were not waiting for a detailed

19. For the Soviet view on the validity of international law in space, see Robert D. Crane "The Beginnings of Marxist Space Jurisprudence" (1963) 57 AJIL 615-25. The early attitudes of some American academics towards international law in outer space is effectively portrayed in the following retort : "No, don't touch it, leave it alone, we don't know enough about it". Pitman B. Potter "International Law of OuterSpace" (1958) 52 AJIL at 304.

codification of rules to regulate space activities: thus principles of International Law came to be applied to activities in this newly conquered domain of outer space. The question that arises is: why international law?²⁰ The success of space exploration directly affected the relations between states and the provisions of international law already took care of inter-state relations in other facets, like aviation. The realization of the need for international co-operation in space activities, was another factor: international law had already laid down a firm foundation for international co-operation. Further space activities were seen as a threat to peace and security of mankind. Hence the need for a "Law of Peace".

20. Perhaps before asking "why international law?" one may ask: "Is international law really law?". For the purpose of this thesis it will be assumed that international law is law. See Akehurst 9 et seq; Maryan Green, *supra* note 3, op cit 1; D.J.Harris, *infra* chapter 2 note 15, op cit 1-12.

UNGA Resolution No: 1721 (XVI) of 20 December 1961 provided that in the exploration and use of outer space: "International Law, including the Charter of the United Nations, applies to outer space and celestial bodies"²¹

Paragraph 4 of UNGA Resolution No 1962 (XVIII) declaring the legal principles governing space activities state: "The activities of states in the exploration and use of outer space shall be carried on in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding"²².

Article 3 of the Space Treaty provides: "States, Parties to the Treaty, shall carry on activities in the exploration and use of outer space, including the moon and other celestial bodies, in accordance with international law, including the Charter of the United Nations",²³...

Article 2 of the Moon Treaty provides:

21. Paragraph A1 (a) See (1961) YUN op cit at 35.

22. (1963) YUN at 101

23. (1966) YUN at 41-42.

"All activities on the moon, including its exploration and use, shall be carried out in accordance with International Law,..."²⁴

Although both the UNGA resolutions cited above, the Space Treaty and the Moon Treaty, have a mere declarative effect, they confirm the validity of International Law in outer space. The binding force of International Law in outer space does not derive from these Treaties alone.

However if the validity of International Law as a whole were extended to outer space, numerous difficulties would arise. The first problem that comes to mind is that Space Law regards outer space and the celestial bodies as a zone outside sovereignty- non-appropriation- (Article 2 of Space Treaty). International Law, however, is based on the principle of sovereignty. In response to the statement of this problem it may be noted that although states do not have jurisdiction over the high seas, or the air space above the high seas, rules of international maritime law and air law do exist.

Secondly, Space Law provides for the peaceful use and exploration of outer space and the celestial bodies,

24. (1979)33 YUN at 111

while international law contains rules relating to armed conflicts. This problem and the problem relating to sovereignty may be resolved by the principle of *lex specialis derogat legi generali*.²⁵ The rules of Space Law, such as the exclusion of appropriation or the obligation of peaceful use, are *leges speciales* and as such they will prevail against the general rules of international law, i.e. *leges generales*. This concept was expressed by Brussels Resolution of the Institute of International Law²⁶ as follows: "in all matters not provided for in the preceding paragraphs" states are bound by general international law, including the principles of the Charter of the United Nations.

Thus although Article 3 of the Space Treaty does not expressly provide for this concept, it may be regarded as *lex specialis*, as it creates new law and new rights for the parties over and above those provided for under general international law.

25. E.Fasan Law and Peace for the Celestial Bodies

at 6 cited by G.Gal Space Law 1969 at 133.'

26. C.Wilfred Jenks Space Law 1965 at 418

CHAPTER 2

DEMARCATIION OF THE BOUNDARY
BETWEEN
AIR SPACE AND OUTER SPACE

2.1. MEANING OF SOVEREIGNTY IN AIRSPACE

The Airspace superjacent to land territory, internal waters, and the territorial sea is, in terms of international law, a part of state territory and other states may only use such Airspace for navigation or other purposes with the consent of the territorial sovereign.¹ The authority that a state exercises over its territory- to the exclusion of all other States- is called territorial sovereignty.

The customary law rule of State sovereignty over its airspace came about with the development of aviation and also as a result of the impact of the First World War. The factors that contributed to the rapid emergence of this rule as customary international law were the concern of States for national security and the integrity of neutral States in times of armed conflict . The

1. Ian Brownlie Principles of International Law (1979) at 109-129. See also N.A.Maryan Green at 163-166 ; Lord McNair, *infra* note 2, op cit 4-9; Bin cheng

principle of state sovereignty over its air space is embodied in the Chicago Convention on International

"Recent Developments in Air Law" (1956) CLP 208-34;
John C. Cooper "High Altitude Flight and National
Sovereignty" (1951) 4 ICLQ 411-8; M. Matte 15-7;
Bin Cheng "From Air Law to Space Law" (1980) CLP
228-54 ; Bin Cheng "Analogies and Fictions in Air and
Space Law" (1968) CLP 137-58.

Civil Aviation², one of the most important sources of International Air Law. Article 1 of the Convention States: "every State has complete and exclusive sovereignty over the air space above its territory".

State sovereignty over its airspace may however be derived from the national laws of States. Section 2 of the South African Aviation Act³ provides: "The provisions of this act and of the Convention and of the Transit Agreement shall... apply to all aircraft whilst in or over any part of the Republic or the Territorial waters thereof...."

As a result of State Sovereignty in airspace, every State is entitled to regulate the air-traffic over its territory. The Chicago Convention affirms that no state aircraft of a contracting state shall fly over the territory of another state or land thereon without authorization by special agreement. Thus agreement is the basis of the use of another state's airspace.

From gleaning through the Chicago Convention and the South African Aviation Act certain characteristics of air sovereignty are worthy of mention:

2. See Lord McNair, The Law of the Air (1965) at 401-433 for full text.

3. Act No. 74 of 1962

1. From the provisions of Section 2 of the South African Aviation Act and Article 11 of the Chicago Convention it may be stated that each state may regulate the use of its airspace in respect of its own aircraft and foreign aircraft.
 2. Freedom of flight may be restricted by the sovereign state specifying prohibited areas, and prescribing flight altitudes and routes. (Article 9 of Convention)
 3. Further, any state has the right to close its air space to overflight of foreign aircraft. However this right is subject to international law obligations especially the right of innocent passage arising out of a treaty.⁴
 4. A special licence is required for cabotage i.e. when foreign aircraft transport passengers or freight between two points of the State territory.
 5. All aircraft in airspace of a particular state is subject to the jurisdiction of that state. This flows from the principle of territorial sovereignty.
-
4. In the absence of a treaty, international law does not permit a right of innocent passage through another State's airspace, including the airspace over the territorial sea. See Brownlie's Principles at 121.

6. Special authorization from the sovereign state, is required for pilotless planes. (Article 8 of the Chicago Convention.)

7. Aircraft that carry out international flights shall submit to customs and inspection. (Article 10)

2.2 UNLIMITED SOVEREIGNTY

Article 1 of the Chicago Convention, cited above provides for the "complete and exclusive" sovereignty of States in airspace. There has been the inclination to interpret the term "complete" as meaning limitless. This interpretation would imply that state sovereignty extended ad infinitum - up to the heavens- and would therefore include airspace and outer space. One of the supporters of this idea, Professor Paul de La Pradelle stated: "The air space, a geometric conception, necessarily comprises an infinite dimension which the legal qualification, equally infinite, of sovereignty can fill"⁵.

One method of demarcating the territorial spheres to show areas under a particular states sovereignty (under this approach) would be to project upwards the radii linking the various points of the state borders with the centre of the earth. (See fig. 1.)

If this idea of unlimited sovereignty is accepted, then satellites and other space objects would, in the absence

5. Paul de La Pradelle "Les frontieres del'air"(1954) Recueil des Cours de l'Academie de Droit International de La Haye, cited by M Matte Aerospace Law (1969) at 35 ;

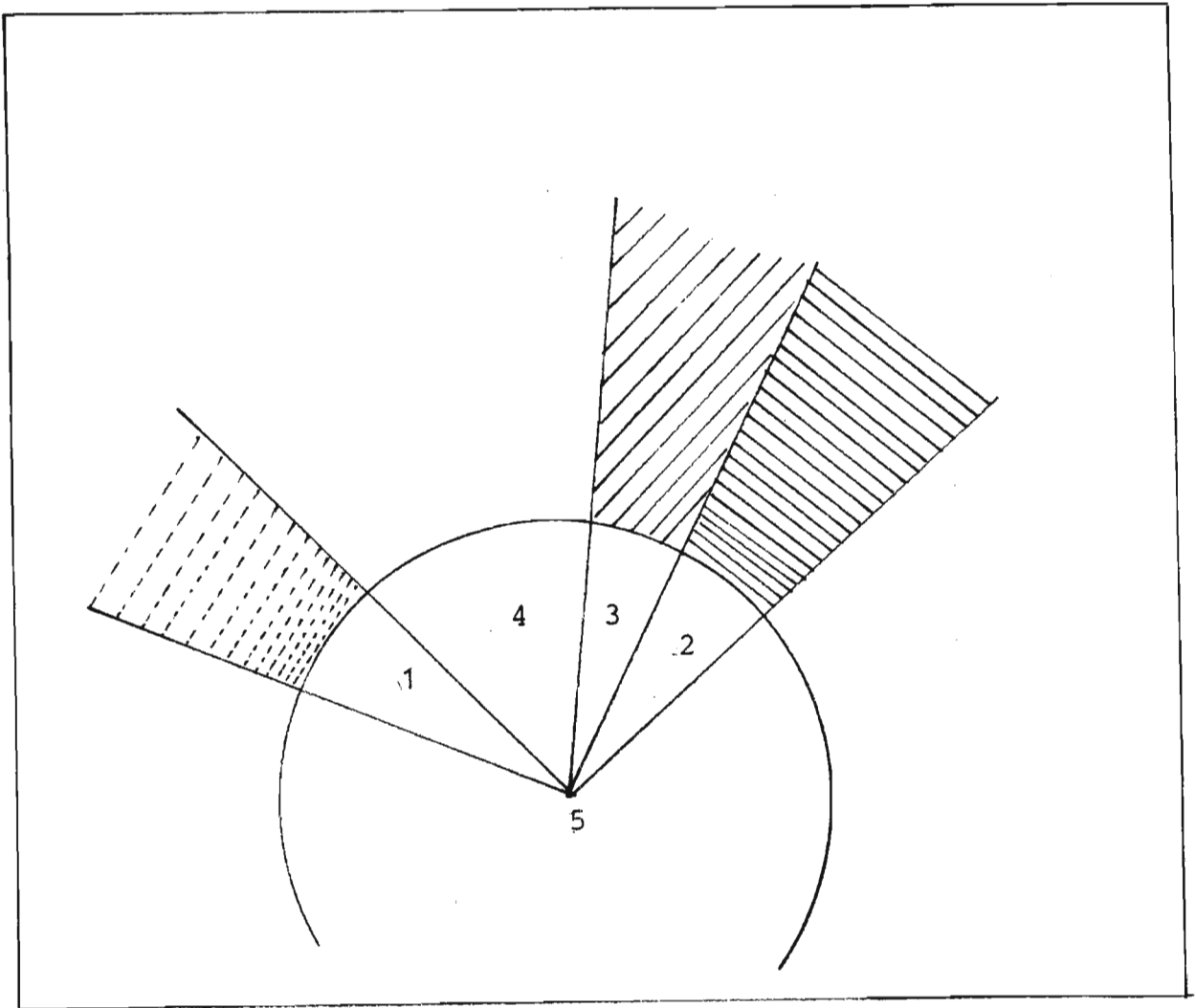


Fig. 1 Vertical projection of sovereignty. 1, 2, and 3 are state territories; 4 sea; and 5 the centre of the earth. (See G.Gal at 67 and M.Matte at 47)

Taken from G.Gal p.67.

see also Lord McNair *supra* note 2, op cit 16;
 D.J.Harris Cases and Materials on International Law
 (1979) 219; M.Matte at 35; David Johnson Rights in
Airspace (1965) 30.

of express or tacit consent, violate the territorial sovereignty of underlying states. It should be noted at this point that Satellites, unlike conventional aircraft, cannot avoid foreign territories.⁶

In terms of this theory of unlimited sovereignty States would continually lose their sovereignty over portions of Space, due to the rotation and revolution of earth. Further States would lay claims to the moon, the planets of our solar system, the galaxy and the millions of stars etc. This would be taking the notion of sovereignty to absurd limits. As C.W.Jenks states

the idea of sovereignty over the various sectors of the universe is just as ridiculous as if the Island of St. Helna claimed the Atlantic Ocean.⁷ To expose the absurdity of unlimited sovereignty even further, sovereignty of states would include celestial bodies that have not existed for thousand of years at the moment they are observed.

6. The position of Satellites over the earth are determined inter alia, by the revolution of the earth, and its own orbit based on Keplerian laws. The orbital angle of the Satellite i.e. the angle between their orbit and the plane of the equator, indicates roughly the area of the earth it will cover. Thus a Satellite having an orbital angle of 65° will cover the areas between latitudes 65° North and 65° South.

7. C.W.Jenks "International Law and Activities in Space", (1956) 5 ICLO 103

As stated by Goedhuis: "The belief that sovereignty could be extended ad infinitum is obviously absurd; it would mean that from the fast revolving Earth sovereignty sectors would be projected into infinity rotating like the beams of a lighthouse into the obscurity of the universe".^{7a}

Thus the theory of sovereignty ad infinitum is definitely not acceptable, either from the positive law point of view or on the fundamentals of natural science.

Further, the use of the word "complete" in Article 1 of the Chicago Convention corresponded with the scientific and technical level of the time when the Convention was drafted. However, at the present state of the art, the question of the upward limit on state sovereignty requires far greater consideration.

7 (a) D. Goedhuis "The Changing Legal Regime of Air and Outer Space" (1978) 27 ICLQ 582 .

2.3 THEORIES OF DEMARCATION

From the discussion in the preceding section it may be noted that although states do have sovereignty in airspace, this sovereignty does not extend indefinitely. The nature of the problem that faces space jurisprudence is that, according to the principles of international law, States have sovereignty in the air space over its land territory, internal waters and territorial seas. Outer space however is considered free for exploration and use by all states and is not subject to national appropriation.⁸ This basic distinction has prompted many writers on space law to put forward proposals on the delimitation of Air Space and Outer Space.^{8a}

However, a further problem has to be contended with: Space exploration essentially involves two phases, each having a different legal status. The take off and landing takes place in territorial airspace which is subject to the jurisdiction of the subjacent state.

8. See Chapter 3, *infra*.

8a. See John Kish The Law of International Spaces (1973) 39-49; D.J.Harris, *supra* note 5, op cit 218-20;

Most of space operations themselves take place in

Lord McNair, *supra* note 2, op cit 14-8; M. Matte 23-74; Grieg, *supra* Chapter 1 note 3, op cit 360-1; Manfred Lachs The Law of Outer Space (1972) 55-67 esp. note 5 at 63-4; C.G. Fenwick "How High is the Sky?" (1958) AJIL 98 et seq; John Cobb Cooper "Flight Space and the Satellites" (1958) 7 ICLQ 82-91.

free outer space. Therefor some writers who regard delimitation of air space and outer space impractical and unnecessary, suggest a functional approach based on the character of space activities.

This chapter will be devoted to an examination of the theories of delimitation of air space and outer space.

2.3.1 THE ATMOSPHERE THEORY

In terms of this theory, the basis of demarcation between air space and outer space should be the atmosphere of the earth in the geophysical sense. This theory relies on the argument that in the interpretation of legal rules natural meaning should be accorded to legal concepts. Further, the Permanent Court of International Justice stated in the Eastern Greenland Case that "the natural meaning of the term 'Greenland' was its geographical meaning".⁹ In the light of this, sovereignty in air space, as laid down in the Chicago Convention, would mean that State Sovereignty extends to the extremes of air space in its geophysical meaning. Thus Bin Cheng stated (in 1956):

"Airspace is the entire space where air is to be found under any form. This is identical with the

9. Permanent Court of International Justice, judgement of April 5, 1933, Legal Status of Eastern Greenland case, Hudson World Court reports, Washington DC, vol III p 17 (1933)

atmosphere in its broadest meaning, including all its layers, irrespective of whether it is sufficiently dense to carry the aircraft."¹⁰

However, on close examination the weakness of this theory may be noted from the legal point of view as well as a natural science. Although the atmosphere is an inseparable part of earth necessary for the sustenance of life on the planet and thus naturally connected with earth, determination of the upper boundaries of the atmosphere meets with important difficulties. Rarified atmospheric gas extends to extremely high altitudes, to hundreds if not thousands of kilometres above the surface of the earth.

Further, the atmosphere consists of several layers: the troposphere; the stratosphere; mesosphere and exosphere. The troposphere, the layer closest to the earth's surface in which weather phenomena occur and conventional aircraft fly, is not constant. The upper limit of the troposphere may range from 9.7 kilometres in March to 11.1 kilometres in July. Further above the poles, it may be about 10 kilometres while at the equator, the upper limit may be 17 kilometres.

10. B.Cheng "Recent Developments in Air Law" (1956) Current Legal Problems 210-13.

The uppermost boundary of the exosphere is stated to be 20 000 kilometres or more.¹¹

For these reasons, demarcation of the boundary between air space and outer space on the basis of the 'atmosphere' theory seems impossible from the natural science point of view.

From the legal point of view there is a strong argument against this theory in that the treaties on which it is based (the Paris and Chicago Conventions), did not define the term air space. Further, at the level of technical and scientific advancement prevalent at the time of drafting those treaties, it may not have occurred to the signatories or drafters that the uppermost layers of the atmosphere would ever come within the scope of human activity. Thus they felt it unnecessary to define the term air space.

A further argument against this theory is that the orbit of certain satellites or at least the perigee, is within the layer considered to be the atmosphere. Thus, if we accept the atmosphere theory, then all satellites would be infringing the sovereignty of States. Otherwise

11. See Matteat p 22.

certain layers of the atmosphere must be regarded as being part of outer space - which would be contrary to the geophysical meaning of the term atmosphere.

2.3.2 THEORY OF PERIGEE OF SATELLITES

This theory is closely related to the theory of gravity, and suggests that the boundary of State Sovereignty should be the lowest point of a satellite orbit (i.e. the perigee of satellites).

C.G.Fenwick was of the view that satellites do not violate International Law as long as they stay in orbit and keep their altitude.¹² Recent studies carried out by COSPAR have indicated that at a height of approximately 100 km above sea level, satellites will not be able to continue in orbit and will fall to earth.¹³ This may have been the reasoning behind the proposal of USSR at the 1979 discussions of the Legal Sub-Committee of COPUOS, that the boundary between air space and outer space should be established at 100 to 110 kilometres above sea level.¹⁴

12. C.G.Fenwick "How high is the Sky?" (1958) AJIL at 98.

13. Goedhuis "The Changing Legal Regime of Air and Outer Space" (1978) ICLQ at 591.

14. (1980) 34 YUN 123-5

Of all the delimitation theories the theory of perigee of satellites, seems to be the only one related to the practical realities of space activities, and could therefore be taken as a basis for international agreement on delimitation. As McMahon states :

"The advantage of such an approach is that it takes cognizance of State practice since the launching of the first sputnik, recognizes the legality of those satellites already in orbit and may easily be reconciled with claims of sovereignty up to the height of aerodynamic lift or even up to 70 miles".^{14a}

Another form of support for this theory is contained in the Convention ^{on} Registration of objects launched into Outer Space.^{14b} Article II (1) of the Convention places an obligation on states to register a space object if such object " is launched into earth orbit or beyond". This provision implies that an object at orbital height or beyond is in outer space and therefore requires to be registered.

