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COMMITTEE ON THE PEACEFUL USES  
OF OUTER SPACE  
Legal Sub-Committee

THE QUESTION OF THE DEFINITION AND/OR THE DELIMITATION  
OF OUTER SPACE

Background paper prepared by the Secretariat

Addendum

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## INTRODUCTION

1. At its nineteenth session, held from 21 June to 2 July 1976, the Committee on the Peaceful Uses of Outer Space, in the course of considering the report of its Legal Sub-Committee of the work of its fifteenth session (A/AC.105/171), noted:

"... that questions relating to the definition and/or delimitation of outer space and outer space activities had also been discussed by the Legal Sub-Committee in the course of two of its meetings and that this discussion had been the occasion for new exchanges of views which were both useful and interesting. In addition, the Committee noted that, in the course of the discussion, the renewed importance of the subject had been underlined and that the hope had been expressed that the Sub-Committee would proceed to examine the question in greater detail. For this purpose and to facilitate the work of the Legal Sub-Committee, the Committee requested the Secretariat to prepare a synoptic table of the proposals made within the framework of the Committee and the two Sub-Committees with regard to this question as well as a revision of document A/AC.105/C.2/7." 1/

The present paper has been prepared by the Secretariat in response to the request just noted that it bring up to date document A/AC.105/C.2/7. The synoptical table of proposals, contained in the same request, will be circulated shortly in document A/AC.105/C.2/14.

2. In preparing the present document, the Secretariat has reviewed the relevant proceedings of United Nations organs since the issuance of document A/AC.105/C.2/7 in 1970. It also, as in the case of the earlier document, sent letters to certain specialized agencies and international organizations requesting information on any new development in their organizations relevant to the subject-matter of the present paper. The reply from the International Telecommunication Union (ITU) is incorporated in paragraph 11 below and other replies which do not provide substantive information are indicated in annex I. Finally, for the preparation of the present paper and in order to review the recent literature of the subject, the Secretariat has compiled a bibliography which is attached as annex II.

3. After reviewing all the materials just mentioned, the Secretariat has concluded that the most useful and concise way for it to proceed would be to issue the present document as an addendum to document A/AC.105/C.2/7, rather than as a complete revision of that document. While there are new proposals or suggestions in United Nations organs, a full revision of the earlier document does not appear necessary, as neither the United Nations proceedings, nor the replies of the agencies and organizations, nor the recent literature disclose the emergence of any major new theories or approaches. Previous arguments, reflected in document A/AC.105/C.2/7, for or against a particular theory have been largely repeated, and only in a few cases have supplementary arguments been developed and set out in greater detail.

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1/ Official Records of the General Assembly, Thirty-first Session, Supplement No. 20 (A/31/20), para. 25.

4. The structure of the present paper follows that of the earlier document. Thus the headings established in that document are maintained in the present paper, except for the omission of the subheadings of section I. As an addendum to that document, the present paper covers the period 1970-1976.

5. Where the new material may be treated under two or more headings, only one such heading is selected for its presentation and cross references to it are made under the other relevant headings or subheadings. This is particularly true of sections II, III and IV since certain views expressed in United Nations organs represent either a spatial or a functional approach to the definition or delimitation of outer space.

#### I. THE QUESTION OF THE DEFINITION AND/OR DELIMITATION OF OUTER SPACE IN GENERAL

6. During the period under review, the question of the definition and/or delimitation of outer space continued to occupy the attention of Governments, United Nations organs and world scientific community.

7. The two different attitudes with respect to the question of the need for defining and/or delimiting outer space which were manifested prior to 1970 have remained basically unchanged:

(a) One view which is still maintained is that there is a need for defining outer space. In support of this view it is stated that although the present activities of States in outer space do not seem to violate the sovereignty of States, some new types of outer space activities at lower altitudes including the forthcoming operation of the space shuttle are becoming a reality and that a clear distinction between the spheres of application of air law and outer space law to avoid any future conflicts is urgently needed. This line of reasoning was recently enhanced by the announced claims of some equatorial States to their sovereignty over the parts of the geostationary orbit lying at an altitude of about 35,700 kilometres above their territorial confines;

(b) The other view continues to be that there is no urgent need for a definition. The following arguments are advanced in support of this view: that a stable, workable legal definition of outer space is not yet politically acceptable or that attempts to define outer space should be postponed until more experience has been gained and further clarification of the implications of various types of outer space activities has been provided. Particular attention was drawn to the fact that the absence of definition and/or delimitation has not so far led to any conflict situations in spite of a substantial recent increase in outer space activities.

8. Along with these views there still exists the opinion in favour of a uniform régime for air space and outer space, which per se dispenses with the necessity for a definition and/or delimitation of outer space.

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9. In the period under consideration a number of States expressed their attitudes in relation to the definition and/or delimitation of outer space which are presented in section II of this paper.

10. The various updated criteria for defining and/or delimiting outer space as well as their modified versions are presented in sections III and IV of this paper below.

11. The question of the definition of outer space has also been dealt with indirectly in relation to space telecommunications. In reply to the inquiry of the Secretariat (see para. 2 above) the following information was submitted by the International Telecommunication Union:

"1. The World Administrative Radio Conference for Space Telecommunications, Geneva, 1971, decided to add or to modify a certain number of definitions:

Space Station

A station located on an object which is beyond, is intended to go beyond, or has been beyond, the major portion of the earth's atmosphere.

Earth Station

A station located either on the Earth's surface or within the major portion of the earth's atmosphere intended for communication:

- with one or more space stations; or
- with one or more stations of the same kind by means of one or more passive satellites or other objects in space.

Space Radiocommunication

Any radiocommunication involving the use of one or more space stations or the use of one or more passive satellites or other objects in space.

Satellite System

A space system using one or more artificial earth satellites.

Satellite Network

A satellite system or a part of a satellite system, consisting of only one satellite and the co-operating earth stations. The definitions "space service" and "deep space" were not modified by this Conference.

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2. The International Radio Consultative Committee (CCIR) of the ITU, the duty of which is, inter alia, to study technical questions relating to radiocommunications, has defined in its Report 204-3 (p. 17 of vol. IV of the CCIR XIIIth Plenary Assembly, Geneva, 1974) the terms concerning space radiocommunications, in particular:

Space craft: A man-made vehicle which is intended to go beyond the major part of the earth's atmosphere.

Satellite: A body which revolves round another body of preponderant mass and which has a motion primarily and permanently determined by the force of attraction of this body.

Note - A body so defined which revolved round the sun is called a planet or planetoid.

3. While no definition of "outer space" appears in the Radio Regulations, the expression "the major portion of the earth's atmosphere" has so far been the factor used in general to provide a distinction between space and terrestrial radio services.

A precise expression to define "deep space" was, however, adopted by the 1963 Conference, i.e.:

Deep Space: Space at distances from earth equal to or greater than the distance between the earth and the moon."

12. The Agreement relating to the International Telecommunications Satellite Organization ("INTELSAT") of 1971 and the Convention on the International Maritime Satellite Organization ("INMARSAT") of 1976 both contain the following definition of the term "space segment":

"'space segment' means the (telecommunications) satellites, and the tracking, telemetry, command, control, monitoring and related facilities and equipment required to support the operation of these satellites."

13. Since 1970 definitions of certain terms which may be relevant to the subject of this paper are contained in two more international instruments in the field of outer space which have entered into force: the Convention on International Liability for Damage Caused by Space Objects and the Convention on Registration of Objects Launched into Outer Space. Each Convention in its article I contains the following provisions:

- (a) The term "launching State" means:
  - (i) A State which launches or procures the launching of a space object;
  - (ii) A State from whose territory or facility a space object is launched;

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(b) The term "space object" includes component parts of a space object as well as its launched vehicle and parts thereof.

In addition the Convention on Registration defines the term "State of registry" as "a launching State on whose registry a space object is carried in accordance with article II".

14. Definitions of certain terms frequently used in the field of outer space which may also be relevant to the subject of the present paper have recently been suggested by some scholars. Thus, Prof. P. Magno and Dr. E. Scifoni <sup>2/</sup> gave the following definitions of some terms in one of their scientific papers:

A space object is any man-made object launched into space beyond atmospheric space.

Artificial satellites are space objects placed in orbit around the earth or around another celestial body.

Meteorological satellites, communications satellites or satellites otherwise qualified are satellites intended for specific tasks which are precisely defined by the qualifying adjective.

Geostationary satellites are satellites which, in orbit, have velocities and characteristics such that they remain constantly in a fixed position in relation to the surface of the celestial body around which they revolve.

A space vehicle is a space object carrying equipment and/or persons.

A space station is a space vehicle which is not intended for transport or transfer from one place to another in the cosmos but is intended to remain, as long as possible, in a specific place or in a precisely defined region of space.

An orbital station is a subcategory of the above-mentioned space station. More precisely, it is a space station intended to remain in orbit as if that were its normal position: for the present, this refers to orbit around the earth; tomorrow it may refer to orbit around the moon or any other celestial body.