14 (a) "Legal Aspects of Outer Space", (1962) 38 BYIL 339

14 (b) Text YUN 1974 at 63-64

However there are certain counter arguments to this theory. Firstly the theory depends on the technical ability of satellite launching: with the advance in technology, it may be possible to reduce the perigee. Secondly the orbit of satellites is affected by the gravity of earth. Gravity varies from one point on the earth to another. Further, the earth is not perfectly round and the fact that there is unequal distribution of land and water masses over the earth, would also affect the earth's gravity . Thus these variations would make it difficult to establish definite orbit perigees .

2.3.3 GRAVITY THEORY

Joseph Kroell expounded the theory that state sovereignty extends up to the point where the gravitational attraction of the earth is balanced by that of another celestial body ¹⁵ The initial view of J.C.Cooper, which related to Kroell's gravity theory, was that territorial sovereignty ends where a missile leaves the gravitational sphere at escape velocity (at an altitude of approximately 257 000 kilometres) and is caught into the gravitational attraction

15. H.Strughold "Definitions and Subdivisions of Space"

Bioastronautical Aspects, First Coll.(1958) 110-13,

cited by G.Gal op cit at 71.

of the sun.¹⁶

The rationale behind this theory is the hypothesis that the security of states can only be endangered from an altitude from which something can be dropped, or from which the return of an object can be imagined. This theory is however rejected by the science of space law for the reasons that follow.

The gravitational attraction of the earth cannot be defined in terms of a closed sphere parallel to the surface of the earth. It may be noted here that the earth's attraction to the various celestial bodies varies greatly. For instance the earth's attraction to the moon is dominant up to 327 000 kilometres, whereas in relation to the sun,^{16a} up to 1 870 000 kilometres. Further the motions of the celestial bodies make it impossible to demarcate sovereignty spheres depending on the gravity of the earth.

2.3.4 AERODYNAMIC LIFT THEORY

The Aerodynamic Lift Theory is related to the Atmosphere Theory. The basis of this theory is that states may only claim sovereignty over the height up to which aircraft can ascend. Such height would be between 20 and 25 miles¹⁷.

16. " High Altitude Flight and National Sovereignty" (1951) 1 ICLQ 411.

17. See McMahon at 339 and M.Matt at 24.

16a See Gal at 72

The lower layers of the atmosphere provide the aerodynamic lift necessary for the flight of aircraft and for the action of the internal combustion engine. This property of the atmosphere has provided the basis for yet another theory in delimitation of air space and outer space. The supporters of this theory rely on the definition of aircraft as "all machines which can derive support in the atmosphere from the reaction of the air".¹⁸

However this theory fails to offer a sufficiently precise criterion for the demarcation of air space and outer space. Further difficulties are imposed by hybrid craft like the X-15 and the space shuttle^{18a} which possess characteristics of both aircraft and spacecraft. The X-15 can attain a height of up to 47 miles.¹⁹

The further arguments against this theory include : the definition relied upon by the supporters of this theory (definition in Annexure VII of Chicago Convention) is applicable only in respect of member states. Further, as the definition is contained in an annexure, it may not be binding upon member states.

18. Annexure VII of the Chicago Convention on Aircraft Nationality and Registration Marks.

18 a. *infra* 8.2

19. See McMahon, at 339

2.3.5 THEORY OF THE "VON KARMAN JURISDICTION LINE"

This theory expounded by A.G.Haley^{19a} suggests that the sovereignty ceiling should be the line where an object travelling at 25 000 feet per second (7 kilometres per second) loses its aerodynamic lift and centrifugal force takes over. The resultant demarcation is called the "Von Karman jurisdiction line" which extends to about 83 kilometres. However, as in the case of the aerodynamic lift theory, the hybrid craft such as the X-15 still poses a problem. The major problem with this theory is that technological advancement may significantly alter the Von Karman jurisdiction line as Haley himself states:

"The Von Karman primary jurisdictional line may eventually remain as presented above or as a result of such developments as improved techniques of cooling and more heat - resistant materials, it may be significantly changed"²⁰

A further counter argument to this theory is that Haley's formula does not result in a single line of demarcation, but a broad range within which centrifugal force takes over from aerodynamic lift in keeping the flying object aloft.

19(a) Space Law and Government (1963) 97

20. Ibid 98-9

This would depend also on the character and speed of the object.

2.3.6 THEORY OF EFFECTIVE CONTROL

In terms of the "effective control theory" state sovereignty extends to the height to which states are able to carry out effective control, i.e. the ability to prevent unauthorized flights. J.C.Cooper in expounding this theory, stated :

"Perhaps the territory of each state should be considered extending upward into space as far as the scientific progress enables the strongest state in the international community to control the space above it."²¹

This theory is however rejected because of its apparent weaknesses. Firstly, sovereignty of states on the surface of the earth is recognised although effective control is impossible ; e.g. Nepal has sovereignty over Mount Everest without effective control. Secondly the use of defensive weapons is questionable as their development is subject to continuous change, and reaches altitudes of satellite orbits, the moon and other planets.

21. J.C.Cooper "Air Law, a Field of International Thinking"

(1951) 4 Transport and Communications Review 3,

cited by M.Matte at 32.

2.3.7 ZONE THEORIES

J.C Cooper, in revising his former view proposed a trichotomous theory which introduced an additional zone in the form of "contiguous space".²³ The trichotomous system divided the vertical space above state territory into 3 zones :

- (i) "territorial space ", over which states had full sovereignty and which extended to the height that aircraft may be operated,
- (ii) " contiguous space", which would extend from the outer limit of territorial space up to 300 miles above the earth's surface and through which all non-military vehicles could travel, and
- (iii) "free space", that is all space above the contiguous zone which would be free for passage of all instrumentalities.

Here we notice a parallel with the tripartite division in maritime law (territorial seas, contiguous zone and high seas). However the introduction of the contiguous zone in space would create more problems than it would solve (if any). The contiguous zone of the sea allows the territorial state to exercise control outside territorial

23. J.C.Cooper Space Law (1959) 128

waters to facilitate protection of the state's security. If such a zone were introduced in vertical space, the protection of states and application of security measures would be a greater problem than in the case of a dual division (i.e. air space - outer space).

At the 1980 meetings of COPUOS, some states felt it necessary to introduce a mesospace into the vertical space regime, which would only be traversed or penetrated by rockets or by rocket - propulsion aircraft.²⁴ This zone would extend from 50 to 100 kilometres above the surface of the earth. The reasons for rejection of Cooper's trichotomous theory would apply here too.

2.3.8 THEORY OF SECURITY OF STATES

This theory entails the extension of state sovereignty in space to a height that will ensure security of states. However it fails to provide a definite basis for demarcation as no matter how high state sovereignty is extended, states' claim to security may still not be satisfied.

24. (1980) 34 YUN 123-4

2.4 PRACTICE OF STATES

Let us examine the practice of states to determine whether any definite trends have developed in respect of the demarcation of the boundary between air space and outer space.

In May 1960, a United States high altitude reconnaissance aircraft (referred to as the U-2) was shot down at a height of 20 kilometres over Soviet territory. The US aircraft had taken off from Pakistan and was scheduled to land in Finland after taking aerial photographs while over Soviet territory. The U.S.S.R had protested at the flight. The United States, however, did not attempt to justify its actions in terms of International Law or protest at the shooting down of the aircraft, and of the subsequent trial of the pilot²⁵. The inference that may be drawn from the U-2 incident is that State sovereignty over air space extended to the height travelled by the U-2 aircraft, which was above the space traversed by conventional aircraft.

In respect of State sovereignty over vertical space, the following remark was made by a British Government spokesman, as early as 1959:

25. See D.J.Harris Cases and Materials on International Law (1979) at 211, note 1. See also Q Wright "Legal Aspects of the U-2 Incident" (1960) 54 AJIL 836

"Her Majesty's Government consider that sovereignty over space above National territory cannot extend indefinitely upwards. It cannot, however, be said that International Law has yet determined the exact limit to be placed on the extension of sovereignty upwards... There are still too many unsolved problems in this field to justify the adoption of any sweeping legal propositions in whatever direction they tend".²⁶

Upon the launching of the first Satellites, Sputnik-1 (by the U.S.S.R) and Explorer-1 (by United States), no state had lodged protest against the violation of its state territory by the passage of these Satellites. It may be argued the absence of protest by states was due to the impact these Satellites had on public opinion- something of the sort when the Wright brothers pioneered aviation. However since these initial launchings several thousands of Satellites and space crafts have been placed in orbit. Each Satellite passes through the space above the territory of a large number of countries, and at some time or another the space above the territory of almost every state has now been traversed in this manner. In spite of these well-known facts none of these states have protested against launching of such Satellites or alleged that they violated its territorial air space.

26. Viscount Hailsham Parliamentary Debate (House of Lords), 1958-9 vol 216, Col 975, cited by D.W. Greig International Law at 360.

Further, neither the U.S.S.R nor the United States has ever considered it necessary to seek permission prior to the launching of a satellite from those states over whose territory the Satellite was scheduled to pass.

Until the recent claims of equatorial countries over portions of the geostationary orbit²⁷ the legal validity of the statement that earth-orbiting Satellites move in outer space appears not to have been challenged by any state.

In the view of Judge Lachs in the North Sea Continental Shelf Cases²⁸ the absence of State protest to, and the fact that launching States sought no premission for, launching instruments into space which traversed the air space of States and circled above them in outer space, led to the recogintion of the principle of freedom of movement in outer space.²⁹ Could this view not be extended then to recognise that Satellite orbits take place in free outer space as opposed to air space which is subject to state sovereignty. Stephen GOROVE maintains: "many years of spatial experiments, both before and after the conclusion of the Outer Space Treaty, have led to the emergence of what has been described as a new rule of customary International Law, namely, that artificial earth-orbiting Satellites move in outer space".³⁰

27. Infra, Chapter on Geostationary orbits.

28. I.C.J Reports 1969 p3

29. See D.J.Harris at p34, fn 44

30. Stephen Gorove "The Geostationary orbit: Issues of Law and Policy", AJIL (vol 73) 1979, p 444 at 447. See also S.H.Lay and H.J. Taubenfeld, The Law Relating to Activities of Man in Space pp 48-49.

However, that the question of demarcation of the boundary between air space and outer space is far from settled, is apparent from UN discussions. At the 1980 sessions of the Legal Sub-Committee of COPUOS, some members viewed the delimitation of outer space a necessity. These members stated that the legal regime applicable to outer space differed in important respects, particularly on matters relating to State sovereignty, from the legal regime applicable to air space; thus it was necessary to establish the boundary between air space and outer space so that the areas of application of the two legal regimes were defined in 1979. The U.S.S.R had submitted a working paper proposing the establishment of a boundary at an altitude not higher than 100 to 110 kilometres above sea level.

Other members including the United States however, were of the view that a delimitation was not necessary at present, further that the absence of a definition of outer space had not resulted in practical difficulties. There was no scientific or technical justification for the designation of a particular altitude as the boundary between air space and outer space. These members noted that the Scientific and Technical Sub-Committee of COPUOS had not identified any problem that would be solved by such a demarcation and

30(a) Including Ecuador, Hungary, Italy and USSR.

31. YUN vol 34, 1980, pp123-128, YUN vol 32, 1978
134-5.

32. Ibid.

referred to a 1976 study of the Committee in Space Research of the International Council of Scientific Unions on minimum altitudes of artificial earth Satellites. The study noted that past estimates of the perigee of satellites had been too high; the perigee of a satellite had already been lower than 100 kilometres. These members considered that an arbitrary definition or delimitation of outer space could lead to complications because of the inability of most countries to observe and control a designated boundary and that such a demarcation could impede further developments in space science and technology.

33

2.5 FUNCTIONAL APPROACH

In terms of the functional approach, unlike earlier legal norms relating to human conduct, the law pertaining to space activities cannot be associated with any limited area or zone, but only with the character of activity under regulation. The possibility of such an approach was mentioned by the United Nations Ad Hoc committee on the Peaceful Uses of outer space, as early in June 1959: "there was also discussion as to whether or not further experience might suggest a different approach, namely, the desirability of basing the legal regime governing outer space activities primarily on the nature and type of particular space activities."

34

33. (1980) 34 YUN 124

34. McMahon "Legal Aspects of Outer Space" (1962)

38 BYIL 339

2.5.1 DEMARCATIION THEORIES Vs FUNTIONAL APPROACH

After the examination of the various theories of demarcation of the boundary between air space and outer space it should be stated that none of those theories have an absolute or practical value in law. The inadequacies of these theories are emphasized by the discussion of the following problems which lends support to the functional theory (approach).

The rules of International Air Law deal with the intrusion of foreign aircraft as well as its interception but only as far as these occur above the state territory. This stemmed from the fact that these foreign aircraft had to appear before they could endanger state security. To transfer this outlook to space law, as intended by the various theories on demarcation, would serve no purpose due to the technological differences of activities in air and outer space. The trajectory of the ICBM (Inter-continental ballistic missile) illustrates this point rather clearly. The ICBM has a range of 10 000 km and a speed of 25 000 km as well as the ability to reach its target in approximately half an hour. What good is the line of demarcation then if state security is threatened by such a missile? Unlike the case of intrusion of foreign aircraft, the ICBM will have endangered the security of the state under attack not upon crossing the vertical boundaries of the latter, but many thousands of kilometres earlier when, relying on its guiding mechanism it is speeding towards its target.

Further, no matter how high the line of demarcation is fixed, safety of a state may be endangered from outside the state territory as a stationary satellite may carry out successful intelligence activity from space even if remaining outside the vertical territory of the state.

Also, with the introduction of anti satellite weaponry in outer space arguments relating to state security from the delimitation point of view, are no longer valid. This and the other problems mentioned above are sufficiently regulated by the Functional Theory.

The Functional Theory is further supported by the fact that about 71% of the earth's surface is covered by the Oceans. Consequently, no matter how high the limit of sovereignty is drawn it would not protect states from harmful interference through activities carried out over the high seas. Only a regulation based on the nature of the space activity will provide a restriction capable of protecting the security of states. (See fig.2)

Just as International Air Law regulations apply to aircraft in the air as well as aircraft on the runway (which incidentally are not governed by rules applicable to road vehicles), International Space Law should apply to space vehicles travelling through outer space, air space as well as vehicles on the launching site.

35. See "Concluding Aspects" Chapter 8 infra.

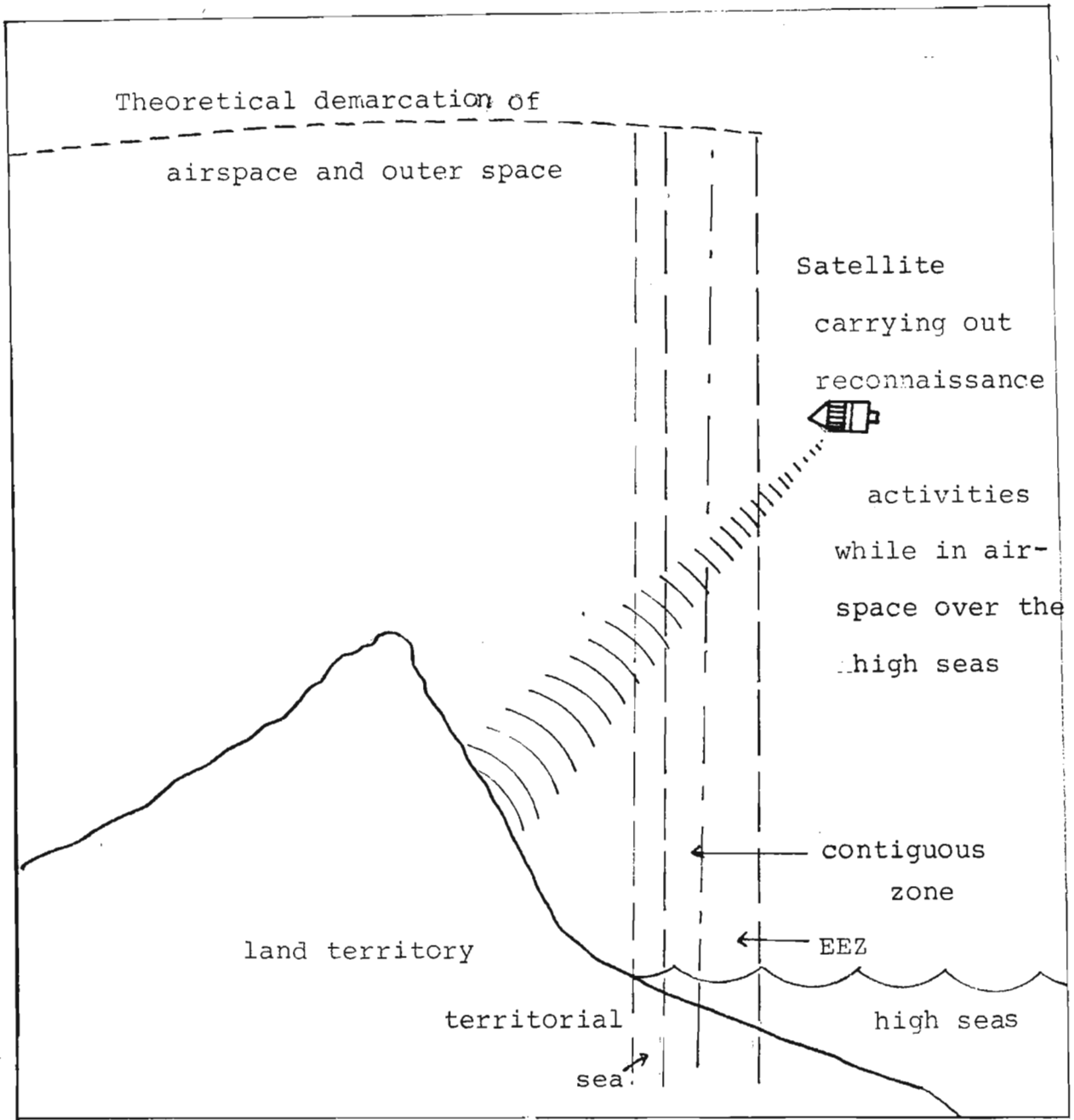


Fig. 2 No matter how high the demarcation line between airspace and outer space is set, this does not protect states from activities in the airspace over the high seas well below the line of demarcation.

The space rockets and the trajectory of space ships form an operational entity which cannot be sliced into several layers of differing legal positions. Thus the only way to preserve unity of legal regulation is to do away with demarcation in space and adopt the functional theory.

2.5.2 THE FUNCTIONAL APPROACH

Having examined the inadequacies of demarcation theories and support for the Functional Approach, it would be of importance to the subject of Aerospace Law to look at the aspects that constitute the Functional Approach.

Firstly, the Functional Approach does away with the division between air and outer space: this should be considered a single entity. This is the fundamental difference between the theories of demarcation and the Functional Approach.

Secondly, the "concepts of freedom of space and state sovereignty must be understood as indicating a functional
³⁶
freedom and a functional sovereignty". Thus state sovereignty over air traffic and over activities of their citizens are recognised. However the functional freedom of space does not imply that there is an absolute right to do anything with no care about the consequences. It also does not imply a lack of legal rules. This freedom

36. M. Matte op cit 63. Emphasis added.

applies only to certain functions, like humanitarian and scientific functions.

Thirdly, certain general principles of international law are also applicable to the air and outer space. Two of these principles are : the right of self defence, and the right of access, that i.e. the right of mobility between two points of the universe. The right of access seems to be a national right- as in the case of state's right of access to the high seas. The Functional Approach adopts this natural right in respect of states that wish to get out of the atmosphere and proceed into outer space.

Finally, in terms of the Functional Approach air law (aeronautical law) is that area of the law which applies to the activities of aircraft (i.e. planes, balloons, and any other device requiring air support) as understood by the participants of the Chicago Convention.

*

The Functional Approach is based essentially on the principles of the rights of states to access to the atmosphere and to outer space, and state's right of self defence .

As outer space is not subject to state sovereignty but available for use and exploration to all states equally, it follows therefrom that all states should have access to outer space - just as landlocked states have access to high seas. In exercising this right of access, all harmless

techniques used to escape the gravitational attraction of earth and proceed into outer space, should be accepted by states. Thus if it is necessary to fly over the territory of some states in order to reach outer space, at whatever altitude, such activities should be permitted as they pose no direct threat to the security of the underlying states. If however damage is caused to the state flown over, it should be compensated for such damages. Further if the state flown over has reason to believe that the spacecraft will cause damage or be used for aggressive purposes, it has the right to defend itself against such spacecraft with appropriate means but proportionate to the damage.

In order that a particular craft (vehicle) is not subject to the jurisdiction of the subjacent state, such craft should have a spatial objective (e.g. research, exploration, communication etc.). In such cases the launching state would be responsible at all times for the craft, whether it is travelling in air space over other states, or in outer space. Thus it follows that if the craft does not succeed in escaping the atmosphere of the earth but falls on the territory of another state, it should continue to be subject to the control and national responsibility of the launching state.

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To summarize then, in terms of the functional approach, space law is a set of rules regulating the activities of space craft (vehicles having the objectives set out above).

No state flown over has the right to intercept such a craft or hinder it in its ascension to outer space or its return to the earth. Such a right of way into outer space is uncontestable and is similar to the rights of landlocked states to have access to the high seas. This functional freedom of space is however restricted from the aspect of security of states: invoking the right of self defence.

2.5.3 SUPPORT FOR THE FUNCTIONAL APPROACH FROM VARIOUS INTERNATIONAL TREATIES ON SPACE LAW.

The 1967 Space Treaty fundamentally bears a functional character. In terms of Article 3 the treaty governs all activities of states in outer space. Article 4 of the treaty prohibits the placing of nuclear weapons or other weapons of mass destruction in outer space. This is in keeping with the principle of state security of the functional approach.

The 1972 Liability Convention deals with the liability of the launching state for damages arising from that state's space activities. A similar view is put forward by the functional approach as a restriction on the functional freedom of space.

The differentiation of craft that would escape jurisdiction of the subjacent states from those subject to such

jurisdiction, under the functional approach, is further facilitated by the 1974 Convention on Registration of Objects Launched into Outer Space. This Convention would provide the means for distinguishing craft that would be governed by air law from those subject to space law.

CHAPTER 3

THE LEGAL STATUS OF OUTER SPACE

3.1 ANALOGY OF THE HIGH SEAS

Before launching into the characteristics of the legal status of outer space let us examine the terrestrial analogies of the high seas and Antarctic. The freedom of the use of the high seas coupled with the freedom from appropriation have induced writers to look to the legal status of high seas when analysing the legal status of outer space.¹

Article 2 of the Geneva Convention States:

"The high seas being open to all nations, no State may validly purport to subject any part of them to its sovereignty. Freedom of the high seas is exercised under the conditions laid down by these articles and by the other rules of international law "².

These principles can easily be applied to outer space. So too can the rules relating to nationality (Article 5, Geneva Convention), jurisdiction of the flag state (Article 6) and rescue (Article 12). Another such analogy for the regulation of outer space is provided by Articles 24 and 25 dealing with prevention of pollution.

1. On the legal status of the high seas, see generally:

John Kish The Law of International Spaces (1973) 54-67

2. Brownlie's Principles op cit at 89.

However inspite of these similarities, essential differences do exists between the high seas and outer space that reduces the analogy to a state of minimal importance.

Firstly, since the high seas are horizontally connected with territories of coastal states and have no connection with the landlocked states, any disasters such as the sinking of vessels or crashing of planes in the high seas, will have no direct effect on states. Outer space on the other hand adjoins all state territories vertically. In the event of space instrumentalities crashing or falling to earth, a real danger exists to the lives of citizens of subjacent states. Further the possibility of an armed attack from outer space endangers state security to a far greater extent than military activities on the high seas.

Secondly, the freedom of the high seas enables states to carry out military activities, including the testing of missiles. Such activities are not permissible in outer space because of the danger to subjacent states.

Thus the legal regime of outer space and that of the high seas cannot be equated.^{2a}

2a. On legal status of the high seas see also: Geneva

Convention on the High Seas, I. Brownlie Basic Documents in International Law (1972) 89-98; Akehurst 171-7; M. Matte 47-54.

3.2 ANALOGY OF THE ANTARCTIC

The Washington Treaty on the Status of the Antarctic is often regarded as a model for legislation on Space Law.³ The object of the treaty is to ensure that the Antarctic is used for peaceful purposes only. Nuclear tests are prohibited in this area. These aspects do suggest that an analogy between the Antarctic and outer space exists. However, in respect of territorial sovereignty in the Antarctic, the contracting parties did not renounce their territorial claims but reserved the rights and claims resulting from their earlier activities for a later date. These claims have been suspended temporarily.

Thus an analogous application of the Antarctic for outer space will be incorrect.

3.3 NON-APPROPRIATION OF OUTER SPACE

As state sovereignty over air space does not extend into outer space it is necessary to examine the legal regime applicable to outer space.⁴

3. See O.J.Lissitzyn "The American Position on Outer Space and Antarctic" (1959) 53 AJIL 126-31; G.N.Barrie Topical International Law (1979) 81-95; J.Kish, *supra* note 1, op cit 70-81; Brownlie's Principles 265-6.

4. On the legal status of outer space, see: C.Wilfred Jenks

Thus outer space cannot be subject to state sovereignty⁵ and is open to all states.

The above status of outer space is termed res communis omnes in international law. Res nullius refers to territory which is not under the sovereignty of any state and can therefor be the subject of occupation. As opposed to this res communis omnes refers to territory which cannot be the subject of occupation. The high seas and the airspace above it are also res communis omnes.

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- "International Law and Activities in Space" (1956)
- 5 ICLQ 102-4; Bin Cheng "Recent Developments in Air Law" (1956) CLP 215-7; Howard J. Taubenfeld "Considerations at the United Nations of the Status of Outer Space" (1959) 53 AJIL 400-5; Bin Cheng "From Air Law to Space Law" (1960) CLP 228-54; Myres S. McDougal "Prospectives for a Law of Outer Space" (1958) 52 AJIL 412 et seq; Bin Cheng "International Law and High Altitude Flights, Balloons, Rockets and Man-made Satellites" *supra* chapter 1 note 1, op cit 492-4; M. Matte op cit 13-74; Bin Cheng "Analogies and Fictions in Air and Space Law" (1968) CLP 137-58.
5. See Thomas R. Adams "The Outer Space Treaty : An Interpretation in Light of the No-sovereignty Provision" (1968) 9 Havard International Law Journal 140-57; J. Kish

The validity of the principle of non-appropriation of outer space has been confirmed by the conduct of states during the past three decades of space exploration.

The effect of non-appropriation of outer space is that states are barred from establishing proprietary rights in outer space. Even if states occupy, for example, a certain area on the moon, in the sense that their equipment and personnel are stationed there, other states still have the right of ^{access} ~~excess~~ to such areas (Article 12 of the Space Treaty and Article 15 of the Moon Treaty).⁶

87-9; G. Gal Space Law (1969) 139 et seq . As early as 19 March 1962, the US representative at COPUOS stated: "We have rejected the concept of national sovereignty in outer space. No moon, no planet, shall ever fly a single nation's flag." UN Document, A/AC 105/PV 2, pp 13-15, cited by Lachs at 49 note 6.

6. The principle of non-appropriation of outer space which has been accepted as a rule of customary law, is set out in the Space Treaty. However "it is scarcely conceivable that by withdrawing from the treaty a state could acquire freedom of action or the right to extend its sovereignty to outer space." Lachs op cit at 44.

3.4. FREEDOM OF OUTER SPACE

Closely related to the rule of non-appropriation of outer space is the principle of Freedom of Outer Space.⁷

Article 1, paragraph 2 of the Space Treaty states:

"Outer Space, including the moon and other celestial bodies, shall be free for exploration and use by all states without discrimination of any kind, on a basis of equality and in accordance with international law, and there shall be free access to all areas of celestial bodies."

The wording of this provision of the Space Treaty implies the declaration of a general principle and not just one recognised only among the States Parties to the treaty. The principle of freedom of outer space was recognised even prior to the Space Treaty. UNGA Resolution No. 1721 (XVI) of 20 December 1961 provided:

"Outer Space and celestial bodies are free for exploration and use for all states in conformity with international law and are not subject to national appropriation".⁸

In addition to the general freedom of space laid down in the Space Treaty, the Moon Treaty provides for certain

7. See H.G.Darwin "The Outer Space Treaty" (1967) XLII BYIL 282-3; J.Kish 82-6, 89-91.

8. See (1961) YUN 35.

specific freedoms.

3.4.1 SPECIFIC FREEDOMS

3.4.1.1 Freedom of Scientific Investigation

Article 6(1) of the Moon Treaty amplifies Article 1 Para 3 of Space Treaty and provides that the freedom of scientific investigation⁹ on the moon is a freedom of "all States Parties". Article 6 (2) provides that in carrying out or in the course of scientific investigations, States Parties enjoy the following rights:-

(a) Collection of Samples

States Parties "have the right to collect on and remove from the moon samples of its mineral and other substances". Although not specifically spelt out by the Moon Treaty, the samples so removed or collected become the property of the States Parties concerned and may be used by them for scientific purposes. Provision is also made by the treaty for portion of the samples to be made available to others for scientific purposes.

(b) Use of Lunar Substances for Support of Missions

States Parties concerned may also use mineral and other substances of the Moon in quantities appropriate for the support of their missions.

9. In this respect one may note Article II of the Antarctic Treaty, which provides: "Freedom of scientific investigation in Antarctica and co-operation towards that end,

3.4.1.2 Freedom of Exploration and Use without Discrimination

Article 11 (4) of the Moon Treaty provides that "States Parties have the right to exploration and use of the Moon without discrimination". Article 8 (1) provides that they may do so "anywhere on or below its surface".

Article 8 (2) states that States Parties may :

- (a) Land their space objects on the Moon and launch them from the Moon;
- (b) Place their personnel, space vehicles and equipment anywhere on or below the surface of the Moon.

Coupled with the freedom of exploration and use of the Moon, is the duty to avoid interference with the activities of other State Parties. In the event of interference, consultations shall take place as provided by Article 15 (2) and (3)¹⁰

3.4.1.3 Freedom to Establish Manned and Unmanned Stations

Article 9 of the Moon Treaty provides that manned and unmanned stations may be established subject to the following conditions:

as applied during the International Geophysical Year, shall continue, subject to the provisions of the present treaty".

3. Article 8 (3) of the Moon Treaty.

- (a) Only the area required for the Station may be used;
- (b) Immediate notification of the location and purpose of such station must be made to the Secretary-General of the UN;
- (c) An annual report has to be made to the Secretary General;
- (d) Free access of other State Parties to all areas of the Moon must not be obstructed.

3.4.2 LIMITS OF FREEDOM OF STATES IN OUTER SPACE

Freedom of outer space is not absolute. The right of free use and exploration of outer space also implies the obligation of states to exercise this right without prejudice to other states. Although the use of outer space is limited to a few states (predominantly USSR and United States) many other states are involved in carrying out space experiments and exploration in certain areas. The rights of the latter states should be protected.

Article 9 of Space Treaty provides :

"States... shall conduct all their activities in outer space, including the Moon and other celestial bodies, with due regards to the corresponding interest of all other States".

Such "due regard" to other states interests constitute one of the limits of the freedom of use of outer space.

Space activities of states which infringe the right of free use and exploration of outer space, are therefore limited. The West Ford Project¹¹ is an example of such activities. This project involved the placement of a band of 350 million copper needles (diapoles) in outer space. The diapoles orbiting around the earth were meant to form a continuous belt to facilitate interception of enemy rockets and military communications. This venture resulted in world wide protest as it could interfere with scientific observations.

Another limit on the freedom of outer space is posed by the problem of pollution related to space activities and exploration.

3.4.3 FREEDOM OF OUTER SPACE AND POLLUTION

Pollution may be defined as a human alteration of the environment by the introduction of undesirable elements or by the undesirable use of elements.¹²

In relation to outer space, pollution may be divided into two categories, viz. "forward " contamination and "back" contamination. "Forward" contamination takes place through the introduction of undesirable elements into outer space

11. S.Lay and H.Taubenfeld The Law Relating to Activities of Man in Space (1970) at 18

12. Stephen Gorove "Pollution and Outer Space: A Legal Analysis and Appraisal " International Law and Politics (1972) at 53-54

by some form of human intervention. "Back" contamination arises as a result of the introduction of undesirable extra-terrestrial matter into the environment of the earth.¹³

This distinction is more of scientific than legal importance. For our purposes the following types of pollution may be noted:

3.4.3.1 Space Debris and Cluttering

According to NORAD (North American Air Defence Centre), as early as August 1970, more than 1800 objects were adrift in outer space. Of these 1400 were classified by NORAD as "Earth orbiting debris".¹⁴ This "space junk" includes satellites that no longer perform useful functions, rocket bodies, burnt out motors and discarded spacecraft. These space debris pose a serious threat to future space exploration because of the danger of collision with space vehicles. Further damage may be caused to people or property if this debris re-enters the earth's atmosphere. The West Ford Project is an example of space cluttering.

3.4.3.2 Electro-Magnetic Pollution

Radio transmitters of satellites (especially solar powered satellites) usually continue sending signals after the instrument has fulfilled its tasks. These "blind" transmissions may interfere with the radio contacts with space vehicles and active satellites and thus restrict the right of free

13. Ibid

14. Ibid at 56

use of outer space. Further since only a limited radio spectra can be used for space communications, the intense competition for the use of the available radio frequencies aggravates the problem of electromagnetic pollution.

3.4.3.3 Rocket Exhausts

The contamination of the upper atmosphere by rocket exhaust gases is another aspect of space pollution.

However COSPAR (Consultative Group On Potentially Harmful Effects of Space Experiments) which had examined reports on rocket pollution of the upper atmosphere in 1964, had reported to the UN Committee on Peaceful Uses of Outer Space that "harmful contamination of the upper atmosphere on a long term global basis is unlikely on present and expected scale of firings of super rockets and the release of experimental seeding".¹⁵

3.4.3.4 Radio-active Contamination

Nuclear experiments by US and USSR were said to have affected the Van Allen radiation belts around the

15. U.S. Senate Committee on Aeronautical and Space Sciences, staff report on "International Co-operation and organisation for Outer Space" 89 th Congress, 1 st Session Doc. No 56 (1965) 394-6; cited by Peter H.Sand "Space programmes and International Enviroment Protection" (1972) 21 ICLQ 43-60 at 48.

earth.¹⁶ These belts are important to space exploration as the radiation of these rings pose a mortal danger to astronauts. Any test which may increase the intensity of these belts will obviously influence explorations of space. However, since the 1963 Nuclear Test Ban Treaty prohibits nuclear testing in outer space, radio-active contamination may result out of earth based nuclear testing.

3.4.3.5 Biological Contamination

Biological Contamination could result from the introduction of living terrestrial organisms from earth into outer space. Also by the introduction of extraterrestrial matter into the earth's environment by returning spacecraft and astronauts . Thus we have a two way projection of contamination which will result from upsetting the balance of nature. Biological contamination could pose a direct danger to life on earth or it may result in the permanent alteration of outer space.

16. The US carried out one such test above Johnson-Island in the Pacific in July 1962. The blast of the hydrogen bomb carried out at an altitude of about 400 kilometres resulted in an artificial radiation belt which led to the widening of the Van Allen belt and alteration of the radiation situation of the earth's environment in a lasting manner. See G.Gal op cit. at 149.

3.4.4 THE CONTROL OF POLLUTION

International efforts to control space-related pollution include recommendations by COSPAR concerning planetary quarantine and sterilization procedures. However, as recommendations they lack binding legal force.

The Institute of International Law recommended that every state under whose authority a space object is launched should ensure that every such object was fitted with a suitable device permitting the launcher to recover it on the termination of its useful life, or if recovery was not feasible, steps should be taken to silence the radio transmission therefrom¹⁷.

Certain provisions of the Space Treaty as well as the Moon Treaty deal with the problem of pollution related to space activities.

Article 9 of the Space Treaty attempts to reconcile the freedom of exploration and use of outer space with the need to ensure that no adverse effects will take place as a result of such exploration and use. This article provides :

"States, Parties to the Treaty, shall pursue studies of outer space including the Moon and other celestial bodies, and conduct exploration of them so as to

17. Jenks Space Law at 280.

avoid their harmful contamination and also adverse changes in the environment of the earth resulting from the introduction of extra-terrestrial matter and, where necessary, shall adopt appropriate measures for this purpose."¹⁸

The essence of this provision is contained in Article 7 (1) of the Moon Treaty.

It is not clear what the term "harmful contamination" means. In its wider sense it could include simple pollution and sufficiently cover space debris and cluttering, electromagnetic pollution and rocket exhausts. In the narrower sense, "harmful contamination" could mean the radioactive or biological type of contamination. Further it seems that Article 9 of the Space Treaty prohibits only "harmful " contaminations. Does this mean that contamination that is not harmful is therefore permitted? Uncertainty also exists in respect of the extent of contamination that would be regarded as harmful. No mention is made of harmful contamination of the earth. These uncertainties and shortfalls of Article 9 suggest that, in keeping with the declaratory nature of the Treaty, future practice or legislation has to provide for specific rules relating to pollution.

The expression "adverse changes in the earth's environment" would include climatic changes and changes in the radiation belts of earth.

18. Emphasis added.

Although the term "harmful contamination" is not defined, to overcome this difficulty, provision is made for the duty of consultations in Article 9:

"If a state, Party to the Treaty, has reason to believe that an activity or experiment planned by it or its nationals in outer space, including the moon and other celestial bodies, would cause potentially harmful interference with activities of other state Parties in the peaceful exploration and use of outer space, including the moon and other celestial bodies, it shall undertake appropriate international consultations before proceeding with any such activities or experiment. A state Party to the Treaty which has reason to believe that an activity or experiment planned by another state Party in outer space, including the moon and other celestial bodies, would cause potentially harmful interference with activities in the peaceful exploration and use of outer space, including the moon and other celestial bodies, may request consultation concerning the activity or experiment. "¹⁹

The above provision relates to generalities. It does not state what constitutes "potentially harmful interference". This expression does, however, seem wide enough to include pollution. The Treaty also does not explain what is meant by "appropriate international consultation" or what the consequences of non-agreement at such a

19. Emphasis added

consultation would be.