"Space laboratories" are space stations equipped to remain in space in a lasting and active manner, with the capability or for the purpose of carrying out one or more specified tasks.

Transports by way of space are transports carried out from one point to another of the earth's surface by using adjacent extra-atmospheric space as the transit route.

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<sup>2/</sup> P. Magno and E. Scifoni, Définitions de l'espace et des activités spatiales. Proceedings of the thirteenth colloquium on the law of outer space (1970), Davis, Calif., 1971, p. 165.

## II. VIEWS EXPRESSED IN UNITED NATIONS ORGANS

15. During the period under review the question of definition and/or delimitation of Outer Space was on the agenda of the Legal Sub-Committee of the Committee on the Peaceful Uses of Outer Space, but not as a priority item. The statements made by representatives in the Legal Sub-Committee and the Scientific and Technical Sub-Committee of the Committee on the Peaceful Uses of Outer Space, in the Outer Space Committee itself and in the First Committee of the General Assembly relating to this question are summarized below.

16. The representative of Argentina <sup>3/</sup> again endorsed the "Fundamental Points to consider in regard to the delimitation of outer space" which were prepared by the Inter-American Committee for Space Research (IACSR) and transmitted to the Secretariat by the National Space Research Commission of Argentina in response to the inquiry previously made by the Secretariat. In his view, the line of demarcation to be fixed between atmospheric space and outer space would necessarily be conventional taking into account the high interests of the States involved. Consequently it was the Legal Sub-Committee's task to study the questions in depth and propose a solution. According to the representative of Argentina, the first problem was that of the criterion to be adopted for a definition. This led to a second problem: was the criterion to be purely scientific or based on other considerations as well? In the view of his delegation the Legal Sub-Committee should adopt a legal-scientific criterion. Another problem to be considered was whether the Sub-Committee should adopt a criterion based on technology. For its part, his delegation would not favour such a course, since it believed that no science was or could be dependent on technology. According to the delegation, the jurists in the Sub-Committee could draft a scientific criterion. The representative observed that the Legal Sub-Committee had encountered something of a setback when it had been informed that there were no scientific or technical criteria, even provisional in nature, which could be taken as a point of departure or reference for a definition. Therefore, since the scientist acknowledged that they were unable to resolve that urgent and serious problem, it was up to the jurist to undertake the task. As another possibility, the representative suggested that the problem should be taken up jointly by the Legal and the Scientific and Technical Sub-Committees. The definition of outer space should be formulated by them on the basis of political and legal criteria similar to those used in the international law of the sea and safeguarding the position of the developing countries in view of the progress made by the space Powers. In connexion with proposals for possible exact altitudes for a demarcation line, the representative referred to the fact that the altitude of 100 kilometres had been proposed seven years earlier by the IACSR, at the suggestion of Argentina.

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<sup>3/</sup> A/AC.105/C.2/SR.152-169 (159th meeting), p. 55; A/AC.105/C.2/SR.208-225 (212th meeting), pp. 31-32; A/C.1/PV.1990, p. 61; A/AC.105/C.2/SR.226-245 (244th meeting), pp. 138-139; (231st meeting), p. 34; A/AC.105/C.1/SR.158, para. 12; A/AC.105/C.2/SR.250, para. 17; A/AC.105/C.2/SR.264, para. 63; for "fundamental points" see A/AC.105/C.2/7, annex, pp. 10-11.



17. The representative of Austria <sup>4/</sup> said that despite other priority items the question of delimitation was a fairly pressing one since it was essential to know the limits of the application of treaties or conventions on outer space.
18. According to the Belgian <sup>5/</sup> delegation the increasing number of objects launched into outer space and the growing number of States taking part in space activities made a definition more and more necessary. Practical and logical reasons demanded that the item should be given priority. In the beginning of the surveyed period the Belgian delegation favoured a functional approach to definition based on three factors: the aim pursued; the means used, thus eliminating the whole field of aeronautics; and respect for air law with regard to the passage through atmospheric space, in other words, the harmonization of air law and space law in atmospheric space. Thus, while a well-defined system would be created for the applicability of space law, the sovereignty of States, as established by other branches of law, would also be respected. In 1976, the representative of Belgium submitted a working paper entitled "Natural Boundaries in Space" (A/AC.105/C.1/L.76) prepared by his delegation to demonstrate on the basis of the latest scientific data the existence of natural boundaries in space suggesting that for practical purposes the dividing line between air space and outer space should be established at an arbitrary altitude of 100 kilometres (see section III below). Finally, he supported the view of the French delegation for a more comprehensive title for this item which would include definition of outer space, definition of space objects and vehicles, and definition of outer space activities.
19. The representative of Brazil <sup>6/</sup> found it paradoxical to formulate juridical norms to regulate matters concerning outer space in the Legal Sub-Committee but to be unable to agree on what "outer space" meant precisely. He felt that in view of the urgent need for a definition the best way to overcome this difficulty was to continue to discuss it, preferably with priority. No arbitrary limits should, however, be set just for the sake of improvising a solution. He found it hard to believe that, considering the stage of research on outer space (1971), there would be not enough data available to enable the Committee on the Peaceful Uses of Outer Space to arrive at a valid conclusion based on reliable scientific information. Particularly in view of the growing number of new international instruments in the field, as well as intensification and diversification of space activities on the part of an increasing number of States, an agreement would put an end to the
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- <sup>4/</sup> A/C.1/PV.1819, para. 7; A/AC.105/C.2/SR.192-207 (194th meeting), p. 30.
- <sup>5/</sup> A/AC.105/C.2/SR.152-169 (158th meeting), p. 50; A/AC.105/PV.85-90 (88th meeting), p. 99; A/PV.98-106 (103rd meeting), p. 163; A/C.1/PV.1823, para. 88; A/C.1/PV.1864, pp. 23-25; A/AC.105/C.2/SR.226-245 (229th meeting), p. 20; A/AC.105/C.1/SR.160, para. 1; A/AC.105/C.2/SR.249, para. 17; A/AC.105/C.2/SR.264, para. 64; A/AC.105/PV.159, p. 17; A/AC.105/PV.164, p. 41.
- <sup>6/</sup> A/AC.105/PV.98-106 (101st meeting), p. 107; (103rd meeting), pp. 166, 167; A/AC.105/PV.111, p. 6; A/C.1/PV.1821, paras. 34-39; A/C.1/PV.1865, p. 38; A/AC.105/C.2/SR.192-207 (195th meeting), p. 36; A/AC.105/C.2/SR.208-225 (211th meeting), p. 21; A/AC.105/C.2/SR.151, para. 21.

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uncertainty in relation to the sphere of application of legal standards. He underlined his willingness to co-operate in any initiative that might lead to the settlement of that difficult question.

20. The representative of Canada 7/ considered that the item was not of priority concern. Arbitrary delimitation of outer space would serve no practical purpose and detailed consideration by the Legal Sub-Committee should be postponed until the subject had been given more thought by Governments and by the Scientific and Technical Sub-Committee.

21. The representative of Chile 8/ said that his delegation considered that an agreement on that subject would put an end to an ambiguous situation which might give rise to conflicts and left in doubt the sphere of application of legal standards. Although scientific and technical factors were involved, the solution of the problem depended primarily on legal and political criteria in respect of which international agreement must be reached. Since the Scientific and Technical Sub-Committee had made no progress in that area at its most recent session, a definition should clearly be sought within the Legal Sub-Committee.

22. In the view of the representative of Colombia 9/ as long as it was not known exactly what outer space encompassed and what should be understood by outer space, it would be extremely difficult to define or indicate the rights of States and the international community as such regarding the utilization of its enormous resources. He linked the necessity for definition directly with a profound interest of his country in the recognition of the sui generis character of the geostationary orbital segments and an unequivocal declaration that they come under the sovereignty of countries situated on the equator. Referring to the "res communis" nature of outer space according to the Outer Space Treaty of 1967, the representative stressed that due to the fact that the geostationary orbit was a natural resource of the nations over which it is situated, and subject to their sovereignty, these States did not relinquish their rights over that geophysical zone in said treaty. This approach was also shared by the representatives of Ecuador 10/ and Panama. 11/

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7/ A/AC.105/C.2/SR.152-169 (160th meeting), p. 60; A/C.1/PV.1791, para. 114.

8/ A/C.1/PV.2050, pp. 58-60; A/AC.105/C.2/SR.247, para. 19; A/AC.105/PV.159, p. 32; A/C.1/31/PV.9, pp. 50-60.

9/ A/C.1/31/PV.8, pp. 7-12.

10/ A/C.1/31/PV.10, p. 37.

11/ Ibid., p. 81. It may be noted that at the First Meeting of Equatorial Countries held in Bogotá from 29 November to 3 December 1976 (Brazil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda and Zaire) it was declared inter alia: "that the geostationary synchronous orbit is a physical fact linked to the reality of our planet because its existence depends exclusively on its relation to gravitational phenomena generated by the earth, and that is why it must not be considered part of the outer space". (Information provided by the Permanent Mission of Colombia to the United Nations. For details see conclusions reached at the Meeting.)

23. Agreeing with the conclusions of the Belgian delegation presented in connexion with its latest proposal (see para. 18 above), the representative of Czechoslovakia <sup>12/</sup> expressed the opinion as to the criteria to be used for the delimitation of outer space that while the Scientific and Technical Sub-Committee had something to say on the physical aspects of the question, the decision on the matter was up to the Legal Sub-Committee.

24. The representative of Ecuador <sup>13/</sup> considered the item of defining and/or delimiting outer space and outer space activities an urgent one. He later supported the approach of the Colombian representative (see para. 22 above).

25. Referring to the background paper prepared by the Secretariat (A/AC.105/C.2/7) the representative of Egypt <sup>14/</sup> suggested that the spatial approach which was intended to fix a boundary between air space and outer space, and the second approach, which concentrated on the definition of outer space activities, were not necessarily contradictory. Space activities could be defined pragmatically as they developed while the spatial approach could be regarded as the ultimate goal to be attained. The question was of prime importance touching on the sovereignty and security of each State on one hand and the use of outer space exclusively for peaceful purposes on the other. The representative emphasized the fact that the scope of application of a number of international space agreements was not known, a situation likely to create a conflict between air law and space law.

26. The representative of France <sup>15/</sup> on a number of occasions emphasized his view that there was an urgent need for a definition, pointing to the difficulties which may arise from the fact that the exact realm of space law - already consisting of four international instruments - is not yet known, whereas space activities continued to expand. The great problem for the years to come was that of reconciling the principle of liberty enshrined in the Outer Space Treaty, with that of the sovereignty of States, which is one of the pillars of traditional

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<sup>12/</sup> A/AC.105/C.1/SR.160, paras. 2-3.

<sup>13/</sup> A/C.1/PV.2050, pp. 93-95; A/C.1/31/PV.10, p. 37.

<sup>14/</sup> A/AC.105/C.2/SR.152-169 (161st meeting), p. 68; A/AC.105/PV.85-90 (88th meeting), pp. 103-104; A/C.1/PV.1790, paras. 86-88; A/AC.105/C.2/SR.192-207 (193rd meeting), p. 24; A/C.1/PV.1980, p. 16; A/AC.105/C.2/SR.208-225 (211th meeting), p. 27.

<sup>15/</sup> A/AC.105/C.2/SR.152-169 (159th meeting), pp. 53-54; (167th meeting), p. 128; A/AC.105/C.2/SR.187-191 (188th meeting), p. 26; A/AC.105/PV.85-90 (86th meeting), p. 26; A/AC.105/PV.98-106 (100th meeting), pp. 78-79; (102nd meeting), pp. 151-152; A/AC.105/PV.111, p. 37; A/C.1/PV.1792, para. 12; A/C.1/PV.1823, paras. 54-55; A/C.1/PV.1862, p. 6; A/AC.105/C.2/SR.192-207 (193rd meeting), pp. 17-18; A/C.1/PV.1982, p. 18; A/AC.105/C.2/SR.208-225 (210th meeting), p. 18; A/C.1/PV.1992, p. 16; A/AC.105/C.2/SR.226-245 (244th meeting), p. 138; A/AC.105/PV.14, pp. 48-50; A/C.1/PV.2049, pp. 56-57; A/AC.105/C.1/SR.160, para. 9; A/AC.105/C.2/SR.249, paras. 5-6; A/AC.105/C.2/SR.264, paras. 59-60; A/AC.105/PV.160, p. 16; A/AC.105/PV.163, pp. 32-40.

international law. Since not even a pre-draft of a draft of a solution existed, the representative would be happy to support any initiative intended to remedy this situation. Concerning the criteria to be used the representative maintained that in the absence of sound and indisputable scientific and technical criteria there was a need to adopt an arbitrary or conventional definition, arrived at by consensus in the Legal Sub-Committee. This could be a compromise boundary that could be modified if it subsequently became possible to fix it more accurately. Later the representative stated that from a purely technical standpoint certain new elements proposed in the discussion perhaps suggested that one should no longer simply note the failure of scientific thinking in this matter, as in the past. Generally speaking, his delegation had always thought that space law should not be allowed to fall too far behind technology. He further suggested that the Legal Sub-Committee should adopt an approach similar to the one used in remote sensing by satellite, namely that it should first identify the common elements emerging from the views expressed and the proposals put forward, define a set of problems and establish provisional criteria for definition, and then go into each concept more deeply. Placing the question in a larger framework the representative of France repeatedly drew attention to the existence of a number of concepts referred to in the space treaties, but not made explicit. In consequence, the title of the item should be changed to read "definition or delimitation of outer space and/or definition of space objects, space devices and space activities". For the latter concept the following formula had been proposed by the French delegation: space activity should be taken to mean "any activity involving the sending into space of an object designed to permit the exploration and utilization of outer space". Further elaborating on this global approach the representative thought it possible to define some type of methodology specifically by drawing up a short list of what there was to do: whether to define each of the notions mentioned or to define several of them simultaneously by stressing any one of them; how to define one or the other, or all of these concepts; which approach - technical, scientific or functional should be adopted; what scope should be given to this definition or definitions; should this definition or definitions be provisional or final; should they serve as a guide or be legally binding. He finally expressed the opinion that the Secretariat should draw up a list of the main items that were to be considered.

27. The representative of the Federal Republic of Germany 16/ said that although he was not convinced of the necessity of settling this matter immediately, his delegation shared the view that endeavours should be made for an agreement in the not too distant future. Whatever borderline might finally become acceptable - and the Scientific and Technical Sub-Committee should be asked to look further into the matter - this would also be a political decision, which, however, should not endanger the free use and exploration of outer space.

28. During the 1974 session of the First Committee the representative of Ghana 17/ expressed the hope that the next report of the Outer Space Committee

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16/ A/AC.105/C.2/SR.250, para. 4; A/AC.105/PV.158, p. 41.

17/ A/C.1/PV.1997, pp. 17-27.

would indicate some progress in the area of the definition of outer space and outer space activities.

29. In the opinion of the representative of Indonesia, 18/ the definition or delimitation of outer space should start from the premise that there were only two zones: the atmosphere and outer space governed by the respective legal régimes. Finally, he considered that: (1) the definition and delimitation of outer space must be based not on a particular altitude, but on the requirements of outer space technology; (2) a fixed classification of space flights was essential for the future development of outer space activities; (3) the geographical scope of regulations governing air space and outer space should be clearly defined, especially since space craft must sometimes pass through the national air space of a third State before reaching Outer Space.

30. The representative of Iran 19/ hoped that the technical experts would reach agreement on the concept of outer space and shared the view of other delegations as to the urgent need for a solution.

31. In 1975, the representative of Israel 20/ expressed the view that it might be perhaps timely in the near future to consider the possibility of convening an international conference on the definition and organization of outer space and the modalities of its exploitation and use for peaceful purposes.

32. The representative of Italy 21/ on one occasion in 1971 restated the position made known by his delegation several years before, namely that the lower limits of outer space cannot be determined by scientific or technical criteria, but rather on the basis of common sense, having, of course, taken due account of the legal and political factors. In 1975, the Italian delegation proposed a demarcation line at approximately 90 kilometres, this distance being the median of the values of 60 kilometres beyond which no air activity could go and of 120 kilometres approximately below which no space activity could be developed (see sect. IIIC for details). If the international community was not prepared for an immediate decision the Legal Sub-Committee should set up a legal framework as soon as possible so as to avoid the same kind of difficult and often counterproductive work that had been devoted to definitions related to the Law of the Sea. The representative did not agree with the trizonal proposal presented by the observer from COSPAR (see sect. IIIH below) and with one of the recent proposals for a boundary of 36,000 kilometres, which, in his view would eventually lead to de facto if not de jure ownership over celestial bodies and which had other negative implications.

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18/ A/AC.105/C.2/SR.265, paras. 3-4.

19/ A/AC.105/C.2/SR.187-191 (190th meeting), p. 44; A/AC.105/C.2/SR.251, para. 12.

20/ A/C.1/PV.2052, p. 7.

21/ A/AC.105/PV.85-90 (86th meeting), p. 58; A/AC.105/PV.151, p. 31; A/AC.105/PV.155, pp. 11-12; A/AC.105/C.2/SR.250, para. 6; A/AC.105/C.2/SR.264, paras. 61-62.

33. The representative of Kuwait, 22/ having previously spoken for the urgency of the matter, observed in 1976 that it was hard to understand why after many discussions a final decision should be so difficult to reach. He foresaw that in the absence thereof States particularly those active in outer space may be tempted to establish a creeping jurisdiction undermining the freedom of outer space, its free use and its exploration.

34. The representative of Mexico 23/ spoke of the urgency of defining and/or delimiting outer space and outer space activities and called for an exhaustive consideration of the subject.

35. The representative of Nigeria 24/ mentioned matters relating to the definition and/or delimitation of outer space and outer space activities among others which were yet to be adequately considered by the Legal Sub-Committee. He qualified the situation as calling for regret but not for censure.