Article 7 (1) of the Moon Treaty repeats in essence, the first provision of Article 9 of the Space Treaty, relating to harmful contamination and adverse changes of the earth's environment. No attempt is made to clear the uncertainty created by the latter provision.

Article 7 (2) of the Moon Treaty places a duty on states to inform the Secretary General of the UN of the measures they adopt in preventing harmful contamination of outer space and adverse changes in the earth's environment as laid down in Article 7 (1). Further advance notice has to be given to the Secretary General of placement of radio active material on the moon.

From the foregoing, which are the only provisions relating to pollution, it may be noted that the Moon Treaty, like the Space Treaty, has left the detailed regulation of pollution related to space activities, to future legislation.

3.5 PEACEFUL USES OF OUTER SPACE

Another limitation on the freedom of space is the principle of Peaceful use of outer space.²⁰ The idea that outer space should be used for peaceful purposes only, seems to have been accepted by most states. This acceptance is due largely to the preservation of world peace and state security. However the interpretation

20. See Emilio Jaksetie "The Peaceful Uses of Outer Space"

(1979) 28 The American University Law Review 483-506.

of the concept of "peaceful use" is among the most discussed subjects in space law.

3.5.1 DEFINITION OF PEACEFUL USE.

Article 4 of the Space Treaty expressly declares that the "moon and other celestial bodies shall be used by all states, Parties to the treaty, exclusively for peaceful purposes." Article 3 (1) of the Moon Treaty states:

"The moon shall be used by all States Parties exclusively for peaceful purposes".

Both these treaties, as well as the various UN Resolutions on the subject, fail to define the term "peaceful use" (or peaceful purpose). Two interpretations have however evolved. According to the first interpretation, which is supported by the United States, "Peaceful" means non aggressive. Accordingly, the use of outer space for military but non aggressive purposes is allowed. The second interpretation is that "peaceful" means non military.

In support of the first interpretation it was contended that the use of space for military purposes was necessary as a retaliatory force, to meet threats directed against the state. Thus the United States and its allies considered that each state had the right to use space for military purposes for self defence (ie in areas relating to state security) and provided such

activities were not of an aggressive nature. With the launching of the Midas Satellites the United States declared that the military activities of reconnaissance in space did not violate the principles of international law and that such activities were legal as they were necessary for self defence. Further, that these activities were not of an aggressive nature but of a "peaceful" nature and therefore fell into the category of peaceful activities.²¹

The second interpretation, viz. that "peaceful use" excludes military activities in space, was originally supported by the USSR. The adherents to this theory considered that military reconnaissance in space, even if it does not represent an act of aggression, would not be peaceful and would constitute spying. However this attitude of the USSR changed after a time and its view was more in line with the United States approach, because it wanted to reserve its rights to use space for ICBM (Intercontinental Ballistic Missile) tests.

For the reasons that follow, the second interpretation (that "peaceful" means non military) is the more acceptable approach. Firstly, the technical purpose

12. M.Matte op cit at 270.

of a particular activity may help to decide whether the activity is peaceful or not, quite apart from the lack of aggression. The peaceful nature of an activity is dependent upon the intention of promoting peaceful international co-existence.

Secondly, in two modern international treaties, the Washington Treaty on the Status of the Antarctic (1959) and the Charter of the International Atomic Energy Agency (1956),²² "peaceful" means non-military. The Antarctic Treaty declares that the Antarctic shall be used for peaceful purposes only. Article 1 of this treaty prohibits the establishment of military bases, carrying out of military manoeuvres, testing of any type of weapons, or taking any measures of military nature.

Thirdly, it may be noted that Article 4 clause 2 of the Space Treaty as well as Art. 3(1) of the Moon Treaty, each provide that the moon and other celestial bodies shall be used exclusively for peaceful purposes. Does this imply that activities in open space (i.e. other than on celestial bodies) need not be of a peaceful nature? Clause 4 of the Preamble of the Space Treaty states that the States Parties "desiring to contribute to broad international co-operation in the... exploration and use of outer space for peaceful purposes." Article 3 of the Space Treaty provides that States Parties shall carry on activities in the

22. (1957) AJIL 467.

exploration and use of outer space "in the interest of maintaining international peace and security, and promoting international co-operation and understanding". It would be contrary to these provisions to interpret peaceful as including the non-aggressive military activities (like space reconnaissance). Therefore, on the definition of peaceful uses of outer space we may conclude that 'peaceful use' means non-military use of space. No activity is peaceful if it affects the security of states. Further, space activity is peaceful if its exclusive purpose is scientific research or the exploitation of the practical results of space exploration for the benefit of all mankind.

3.5.2 DEMILITARIZATION OF OUTER SPACE

Demilitarization is the prohibition of the military fortification of a territory - in this case of outer space.²³ The fact that the "arms race" did not progress into outer space is no accidental occurrence. In this respect the efforts directed at the expulsion of nuclear weapons from outer space are worthy of mention.

Firstly, the Moscow Treaty (The Treaty Banning Nuclear Weapon Test in the Atmosphere, in Outer Space and Under Water, signed at Moscow on August 5, 1963) is an important step in the demilitarization of outer space. Nuclear

23. On demilitarization of outer space, see: Ian Brownlie

tests in outer space had to be prohibited because states realized that the effects of these tests in outer space

"The Maintenance of International Peace and Security in Outer Space" (1964) BYIL 1-31 ; United Nations
 "Impasse in Outer Space Committee Over Militarization of Outer Space" (1984) XXI(6) UN Chronicle 18-19; J. Kish 185 et seq ; Bin Cheng "The United Nations and Outer Space" (1961) CLP 272-9; H.G.Darwin
 "The Outer Space Treaty" (1967) XLII BYIL 282-3.

were contrary to the res communis omnium nature of outer space. Thus Article 1 of the Moscow Treaty provides:

"Each of the Parties to this Treaty undertakes to prohibit, to prevent, and not to carry out any nuclear weapon test explosion, or any other nuclear explosion, at any place under its jurisdiction or control: in the atmosphere, beyond its limits, including outer space; or under water ..."

Secondly, UNGA Resolution No. 1884 (XVIII) which was unanimously adopted by the UN on 17 October 1963, called on States to refrain from placing in orbit around the earth any object carrying nuclear weapons or any other kinds of weapons of mass destruction or from installing such weapons on celestial bodies.

The exact wording of this resolution was adopted by Article 4 of the Space Treaty, which further provides that the "establishment of military bases, installations and fortifications, the testing of any type of weapons and the conduct of military manoeuvres on celestial bodies shall be forbidden." This provision is repeated by Article 3 (4) of the Moon Treaty. In this respect Article 3 (3) of the Moon Treaty states:

"States Parties shall not place in orbit around or other trajectory to or around the moon objects carrying nuclear weapons or any other kind of weapons of mass destruction or place or use such weapon on the moon".

It may be noted however, that both in the Space Treaty and the Moon Treaty care is taken to specify that the use of military personnel for scientific research or for any peaceful purposes is not forbidden, nor is the use of equipment or installations necessary for the peaceful exploration of the moon and other celestial bodies.²⁴

The problem of demilitarization of outer space is a peculiar one as it involves the prohibition of military activities by an international treaty in a region which is not under the sovereignty of any state. The treaties and resolutions mentioned above have successfully banned nuclear tests in space. The Space Treaty itself declares the obligation of the peaceful purpose of space activities. However one cannot say that as a result of these treaties outer space is now totally demilitarized. The primary reason for this is that demilitarization in outer space is depended on disarmament on earth.

Further, the "partial " demilitarization of outer space also relates to the deliberate omissions in the wording of the Space Treaty, which was repeated by the Moon Treaty. Article 4 para 1 of the Space Treaty prohibits States Parties from placing in orbit around the earth or stationing on celestial bodies or in outer space objects carrying nuclear arms or any other type of weapons

24. See Article 4 clause 4 of Space Treaty, and Article 3 (4) of Moon Treaty.

of mass destruction. Para 2 prohibits military operations on celestial bodies. No mention is made of outer space. This deliberate omission seems designed to permit the use of ICBMs which cross into space for a short time. It is contended by the space powers that since these missiles (ICBMs) are not placed in orbit but that their trajectories traverse outer space for a short period, they are not banned under the Space Treaty. The counter argument to this is that the very nature of ICBM activities is irreconcilable with the use of outer space for peaceful purposes.

Another aspect related to demilitarization is the state's right of self defence. Do states have the right of self defence in outer space? State's right of self defence is recognised in international law. Article 51 of the UN Charter acknowledges this right of self defence in the case of an armed attack until the point in time when the Security Council takes the necessary measures to maintain international peace and security. If Article 51 is strictly interpreted this may give rise to problems when one considers intelligence satellites. The activities of these satellites do not directly constitute an armed attack. However, the strategic role of surveillance from outer space might turn the activities of intelligence satellites into an element of aggression. Thus a state may have the right to paralyse these satellites, if such equipment provide the necessary data which facilitate

an armed attack against such a state. The fact that no such measures have been taken thus far should not be seen as a waiver on the part of states to make use of this possibility at a later date.

To avoid unilateral actions by states against such activities, further steps should be taken to demilitarize outer space, in keeping with the objective of the peaceful use of outer space. To prevent a situation in which the necessity for self defence would arise, complete demilitarization of outer space is necessary. But as long as the possibility exists for the abuse of outer space for military purposes, the right of self defence will be considered an important part of space law.

3.6 THE LEGAL STATUS OF CELESTIAL BODIES

3.6.1 DEFINITION OF CELESTIAL BODIES

The natural objects, including the planets, stars, asteroids, meteorites, natural satellites etc., which populate outer space are referred to as celestial bodies. The myriads of celestial bodies vary in size from the micro-meteorites to gigantic stars. Are all these objects relevant to space law provisions and regulations? For the purposes of space law celestial bodies are the planets other than earth, moons, asteroids of our solar system which are suitable for the landing of manned and unmanned space vehicles, which are of natural origin and which

cannot be deviated from their celestial orbit.²⁵ Thus Article 1 (1) of the Moon Treaty provides :

"The provisions of this Agreement relating to the moon shall apply to other celestial bodies within the solar system, other than the earth, except in so far as specific legal norms enter into force with respect to any of these celestial bodies."²⁶

The reason for narrowing down the category of celestial bodies is that space jurisprudence can only concern itself with those natural objects in space that can become the scene of legally relevant actions.

3.6.2 THE APPLICABILITY OF SPACE LAW REGULATIONS TO CELESTIAL BODIES

Space law contains various principles and rules which relate to celestial bodies. Prior to the Moon Treaty, whenever any regulation wanted to expressly include celestial bodies, they are mentioned separately. E.g. the principles of UNGA Resolution No. 1721 (XVI) refer to "outer space and celestial bodies"; The Space Treaty consistently refers to celestial bodies separately wherever its provisions want to cover them.

In respect of the legal status of celestial bodies it may be noted that the following provisions of the space

25. See G Gal at 186. Also Lachs at 46-48

26. Emphasis added.

Treaty are also valid for celestial bodies and the conclusions attached to these provisions are also valid for space activities affecting celestial bodies:

- (a) The exploration and use of outer space shall be carried out for the benefit and in the interests of all countries (Article 1)
- (b) Outer space shall be free for exploration and use by all states on a basis of equality (Article 1)
- (c) Outer space is not subject to national appropriation (Article 2)
- (d) Exploration and use of outer space shall be carried on in accordance with international law, in the interest of maintaining international peace and security (Article 3)
- (e) States shall bear international responsibility for activities in outer space (Article 6)

Following the definition given by Article 1 (1) of the Moon Treaty, cited above, reference to the moon in relation to the treaty would include "all other celestial bodies within the solar system, other than the earth..."

Article 1 (3) of the Moon Treaty provides that the Treaty does not apply to extraterrestrial materials which reach the surface of the earth by natural means.

3.6.3 NON-APPROPRIATION OF CELESTIAL BODIES

We have already noted that the Space Treaty prohibits the national appropriation of celestial bodies. In this respect, Article 11 (2) of the Moon Treaty repeats Article 2 of the Space Treaty. The latter does not however prohibit the appropriation of the resources of celestial bodies.

In terms of Article 11 (3) of the Moon Treaty:

"Neither the surface nor the sub-surface of the moon, nor any part thereof or natural resources in place, shall become property of any state, international intergovernmental or non-governmental organisation, national organisation or non-governmental entity or of any natural person."

Thus there may be no proprietary right over the surface or sub-surface of celestial bodies. Reference is made to "natural resources in place". This would imply that once the natural resources are removed from the place of origin they would become the property of the states concerned. However the position is not so straight forward. The closing sentence of Article 11(3) of the Moon Treaty provides that the "foregoing provisions are without prejudice to the international regime referred to in para 5 of this Article."

The international regime referred to is a consequence of the "common heritage of mankind" principle. (See below)

A further provision in Article 11 (3) of the Moon Treaty has the effect that the placement on celestial bodies, of personnel, space vehicle, equipment, and other installations creates no right of ownership over the surface, or sub-surface of celestial bodies or any area thereof.

3.6.4 THE "COMMON HERITAGE OF MANKIND" PRINCIPLE AND THE EXPLOITATION OF CELESTIAL BODIES

Article 11 (para 1) of the Moon Treaty provides that:

"The Moon and its natural resources are the common heritage of mankind."

It is submitted that the "common heritage" principle does not immediately affect the exploitation of celestial bodies.²⁷ However when exploitation on a large scale basis is feasible, say, on the moon, an international regime will become necessary. Such international regime will be created by the parties to the Moon Treaty. Thereafter, benefits from such exploitation of celestial bodies

27. See Bin Cheng "The Moon Treaty: Agreement Governing the Activities of States on the Moon and other Celestial Bodies within the Solar System other than the Earth, December 18, 1979" (1980) Current Legal Problems 213-37

will be shared by States Parties, on an equitable basis.

Thus until the time when "large scale" exploitation of celestial bodies becomes feasible, the res communis omnium nature of celestial bodies permits exploitation.²⁸

3.6.5 DEMILITARIZATION OF CELESTIAL BODIES

Article 4 of the Space Treaty prohibits the following activities:

- (a) placing nuclear weapons on any other kinds of weapons of mass destruction on celestial bodies.
- (b) establishment of military bases, installations and fortifications on celestial bodies.
- (c) testing of any type of weapons on celestial bodies.
- (d) conducting military manoeuvres on celestial bodies.

Over and above these specific prohibitions, the Space Treaty provides that the "Moon and other celestial bodies shall be used by all States Parties to the Treaty, exclusively for peaceful purposes".

Article 3 of the Moon Treaty repeats, the provisions of Article 4 of the Space Treaty as set out above. Neither the Space Treaty nor the Moon Treaty deals with the right of self defence on celestial bodies.

28. Refer to Chapter 8 : After the Conquest of the Moon.

The arguments dealt with under demilitarization of outer space are also relevant here.

3.6.6 SPACE DEVICES AND STATIONS ON CELESTIAL BODIES

Although no research stations have been established as yet on the moon or other celestial bodies, technical advances in space sciences make this a possible reality in the near future. The Space Treaty set out the main principles relating to such stations that may be established on celestial bodies.²⁹

Article 8 provides that States Parties, on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object (i.e. including a space station), and over any personnel thereof, while in outer space or on a celestial body.

Article 12 of the Space Treaty deals specifically with space stations on the moon and other celestial bodies, and provides that these "shall be open to representatives of other States, Parties to the treaty, on a basis of reciprocity". However, advance notice must be given of a projected visit in order to assure safety and to avoid interference with the normal operations of the stations. Article 12 of the Moon Treaty has a similar provision.

29. Freedom of access to all areas of celestial bodies confers on all states the right to establish stations

In terms of Article 9 of the Moon Treaty, manned and unmanned stations may be established on celestial bodies, subject to the following conditions:

- (a) only the area required for the station may be used;
- (b) immediate notification of the location and purpose must be given to the Secretary-General of the UN;
- (c) an annual report must be made to the Secretary General; and
- (d) the stations shall be installed in such a manner that they do not impede other States right of free access to all areas of the celestial body.

and installations to conduct experiments. In this context doubts were expressed whether proprietary rights are really barred on celestial bodies. It was suggested that movable objects "attached to celestial bodies would become immovables", which "grants the state to which they belong a right to the "soil" of the celestial bodies or at least a right to the surface." Thus it is contended that "we arrive at an ownership by technical and industrial occupation, without giving it a name". M. Matte at 313 et seq; also Lachs at 52-3 note 30. There is the problem also that the establishment of permanent stations of which states made exclusive use would constitute proprietary rights implying "national appropriation" of that part of the celestial body on which the stations are set up.

CHAPTER 4

THE LEGAL STATUS OF
ASTRONAUTS AND SPACE OBJECTS

4.1 DEFINITION OF SPACE OBJECTS

Among the vast array of objects covered by the term¹ "space objects" are: artificial satellites,² space rockets,³ artificial planets,⁴ spaceships,⁵ space stations,⁶ space platform⁷ and space probes.

Although the Space Treaty does not define the term "space objects" it uses this term to indicate objects "launched⁸ into outer space" or objects "placed into orbit around

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1. Man-made objects placed in orbit around the earth, sun or another planet. See (1974) Dictionary of Scientific and Technical Terms, at 97.
 2. Rockets launched for space exploration. Ibid
 3. Man-made objects orbiting the sun- a type of satellite, see G.Gal at 207.
 4. Devices, manned and unmanned, which are designed to be placed into an orbit about the earth or into a trajectory to another celestial body. Supra note 1.
 5. An autonomous, permanent facility in space for the conduct of scientific and technological research. Ibid.
 6. A type of high capacity artificial satellite enabling repair and refuelling in space. Ibid.
 7. An instrumented vehicle, designed specifically for flight missions to other planets or the moon and into deep space. Supra note 1.
 8. Articles 7 and 8 of the Space Treaty.

the earth ".⁹ The lack of a specific definition in the international space treaties, of the term "space object", is largely attributable to the unpredictability of future developments in space technology which may render the definition inadequate or useless.

Manfred Lachs suggests the following definition:

a space object is "any object designed :

1. to be placed :

(a) in orbit as a satellite of the earth,
the moon, or any other celestial body;

(b) on the moon or any other celestial
body;

2. to traverse some other course to, in or through

outer space".¹⁰ The Convention on Registration of
¹¹
objects launched into outer space provides that the term
"space object includes component parts of a space
¹²
object as well as its launch vehicle and parts thereof.

From the above provisions it is apparent that in designating a particular object a space object, its purpose and location are of greater importance than its design or technical abilities.

9. Article 4 of the Space Treaty

10. M. Lachs The Law of Outer Space at 69

11. For text see (1974) 28 YUN at 63-4.

12. Article 1 para (6)

4.2 ASTRONAUTS AND SPACE PERSONNEL

The various international treaties in space law refer to "astronauts" and "space personnel" of spacecraft. Article 5 of the Space treaty declares that States Parties "shall regard astronauts as envoys of mankind in outer space". Article 8 refers to "personnel" of states' space objects. The Rescue Agreement¹³ mentions "personnel of a spacecraft" (Articles 2; 3; and 4). The Moon Treaty also refers to "personnel" in Article 12.

These terms refer to all persons aboard a space vehicle or space station and include all persons in control of a space vehicle, as well as those who perform other functions, like scientific tasks. With the advent of the space shuttle, the possibility exists that passengers may be carried into outer space. In the absence of specific provisions dealing with such space passengers, the term "personnel" may be extended to include them.