36. Calling for an in-depth consideration of the question, the representative of Pakistan 25/ said that the definition of outer space was largely to be determined on the basis of scientific and technical considerations, whereas for a definition of outer space activities legal, political and other aspects played a role as well. He also spoke of possible misuse or abuse of space technology since the work of the Legal Sub-Committee seemed to be outpaced by its development.

37. The representative of Poland 26/ was of the opinion that the time had come to develop space law in accordance with Article 13, paragraph 1 of the United Nations Charter which should lead to a legal solution in a number of fields, including the definition or delimitation of outer space.

38. The representative of Romania 27/ underlined the importance of formulating a definition of outer space which is likely to ensure respect for national sovereignty over air space and the access of all States to outer space for scientific research and the use of that area for peaceful purposes.

39. The representative of Sweden 28/ said that from the point of view of international law his delegation had concluded that States in general, including his own, were not yet (1971) ready to adopt a common upper demarcation line of sovereignty over the air space above their territory, the establishment of which

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22/ A/C.1/PV.2052, pp. 23-25; A/C.1/31/PV.5, pp. 11-12.

23/ A/C.1/PV.2051, pp. 39-40.

24/ A/C.1/PV.1982, p. 36.

25/ A/AC.105/C.2/SR.226-245 (232nd meeting), p. 55; A/AC.105/PV.150, pp. 27-30.

26/ A/AC.105/C.2/SR.187-191 (187th meeting), p. 16.

27/ A/AC.105/C.2/SR.98-106 (99th meeting), pp. 49-50; A/AC.105/PV.114, p. 7; A/AC.105/C.2/SR.208-225 (212th meeting), p. 35.

28/ A/AC.105/C.2/SR.132-151 (146th meeting), p. 46; A/AC.105/C.2/SR.152-169 (161st meeting), pp. 61-62; A/AC.105/C.2/SR.187-191 (189th meeting), pp. 35-37.

demarcation would have far-reaching consequences in many areas, of vital interest to the individual State. The question of national sovereignty over air space should perhaps be dealt with in a wider framework than the Committee on the Peaceful Uses of Outer Space, in co-operation with other United Nations bodies. Commenting in detail on scientific aspects of the problem, the representative maintained that further such studies were needed and that it was premature to seek a definitive solution (1972). He said that some aspects of the question were at present being studied by the competent Swedish authorities.

40. Acknowledging the importance of the problem, the representative of the USSR 29/ doubted whether the Sub-Committee could solve it by the application of scientific criteria. The question could be viewed from two aspects, the political and the legal and everything depended upon the approach adopted. He proposed that a legal definition should be drawn up, and that in his view was a task for the Legal Sub-Committee. The Soviet representative also stated that the account given by the Belgian delegation (see above para. 18) was beyond dispute but that its conclusions, as acknowledged by the authors themselves were arbitrary. He could not agree with the trizonal approach of the observer from COSPAR.

41. The representative of the United Kingdom 30/ maintained his earlier position that there was no pressure to reach rapid solution in that sphere, since no practical difficulties had arisen in the nine years since the entry into force of the Outer Space Treaty, nor was any definition of outer space necessary for implementing the Convention on International Liability for Damage caused by Space Objects. A preliminary discussion could be embarked upon by the Legal Sub-Committee.

42. The representative of the United States 31/ was of the opinion that it was impossible to arrive at a meaningful definition unless its purpose was made quite clear. He furthermore questioned the definition proposed by Belgium (see above, para. 18) since, in the words of its author, it was "arbitrary" and thus another definition might be chosen on a similar basis.

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29/ A/AC.105/PV.148, p. 16; A/AC.105/C.1/SR.158, para. 32.

30/ A/AC.105/C.2/SR.152-169 (161st meeting), p. 66; A/AC.105/C.2/SR.248, para. 5.

31/ A/AC.105/C.1/SR.160, para. 4.

III. SPATIAL APPROACH TO THE DEFINITION AND/OR  
DELIMITATION OF OUTER SPACE

43. In the period under consideration (1970-1976) the spatial approach to the definition and/or delimitation of outer space has been commented on by several authors. Some of them are of the opinion that certain scientific criteria typical of the spatial approach do not yield results which are sufficiently precise to furnish the basis for an operational solution to the problem of definition, while others continue to espouse the various criteria of the spatial theory.

A. Demarcation based upon the equation of the upper limit of national sovereignty with the concept of "atmosphere"

44. This approach is linked to the terminology of the Paris and Chicago Conventions and national legislation. 32/

45. Some authors do not agree with this approach. Their criticism is based on the traditional argument 33/ that the transition between atmosphere and outer space is gradual and that there seems to be no precise boundary that could be established by scientists.

46. A few examples of this view can be presented. M. Lachs wrote:

"Difficulties would thus arise for instance if the earth's atmosphere, the gravitational field or the radiation belt were adopted as criteria: none of them having visible or clearly discernible frontiers, they would require therefore additional qualifications." 34/

M. Marcoff presented a detailed description of the physical aspects of the atmosphere in order to prove his opinion that it is necessary to base the demarcation on a consensus between nations rather than naturalistic criteria. 35/  
L. Bota notes that the different variants of the "physical school" are incapable of providing a definition which could fulfil the need for juridical regulations of relations between States. 36/

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32/ See A/AC.105/C.2/7, para. 99.

33/ See Ibid., para. 104.

34/ M. Lachs, The Law of Outer Space, Leiden, 1972, p. 56.

35/ M. Marcoff, Traité de droit international public de l'espace, Fribourg, 1973, pp. 300-316, 324, 325.

36/ L. Bota, Sur la définition de l'espace extra-atmosphérique, Revue roumaine d'études internationales, 1973, p. 140; a similar view is held by C. S. Tang, see Boundary question in space law: a balance sheet, Ottawa Law Review, 1973, p. 267; P. Huet, La frontière aérienne, limite des compétences de l'état dans l'espace extra-atmosphérique, RGDIP, 1971, p. 133, concerning the atmospheric theory.



47. Consequently, some authors favour a more legal approach. Lachs is of the opinion that there is a possibility of adopting a purely conventional boundary which would only subsidiarily rely on specific environmental or functional criteria. 37/

B. Demarcation based on the division  
of atmosphere into layers

48. This approach takes into account the fact that the atmosphere is divided by scientists into different layers (e.g. troposphere, stratosphere, mesosphere, ionosphere). The physical characteristics of these different layers form the basis for several proposals for delimitation. 33/

49. Some authors reject this approach with the observation that it is apparently impossible for science to establish definite boundaries for the layers suitable for an internationally acceptable demarcation. 39/ Marcoff remarks that the division of the atmosphere into layers established by geophysical science are subject to constant rectifications. 40/

50. M. Dausès, after careful consideration of "juridico-political" and "dynamographical" approaches examines the "spatiographical" method. This final approach leads him to his "aerological theory", focusing on the division of the atmosphere into layers. He points out that a number of distinctive changes in the vertical stratification of the earth's atmosphere take place at the relatively low altitude of 80 to 90 kilometres. He writes:

"This region constitutes the upper limit of the stratosphere and homosphere (stratopause and homopause) and the lower limit (basis) of the ionosphere and heterosphere. There, the most significant functional changes in the composition and constitution of the atmosphere are to be encountered which, beyond this small transitional layer, is no longer reasonably to be compared to the atmospheric strata near the ground. The homopause is not only an aerologically most appropriate dividing surface between air and outer space, but its location at an altitude of 80 to 90 kilometres is also a satisfactory synthesis between dynamo-graphical-technological and juridico-political requirements of demarcation. As it is basically a natural boundary of highly persuasive rationality and inalterable efficiency, it should be adopted as the working basis of legal demarcation of territory in space." 41/

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37/ M. Lachs, op. cit., p. 58; also F. Nozari, The Law of Outer Space, Stockholm, 1973, p. 124.

38/ See A/AC.105/C.2/7, paras. 105-114.

39/ See for example L. Bota, op. cit., p. 140.

40/ M. Marcoff, op. cit., p. 300; also M. Lachs, op. cit., pp. 56, 57.

41/ M. Dausès, Die Grenze des Staatsgebietes im Raum, Duncker and Humblot, Berlin, 1972, p. 126, see also: pp. 81-98.

51. The working paper entitled "Natural boundaries in space" <sup>42/</sup> submitted by Belgium, begins with definitions of the terms "gas", "air", "atmosphere" and "air space". <sup>43/</sup> Before a detailed analysis of the subdivisions of the atmosphere is given it is explained that they depend on the parameters used such as temperature, physical and chemical properties, composition, nature and origin of particles, etc.:

"Each of these parameters yields a specific subdivision and accordingly other boundaries. The choice depends on the particular phenomena one wishes to deal with. However it should be emphasized that per definition gases in general are fluid and may respond to numerous external forces. This is particularly true for upper atmosphere conditions that may depend on solar activity. As a matter of fact, any single picture can represent only a snapshot aspect of the atmosphere, adopted to a certain place on earth, to a certain moment in time and also to specific solar conditions." <sup>44/</sup>

The following conclusion is reached:

"Considering all the natural boundaries occurring in space and mostly mentioned before; considering various criteria and taking into consideration following facts:

- (i) the turbopause, situated at the height of  $100 \pm 10$  km, being a boundary that separates two atmospheric regions with different physical properties;
- (ii) the turbopause being the atmospheric boundary where air ends to exist with its normal composition for principal constituents;
- (iii) the first persistent and important ionospheric level, e.g. the E-region, occurring in the neighbourhood of 100 km;
- (iv) atmospheric drag becoming important and perceptible through the glowing of falling meteorites at  $100 \pm 10$  km;
- (v)  $100 \text{ km} \pm 10 \text{ km}$  seeming to be the lowest perigee attainable by artificial satellites;

the Belgian delegation proposes

- (i) That one should agree on the physical boundaries of the terrestrial atmosphere as revealed by space science and defined in aeronomy;

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<sup>42/</sup> A/AC.105/C.1/L.76 presented at the thirteenth session of the Scientific and Technical Sub-Committee of the Outer Space Committee in Geneva, 1976; see sect. II of this paper.

<sup>43/</sup> *Ibid.*, pp. 2, 3, para. 7.

<sup>44/</sup> A/AC.105/C.1/L.76, para. 8.

- (ii) That the air space should be extended to the whole homosphere;
- (iii) That basically the turbopause should be taken as the outer boundary of the air space (espace aérien);
- (iv) That for all these reasons an arbitrary altitude (round figure) of 100 km could be considered as the practical boundary;
- (v) That this boundary should be for practical purposes the dividing line between air space and outer space, knowing that important and vast atmospheric regions lie beyond it, as, e.g. plasmasphere, magnetosphere, etc." 45/

C. Demarcation based on the maximum altitude of aircraft flight (theory of navigable air space)

52. This approach which is based on the definition of aircraft in the annexes to the 1919 Paris Convention and the 1944 Chicago Convention 46/ is mentioned by several scholars.

53. J. D. Théraulaz, while holding that this criterion is among the more adequate ones since it would result in a boundary of an altitude of less than 100 kilometres, rejects it in view of present (the American plane X-15) and possible future development of aircraft technology making this criterion too unstable. 47/

54. P. Magno explained in a proposal of the Italian delegation to the Committee on the Peaceful Uses of Outer Space:

"The delimitation of those two areas leads to the determination of the geographic point where air space finishes and outer space begins. That is the point which we space jurists call the 'vertical frontier'.

"The Italian legal school that specializes in space law believes that the vertical frontier should be situated in such a way as to ensure that all air activity takes place beneath it and all space activity takes place above it. That is technically possible, since air activity cannot go beyond, at the maximum, 60 kilometres from the surface of the earth and space activity cannot be developed below approximately 120 kilometres. If

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45/ A/AC.105/C.1/L.76, para. 15.

46/ See A/AC.105/C.2/7, para. 115.

47/ J. D. Théraulaz, *Droit de l'espace et responsabilité*, Lausanne, 1971, p. 125; see also Marcoff, *op. cit.*, p.305; S. Lay and H. Taubenfeld, *The law relating to activities of man in space*, Chicago, 1970, p. 44.

we take the median of the values corresponding to those two limits, lower and upper, we can place the vertical frontier at approximately 90 kilometres from the surface of the earth.

"The criteria and the formula thus described are simple and technically and legally orthodox. No difficulties can be posed by the existence of objects -- such as the X-15 -- which move both in air space and in outer space. These are amphibious devices and, like all amphibious devices, they are subject to the respective legal systems governing the area in which they are found at any given time. All that, of course, depends on no specific rules being laid down." 48/

55. This view that the upper limit of present air navigability constituting the upper limit of air space should be one of the elements used in a solution of the boundary problem is shared by J. Kish. He suggested that the upper flight height of aircraft and the lower orbit height of space craft should determine the minimum and maximum heights of the limit of air space and outer space. 49/

D. Demarcation based on aerodynamic characteristics of flight instrumentalities (von Karman line)

56. This widely known approach suggesting a boundary at the theoretical limit of airflight at an altitude where aerodynamic lift is exceeded by the centrifugal force (at about 84 km) 50/ is discussed by a number of scholars, occasionally at length.

57. L. Perek is of the opinion that this theory meets the criteria for a convenient definition and that there would be no reason to change it now had it been accepted in 1957 when it was first proposed by von Karman. 51/ M. Marcoff remarks that it will remain a useful basis of reference, pointing out that it is situated almost exactly in the middle between the upper limit of "pure" aeronautical flight (40 km) and the lowest perigee of satellites whose orbit is of a certain duration (140 km). 52/

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48/ P. Magno, A/AC.105/PV.155, pp. 11, 12; see sect. II, para. 32.

49/ J. Kish, The law of international spaces, Leiden, 1973, p. 43.

50/ L. Perek, Remarks on scientific criteria for the delimitation of outer space, Twenty-seventh Congress, International Astronautical Federation (1976), a reprint, Paris, France, 1976, p. 6; see for detailed description A/AC.105/C.2/7, paras. 124-126.

51/ L. Perek, op. cit., p. 6.

52/ M. Marcoff, op. cit., pp. 308, 309; see also the proposal of the Italian delegation, IIIC, para. 56.

58. On the other hand the criticism based on the observation that the von Karman line is unstable since it is linked to technological development continues to be maintained. 53/

E. Demarcation according to the lowest perigee of an orbiting satellite

59. This view and its technical aspects continue to be the subject of extensive discussion and research. In the detailed working paper presented by the United Nations Secretariat and prepared by COSPAR "Study on the Altitudes of Artificial Earth Satellites", 54/ special attention is paid to the conditions in the lowest altitudes at which satellites move and to the disturbing forces which can affect the diminishing of the height of the closest point of approach of a satellite to the earth. 55/

60. The scope of the COSPAR study concentrates on satellites with orbits of perigee heights below 150 kilometres. According to this paper it seems that the past estimates of the lowest heights into which satellites can plunge, without falling down to the ground or burning up, in the atmosphere were too high. This is held to be especially true for satellites with highly eccentric orbits which penetrate into the atmosphere for a limited time during each revolution around the earth. The lowest depth into which artificial satellites of the earth have penetrated is with good precision the height of 90 kilometres. 56/

61. Taking up the distinction between the lowest effective perigee of usual satellites and the even lower ones of satelloids (objects which require during their orbiting continuing rocket thrust in order to equalize aerodynamic resistance 57/), M. Marcoff wrote against the use of the latter for delimitation purposes, since the satelloids could not be considered to be "space objects", 58/ while at the same time maintaining his scepticism toward the whole approach.

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53/ J. Théraulaz, op. cit., p. 126; C. S. Tang, op. cit., p. 267; Bhatt, Legal Controls for Outer Space, New Delhi, 1973, p. 123; M. Marcoff, op. cit., p. 308; see also A/AC.105/C.2/7, paras. 127-129.

54/ A/AC.105/164, 6 January 1976.

55/ Ibid., p. 4.

56/ A/AC.105/164, 6 January 1976, p. 4 and annex I, pp. 1 and 20.

57/ See A/AC.105/C.2/7, para. 133.

58/ M. Marcoff, op. cit., pp. 309, 310.

62. P. Huet wrote that the limit of air space could be seen at an altitude where a satellite in its perigee would burn, this altitude being at about 100 kilometres. 59/

63. J. Vosburgh and A. Bueckling shared the view that the lowest altitude at which a satellite can be put into orbit at least once should be selected. 60/ A. Bueckling further suggested that the lowest perigee has been implicitly accepted as demarcation line in the Outer Space Treaty pursuant to which objects sent on an orbit are considered to be in outer space. 61/ S. Lay and H. Taubenfeld see in the lowest perigee an interesting basis for speculation because it is already a part of State practice, however informal and temporal. 62/

64. L. Perek observed: "The criterion of lowest perigees of earth satellites has the advantage that it is based primarily on physical concepts which are invariable. It depends on technological progress to a very slight degree. In principle it would be possible to construct a special purpose artificial satellite which would survive below 90 km or at any height for that matter. There would, however, be no gain in any application of such a satellite, and its cost would be out of proportion because an extreme mass-to-area ratio can be achieved only by using heavy materials such as lead, gold, uranium or platinum in large quantities." 63/ Supporting a delimitation between 90 and 100 kilometres the author observed that it would today be possible to determine the relative position of any object with regard to such a limit with an accuracy of 3 metres and that even the space objects themselves could determine their position with regard to the limit with a sufficient accuracy. 64/

65. Finally, it should be noted that the lowest perigee approach is important in being selected as one of the elements of different solutions, such as for example in the proposal of the Italian delegation to the Legal Sub-Committee of the Outer Space Committee 65/ and in the conclusions of the Belgian working paper "Natural boundaries in space". 66/

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59/ P. Huet, op. cit., p. 133.

60/ J. A. Vosburgh, Where does Outer Space begin? ABAJ 1970, Vol. 56, p. 136; A. Bueckling, Die völkerrechtliche Haftung für Schäden, die durch Weltraumgegenstände verursacht werden, Zeitschrift für Luftrecht und Weltraumrechtsfragen, 1972, p. 215.