4.3 REGISTRATION OF SPACE OBJECTS

The Space Treaty attaches serious consequences to the international registration of space objects. Article 8 provides that jurisdiction over an object launched into outer space shall be retained by the state on which it is registered. What is the state of registration and how does the system of international registration of space

13. Full title: Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched

objects operate?

These questions, *inter alia*, were dealt with by the Convention on Registration of Objects Launched into Outer Space, which was adopted unanimously by the UNGA on 12 November 1974.¹⁴

4.3.1 THE DUTY OF REGISTRATION

The expression "State of registry" means a launching state on whose registry a space object is carried (Article 1 provision (c)). Paragraph 1 of Article 2 provides that "when a space object is launched into earth orbit or beyond, the launching state shall register the space object"... Further "launching state" means a state which launches or procures the launching of a space object, or from whose territory or facility a space object is launched (Article 1)

It may be noted that the launching state has a duty to register a space object when such object is launched into earth orbit or beyond. This provision adheres to the functional approach of space law and implies that objects that do not enter into outer space do not require registration.

into Outer Space. For text see (1967) YUN 34-5

14. See (1974) 28 YUN at 63

4.3.2 JOINT LAUNCHING

Where there is more than one launching state in respect of a particular space object, the launching states "shall jointly determine which one of them shall register the object" (Article 2 para 2). This may entail a bilateral or multi-lateral agreement between the launching states. Such an agreement would take into account the aspects of jurisdiction and control of such state as set out in Article 8 of the Space Treaty.

4.3.3 THE SYSTEM OF REGISTRATION

The Convention on Registration provided for a dual system of registration of space object.

On the first level, registration takes place at a national level, i.e. by the state of registry. Such a state has to "register the space object by means of an entry in an appropriate registry which it shall maintain" (Article 2 para 1). The states of registry also determine the contents of each registry and the conditions under which it is maintained (Article 2 para 3).

On the second level, registration is carried out at an international level. In this instance the Secretary-General of the UN maintains a register which records the information provided by states of registry in respect of the individual launching. The state of registry

has to furnish the following information pertaining to the space object that is launched (Article 4):-

1. name of launching state or states
2. registration number of object
3. date and location of launch
4. basic orbital parameters including nodal period, inclination, apogee and perigee
5. general function of the space object.

4.3.4 INTERNATIONAL INTERGOVERNMENTAL ORGANIZATIONS AND REGISTRATION.

International intergovernmental organizations can assume rights and obligations under the Registration Convention provided:

- (a) it makes a declaration accepting such rights and obligations, and
- (b) if a majority of its members are parties to both the Space Treaty and the Convention on registration .

These provisions are set out in Article 7 of the Convention (on registration) which follows Article 22 of the Liability Convention.

4.3.5 STATES' RIGHT TO ASSISTANCE UNDER THE CONVENTION

Article 6 provides for situations where, in spite of the provisions of the Convention, a State Party is unable to identify a space object which has caused damage

or poses a potential danger. In such cases a State Party affected may request other State Parties to assist in the identification of such objects. This affords the affected State Party the use of other states tracking and monitoring facilities.

4.4. JURISDICTION OVER SPACE OBJECTS AND ASTRONAUTS

Unlike the legal order of the "law of the flag"^{14a} applicable to ships on the high seas, or any form of territorial sovereignty, space objects remain under the jurisdiction of the state on whose registry they are carried.

Article 8 of the Space Treaty provides:

"A state, Party to the Treaty, on whose registry an object launched into outer space is carried shall retain jurisdiction and control over such object, and over any personnel thereof, while in outer space or on a celestial body".

Thus the exercise of jurisdiction is based on registration and the location of the space object "in outer space or on a celestial body".

Even if a space object is launched by a private enterprise, it exercises its functions under the jurisdiction, control and responsibility of the registering state.

14a. See Lotus case, PCIJ series A, No. 10 1927 p25.

The use of the words "jurisdiction and control" in Article 8, indicates that only the state of registry can influence the operation of the space object. Other states have no right to interfere with the directions and supervision of the object.

Article 12 (1) of the Moon Treaty provides:

"States Parties shall retain jurisdiction and control over their personnel, space vehicles, equipment, facilities, stations and installations on the moon".

The Moon Treaty does not state, however, what is meant by a "state's personnel". The interpretation of these words to mean a state's nationals would be contrary to the legal order set out in the Space Treaty. It would be in keeping with the latter to infer that jurisdiction over such personnel lies with the state of registry of the vehicle. One may then ask what happens when astronauts are no longer part of the personnel of a space vehicle? To whose jurisdiction and control would they be subject? Do they revert to the jurisdiction of his national state?

From the very nature of outer space and space activities, astronauts cannot leave the space ship or space station for a long period of time due to the constraint of survival. Thus where the astronaut leaves one space object and becomes part of the personnel of another (e.g. a space

station) he is then subject to the jurisdiction of the state of registry of the latter.

Aboard a space ship, the legal order (i.e. statutes and laws) of the state of registry shall govern. This is in keeping with the law of the flag of ships on the high seas.

4.5 RECOVERY AND RETURN OF SPACE OBJECTS

One of the consequences of space activities is the risk of space objects, or fragments thereof, falling on territory under the jurisdiction of another state or in a place not under state jurisdiction, like the high seas. Not only do these occurrences make it imperative for rules relating to liability for damages arising therefrom, but also rules relating to the recovery and return of such space objects. Both the Space Treaty and the Rescue Agreements provide for specific rules in this respect.

At the outset, the following provision of the Space Treaty may be noted:

"Ownership of objects launched into outer space, including objects landed or constructed on a celestial body, and of their component parts, is not affected by their presence in outer space or on a celestial body or

by their return to the Earth ".

The Space Treaty (Article 8) and the Rescue Agreement (Article 5) place certain obligations on States Parties, in respect of space objects that have returned to earth in alien territory.

4.5.1 DUTY OF NOTIFICATION

In terms of para 1 of Article 5 of the Rescue Agreement each State Party which receives information that a space object or its component parts have returned to the earth in territory under its jurisdiction or on the high seas or in any other place not under the jurisdiction of any state, has a duty to notify the launching authority and the Secretary-General of the UN.

4.5.2 OBLIGATION TO RECOVER THE SPACE OBJECT

Where a space object is found in territory under the jurisdiction of another state, such state has a duty to take such steps as it finds practicable, to recover the object or its component parts. However this obligation only arises if the launching authority of the space object in question, requests such recovery. The state concerned may request assistance from the launching authority.

4.5.3 RETURN OF SPACE OBJECTS

In terms of Article 8 of the Space Treaty:

"... objects or component parts found beyond the limits of the state, Party to the Treaty, on whose registry they are carried shall be returned to that State Party which shall, upon request, furnish identifying data prior to their return".

Para 3 of Article 5 of the Rescue Agreement repeats the wording of the above provision.

Thus, the claim of the launching authority (referred to in the above provision as the "state of registry") must be substantiated by providing "identifying data". The data used in registration of space objects under the Convention on Registration of objects launched into outer space, would be sufficient identification.

The obligations of the state on whose territory the object launched is found, may be discharged by the return of the object to the launching authority, or by holding it at the disposal of persons duly authorized to collect it.

The Rescue Agreement also provides that expenses incurred by such a State in the recovery and return of the space object, must be reimbursed by the launching authority (para 5 of Article 5).

4.6 RESCUE AND RETURN OF ASTRONAUTS

Several of the international treaties in space law deal with assistance to, and the rescue and return of astronauts.^{14b}

4.6.1 PROVISIONS OF THE SPACE TREATY

Para 1 of Article 5 states that:

"States, Parties to the Treaty, shall regard astronauts as envoys of mankind in outer space and shall render to them all possible assistance in the event of accident, distress, or emergency landing on the territory of another State Party or on the high seas. When astronauts make such a landing, they shall be safely and promptly returned to the State of registry of their space vehicle."

Further to the obligations contained in the aforementioned provision, Article 5 also lays down the obligation of assistance among astronauts themselves:

"In carrying on the activities in outer space and on celestial bodies, the astronauts of one State Party shall render all possible assistance to the astronauts of the other State Parties." (Para 2)

Para 3 of Article 5 places a duty on States Parties to inform other States Parties or the Secretary-General of the UN, of any phenomena they discover in

14b. See R.C.Hall "The Rescue and Return of Astronauts on

outer space which could constitute a danger to the life or health of astronauts. This duty is imposed not only on space powers but on all States Parties, who must provide information on observing anything that may affect manned space flights.

4.6.2 PROVISIONS OF THE RESCUE AGREEMENT

When the "personnel of a spacecraft have suffered accident or are experiencing conditions of distress or have made an emergency or unintended landing "¹⁵ in the territory under the jurisdiction of a state, on the high seas or in any other place not under the jurisdiction of any state, the following obligations are imposed on contracting parties to the Rescue Agreement: duty of notification ; assistance to and rescue of astronauts; and the "safe and prompt" return of the astronauts. An examination of each follows.

4.6.2.1 Duty of Notification

A state which receives information, or discovers that one of these events (i.e. the accident, distress, emergency or unintended landing) has a duty to immediately notify the launching authority. When the launching authority cannot be identified, e.g. if a space object is spotted in an inaccessible area ¹⁶, such a state

Earth and Outer Space" (1969) 63 AJIL 197-210.

15. Article 1 of Rescue Agreement

16. See Lachs Law of Outer Space (1972) at 80

has to make a public announcement by all appropriate means at its disposal. Notification must also be sent to the Secretary-General of the UN who has to disseminate the information.

4.6.2.2 Assistance to and Rescue of Astronauts

Firstly, when the personnel of a spacecraft land in territory under the jurisdiction of a Contracting Party, owing to accident, distress, emergency or unintended landing, the Contracting Party has a duty to take all possible steps to rescue them and to render them all the necessary assistance. It must also inform the Secretary General of the UN and the launching authority of the steps it is taking and their progress.¹⁷

It is possible that the means of the particular Contracting Party may not be sufficient to effect the rescue of the astronauts. Article 2 therefor provides for the co-operation of the launching authority in the rescue operations. The launching authority has to, however, co-operate with the state conducting the rescue operations on the basis of its territorial jurisdiction.

Secondly, if the accident or emergency occurs on the high seas or in any other place not under the jurisdiction

17. Article 2 of Rescue Agreement. Emphasis added.

of any state, the search and rescue operation must be carried out by those Contracting Parties that are in a position to do so. This obligation arises when they receive information or discover the emergency landing. The object of this provision is to effect the swift rescue of the astronauts in distress. There again the States assisting must inform the launching authority and the Secretary-General.

4.6.2.3 The Return of Astronauts

Once the astronauts are found and rescued, they must be "safely and promptly" returned to the representatives of the launching authority.¹⁸

4.6.3 PROVISIONS OF THE MOON TREATY

Article 10 para 1 provides that States Parties shall adopt all practicable measures to safeguard the life and health of persons on the moon and treat them in accordance with the Astronauts Agreement.

In terms of para 2 of this Article, States Parties shall offer shelter to persons in distress on the moon in their lunar facilities.

18. Article 4 of Rescue Agreement.

In the event of an emergency involving a threat to human life, States Parties may use the facilities of Other States Parties on the moon. Prompt notification thereof shall be made to the Secretary-General of the UN and the State Party concerned.¹⁹

In respect of accidents, Article 13 provides:

"A State Party which learns of the crash landing, forced landing or other unintended landing on the moon of a space object, or its component parts, that were not launched by it, shall promptly inform the launching State Party and the Secretary-General of the United Nations."

*

These international agreements are the initial steps that provide a basis for international co-operation serving to protect astronauts. Detailed and specific rules, in the form of multilateral agreements, may come about when the need arises in the future.

19. Article 12(3) of the Moon Treaty.

CHAPTER 5

LIABILITIES FOR DAMAGES IN SPACE ACTIVITIES

5.1 POSSIBLE CLAIMS FOR DAMAGES

Advancement in space technology increases the probability of occurrences that may give rise to international claims for damages. The advent of carrier rockets and the Space Shuttle, which is capable of lifting several satellites simultaneously, poses a considerable risk of damage to persons and property.

At this point it would be advantageous to consider some of the occurrences which may give rise to international claims for damages resulting from space activity.

5.1.1 FALLING BOOSTERS, SPACECRAFT AND DEBRIS

Contrary to the expectations of some scientists that boosters, fragments and parts from space vehicles sent into orbit or placed beyond the atmosphere will burn up in the atmosphere prior to reaching earth unless designed specifically for re-entry, experience shows that some fall back to earth as solid pieces of metal.¹ During 1979 the American space laboratory,

1. Fragments of an American navigation satellite fell in Oriente Province in Cuba, New York Times, December 2 1960, cited by Lay & Taubenfeld The Law Relating to Activities of Man in Space(1970) at 137. Pieces of the second stage of an Atlas - Able launched vehicle found on a farm in Transvaal, South Africa on September 25, 1960, *ibid.*

Skylab², fell to earth. The Cosmos 954³ incident resulted in Canada presenting a claim for damages to the USSR.

With the increase in the number of objects placed in space, the risk of damage from falling debris also increases.

5.1.2 COLLISIONS

Given the vastness of air space and outer space, the probabilities of collisions occurring between space craft or between aircraft and spacecraft, seem remote. However one such incident has already been reported by an American Scientist who described a collision at the Seventeenth International Astronautical Congress in Madrid in October 1966. Eight Satellites had been placed in orbit by a single rocket on March 9, 1965; about a month later, two of them brushed together

2. Space station Skylab re-entered the earth's atmosphere on July 11, 1979, after 6 years in orbit. As its orbit rapidly decayed in the final weeks, flight controllers influenced the space station to enter the atmosphere while it was over low density population area on the earth. Skylab enter the atmosphere and broke up over Western Australia with no injury or property damage. Several large fragments survived re-entry and were recovered. See (1981) Yearbook of Science and the Future at 383.

3. See Galloway "Nuclear Powered Satellites: The USSR Cosmos 954 and the Canadian Claim" (1979) 12 Akron Law Review Dembling "Cosmos 954 and the Space Treaties"(1978) 6

but with only slight damage⁴.

5.1.3 POLLUTION

Pollution involves the introduction of substances capable of causing damage or undesired change by other than normal impact or fire⁵.

Pollutants may include micro-organisms, biological products, chemicals, radio-active debris, or other matter not found at a particular place except through the action of man. Claims, which may be in addition to or separate from those for impact damages, may arise for specific damages caused by pollution introducing micro-organisms to earth or to a celestial body, might upset the balance of nature in such a way so as to have lasting and unpredictable consequences. Nuclear radiation is also a possible contaminant.

Increasing ability to move about in space will carry the risks of damage from all types of pollution to celestial bodies and activities which may be centred there.

Journal of Space Law at 29.

4. "Washington Post", 11 October 1966, Section A at 1, cited by Lay & Taubenfeld op cit 140. See also Manfred Lachs op cit at 128. note 5.
5. Jenks, The International Law of Outer Space (1962) 167-74.

The ambit of the present chapter relates to the first two occurrences referred to above⁵.

5.2. THE DEVELOPMENT OF INTERNATIONAL SPACE LAW RELATING TO DAMAGES

The subject of liability for damage caused by objects launched into space⁶ initially came before the Legal Sub-Committee of the UN Committee on the Peaceful Uses of Outer Space in 1962. Article 7 of the Space Treaty contains the nude provision that states launching objects into space are "internationally liable" for damage caused. Article 6 of the Space Treaty deals with the problem of imputability in respect of liability that may arise for space activities. These principles

5. The problem of pollution is discussed under "Freedom of Space" (chapter 3).
6. See generally: Foster "The Convention on International Liability for Damage Caused by Space Objects" (1972) Canadian Yearbook on International Law 137 et seq; Wilkins "Substantive Bases of Recovery for Injuries Sustained by Private individuals as a Result of Fallen Space Objects" (1978) 6 Journal of Space Law 164-9; Carl Q Christal "International Liability for Damage Caused by Space Objects" (1980) 74 AJIL 346-71; Lay & Taubenfeld, see note 1 supra at 137 et seq.

have now been elaborated into a detailed set of rules in the Convention on International Liability for Damage Caused by Space Objects. This Convention is regarded as being claimant orientated.⁷

Further to the provisions of these treaties, International Case Law has established the duty to avoid causing damage to other states and to natural persons, as well as the duty to pay for damage. In the Corfu Channel case⁸, the International Court of Justice held that there is an obligation on every state "not to allow knowingly its territory to be used for acts contrary to the rights of other states."⁹ The Trail Smelter arbitration

7. Carl Q Christol, *supra* note 6, op cit 351. The Convention, which is the work of the Committee on the Peaceful Uses of Outer Space, was commended by the UNGA on 29 November 1971 in Resolution 2777 (XXVI), opened for signature on 29 March 1972, and took effect on 1 September 1972; see (1971) 25 YUN at 52.

8. (1949) ICJ Reports 4, see (1949) 43 AJIL 558

9. *Ibid* at 22 of ICJ Reports.

10. For discussion of the principle in the Trail Smelter arbitration see R Soni, *supra* at chapter 1 note 16, 182-95.

See also D.J.Harris, *supra* chapter 1 note 12, 230-4.

reiterated this principle and further set out the duty to pay monetary damages for identified harm to property.

The 1979 Moon Treaty appears to rely on the rules for liability found in the Liability Convention. However the Moon Treaty recognises the need for more detailed arrangements as the activities on the moon become more extensive.

5.3. DEFINITION OF DAMAGE

For the purposes of the 1972 Liability Convention, damage means "loss of life, personal injury or other impairment of health; or loss of or damage to property of states or of persons, natural or juridical, or property of international intergovernmental organisations." (Article 1)

Nuclear damage is also covered by the Convention. Such damage maybe caused by a nuclear space device or by a space object damaging a nuclear installation.¹¹

In respect of damage we may differentiate between direct and indirect damages. Direct damage may result from the collision of a space object with a person or object outside any space activity, or from the collision of two

11. B.Cheng "Liability for Spacecraft" (1971) Current Legal Problems 230.

space objects. Indirect damage may result from secondary consequences of space activities.

The four kinds of harm set out in Article 1 of the Liability Convention (loss of life etc.) are all within the direct damages category. The question that has been raised is whether the Liability Convention covers indirect or consequential damages. The use of the words "damage caused by " may be interpreted as providing that only a direct hit by space debris would allow for recovery of damages. A more reasonable view would be to allow for additional consequences produced by the initial hit. Thus the expression "caused by" would allow for recovery of both direct and indirect damages. The vital point seems to be that there "must be proximate causation between the damage and the activity from which the damage resulted."¹²

The geographical scope of Liability Convention is universal in that it covers damages caused by space activity on the surface of the earth (i.e. on the land and water territories of states, on the high seas) as well as "elsewhere than on the surface of the earth(i.e. in outer space in the air space of states and in the air space above the high seas).

12. S. Gorove "Cosmos 954: Issues of Law and Policy" (1978) 6 Journal of Space Law 141, cited by Christol *supra* note 6, op cit at 362

5.4. SUBJECTS OF LIABILITY

The principle of State Liability for damages arising out of space activity has been accepted under the Convention. Responsibility for damage lies with the "launching state". The term launching state refers to:

- (a) A state which launches or procures the launching of a space object;
- (b) A state from whose territory or facility a space object is launched.¹³

Now one may ask: are international organisations subjects of liability? Can they be held liable for damages arising out of space activity? Prior to any international treaty - provisions on these questions, some states (including the U.S.A and Australia) supported the view that international organisations should be recognised as having separate personality from their member states. During the UN discussions on proposals for an agreement on liability for damages, these states felt that an international organisation should not be bound by such an agreement unless it made a declaration accepting the agreement¹⁴. In this respect the Rescue Agreement was cited as a guide.

13. Article 1 (c) of The Liability Convention.

14. See Belgian Draft, of Liability Agreement, UN document, A/AC 105/C.2/L7/Rev 3, Article 6. See Bin Cheng, *supra* at note 11, at 223 note 39.

On the other hand, USSR and other Socialist states denied that international organisation had an existence separate from the members and maintained that the fact that a state conducted its space activities merely as a member of an international organisation made no difference to its obligations under an agreement on liability for damages.¹⁵

As a counter argument to the Soviet view one may refer to the Advisory Opinion on Reparation for Injuries Suffered in the Service of the United Nations¹⁶ which fully demonstrates the possibility of international organisations acquiring legal personality.

Let us now look at the international treaty provisions on the subject of liability for space activities.

The Space Treaty provides that both the international organisation and the states participating in it shall be responsible for the activities of the organisation and that any problem arising out of such activities shall be resolved either with the international organisation or the states participating in it.¹⁷

15. Bin Cheng supra note 11, op cit at 223.

16. (1949) ICJ reports 174. See L.C.Green International Law through the Cases (1970) 157-65.

17. Articles 6 and 13 of Space Treaty.

The 1968 Agreement on the Rescue and Return of astronauts provides that international organisation can assume the rights and liabilities of the "launching authority" :

- (a) If it makes a declaration accepting such rights and
- (b) If a majority of its members are parties to both the Space Treaty and the Rescue Agreement

The Liability Convention follows the Rescue Treaty in that Article 22 provides that an international organisation can assume rights and liability arising under the Liability Convention if it makes a declaration accepting such rights and obligations, and a majority of its members are parties to the Space Treaty and the Liability Convention.

Thus both states and international organisations (providing the above requirements are met) are legal subjects that may be internationally liable for damages arising out of space activities.

5.5 BASIS OF LIABILITY

Under various civil laws, including South African law, there are basically two types of liability, namely: liability based on fault and absolute liability¹⁸

18. See generally R.G. McKerron The Law of Delict (1971) 11 et seq; also J.C. Van Der Walt Delict: Principles

In the case of liability based on fault, the existence of culpable conduct in the form of intention or negligence must be proved. However under absolute liability (i.e. liability independent of intention or neglect) the mere fact that the damage involves the liability of the person causing the damage (causal link) is sufficient.

The basic frame work of the Liability Convention is such that it provides for either absolute liability or liability based on fault.

The Liability Convention applies to damage arising in four situations:

Case 1 : where damage is caused by the launching state's space object on the surface of the earth or to an aircraft in flight.

In this instance the liability of the launching state is absolute (Article 2). The application of the principle of absolute liability implies that "the occurrence of the event causing the damage shall create a liability for compensation once proof has been given that there is a relationship of cause and effect between the damage, on the one hand, and the launching, motion or descent of all or part of the space device on the other hand."¹⁹

and Cases (1979) 60 et seq.

19. Article 1 of the Belgian draft of Liability Convention cited by G Gal at 245.

However there is one exception to the principle of absolute liability : where the damage has resulted "either wholly or partially from gross negligence or from an act or omission done with intent to cause damage on the part of a claimant state or of natural or juridical persons it represents" the launching state is exonerated from absolute liability. (article 6(1)) This exception does not however apply where the damage results from activities being carried out which are contrary to international law. (Article 6(2))

The exoneration from absolute liability does not apply where the damage has resulted from natural disaster²⁰. The reasoning behind this is: had the particular space activity (that resulted in the damage) not been carried out, there would have been no damage.

Case 2 : Where damage is caused by the launching state's space object to the Space Object of another launching state elsewhere than on the surface of the earth.

In this case liability for damage is based on fault (Article 3).

20. The Hungarian Draft of the Convention allowed for exculpation when damage has resulted from natural disaster. However in 1968 Hungary withdrew this exception of natural disaster. B Cheng, supra note 11, op cit at 233.

Case 3 : Where damage is caused to a third state on surface of the earth or to an aircraft in flight.

In this case the damage to the third state is as a result of one state's space object colliding into another. Liability of the launching state is absolute (Article 4 (1a)). The exoneration from absolute liability laid down in Article 6(1) and referred to in case 2 above, also applies here. Here again there would be no exoneration from liability if damage results from activities that are contrary to international law.

Article 4(1) provides for joint and several liability of the first two states in compensating the third state for damages. Further, the burden of compensation must be apportioned to the extent to which they were at fault. If the extent to which each of the first two states were at fault, cannot be established then the burden of compensation shall be apportioned equally (Article 4 (2)).

Case 4 : Where damage is caused to a third state's space object elsewhere than on the surface of the earth.

Here too the damage to the third state's space object is as a result of one state's space object causing damage to another state's space object. As in case 2 the liability of the launching state is based on fault. (Article 4(1b)).

Further, as in case 3 , the first two states are jointly and severally liable to the third state. The provisions in respect of apportionment of burden of compensation set out in Article 4(2) is applicable in this case as well.

5.6. JOINT LIABILITY

Joint and several liability of launching states has already been referred to above under case 3 and case 4, however Article 5 of the Liability Convention provides for cases where two or more states jointly launch a space object. In case of damage caused by such launching, the states shall be jointly and severally liable.

A state whose territory or facility is used for the launching of a space object is considered a participant in the joint launching of that space object. (Article 5(3)) Consequently the state whose territory or facility is used would be jointly and severally liable together with the launching state for damage caused.

In the cases of joint and several liability, where one of the launching states has paid compensation for damage, it has the right to claim for indemnification from the other participants to the joint launching.

Since the state lending its territory or facility runs the risk of joint and several liability, there may be

a reluctance to allow such use of territory or facilities. This would definitely restrict development of space activities. However provision is made under Article 5 for participants in a joint launching to conclude agreements regarding the apportionment of "the financial obligations" that they may be liable for in respect of damages. Thus it may be to the advantage of the state whose territory or facility is used to require an undertaking from the launching state, for complete responsibility for damage that may arise. However such agreements would not affect the rights of the claimant state.

5.7. PRESENTATION OF CLAIMS

5.7.1. WHO MAY PRESENT A CLAIM ?

- (a) A state that suffers damages directly may present a claim.
 - (b) A state may present a claim for damage suffered by its natural or juridical persons.
 - (c) Where a state of nationality does not present a claim, the state in whose territory damage was sustained (by natural or juridical persons) may present a claim.
 - (d) A state may present a claim for damages sustained by its permanent residents provided that the state of nationality or the state in whose territory the damage was sustained, have not presented a claim or notified its intention to present one.
- (Article 8)

In all these cases the claim for damages must be presented to the launching state. However no claim may be presented under the Liability Convention in respect of the nationals of the launching state whose space object caused the damage, as well as foreign nationals participating in the operation of such space object (Article 7).

5.7.2. DIPLOMATIC CHANNELS

Claims for compensation are to be presented through the normal diplomatic channels. A claimant may however request another state to present its claim and otherwise represent its interests if it does not maintain diplomatic relations with the launching state concerned. (Article 9)

5.7.3 TIME LIMIT

Claims for compensation must be presented within one year of the occurrence of the damage or identification of the launching state which is liable, or if a state is unaware of the occurrence of damage or is unable to identify the launching state, the claim must be presented within a year of learning of such facts.

5.7.4 LOCAL REMEDIES

There is no obligation for a state to exhaust any domestic remedies before presenting a claim, although it is not

prevented from pursuing a claim in the national courts of the launching state. However the claimant shall not be entitled to pursue claims under the Liability Convention in respect of the same damages for which a claim is being pursued in the national courts of the launching state.

5.8 THE COMPENSATION DUE

During the formulation of the Liability Convention the United States maintained that any international agreement on liability for damages would have to contain a "meaningful statement as to the standards to be applied to evaluate losses suffered and the amount of compensation to be paid. Ideally, to the extent that money can ever adequately compensate for injury, the objective must be to restore a claimant to the condition existing prior to the injury."²¹ The view of the United States accepts the principle of international law identified in the Chorzow Factory opinion²², according to which reparation for unlawful conduct "must, as far as possible, wipe out all the consequences of the illegal act and re-establish the situation which would, in all probability, have existed if that act had not been committed."²³ Thus in terms of Article 12 of the Liability Convention the compensation which the launching state shall be liable to pay shall be determined in accordance with

21. Reis "Some Reflections on the Liability Convention for Outer Space" 6 Journal of Space Law (1978) 126, cited by Christol *supra* note 6, op. cit. at 352.

22. PCIJ (1928) series A No. 17 at 47, see L.C.Green 612 -23

23. Ibid

international law and the principles of justice and equity in order to provide such reparation in respect of damage as will restore the person on whose behalf the claim is brought to the condition which would have existed if the damage had not occurred. Here we find that restitutio in integrum is required.

The Liability Convention does not provide for limitation of the liability of the launching state for damages caused. Liability is thus unlimited.

5.9 SETTLEMENT OF CLAIMS BY ARBITRATION

If no settlement is reached through the diplomatic channels, within a year of presenting the claim, either party (claimant or launching state) may request the establishment of a Claims Commission.

The Claims Commission shall be composed of three members: one member appointed by each of the parties and a chairman appointed jointly.

The Commission shall decide the merits of the claim for compensation and determine the amount of compensation payable, if any (Article 18)

The determination of the amount of compensation due shall be in accordance with international law and the principles of justice and equity, and where restitutio in integrum is required.

Is the decision of the Commission binding? In the course of discussion of the Legal Sub-Committee on the Peaceful Uses of Outer Space, during 1970 Bulgaria, Hungary, Poland and USSR, inter alia, opposed the concept of "binding arbitration" on the grounds that "such an approach would be tantamount to an infringement of the sovereignty of states, since, under the Outer Space Treaty, states bore the final responsibility for all national activities in outer space."²⁴

The Liability Convention provides that the decision of the Claims Commission is final and binding if the Parties have so agreed; otherwise the decision shall be regarded as a recommendation which the Parties shall consider in good faith (Article 19).

5.10 INTERNATIONAL INTERGOVERNMENTAL ORGANIZATIONS

That international intergovernmental organizations can assume rights and obligations of the launching state, has already been discussed under the heading "Subjects of Liability".

24. (1970) 24 YUN 44

Article 22 provides that where an international organization is liable under the Convention, the organization and its member states are jointly and severally liable. However, any claims must be presented to the organization first. Only where the organization has not paid within six months the sum agreed as compensation, may the claimant present its claim to the member states of the organization.

The position is different where the organization wishes to bring a claim for damages due to itself. In this case the claim is to be brought, not by the organization, but by one of its member states.

5.11 DUTY TO RENDER ASSISTANCE

Article 21, the provisions of which are similar to but wider than Article 5 (4) of the 1968 Treaty, provides that States Parties shall, if requested, assist a state which has suffered damage caused by a space object where such damage "presents a large scale danger to human life or seriously interferes with the living conditions of the population or the functioning of vital centres."

CHAPTER 6

THE REGULATION OF SATELLITE ACTIVITY

6.1 COMMUNICATIONS IN SPACE

Telecommunications is the "vital nervous system" in co-ordinating space ventures and is responsible, to a certain extent, for the success of space activity. However, the scope of Space Telecommunication is much wider than the guiding of space instrumentalities. Recent developments in the field of communication satellites have revolutionized television broadcasting and Public Telecommunication Services (telephone, telegraphy and telex). At the same time these technological advances have placed a number of problems at the doorstep of the space lawyer including those related to allocation of the radio-frequency spectrum and direct broadcasting by satellites.¹

At the outset we should note that since all telecommunications are in competition for the use of the limited radiospectrum available, space telecommunications cannot be dealt with separately from telecommunications generally.

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1. On regulation of satellite activity see generally:
 Rothblatt, *infra* note 13, Grieg *infra* note 3a; Fawcett & Parry, *infra* note 5 ; S.M.Beresford "Surveillance aircraft and satellites: A Problem of International Law" (1960) 27 Journal of Air Law and Commerce 107-9; B.Cheng "Communications Satellites" (1971) CLP 211-245; J.C.Cooper "Flight Space and the Satellites" (1958) ICLQ 82-91.

The main forms of telecommunication are telegraph, telephone, radio and television . Telecommunications are defined in the Montreux Convention, 1965, as "any transmission, emission or reception of signs, writing, images and sounds or of intelligence of any nature by wire, radio, optical or other electromagnetic system"^{1a}

The International Telecommunication Union (I.T.U.) provides a framework for continuous international co-operation in telecommunication.

Besides providing for the free use of space, the 1967 Space Treaty does not deal with the question of telecommunication in Space. However, several UN resolutions may be noted. The Preamble of UNGA Resolution 1721 / XVI D of 20 December 1961 states that "communication by means of satellites should be available to the nations of the world as soon as practicable on a global and non-discriminatory basis"²

(1) a Cited by N.A.Maryan Green, International Law-Law of Peace, at 199 .

(2) (1961) YUN 36

Resolution 1802XVII of 14 December 1962 states that the General Assembly "believes that communication by satellite offers great benefits to mankind, as it will permit the expansion of radio, telephone and television transmissions, including the broadcast of United Nations activities, thus facilitating contact among the peoples of the world; emphasizes the importance of international co-operation to achieve effective satellite communications which will be available on a world-wide basis"³

Both these resolutions promote the idea of establishment of a world-wide telecommunications system available to all nations of the world. However, instead of a global establishment there has been polarization of satellite activity on a commercial basis. On the one hand there is INTELSAT (of which the US is a member), and on the other we have INTERSPUTNIK (a Soviet based system)

6.1.1 INTELSAT AND INTERSPUTNIK

6.1.1.1 INTELSAT

The rapid progress achieved by the United States in the area of telecommunication through Satellites encouraged them to engage in a profit-making Satellite Communication business and try to interest private capital in the exploration of space telecommunications, not only on a national basis but with international aims. Thus the Communications Satellite Corporation (COMSAT) was created under the United States Communications Satellite Act of 1962. COMSAT, which was a privately owned company, was soon able to operate a Commercial Satellite Communications system and obtain the first ground stations needed. What remained to be resolved was the organization of an international system, with the co-operation of the other States. This step was finalized with the establishment of INTELSAT.^{3a}

INTELSAT was created by the Agreement Establishing Interim Arrangements for a Global Commercial Communications Satellite System, consisting of an "Inter-Governmental Agreement" which was signed only by governments, and the "Special Agreement" which was signed by Governments or communications entities designed by them.

3(a) South Africa is a member of INTELSAT. See
GN Barrie "Observations on the International
Control of Satellite Telecommunication"

The regime established by the Agreements was based upon the principle that the Space Segment of the system (consisting of the Satellites and the tracking, control, command and related facilities and equipment required to support the operation of the Satellites) "shall be owned in individual shares by the signatories to the Special Agreement in proportion to their respective contributions to the cost of the space segment" (Article 111)

Article X11 provided, inter alia, that any state which was a member of the ITU may accede to the Agreements. The Preamble to the first agreement provided that "satellite communications should be organized in such a way as to permit all States to have access to the global system. The Special Agreement set out the rights and obligations of the entities directly involved in the INTELSAT System.

Although the Interim Arrangements provided a speedy means for bringing into operation an international scheme for Satellite Communications, it was nevertheless temporary. The INTELSAT Definitive Arrangements which were finalised in February 1973, consisted of two international agreements, an Inter-Governmental Agreement and an Operative Agreement. Under the first of these the former loose association of INTELSAT is replaced by an international organization having "juridical personality" and "the full capacity necessary for the exercise of its functions and achievements of its purposes" including the capacity to "conclude agreements with States on international organizations" (Article 1V)

6.1.1.2 INTERSPUTNIK

In 1968 Bulgaria, Cuba, Czechoslovakia, Hungary, Mongolia, Poland, Romania and USSR submitted a draft agreement on the Establishment of an International Communications System Using Artificial Earth Satellites (INTERSPUTNIK)⁴. The preamble of the draft agreement emphasized "the need to promote the strengthening and development of comprehensive economic, cultural and other relations through the maintenance of communications, including radio and television broadcasting using artificial satellites." An agreement establishing INTERSPUTNIK was signed by the aforementioned Socialist states on 15 November 1971 and is open to all states.

*

Satellite activity has introduced the novel concepts of allocation of radio frequency spectrum, and direct broadcasting by satellites, into the field of space telecommunications. An examination of each of these concepts would do justice to this aspect of space law.

4. U.N.document A/AC 105/46, 9 August 1968, cited by Lachs at 102. INTERSPUTNIK was preceded by a communication network built on the Molniya Communications Satellite whose participating members were the Socialist States. See Gal op cit at 267.

6.1.2 DIRECT BROADCASTING BY SATELLITES

Direct broadcasting presently entails the transmission of radio or television through a satellite to community receivers.⁵ Transmission of signals directly into individuals receivers in the home is not yet possible but technological development will make such transmissions feasible in the foreseeable future.⁶

In spite of the importance of direct broadcasting (educational and otherwise), there has been controversy over its potentialities since 1963.⁷ As a result of the efforts of COPUOS and its legal Sub-Committee, UNGA Resolution 37/92, relating to "Principles Governing the Use by States of Artificial Satellites for International Direct

5. Fawcett & Parry Law and International Resource Conflicts at 161.

6. D.Goedhuis, "The Changing Legal Regime of Air and Outer Space" (1978) 27 ICLQ 586.

7. At an Extraordinary Administrative Radio Conference of ITU, a proposal by France and some developing countries, was to impose a complete ban on all radio and television broadcasts through satellites pending international agreement. This proposal was defeated. Fawcett & Parry op cit at 171.

Television Broadcasting"⁸ was adopted on 10 December 1982.

Developing countries in particular feared that direct broadcasting may influence their political, social and cultural systems. E.g. the relay by television of a Spanish bullfight was followed by riots in India.⁹

In this respect Article 1 of the Principles on Direct Broadcasting provides that Direct Broadcasting Activities "should be carried out in a manner compatible with the sovereign rights of States, including the principle of non-intervention....¹⁰

The principle of freedom of information as enunciated by the various Human Rights documents in international law is also covered by Article 1: "the right of everyone to seek, receive and impart information and ideas".

The "Free Dissemination" of information is restricted in the sense that it shall have "due respect to the political

8. UN document A/Res/37/92 (February 4 1983), adopted by the General Assembly on the report of the Special Political Committee, UN Document A/37/646 (1982). For text see (1983) 77 AJIL 733-8, also (1983)22 (2) International Legal Materials 451-4

9. Fawcett & Parry op cit at 163.

10. See *supra* note 8

and cultural integrity of States"¹¹.

Article 4 provides that direct broadcasting activities shall be conducted in accordance with international law including the UN Charter and 1967 Space Treaty, as well as "the relevant provisions of the International Telecommunication Convention and its Radio Regulations". Thus a further source of space law in the regulations of the ITU have been recognised by the UN Resolution.

Articles 3 and 6 provide for co-operation between states and for international co-operation in the field of direct broadcasting. Disputes in respect of direct broadcasting activities shall be settled in accordance with the provisions of the UN Charter¹².

In addition to state responsibility for direct broadcasting activities (Article 8), international intergovernmental organisation carrying out direct broadcasting activities shall be jointly liable with the states participating in that organisation (Article 9). This is in keeping with the rules laid down in the 1972 Liability Convention (Article 22).