61/ Bueckling, op. cit., p. 215.

62/ S. Lay and H. Taubenfeld, op. cit., p. 49.

63/ L. Perek, op. cit., pp. 4, 5.

64/ L. Perek, op. cit., p. 6.

65/ See para. 56 above.

66/ See para. 53, conclusion (V).

F. Demarcation based upon the earth's gravitational effects

66. Several authors commented on this proposal which intends to establish the boundary between air space and outer space at a point where the earth's gravitational pull ceases. 67/

67. J. Théraulaz and L. Perek further elaborate on the traditional criticism of this proposal 68/ in pointing out that according to Newton's law the attraction of a body is proportional to its mass and to the inverse square of its distance. This signifies (in Euclidean Universe) that the field of attraction of the earth extends to infinity, 69/ the latter being unsuitable for definition purposes.

68. Starting from the need to safeguard the security of States on the basis of the gravitational theory it had been suggested that sovereignty should reach beyond any altitude from which something can be dropped. 70/ L. Perek rejects this criterion:

"Interpreting the term of 'dropping' as 'releasing with zero velocity with respect to the centre of the earth,' the criterion would lead to a very complicated limiting surface depending on the distribution of masses within and outside the solar system and changing with time."

He explained that an object 'dropped' at a high altitude above the earth would move along a trajectory primarily determined by its velocity and direction of motion at the time of being "dropped". Similarly, the altitude where the attraction of the earth is balanced by the attraction of the sun, which is about 260,000 kilometres would be of no importance in the dynamic problem of motion of a satellite around the earth. 71/ Linking the theories based on satellite orbits (see section III E above) with those of limits based on fields of attraction, he observes that the upper limit of satellite orbits can be determined in, what is called in astronomy, the "problem of three bodies", involving the sun, the earth and the satellite. Its mathematical treatment leads to the upper limit of satellite orbits around the earth at approximately 1,500,000 kilometres. Satellites at distances exceeding that limit would orbit not only around the earth but around the sun. 72/

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67/ See A/AC.105/C.2/7, para. 136.

68/ Ibid., para. 139.

69/ J. Théraulaz, op. cit., p. 124, L. Perek, op. cit., p. 5.

70/ See A/AC.105/C.2/7, para. 138.

71/ L. Perek, op. cit., p. 5.

72/ Ibid.

G. Demarcation based on effective control

69. This theory suggests that the exclusive sovereignty of the underlying State should reach as high as it can exercise effective control. 73/ The limited number of authors referring to it shows a negative attitude towards the continuing validity of the theory.

70. The criticism is upheld that this approach would favour rich and powerful States, 74/ create instability 75/ and deprive certain States of rights belonging to them as equal subjects of international law, 76/ a treatment contrary to the principle contained in article 1, paragraph 2 of the Charter of the United Nations. 77/

71. M. Marcoff further observes that outer space law does not accept the existence of a permanent expansion of sovereignty which would be the final result of theories based on the principle of effectiveness. 78/

H. Demarcation based upon the division of space into zones

72. This approach going back to the end of the nineteenth century 79/ was the basis of a proposal by Professor C. de Jager and G. Reijnen. It started from the approximate values of 50 and 130 kilometres as the upper boundary of air space (maximum altitude of aircraft flight) and the lower boundary of outer space (satellite perigee). The region in between, i.e. approximately 80 kilometres, is called "mesospace", to avoid the legal implications of the first name suggested, "no-man's space". The authors wrote:

"Apparently the mesospace is the region where no vehicle can stay for a period of considerable duration: satellites arising in that space will descend to earth in a time of the order of a few hours at most, the region is also inaccessible to airplanes or balloons. It can only be traversed or penetrated by rockets, or rocket-propulsed airplanes." 80/

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73/ See A/AC.105/C.2/7, paras. 141-146.

74/ See J. Théraulaz, op. cit., p. 119.

75/ S. Lay and H. Taubenfeld, op. cit., p. 45.

76/ M. Lachs, op. cit., p. 57.

77/ M. Marcoff, op. cit., p. 318.

78/ Ibid.

79/ See A/AC.105/C.2/7, para. 151.

80/ Professor C. de Jager and G. Reijnen, Mesospace: the Region between Airspace and Outer Space, Proceedings of the Eighteenth Colloquium on the Law of Outer Space, (1975) Davis, Calif., 1976, p. 109; see also section II, para. 32.



73. Since no legal régime exists for mesospace, the authors suggested that:

"... All relevant rules should be applicable that are internationally acceptable, in accordance with the rules as set in the corpus juris spatialis, including the remark that mesospace as such should be a 'free transition region for objects to be launched into outer space, to the moon and to other celestial bodies'." 81/

74. P. Magno opposed this proposal on the grounds that the division of space into three zones instead of two would complicate the problem and that the third, intermediary zone would give rise to the same disadvantages that the convention on the delimitation of space seeks to remove. 82/

I. Demarcation based on a combination of various spatial approaches and other proposals

75. As the survey has shown there are suggestions for the use of a combination of two or more different spatial approaches to arrive at a definition of outer space. For example, the Belgian working paper 83/ is based on the division of atmosphere into layers and the lowest perigee of satellites while the Italian proposal 84/ combines the criterion of a maximum aircraft altitude with that of the lowest perigee of satellites.

J. The question in general of fixing a boundary between air space and outer space

76. J. Théraulaz 85/ and M. Smirnoff 86/ favour a uniform régime for air space and outer space since the fundamental basis of State sovereignty - economic interests and security - has lost its significance.

77. A number of authors consider that a boundary is desirable because different legal régimes govern air space and outer space. 87/

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81/ Ibid., p. 111.

82/ P. Magno, op. cit., p. 116; see for similar criticism: J. Théraulaz, op. cit., p. 129; M. Marcoff, op. cit., p. 315.

83/ See para. 53 above.

84/ See para. 56 above.

85/ J. Théraulaz, op. cit., pp. 141-148.

86/ M. Smirnoff, Le régime juridique commun de l'espace aérien et cosmique comme la seule solution du problème de la délimitation de ces espaces. Revue française de droit aérien, Paris, 1971, pp. 27-33.

87/ See for example Marcoff, op. cit., p. 280; Nozari, op. cit., p. 113; Csabafi, op. cit., p. 53.

78. M. Dausés is of the opinion that the demarcation should not be left to customary law, but be solved by an international convention to be worked out by the United Nations based on scientific and legal considerations. He suggested that the following rules should be embodied in a "Convention establishing a frontier between the airspace above the territories of States and outer space":

Article 1

The frontier between the airspace above the territories of the Contracting Parties and outer space is a surface every point of which is at a distance of 80,000 metres from the nearest point of the International Ellipsoid of Reference.

Article 2

"International Ellipsoid of Reference" means the ellipsoid of revolution of the earth the semi-major axis of which is 6,378,388 metres and the oblateness of which is 1:297.

Article 3

The frontier between the airspace above the territories of the Contracting Parties and outer space does not impair the freedom of telecommunication of States. The Contracting Parties consider the transit of the ranges of electromagnetic waves actually used in international telecommunication services to be free and illimitable.

Article 4

1. Each Contracting Party grants to the other Contracting Parties, on a basis of reciprocity, the right of innocent passage through its airspace to such extent as may be required to ensure
  - (a) the safe and effective launching of space craft from the territory of the launching State into outer space,
  - (b) the safe and effective return of space craft from outer space into the territory of the launching State.
2. Passage is innocent so long as it takes place for exclusively peaceful purposes and is not prejudicial to the good order or security of the State flown over. 88/

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88/ M. Dausés, op. cit., pp. 127-128.

#### IV. FUNCTIONAL APPROACH TO THE DEFINITION OF OUTER SPACE

79. In the period under review the various aspects of the functional approach to the definition of outer space as reflected in the earlier background paper A/AC.105/C.2/7 (pp. 58-66) remained the subject of continuing interest and further study on the part of the world scientific community, United Nations organs and individual Governments. This interest has been kept alive by the lack of agreement on solving the problem of definition and/or delimitation of outer space through a spatial approach and by an unflagging desire of some countries and scientists to find an early way out of the stalemated situation especially in the face of new technological developments, such as the space shuttle, and the announced claims of national sovereignty by several equatorial States to the parts of the geostationary orbit above their territories.

80. However, despite the attention that the functional approach has been enjoying since 1970 to the present and the number of papers devoted to it few of the authors went beyond a mere presentation of its substance with the known arguments in favour or against it. <sup>89/</sup> Some writers being in favour of the spatial method criticized certain elements of the functional approach with others giving their own interpretation of "functionalism". Certain authors not being champions of either spatial or functional approaches were of the view that a solution to the problem of definition might be found in a combination of the two.