One of the problems associated with direct broadcasting by satellites is that unauthorized use of programmes

11. Article 2 of Principles Governing Direct Broadcasting.

12. Article 7.

may infringe copyright. Further the geographic range over which broadcasts can now be received makes reception and relay possible over areas between which copyright Law and practice varies. Article 11 provides that agreements should be entered, on bilateral or multilateral basis for protection of copyright and neighbouring rights. The parties to these agreements may be states or the "competent legal entities acting under their jurisdiction."

States conducting or authorizing direct broadcasting activities have a duty to notify the Secretary-General of the UN of the nature of such activities (Article 12)

In cases of unavoidable "spillover", Article 15 provides that ITU instruments shall apply.

Finally Article 10 deals with the duty of states to consult with other states (broadcasting or receiving states) in respect of direct broadcasting activities. Articles 13 & 14 impose this duty of consultation when establishing a direct broadcasting satellite service.

6.1.3 ALLOCATION OF FREQUENCY BANDS

Messages that reach orbiting communications satellites are returned as signal patterns impressed upon certain frequency bands of the electromagnetic spectrum.¹³

13. See M Franklin Mass Media Law 536-39 (1977) A.Rothblatt, "Satellite Communication and Spectrum Allocation" (1982) 76 AJIL 56-77.

Satellites transmitting within a certain area compete for the use of the spectrum. They compete with each other and with terrestrial communications and even with intergalactic transmissions.¹⁴

The international regulations of the electromagnetic spectrum is based upon the application of the principle of "maximum channel dispersion" the object of which is to maximise the availability of satellite communications pathways¹⁵. Support for this principle can be found in the Outer Space Treaty of 1967. Articles 1 and 2 of the Treaty declares the electromagnetic spectrum to be "the province

14. C.G. Wihlborg and P.M. Wijkman "Outer Space Resources In Efficient and Equitable Use: New Frontiers for old Principles" (1981) 24 Journal of Law and Economics 23-43 at 25.

15. To maximize the availability of satellite channels means to increase, to the greatest extent possible, each of the three functional dimensions whose product make up a channel. The first dimension, channel depth, describes how many messages can be conveyed at any one time. The second dimension, channel distribution, describes how many different places the message can reach. The third dimension, channel directionality, describes from how many different places a message may be sent. Martin A. Rothblatt "Satellite Communication and Spectrum Allocation" (1982) 76 AJIL 56-77 at 58.

of all mankind," "free for exploration and use by all states", and "not subject to national appropriation by claims of sovereignty, by means of use or occupation, or by any other means". This is in keeping with McDougal's contention that the electromagnetic spectrum will generally yield "the greatest production and widest distribution of values" when the governing legal rules keep the resource "open to inclusive enjoyment by many or all participants"¹⁶

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In respect of harmful interference between different communications satellite systems, Article 4 of the International Telecommunication Convention requires the ITU to "effect allocation of the radio frequency spectrum and registration of radio frequency assignments in order to avoid harmful interference between radio stations of different countries"¹⁸

At the 1979 World Administrative Radio Conference (WARC-79), a controversial issue was whether the electromagnetic spectrum should be rationed among the nations of the world. However this would amount to "appropriation " of the spectrum which is in contravention of Article 1 of the Space Treaty.

16. M.McDougal, H.Lasswell and I.Vlasic Law and Public Order in Space (1963) 774-6, cited by Rothblatt, supra n13, at 60

17. "Harmful interference" is legally defined as unwanted energy due to emissions that "seriously degrades, obstructs, or repeatedly interrupts a radio communication service operating in accordance with [the radio] regulations." ITU Radio Regulations, Art.N1, see 7, No. 3140A, 3142. Rothblatt at

18. International Telecommunication Convention. Art. 4(2) (a), 28 UST 2497, TIAS No. 8572. Cited by Rothblatt at 61.

6.2 REMOTE SENSING

6.2.1 DEFINITION OF REMOTE SENSING

Remote Sensing by satellite has been defined by the UN Working Group as "a methodology to assist in characterizing the nature and conditions of the natural resources, the natural features and phenomena, and the environment of the earth by means of observation and measurements from space platforms."¹⁹

Remote Sensing entails the viewing of the earth's surface and its surrounding environment by means of sensing devices which are affixed to a platform orbiting the earth, referred to as Earth Resources Technology Satellite.

6.2.2 EARTH RESOURCES TECHNOLOGY SATELLITE

The first Earth Resources Technology Satellite (ERTS), LANDSAT I, was launched by the United States in 1972.

A second earth satellite, LANDSAT II, was launched in 1975 and a third one, LANDSAT III, in 1977.²⁰

19. UN Document, A/AC105/111, at 2 (Feb 14, 1973), cited by J.E.S. Fawcett and Parry op cit at 155.

20. Two LANDSATs, flying in near-polar sun synchronous orbits, circle the earth 14 times a day. In near circular orbit at an altitude of about 920 kilometres, each covers a greater part of the earth's surface in 9 days. Fawcett and Parry op cit at 155.

The data acquired by the satellites are transmitted to ground receiving stations almost instantaneously or are recorded for later transmission.²¹

6.2.3 THE IMPORTANCE OF REMOTE SENSING

The surveys presently being made by the Earth Resource Satellites cover crop acreage, quality and disease; timber volume, including the mapping of forest fires; the location of surface water and flooded areas; geological features and mineral resources; fish habitats in coastal waters; and shoreline changes.

Numerous countries, especially developing countries, seek information from remote sensing by satellites as such information assists cartographers, geologists, meteorologists, hydrologists, and agriculturalists. Further the data available helps to uncover and utilize resources within the reach of such countries.²²

6.2.4 PROBLEMS RELATED TO REMOTE SENSING

As remote sensing is a fairly new concept, it has created

21. There are receiving stations in the United States, Brazil and Italy. Ibid.

22. Data derived through remote sensing by satellite have led field expeditions in Pakistan to undiscovered areas of copper ore. H. de Saussure "Remote Sensing by Satellite" (1977) AJIL 714.

a whole range of legal problems. While many states are glad to have the information from remote sensing, which is both useful and often vital to their economies, they are however anxious as to the use which might be made of such easily obtainable information by their military adversaries or their competitors.²³

Some of the problems posed by remote sensing are:

- (1). whether remote sensing is governed by the Space Treaty and the rules of international law generally,
- (2). whether the consent of the sensed state is required,
- (3). whether data distribution should be subject to the approval of the sensed state, and
- (4). The right of the subjacent to data obtained.

6.2.4.1 Are Remote Sensing activities governed by the Space Treaty and International Law?

Article 1 of the Space Treaty provides for the exploration and use of outer space. Earth resource satellites are certainly a use of outer space and is certainly covered by the Space Treaty. Although remote sensing relates to the viewing of the surface of the earth and is thus earth-oriented, it is still a space activity. Article 1

23. "Satellite imagery from anywhere in the world including Russia and China can be purchased from EROS by anyone with money to buy it and no international agreement with any foreign state is required." H.de Saussure, at 709.

further provides for the freedom of scientific investigation in outer space. Remote sensing can be regarded as a scientific investigation and would therefore enjoy such a freedom.

Article 3 requires the uses of outer space to be based on the principles of co-operation and mutual assistance and also provides that activities in outer space shall be carried on in accordance with international law, including the UN Charter.

The Space Treaty further provides that the registry state of satellites shall retain the jurisdiction and control over its spaceborne objects (Articles 7 & 8).

However these provisions do not solve the issues under problems (2), (3) and (4) as will be noted hereunder.

6.2.4.2 Is the consent of the sensed state required?

The space lawyer is faced with the dilemma that on the one hand Article 3 of the Space Treaty provides for the freedom of use of space and thus consent of the sensed state is not required for the sensing of its territory. On the other hand the principle of state sovereignty in international law requires that " peoples and nations have a right to permanent sovereignty over their natural wealth and resources".²⁴ Thus remote sensing would require

24. H.de Saussure op cit at 711.

the consent of the sensed state if the sovereignty of the sensed state is thereby infringed.

In the course of the debate of the Legal Sub-committee of COPUOS²⁵ during 1976, Algeria, Iraq, Kuwait, inter alia, called for prior consent of sensed states before remote sensing was undertaken.²⁶ The view of other member states including USSR, United States and UK is that remote sensing from space did not require prior consent of the sensed state in view of the principle of freedom of outer space laid down in the Space Treaty.²⁷ The Netherlands, one of the other members holding the latter view, submitted that "the authority of the state does not extend beyond its territorial jurisdiction. This does include outer space, as is apparent from the 1967 Treaty..."²⁸

It may be noted that remote sensing activities are geared towards civilian needs and poses no real threat to any state's national or political security. Unlike 'direct broadcasting by satellite', the purpose of remote sensing activities is "to uncover more facts, not to disseminate opinions."²⁹

25. Committee on the Peaceful Uses of Outer Space.

26. (1976) 30 YUN 64-5.

27. (1977) 31 YUN 71.

28. H. de Saussure op cit at 714

29. (1977) 31 YUN 71

Thus it would be in keeping with the idea of freedom of outer space to aver that the prior consent of a state whose territory is the object of remote sensing, is not required.

6.2.4.3 Should Data Distribution be subject to the Approval of the Sensed State ?

At the 1977 discussions in the Legal-Sub-Committee, certain states, including USSR, Argentina, Brazil and Chile, maintained that sensed states had sovereign rights over their natural resources and over information regarding them, and that such information could be distributed to other countries only with the prior consent of sensed states.³⁰

The United States, among other members, held the view that the concept of state sovereignty did not include sovereignty over information concerning natural resources and dissemination of data derived from remote sensing activities should therefor be unrestricted.

The delegate for USSR suggested that data from remote sensing should be divided into two categories: data which could be freely disseminated and published for general use, and data which could be disseminated only with the agreement of the sensed state. The basis of

30. Ibid.

division into these categories was the spatial resolution (the smallest detail on the ground that can be seen in a photograph taken from space) of 50 square metres.³¹

No agreement was reached at the Legal Sub-Committee's discussion on the question of whether approval of the sensed state is a requisite for data distribution.

We have already noted that remote sensing is politically a neutral activity. However in the absence of control over data distribution there is the possibility that states may gain an economic advantage over sensed states. Eg. where a state's economy is dependent upon the sale of a certain agricultural commodity, if other states become aware through data obtained from remote sensing that there was an oversupply of the commodity in that state, it would have an adverse effect on prices.³²

However there is a counter argument to this. Where one state contends that it has a shortage of a certain commodity and wants to purchase the commodity from another state, the latter can verify the contention by consulting remote sensing data, if available.

It would be "in the interests of maintaining international peace and security and promoting international co-operation

31. Ibid at 72.

32. Pikus "Possibility of Technical Control over Resource Surveying from Space," cited by H.de Saussure op cit at 71

and understanding "³³ if dissemination of remote sensing data is unrestricted. The words of the Dutch Government are rather appropriate in this connection:

".... the fact that a country has sovereignty over its natural resources in particular does not mean that it also has sovereignty, i.e. authority, over information on these resources.... openness serves peace better than does secrecy."³⁴

6.2.4.4 The Right of the Subjacent State to Data Obtained

The solution to the problem whether the subjacent state has a right to data obtained, would depend eventually on how the aspects under problem(3) above are settled: if data dissemination is unrestricted, then the subjacent state would have access to the data obtained.

6.2.5 PROPOSED TREATY ON REGULATION OF REMOTE SENSING ACTIVITI

In view of the areas of conflict relating to remote sensing, an International Agreement is required to regulate remote

33. Article 3 of the Space Treaty.

34. Emphasis added. Stated by the Dutch Government in a note to the UN. (1984) NYIL op cit at 339.

sensing activities. Such a document should provide inter alia, that remote sensing activities should be conducted in accordance with international law, including the Space Treaty; that remote sensing is a peaceful activity; co-operation between state; and that dissemination of data derived from remote sensing is to be without restriction except as provided in bilateral or regional agreements.

The Legal Sub-committee is presently engaged in drafting Principles for the regulation of remote sensing which would be included in an international agreement on the subject.

6.3 GEOSTATIONARY ORBITS³⁵

Satellites may be geostationary, that is, remain in a fixed position in relation to the surface of the Earth,

35. The geostationary orbit is a circular orbit at a distance of approximately 35 800 kilometres above the earth's equator. A satellite placed in this orbit (GEOSAT) lies in the plane of the equator and turns about the polar axis of the earth in the same direction and within the same period as the earth itself. Thus a GEOSAT appears stationary in relation to the underlying point. S.Gorove op cit at 445.

or they may circle the earth in polar orbits or in other orbits. Geostationary orbits are important for those services that require twenty-four-hour coverage of a given point on earth.

There is a definite physical limit to the use of Geostationary orbits: estimates of the maximum number of satellites that may occupy the Geostationary orbit at a given time, range from 180 to 1 800.³⁶ In 1977 the total number of Satellites placed in Geostationary orbit reached 100³⁷ and 239 geostationary satellites are expected to be active in 1990.³⁸ Thus it is inevitable that the increasing use of the Geostationary orbit will create problems of overcrowding, which may possibly hinder the effective functioning of satellites.

36. The wide disparities are attributable to criteria such as size of the satellite, stability of the orbit, the degree of tolerated electromagnetic interference and the state of technology. See Econ INC, "Political and Legal Implications of Developing and Operating a Satellite Power System," Final Reports (77-195-1, August 1977) at 60, cited by S. Gorove op cit at 445.

37. A/AC 105/203 (August 1977) cited by Fawcett and Parry at 160 *supra* note 19.

38. Gehrig "Geostationary orbit - Technology and Law," in Proceeding of the 1974 Colloquim on "The Law of Outer Space" (1977) 267, cited by S Gorove op cit at 446.

6.3.1 LEGAL STATUS OF GEOSTATIONARY ORBITS

There are conflicting views regarding the legal status of the geostationary orbits and the root of the conflict hinges on whether or not it (i.e. the geostationary orbit) is located in outer space.

At the Thirtieth Session of the UNGA (during October 1975) Columbia laid claim to a segment of the geostationary orbit above its national territory.³⁹ The basis of Columbia's claim was that the geostationary orbit was not included in the concept of outer space as provided for in the 1968 Space Treaty . This view is also followed by the Bogota Declaration⁴⁰ which ascerts that segments of the geostationary orbit lying above the territories of the equatorial countries are an "integral part " of the territory over which the equatorial countries exercise complete and exclusive sovereignty.⁴¹

Although there is no internationally accepted determination

39. See Gorbiel "The Legal Status of Geostationary Orbits: Some Remarks " (1973) 6 Journal of Space Law 171.

40. In November 1976, eight equatorial countries (Brazil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda, and Zaire) met in Bogota to discuss the Legal Status of the Geostationary Orbit. Their conference ended with what is known as the "Bogota Declaration" which sets out the position of the equatorial countries with respect to the geostationary orbit.

41. S Gorove at 450.

of where outer space begins, many years of spatial experiments, have led to the emergence of what has been described as a new rule of customary international law, namely, that artificial earth orbiting satellites move in outer space.⁴² This conclusion - made prior to the recent claims of the equatorial states was based on the fact that no formal objection had been lodged against the orbiting of such satellites by underlying states.

When the claims of the equatorial states, to portions of the geostationary orbit, were made at the meetings of the Legal Sub-committee of COPUOS (during April 1979), an opposing view was voiced by USSR, United Kingdom, United States and other states,⁴³ who stated that geostationary orbits, at an altitude of 36 000 kilometres were inseparable from outer space and that all relevant provisions of the Space Treaty were applicable to such orbits.⁴⁴

The view of the latter states are more acceptable for the reasons that follow. The lack of a definition of "outer space" should not be seen as an opportunity for extending the sovereignty of states to a height of 36 000 kilometres

42. McDougal, "The Emerging Customary Law of Space" (1964) Nw.U.L. Review 618, Lay & Taubenfeld op cit 48-9.

43. Australia, Belgium, Bulgaria, Egypt, France, the Federal Republic of Germany, Hungary, Iraq, Italy, Japan and Poland

44. (1979) 33 YUN 108.

and thus include geostationary orbits under state sovereignty. Further, if the view of the equatorial states are accepted, what would the status of all other satellite orbits be ? Does it mean that states will then be able to claim sovereignty over spaces which are thousands of kilometres from earth, whenever it is shown that such a space is a "limited resource" ? This would definitely result in "a fragmentary division of outer space leading to an ever-growing erosion of the fundamental principle of freedom of outer space"⁴⁵

It would therefore be in keeping with the rules of international law generally as well as the practice of states to aver that the geostationary orbit is located in outer space and that the provisions of the Outer Space Treaty are applicable to it.

In terms of Article 2 of the 1967 Space Treaty, geostationary orbits are "not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means." Thus the placing and keeping of a

45. D.Goedhuis, "The Changing Legal Regime of Air and Outer Space" (1978) 27 ICLQ 590.

satellite in geostationary orbit would not amount to an appropriation of orbital space.⁴⁶

Article 11 of the Moon Treaty precludes from pretensions to ownership not only states but also international, intergovernmental, or non-governmental organizations, denying that placement of personnel, space vehicles, equipment, facilities, stations and installations, creates any such rights. Article 11(1) declares that "the moon and its natural resources ⁴⁷ are the common heritage of mankind". This is in keeping with the non-appropriation principle contained in the Space Treaty.

The limitation to the freedom of use of geostationary orbits is that such use must be carried out for the "benefit and in the interests of all countries"⁴⁸.

46. The view to the contrary was expressed by the Columbian delegate in the course of UN discussions. The delegate noted that with progress of technology it was possible to extend the life of geostationary satellites and in view of this, he expressed the fear that the geostationary orbit would be subject to appropriation. UN Doc. A/AC 105/C2/SR 296 at 4(1978), cited by S.Gorove at 449 n26.

47. This would of course include geostationary orbits. See Article 1 of Moon Treaty.

48. Article 1 of Space Treaty.

Another limitation is the principle of "first come first served". Although neither the Space Treaty nor the Moon Treaty mentions this limitation, state practice to date appears to have confirmed it. "Though everybody has a right to place a space object in orbit, the second in time is to respect the route chosen by the first." ⁴⁹

49. Cocca "Towards an Adequate Legal Regulation of the Geostationary Orbit," in Proceedings of the 20 th Colloquim on The Law of Outer Space (1978) at 194.

CHAPTER 7

SETTLEMENT OF DISPUTES ARISING FROM SPACE ACTIVITIES- SELECTED ASPECTS

SETTLEMENT OF DISPUTES

Article 3 of the Space Treaty provides that space activities shall be carried on "in accordance with international law, including the Charter of the United Nations". The settlement of disputes arising out of space activities would therefore be governed by the provisions and procedures of the Charter of the United Nations, as well as international law generally.

The Charter of the U.N. provides that all members of the U.N. "shall settle their international disputes by peaceful means in such a manner that international peace and security, and justice, are not endangered". Article 2 Clause 3 of the Charter also states that "all members shall refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any state, or in any other manner inconsistent with the purposes of the U.N.". These principles are also applicable to the settlement of disputes arising out of space activities.

Articles 33 to 38 deal specifically with Pacific Settlement of Disputes. Article 33 provides: "The parties to any dispute the continuance of which is likely to endanger the maintenance of peace and security shall, first of all, seek a solution by negotiation, enquiry, mediation, conciliation, arbitration, judicial settlement, resort to regional agencies or arrangements, or other peaceful means of their own choice."

The powers and procedures of the Security Council and General Assembly in respect of settlement of disputes apply to space disputes.