81. Thus, P. Haanappel, for example, suggested a new functionally oriented approach. In his view an international agreement could limit itself to stating the principles: air space extends up to the maximum height of normal flight by aircraft; outer space begins at the lowest altitude at which earth satellites can exist in orbit; the zone in between the two is mesospace with the boundaries to be fixed initially at 40 and 90 kilometres and, if necessary, to be reviewed and amended periodically in accordance with existing scientific standards. As noted by the author himself, the idea of a contiguous zone between air and outer space had been advocated earlier by J. Cooper <sup>90/</sup> as well as de Jager and Reijnen. <sup>91/</sup>

82. This modified functional approach was in substance shared by J. Kish, according to whom "functional factors determine the concrete delimitation of air space and outer space". On the basis of this consideration, he wrote, the upper flight height of aircraft (about 30 miles) might be accepted as the functional limit of air space and the lower orbit of space craft (about 90 miles) might constitute the functional limit of outer space. J. Kish suggested also that "the passage of space craft through air space and the intermediary zone to orbit height can, and should, be limited to the superjacent area of the launching State". <sup>92/</sup>

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<sup>89/</sup> See, for example, S. Lay and H. Taubenfeld, *op. cit.*, p. 48.

<sup>90/</sup> Peter P. C. Haanappel. *Airspace, outer space and mesospace*. XXVIIth Congress of IAF (1976), a reprint, Paris, 1976, p. 3.

<sup>91/</sup> See: *Spatial Approach*, paras. 74-76 above.

<sup>92/</sup> J. Kish, *op. cit.*, pp. 45-46.

83. Elaborating on the functional theory L. Bentivoglio stated that in speaking of "boundaries" (or "limits") in this field what was meant was not the place or the site where certain activities took place but rather the activities themselves. Thus, the still valid principle of "complete and exclusive" sovereignty of every State with respect to its national airspace actually meant that the international legal régime guaranteed for every State the right to prevent any activity over its territory which might be harmful or prejudicial to its interests. According to L. Bentivoglio, this right was not left to an ad libitum discretion of the State in question but was objectively limited by the existing international air law with respect to international air communications and by the international space law as regards the use and exploration of outer space for peaceful purposes. For these reasons, L. Bentivoglio concluded, there was no sense in raising the question as to the legal height or vertical limits of State's national sovereignty. 93/

84. Criticizing certain features of the purely functional approach, A. S. Piradov and V. G. Emin favoured a functional delimitation of outer space activities and suggested that a boundary at an altitude between 40-60 kilometres be established as the minimum lower height for the flight of spacecraft over territories of other States. In their view, to be effective such functional delimitation should be accepted by a majority of States and form an integral part of a clear-cut and detailed regulation of outer space activities regardless of their altitude or locus. The authors saw the merit of their approach in the fact that on the one hand, it would secure the sovereign rights and interests of subjacent States since practically no air activity was possible higher than the suggested altitudes, and, on the other, such functional delimitation would not hinder further peaceful exploration of outer space in accordance with international law, including the Charter of the United Nations. 94/

85. L. Bota considered that a definition of outer space should combine physical delimitation by a conventional boundary between the two zones with functional elements because the physical delimitation by conventional boundary between the two zones would contribute to the protection of certain security, economic and sanitary interests of States while functional elements would facilitate a solution to the problem of free access to outer space by all States. 95/

86. After a very thorough and detailed analysis of both spatial and functional approaches, M. Marcoff also came to the conclusion that the task of definition might best be served by a combination of those two methods achieved on the basis of contractual agreement by all States. The author suggested the establishment of a conventional boundary between 80 to 200 kilometres whose legal force would be determined by the political objective of the mission as contained in article I, paragraph 1 of the Outer Space Treaty. The presumption of conformity with the rule of article I, paragraph 1, according to M. Marcoff, could have value only if the

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93/ L. M. Bentivoglio, *Esiste un-confine dello State nello spazio verticale? Diritto Internazionale*, Milano, 1970, No. 2, pp. 206, 207, 210, 211.

94/ A. S. Piradov and V. G. Emin, *Tendentsii razvitia kosmicheskogo prava (Trends in the development of cosmic law)* Moscow, 1971, pp. 124-125.

95/ L. Bota, *op. cit.*, pp. 141-142.

functional factor of the purpose of a space mission was institutionalized under an appropriate international control. 96/

87. Stating that although so far space experience witnessed a functional control of space activities based on the type of activity conducted by a spacecraft, S. Bhatt was of the opinion that the "reconciliation" process between the régimes of air and outer space did not merely relate to the demarcation of the two zones in question nor would it be helped by functionalism, defined in terms of the type of activity. In his view, "in trying to arrive at a reconciliation of the two régimes it is necessary to seek ways and means in order to bring about a rationalization of the global transportation system supported through the medium of air space and outer space with the nature of limits or demarcation to be set up through international negotiations. 97/

88. One view, which may be said to bear upon the functional approach, was suggested by M. Lachs who thought that if the status of outer space was to be regarded not as a pious figment or abstract desideratum, but as a reality in terms of law, the legal conditions must be created for States to avail themselves of the rights it bestowed. According to him this meant that something in the nature of "freedom of innocent passage" through airspace must be recognized for the purpose of lawfully exploring and using outer space, as a necessary corollary of the declaration of the freedom of outer space made in written law. In his judgement, to think otherwise would be to postulate a right on the one hand and frustrate its essential purposes on the other. However, in the view of M. Lachs, the mutual acceptance of "innocent passage" by States (all of which would possess this right without discrimination) would preclude the assumption that they had renounced, once and for all, the right to object to any activity connected with outer space that might be carried on in their airspace. In other words, as he saw it, the right of passage did not connote activities which might be contrary to the principles and rules of outer space law or international law in general, or which were directed against a subjacent State or jeopardized its rights. 98/

89. Proceeding on the assumption that the importance of air communications would diminish with the inevitable growth of space flights, M. Smirnoff expressed the opinion that these developments would gradually make the classical notion of State sovereignty increasingly archaic, which would contribute to an easier acceptance of a uniform legal régime for air and outer space. Such a régime, in his view, could be established either by completing the Chicago Air Convention or by working out a new international treaty on vertical flights. By the author's own admission this solution to the problem of definition might materialize only after a complete and general disarmament. 99/ Believing that outer space could not be free unless its

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96/ M. Marcoff, op. cit., pp. 323-325.

97/ S. Bhatt, Current developments in outer space: perspectives on law, freedom and responsibility after the lunar landings. 36 Journal of Air Law and Commerce, 1970, pp. 276-277, 282.

98/ M. Lachs, op. cit., pp. 60-61.

99/ M. Smirnoff, op. cit., pp. 27-33.

air support was also free J. Hervy suggested that the problem of definition would cease to exist if States agreed to dispense with what he considered the outdated notion of national sovereignty. 100/ Sharing this opinion J. Théraulaz called for a space law which would embrace both air and space law. 101/

90. F. Moss held the view that space missions had been successfully performed for the past 19 years without having an exact definition of where airspace and outer space began. In his opinion the motivating force had been the accomplishment of specific projects that contributed to the objective of using space for peaceful purposes for the benefit of all mankind. According to him, that functional approach was embodied in the Outer Space Treaty, which provided for State responsibility for space activities no matter where the spacecraft was located. Referring to the Convention on Registration of Objects Launched into Outer Space, F. Moss suggested that there would be no confusion as to whether a vehicle, presumably including the space shuttle, was a spacecraft (space object) or not. 102/

91. Although criticism raised against the functional approach by its opponents in the period under review essentially comprises the arguments advanced earlier and previously reproduced in document A/AC.105/C.2/7, paragraphs 179-180, some fresh critical elements have been added. In an attempt to refute the functional approach based partly on the belief that it was not possible to determine the exact location of an outer space activity, attention is drawn to the new achievements in science and technology which now enable man not only to locate a space object in outer space hundreds of thousands kilometres away from Earth by means of photography but to establish technical parameters of a satellite. It is further argued that with the advent of satelloides, hybrid craft or the space shuttle, the sphere of application of space law would be gradually "lowering". 103/ Some functionalists were criticized for replacing the problem of two zones with two different legal régimes by the one of a single space with two different legal régimes 104 applied.

92. The view is expressed that the major preoccupation of securing passage for spacecraft through air space which gave rise to the functionalist theory has no practical justification since the ever growing flights of space vehicles through atmosphere have not led to complaints or claims. Nor is this preoccupation justified legally since the passage itself may be a legal right derived from the right of universal free access to outer space although this right should be exercised with necessary precautions not to inflict damage to others. 105/

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100/ J. Hervy, *Le concept juridique de souveraineté et le droit spatial. Proceedings of the eighteenth colloquium on the law of outer space* (1975), Davis, Calif., 1976, pp. 98-105.

101/ Jean-Daniel Théraulaz, *op. cit.*, pp. 138-148.

102/ F. E. Moss, *The space shuttle and the law of outer space*, XXVII IAF Congress (1976), a reprint, Paris, 1976, p. 14.

103/ M. Marcoff, *op. cit.*, pp. 292-295.

104/ J. Théraulaz, *op. cit.*, p. 140.

105/ P. Magno and E. Scifoni, *op. cit.*, p. 167.