Legal questions relating to space activities may be referred by the General Assembly and Security Council to the International Court of Justice for an advisory opinion and the provisions pertaining to jurisdiction of the court (as defined by the Statute of the Court), as well as compulsory jurisdiction, would also apply to space disputes between states.

States may attempt settlement of space disputes by way of bilateral arbitration and treaties.

Thus the settlement of disputes in space activities is governed by the settlement of disputes generally.

In the area of claims for damages arising out of space activity, the Liability Convention provides for settlement of disputes by arbitration¹. Article 2 of the Principles on Direct Broadcasting provides for dispute settlement in accordance with the provisions of the UN Charter².

When space activities and related disputes become too numerous to be settled in the manner stated above, it may be necessary to establish an independent

1. For a detailed discussion see chapter 5, section 5.9

2. Supra chapter 6 section 6.1.2.

forum for the settlement of disputes arising from space activities only. Such a forum would be able to specialise in the area of space related disputes and in the application of international space law.

CHAPTER 8

CONCLUDING ASPECTS

8.1 AFTER THE CONQUEST OF THE MOON

On 20 July 1969 Apollo successfully landed two Americans on the moon. Not only was this historic event a "giant leap for mankind"¹ but it was yet another step in the evolution of the system of international space law.

In 1970 Argentina presented to the Legal Sub-committee of COPOUS a Draft Agreement on Principles governing the moon and other celestial bodies. After much discussion and deliberation on this and other drafts, the Agreement Governing the Activities of states on the moon and other celestial bodies (Moon Treaty) was opened for signature on 18 December 1979.

Paragraph 1 of Article 11 of the Moon Treaty provides: "The moon and its natural resources are the common heritage of mankind". Until then the division of the world in International Law was tripartite: (a) natural territory; (b) res nullius; i.e. areas which may be acquired as national territory, and (c) res communis omnium, i.e. areas which by law are not susceptible of natural appropriation. Now there is a fourth category: The common heritage of mankind, i.e. areas which are

1. The words of Astronaut Neil Armstrong when he stepped onto the surface of the moon.

not only in themselves not subject to national appropriation in a territorial sense, but the fruits and resources of which are also deemed to be the property of mankind at large.²

Does the provision of paragraph 1 of Article 11 create a moratorium upon the exploitation of natural resources of the moon as in the case of UNGA Resolution 2574 (XXIV) of 1970 which declares a moratorium on the exploitation of the resources of the sea-bed and ocean floor ?

An examination of Article 11 provides that "neither the surface nor the subsurface of the moon, nor any part thereof or natural resources in place, shall become property of any state" or other entity.³ Although the national appropriation of the moon is prohibited under paragraph 2 (of Article 11), the use of the words "in place" in paragraph 3 is intended to make certain that property rights appertain to any juridical or natural person that comes into possession of a moon based natural resource by removing that resource from its original "in place" position.

2. See Bin Cheng. "The Moon Treaty: Agreement Governing the Activities of States on the moon and other celestial bodies within the solar system other than the Earth, December 18, 1979". (1980) Current Legal Problems 213-237.

3. Emphasis added.

Article 18 provides for the ultimate implementation of the common heritage principle by authorizing the establishment of "an international regime" to govern the exploitation of the natural resources of the moon when such exploitation "is about to become feasible".

The use of the words "is about to become feasible" suggests that the framers of the agreement believed that exploitation on a large scale, which would require implementation of the international regime, is a distant event. Thus para 3 of Article 11 may be viewed as protecting free enterprise opportunities in respect of the natural resources of the moon until the occurrence of that distant event when exploitation on a large-scale basis is feasible, and an international regime will be necessary.

Further Article 1 of the 1967 Space Treaty provides that "outer space, including the moon and other celestial bodies, shall be free for exploration and use by all states" and that "there shall be free access to all areas of celestial bodies" (which would include the natural resources of the moon)

Thus the position of exploitation of the natural resources of the moon may be stated as follows : at present the res communis rights of those who are able to engage in the exploration, exploitation and the use of the moon and its resources are fully recognized. When exploitation

on a large scale basis is feasible, an international legal regime will become necessary to support the common heritage principle. Such an international regime will be created by the parties to the Moon Treaty. Therefore the provisions of Article 11 of the Moon Treaty do not create a moratorium on the exploitation of the natural resources of the moon. In this regard the United States delegate to COPOUS stated :

"The Draft Agreement ... places no moratorium upon the exploitation of the natural resources on celestial bodies, pending the establishment of an international regime. This permits orderly attempts to establish that such exploitation is in fact feasible and practicable, by making possible experimental beginnings and, then, pilot operations, a process by which we believe we can learn if it will be practicable and feasible to exploit the mineral resources of such celestial bodies."⁴

Further, the International Law Section of the American Bar Association was of the view that the use of the expression "common heritage of mankind" in space law was not the same as in the law pertaining to the oceans.⁵

4. Stated by Mr Hosenball. A/AC 105/PV 203 (July 3, 1979) 22, cited by B.Cheng at 229, *supra* note 2.

5. See Section of International Law, report to the ABA House of Delegates 10 (1980). Referred to by C.Q.Christol "The Moon Treaty enters into force" (1985) 79 AJIL 163-9.

It should also be noted that upon the establishment of an "international regime" the benefits from the exploitation of the natural resources of the moon will not be shared equally by states, but distribution of such benefits will be on an equitable basis among the parties to the Moon Treaty, taking into account the interests and needs of the less developed countries, as well as the efforts of the states engaged in space exploration. (Article 11 (7))

An interesting development in this respect is that although the United States and the USSR supported the Moon Treaty at the UN neither have formally approved it.⁶ Both are however parties to the other UN negotiated international space law agreements.⁷ This could be attributed to the Moon Treaty's limitations on the threat or use of force on and around the moon. (Article 3) However, as the benefits enjoyed by the parties to the Moon Treaty in respect of exploitative rights are not accorded to non-parties, these major space powers ought to re-appraise their standing on approval of the Moon Treaty.

Closely related to the "conquest of the moon" is the effectiveness of international law in space. A period of

6. Ibid at 168.

7. Including the Space Treaty, Convention on Liability for damage, Registration Agreement and Rescue Agreement.

sixteen years has elapsed since man landed on the moon and the rules of international space laws (including the 1967 Space Treaty) pertaining to non-appropriation have been upheld by states during that time. Only recently have the equatorial states laid claims to the geostationary orbit which has long been accepted as a part of free space.⁸

8.2 THE SPACE SHUTTLE

When the Space Shuttle⁹, Columbia, was successfully launched on 12 April 1981, a new era had dawned on the horizon of the space lawyer. Compared to the "throw-away " rockets of the past, the Space Shuttle provides a more economic space transportation system.

A notable feat of the Space Shuttle is its ability to travel through "airspace" and to land in the manner of conventional aircraft.

The present and future capabilities of the Space Shuttle¹⁰ include:

- (1). placing of satellites in orbit; retrieving

8, Refer to Chapter 7 on Geostationary Orbits.

9. The Space Shuttle flight system consists of an orbiter with three Space Shuttle main engines, an external tank, and two solid rocket boosters. The orbiter with its main engines and the retrievable booster casings are reusable elements; the tank is expended on each launch. L.M. Weeks 249-56, *supra* n 10. Ibid, also Yearbook on Science and the future (1982) 382.

- malfunctioning satellites, repairing them in space or returning them to earth.
- (2) Transporting sections of spacecraft to orbit for assembly or launch in space.
 - (3) Carrying fuel to orbit for spacecraft and satellites, crewmen and supplies to an orbiting space station.
 - (4) Coming to the rescue of astronauts stranded in space.
 - (5) Conducting missions of up to 30 days to serve as a short-duration space station. The Shuttle is capable of taking into space whole laboratories or sensor systems for performing tasks such as crop and resources surveys or weather studies.

8.2.1 THE IMPLICATIONS OF THE SPACE SHUTTLE ON INTERNATIONAL LAW

The technical capabilities of the space shuttle gave rise to the controversy whether the space shuttle is an "aircraft" or "spacecraft". The importance of this issue should not be underestimated as it affects the legal status of the space shuttle.¹¹ If it is an aircraft then the rules of air law would apply to it; if it is a spacecraft, then the rules of space law would be applied.

11. See generally M.A.Rothblatt "International Liability of the United States for Space Shuttle Operations" (1979) 1 International Lawyer 471-84; also Carl Q Christol, *supra* Chapter 5, note 6; also S.Gorove "Space Shuttle: Some of its features & legal implications"(1981) Annals of Air & Space Law 381-98.

A third possibility is that if it is a hybrid vehicle then both the rules of air law and space law must be applied to it. Hence the need for application of principles of "aerospace law".

The Space Treaty and Rescue Agreement mention the "launching" of space objects and "return" of space objects but no mention is made of the change of status of these objects, especially on entering air space. The failure of these international agreements to provide for hybrid vehicles like the space shuttle may be as a result of poor foresight on the part of the drafters.

If the functional approach ¹² is adopted then as long as the space shuttle is used for "space activities" it would be considered a space object and the rules of space law would apply. However, if technological developments create a versatile vehicle, capable of flying at will through the air space, like a conventional aircraft, and at the same time capable of moving into outer space, the applicability of air law and space law on the different activities of such a vehicle would have to be examined.

12. See chapter 2 for discussion of the functional approach to space law.

Thus where such a vehicle is used for national transportation - especially within the space used by conventional aircraft, on application of the functional approach, the rules of air law would have to be applied.

The second issue relates to jurisdiction. The Registration Convention requires the launching state to register the space object. Thus in the case of the space shuttle this duty lies with the United States. Jurisdiction and control over the space shuttle and its personnel while in outer space would therefor vest in the United States (as the state of registry). However what about the payload of the space shuttle, which may consist of space laboratories belonging to other states or even international organisations? If the state of registry of such space laboratories is not the state of registry of the space shuttle but some other state, then the problem arises as to who is to exercise jurisdiction over the space laboratory while it remains within the confines of the shuttle in outer space. This would necessitate agreements between the participating states. In the absence of provisions in an International Convention it would be best to regard the foreign registered space laboratory and its personnel as remaining under the jurisdiction and control of the shuttle commander in such matters as mission control, but being under the jurisdiction and control of the commander of the space laboratory in matters relating to operation of such laboratory.¹³

13. See remarks by S.Gorove (1981) 75 American Society of International Law Proceedings 249-67, at 262.

Since the shuttle will be flying civilians and non-US citizens, there is a problem of establishing a criminal law aboard the shuttle. The Uniform Code of Military Justice covers all military persons aboard the shuttle, because for people in the military, the code applies to crimes anywhere. However the civil side is not covered. There are moves to supplement the NASA Authorization Act under the national law of the US, to establish special criminal jurisdiction for any crime which occurs on any vehicle in flight which is used for navigation in space and registered to the US in terms of the Space Treaty and Registration Convention.^{13a}

8.3 UTOPIA

More than once there have been claims that we are not alone in this universe; that the possibility of encountering extra-terrestrial beings somewhere in space does exist. What law would be applicable in such cases? Some writers have laid down rules that should be applicable. A.G.Haley has introduced a concept of "Metalaw" for the regulation of contacts between men and other sapient beings.¹⁴

Problems of similar nature relating to the existence of extra-terrestrial beings, which are thrown at the space,

13 (a) Ibid. See Maurice Chatelain Our Ancesters Came From Outer Space

(14) Space Law and Metalaw at 395, cited by G Gal at 202. See also C.W.Jenks "International Law and Activities in Space" (1956) 5 ICLQ op cit at 112.

lawyer, range from the legal status of a child born on a space ship, to the invasion of earth by aliens (beings from space).

We are aware that speculation is one of the fundamentals of science: there is no science without fantasy. Should we therefor base rules of law on speculation?

"Law is a social reality based on technical, economic and social foundations; therefore the science of law should be engaged with actual facts, real social phenomena, and not have recourse to the world of science fiction."¹⁵

There has been speculation that even if living beings are not found on the other eight planets of our solar system, there is a possibility that such beings may be found on one of the planets of the nearest star to us - Proxima Centaury - a voyage that would take about 40 000 years at the present state of technology. Thus if the meetings with extra terrestrial beings were to take place some thousands of years from now, space lawyers of the twentieth century would be excused for not providing for such events.

However that seemed of a utopian nature a few decades ago are now realities which have to be dealt with in

15. G.Gal op cit at 205.

international law. E.g. the launching of the Sputnik sent delegates scrambling to the drafting tables to come up with the rules to regulate this new activity that traversed frontiers which were considered impossible for centuries.

The provisions of the Moon Treaty, applies to the moon and other celestial bodies within the solar system, other than earth (Article 1). However, on 13 June 1983, a space probe launched by NASA left our solar system¹⁶ and is thus beyond the scope of the Moon Treaty.

On the one hand rules of international space law should not be based on speculation only but provide for actual facts. On the other hand it should provide for situations that may be possible through technology in the foreseeable future. Although the extremes of utopia and reality are clearly distinguishable, there is the grey area bordering on both that will always pose a problem.

8.4 STAR WARS!

Satellite technology, by its very nature, is capable of being used for passive military activities including military communication, photo reconnaissance, navigation and early warning systems, and provides an invaluable

16. "World News at 7.30 a.m." on Springbok Radio on 14 June 1983.

advantage to a state's adversaries. It is therefore not surprising that the space powers (US and USSR) are now engaged in anti-satellite tests which could make "star wars" a reality, especially if President Reagan goes ahead with his plan to carry the arms race into space.

The USSR is busy testing its interceptor KOSMOS satellites. These take one or two orbits to approach their satellite victims before exploding and destroying both. Its drawbacks are that the satellites take several hours to manoeuvre close to their victims and can only reach low-flying satellites¹⁷.

The US anti-satellite weapon is a tiny, two-stage missile launched by high-flying F-15 fighters. Guided by eight infra-red detectors it simply rams a satellite¹⁸ to destroy it. If these missile are successful they could be fitted to US fighters around the world by 1986. The US would then have the power to knock out Russian satellites in a few minutes.

However, the US also envisages a Star Wars battle satellite flotilla: infra-red detectors in high-orbiting satellites

17. "The Daily News" 29 December 1984.

18. Ibid.

would be used to pinpoint the exhaust plumes of attacking Soviet missiles. They would automatically alert a series of communication satellites which, in turn, would trigger orbiting laser beam guns to destroy the missiles from space. Thus, this would be the anti-satellite system of the United States. However this system faces numerous problems. For instance at least a hundred of these satellites would be needed to cover all Soviet strategic missile silos. Each satellite would need generators capable of giving 25 megawatts of power

(enough to power a small town) to drive their beam guns. Further a hundred tons of fuel would be needed for each. Another, worse fear is that the command to fire to a Star Wars flotilla would be given by a computer. No human would have time to challenge, let alone cancel, the firing order.

A realisation that does not seem to have sufficient impact on the space powers is that the human race simply cannot afford to carry the arms race into space. Every step away from demilitarization of outer space is a direct threat to the continued existence of all living species.^{18a}

The drafters of the Space Treaty foresaw these problems. In terms of Article 4, States Parties to the Treaty, undertook to refrain from placing in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction. Both USSR and

18a. On the subject of general disarmament, one of the

United States were parties to that treaty.

questions posed by General Assembly President Jorge E. Illueca, on 20 December 1983, was: "With 40 000 nuclear warheads now in existence having one million times the destructive power of the Hiroshima bomb, and both sides capable of destroying each other many times over, are present arsenals really not adequate?" (1984)XXI (2)
UN Chronicle op cit at 17.

The question that arises is : do the provisions of the Space Treaty prohibit the anti-satellite activities of the USSR and United States? It may be contended that since the anti-satellite weapons do not carry nuclear weapons they are not affected by the prohibition in the Space Treaty. However the words "or any other kinds of weapons of mass destruction "(Article 4) sufficiently cover these activities and suggest that the framers of the treaty intended providing for threats other than nuclear threats.

Article 4 of the Space Treaty further provides that the use of outer space is exclusively for "peaceful purposes." Here again we stumble across the United States interpretation of convenience that "peaceful" in this context means "non-aggressive" as opposed to non-military.¹⁹ From the previous "non aggressive" uses of outer space, like reconnaissance satellites, it seems that the United States has now extended the connotation of "non-aggressive" to include anti-satellite weaponry. No matter how saintly a state's motives and intentions are, international law cannot afford an "interpretation of convenience". Anti-satellite weaponry in space is

19. See chapter 3, section 3.5.1.

definitely not in keeping with the principle of peaceful uses of space. The activities of the USSR, and more especially the United States, must therefore be seen as a blatant violation of the provisions of the Space Treaty and a direct threat to the maintenance of world peace. Britain, Germany, and France are among the States that are ²⁰ opponents of anti-satellite weaponry and Star Wars.

20. These states seem to be changing their views.

France has made public its intentions to proceed with its own SDI (Strategic Defence Initiative) Programme.

CONCLUSION

Having examined the spectrum of international law in space it seems unavoidable to ask the questions: does international law sufficiently provide for the regulation of space activities and space exploration? How effective is international space law?

Presently the ambit of space activities are sufficiently governed by international law, but at some time in the future - exactly when, depends on the state of technology - the establishment of an independent international regime may be necessary for the regulation of activities in the medium of outer space and on celestial bodies other than earth. Such a regime may incorporate the unique features of a Legislature and Judiciary as in the national systems.

The two fundamental principles (freedom of outer space for exploitation and use, and that of outer space not being subject to national appropriation) achieved universal consensus shortly after the first space venture and have since been upheld by states. The adherence to rules of international space law by states stems from the need for international co-operation in outer space which is greater than in any other field of international relations.

Jurisprudence of space law has the formidable task of constantly providing new rules or applying accepted principles of international law to keep pace with the ever-accelerating speed of technological change which is effectively portrayed in the American Space Shuttle - a vehicle that starts as a rocket, flies as a spacecraft and lands as an aeroplane.

In our haste to provide for a system of law which is both complete and concise we should not lose sight of the fact that we are merely laying down the foundations for a system of international space law that will evolve over the centuries and will ultimately consist of numerous rules and principles strung together by the acceptance of states.

In closing it is submitted by the writer : this world, this universe, is ours but only for a time. Each individual has the privilege of the use of this world - and outer space - for a definite period of time. If anything at all can be left to future generations, let us leave this place - the world and the space around it - just as it was when we found it.

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- (1) Treaty on the Principles Governing the Activities of States in the Exploration and use of Outer space, including the Moon and Other Celestial Bodies (UNGA Res. No. 2222 (XXI), 19 December 1966)
- (2) Agreement on the Rescue of Astronauts, the Return of Astronauts and Return of Objects Launched into Outer Space (UNGA Res. No. 2345 (XXII), December 1967)
- (3) Convention on Registration of Objects launched into Outer Space (UNGA Resolution No. 3235 (XXIX), 14 November 1974)
- (4) Convention on International Liabilities for Damage Caused by Space Objects (Resolution 2777 (XXVI), 29 November)
- (5) Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (UNGA Res. No. 34 (168), 5 December 1979)
- (6) Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting. (UNGA Resolution 37/92, 10 December 1982)
- (7) Convention on International Civil Aviation (signed at Chicago, 7 December 1944)
- (8) Geneva Convention on High Seas (28 April 1958)
- (9) Agreement establishing Interim Arrangements for a Global Commercial Communication Satellite System of 1964 and Definitive Arrangements of 1973.

- (10) Antarctica Treaty of 1959
- (11) The Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water (signed at Moscow, 5 August 1963).

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