## V. CONCLUSIONS

93. As can be seen from the foregoing, in the period under review, the question of the definition and/or delimitation of outer space has retained its great complexity. In spite of certain modifications of and additions to the spatial and functional approaches these two basic avenues for solving the problem in accordance with a variety of known criteria still seem to dominate the reasoning of Governments, scholars and United Nations bodies. As before, none of the suggested approaches or their combination has so far met with general acceptance although several States expressed their considered preference for establishing the air-outer space boundary at an altitude between 90 and 100 kilometres above the sea level. At the same time certain equatorial States have introduced a new element into the mosaic of ideas relating to the definition and/or delimitation by claiming sovereignty over parts of the geostationary orbit at 35,700 kilometres above their territories.

94. On the other hand, two opposite views as to the urgency to define and/or to delimit outer space continue to persist. The view is also held that there should be a uniform legal régime for air and outer space, which dispenses with the need for definition and/or delimitation of outer space altogether.

Annex I

REPLIES BY SPECIALIZED AGENCIES AND OTHER  
INTERNATIONAL ORGANIZATIONS

The reply from ITU of 27 October 1976 has been reproduced in paragraph 11 of this paper. In their letters to the Secretariat dated 29 October 1976, 22 August 1976 and 15 September 1976 respectively, officials of UNESCO, IAEA and the European space agencies indicated that their organizations had nothing to add on the subject to the comments they had submitted in 1969 and 1970. The letter from the Executive Secretary of COSPAR of 16 August 1976 referred to the contributions made by his Committee to the paper titled Study on altitudes of artificial earth satellites in December 1975 and published by the United Nations Secretariat on 6 January 1976 as document A/AC.105/164.



Annex II

BIBLIOGRAPHY (1970-1976)

A. ARTICLES AND STATEMENTS

- Bhatt, S. Current developments in outer space: perspective on law, freedom and responsibility after the lunar landings. 36 Journal of Air Law and Commerce (Dallas, Texas) 261-289, 1970.
- Bentivoglio, Ludovico M. Esiste un confine dello Stato nello spazio verticale? Diritto internazionale (Milano) 24:203-212, 1970, No. 2.
- Bota, Liviu. Sur la définition de l'espace extra-atmosphérique. Revue roumaine d'études internationales, (Bucharest) No. 19:137-144, 1973.
- Bueckling, A. Die völkerrechtliche Haftung für Schäden, die durch Weltraumgegebstände verursacht werden. 21 Zeitschrift für Luftrecht und Weltraumrechtsfragen, (Köln), 214-220, 1972.
- Colliard, Claude-Albert. Le droit de l'espace ou le ciel et la terre. In: La communauté internationale; mélanges offerts à Charles Rousseau. /Comité d'honneur: R. Ago and others/ (Paris), 1974, pp. 63-74.
- Da Mota, O. S. Direito aeronáutico, direito espacial, direito aeroespacial. Scientia Juridica, Revista Bimestral Portuguesa e Brasileira, 22:242-247 My-Ag, 1973.
- Dow, H. Cushman. Legal liability resulting from space activities. California Western International Law Journal (San Diego, California) 1:1-12, fall 1970.
- Durante, Francesco. Definizione e delimitazione dello spazio extra-atmosferico. Rivista di diritto internazionale (Milano) 54:377-395, 1971, No. 3.
- Emin, V. G. Polioty kosmitcheskih apparatov v nadzemnon prostranstve i problema vysotnogo predela gossudarstvennogo suvereniteta. (Les vols des engins cosmiques dans l'espace supraterrrestre et le problème de la limite verticale de la souveraineté étatique). Tendentsii razvitia kosmitcheskogo prava, (Moscow), 1971, pp. 95-125.
- Emin, V. G. Spaceflight and the problem of vertical limit of state sovereignty. In: Proceedings of the 14th Colloquium on the Law of Outer Space (1971) Davis, Calif., 1972, International Astronautical Federation, pp. 201-203.
- Ferrer, M. A. Jr. Espacio aéreo y espacio superior. 34 Boletin de la Facultad de Derecho y C. Sociales (Cordoba) (No. 1-5) 301-460, 1970.

/...

- Haanapel, Peter P. C. Airspace, outer space and mesospace, XXVIIth Congress of International Astronautical Federation (1976), a reprint, Paris, 1976.
- Hosenball, S. Neil and Hartman, Pierre M. The dilemmas of outer space law. American Bar Association Journal (Chicago) 60:298-303, March 1974.
- Hosenball, S. Neil. Current issues of space law before the United Nations. Journal of space law (University of Mississippi, Mississippi) 2:5-13, spring 1974.
- Huet, Pierre. La frontière aérienne, limite des compétences de l'Etat dans l'espace atmosphérique. Revue générale de droit international public (Paris) 75:122-133, janvier-mars 1971.
- de Jager C. and Reijnen, G. Mesospace: the region between airspace and outer space, Proceedings of the XVIIIth Colloquium on the Law of Outer Space (1975), Davis, Calif., 1976, p. 109.
- Kolosov, V. Some urgent problems of space law. International Affairs (No. 9) (Moscow) 24-38, 1970.
- Kries, Wulf von. Zur Fortentwicklung des Weltraumrechts. Zeitschrift für Luftrecht und Weltraumrechtsfragen (Köln) 23:89-102, 1974, No. 2.
- Magno, P. et Scifoni, E. Definitions de l'espace et des activités spatiales, Proceedings of the 13th Colloquium on the Law of Outer Space, (1970), International Astronautical Federation, Davis, Calif., 1971, pp. 165-176.
- Magno, P. et Scifoni, E. Necessità della distinzione tra spazio aereo e spazio extratmosferico. Il Diritto Aereo (Rome) 27-37, 1971.
- Perek, L. Remarks on scientific criteria for the delimitation of outer space, XXVIIth Congress of IAF (1976), a reprint, Paris, 1976.
- Péripkanakis, Constantin. L'aurore du droit de l'espace. Revue Hellénique de droit international (Athènes) 25:10-41, janvier-décembre 1972.
- Rauchhaupt, Fr. W. von. El sistema del derecho espacial. Revista de política internacional (Madrid) 135:201-207, septiembre-octubre, 1974.
- Smirnoff, M. Le régime juridique commun de l'espace aérien et cosmique comme se solution du problème de la délimitation de ces espaces. 25 Revue française de droit aérien (Paris) 27-34, 1971.
- Smirnoff, Michael. The problem of security in outer space in light of the recent adopted international convention on liability in outer space. Journal of space law (University of Mississippi, Mississippi) 1:121-127, fall 1973.

- Space Law. 54 International Law Association. Conference report, 405-441 (1970).
- Tang, C. S. Boundary question in space law; a balance sheet. Ottawa Law Review (Ottawa), 6:266-276, 1973.
- Vosburgh, John A. Where does outer space begin? American Bar Association Journal (Chicago), 54:134-136, February 1970.

B. BOOKS

- Bhatt, S. Legal controls of outer space; law, freedom and responsibility. New Delhi, S. Chand, 1973, 372 p. illus; pp. 118-137.
- Csabafi, Imre Anthony. The concept of state jurisdiction in international space law; a study in the progressive development of space law in the United Nations. The Hague, Martinus Nijhoff, 1971, 197 p; pp. 51-57.
- Dausies, M. A. Die Grenze des Staatsgebietes im Baum. Berlin, Duncker and Humblot, 1972, 141 p. (Schriften zum öffentlichen Recht, 204).
- Kish, J. The law of international spaces. Leiden, Sijthoff, 1973, 236 p; pp. 39-51.
- Lachs, Manfred. The law of outer space; an experience in contemporary law-making. Leiden, Sijthoff, 1972, 196 p; pp. 55-67.
- Lay, S. Houston and Taubenfeld, Howard. The law relating to activities of man in space. Chicago, 1970, 333 p; pp. 36-51.
- Marcoff, Marco G. Traité de droit international public de l'espace. Fribourg, Editions Universitaires, Fribourg, Suisse, 1973, 835 p. illus; pp. 277-326.
- Nozari, F. The law of outer space. Stockholm, 1973. 261 p; pp. 113-126.
- Ogunbanwo, Oguniola O. International law and outer space activities. Martinus, Nijhoff, The Hague, 1975, 272 p; pp. 50-62.
- Piradov, A. S. Kosmos i mezhdunarodnoye pravo (Outer Space and International Law) Moscow, 1970; pp. 35-36.
- Piradov, A. S. Tendentsii razvitiia kosmicheskogo prava. /Pod obshchei red. A. C. Piradova/ Moskva, Nauka, 1971, 243 p. /Trends in the development of cosmic law/; 96-125.
- Piradov, A. S. Mezhdunarodnoye kosmicheskoye pravo (international law of outer space), Moscow, 1974, pp. 19-23.

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Reijnen, G. C. Legal aspects of outer space, Utrecht, 1976, pp. 79-92.

Théraulaz, Jean D. Droit de l'espace et responsabilité, Lausanne, 1971,  
pp. 117-148.

White, Irvin L. Decision-making for space; law and politics in air, sea, and  
outer space. West Lafayette, Indiana, 1970, 277 p. (Purdue University Studies).

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