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THE DELIMITATION OF OUTER SPACE REVISITED
The Role of National Space Laws in the Delimitation Issue

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Abstract

Recently, the issue of the delimitation and definition of outer space has been put back on the agenda of the Legal Subcommittee of UNCOPUOS. This issue has of course many complex features. It effectively revisits the fundamental but rather theoretical debate between proponents of 'spatialism' and adherents to 'functionalism' when it comes to defining the essence of international space law. It reflects on a measure of absence of political will to establish any rigid delimitation and definition ahead of technical or other developments which may tend to ignore such legal borderlines. Moreover, even amongst those agreeing on the need to settle the issue, substantial differences of opinion rule as to for example where any borderline would have to be drawn.

Either way, the fact that the issue is back on the agenda of the world's most authoritative space law-making institution, signifies that no arguments have so far been able to settle the matter once and for all. The present paper represents an effort to add another perspective to this debate. It is clear, that in the absence of any unequivocal and authoritative agreement so far on the international level, no treaty law exists settling the matter. No uniform interpretation, definition and delimitation of outer space and outer space law can be distilled.

However, this does not exclude the possibility of customary law taking the place of treaty provisions on such principled matters. For the formation of customary law, the *opinio juris sive necessitatis* of individual states is a crucial factor. Especially important in this context is the *opinio juris* of states which occupy a special and outstanding position in the field at issue. Such an *opinio juris* of an individual state could, in principle, very well be given shape in the form of national legislation on the relevant issue.

The paper presents an effort to analyze the five cases of national space legislation presently in existence from that perspective. This concerns, in a non-chronological order, the Russian Federation, the United States, the United Kingdom, Sweden, and South Africa. In other words: the first and second nation in space ever and today still the world's space superpowers, the third depositary of the first three space treaties, the state with the Northern-most operational space-base and the state with (in all probability) the Southern-most operational space-base. Analysis of these cases thus might indeed have considerable relevance for the development of international space law on this issue.

After an overview of the main arguments and issues on the international level, it will be evaluated therefore, whether these cases can give a further clue as to the debate on the delimitation-and-definition issue. To what extent do these laws proceed, explicitly or implicitly, from the concept of outer space as a distinct legal realm? To what extent would they perhaps provide arguments to establish the borderline of outer space at a certain height, assuming that the need for such delimitation is confirmed? In sum, to what extent do these five pieces of domestic legislation contribute to the further codification and development of international space law, amongst others as undertaken by UNCOPUOS?

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1. Introduction

After a considerable time having not been considered a relevant item, the issue of the delimitation and definition of outer space has effectively been put back on the agenda of the Legal Subcommittee of UNCOPUOS.[1] The narrower issue could, for analytical purposes, best be envisaged as consisting of the two consecutive questions already indicated by the title of the agenda item itself.

The first question revisits the fundamental but rather theoretical debate between proponents of 'spatialism' and adherents to 'functionalism' when it comes to defining the scope of international space law - does and/or should it fundamentally apply to activities *in* outer space or to activities *having an 'outer space-character'*?

Then, in view of the fact that without any doubt at least a substantial number of space law-obligations do refer to outer space as an area, the second question would obviously be: where does outer space begin? The answer to this question would allow differentiating between outer space as a *terra communis* and airspaces especially over states' territories where national sovereignty rules supreme - not just in the abstract but also in particular cases and conflicts.

Thus, the absence of agreement so far also reflects on the measure of absence of political will to establish any rigid delimitation of outer space. Such a delimitation is often perceived as risking to run ahead of technical or other developments which may tend to reduce such legal borderlines to irrelevance - or even turn them into a nuisance. Moreover, even amongst those agreeing on the need to settle the issue, substantial differences of opinion rule as to for example where any borderline would have to be drawn.

On the other hand, the mere fact that the delimitation of outer space is back on the agenda as such, proves that little disagreement exists about the fact that space law is at least for a very substantial part a regime applicable to the area of outer space, while of course acknowledging that a number of sub-regimes are based on functionalist premises.[2] From this perspective, the question of the definition of outer space would really be incorporated in the question of the delimitation thereof. The present paper will therefore concentrate on that last question.

2. Customary law and the delimitation issue

Whatever the value of the foregoing arguments, the absence of any measure of agreement on the question has led to thè absence of any treaty law settling the matter. No uniform interpretation, definition and delimitation of outer space and outer space law can be distilled from this source. Neither can rules of customary law (existing as much as emerging), as the other primary source of public international law, presently be detected at the global level - at least *prima facie*.

In this regard, however, the two factors essential for the formation of customary law should be noted - state practice and the *opinio juris sive necessitatis* of individual states.[3] Moreover, not all states are equal from that perspective. State practice and *opinio juris* of states which occupy a special and outstanding position in the field at issue are of more value than those of other states. Such a state practice and/or *opinio juris* of an individual state could very well take the shape of establishment of national legislation on the relevant issue.

For that reason, any relevant national space law could contribute to the debate on definition and delimitation of outer space. If such legislation would provide clues as to how individual states look upon and (try to) implement the legal regime of international space law, this means, to begin with, that a certain relevance for defining and delimitating is evidently perceived to exist. Further than that, questions would arise as to how exactly this is being given shape: are certain definitions and/or delimitations actually provided? And in such cases, would the state practice and *opinio juris* of relevant individual states show consistency and coherence, or would they diverge on important counts?

Presently, five states have enacted national space legislation in the true sense of the word.[4] This concerns, firstly, the Russian Federation and the United States, in other words: the first and second nation in space ever and today still the world's space superpowers. Secondly, the United

Kingdom, as the third depositary of the first three space treaties and fourth nation to enter space obviously also a space power, has a national space law *in situ*. Thirdly, Sweden, the state with the Northern-most operational space-base, belongs to this category. And finally, South Africa, the state with (most likely) the Southern-most operational space-base, also has enacted a national space law. Though other major space powers such as France, China, India, Indonesia and Brazil are missing, the five states which do have a national space legislation clearly are primary examples of states of particular relevance from the point of view of state practice, *opinio juris* and the development of international customary law.

3. International space law and the delimitation of outer space

The international space law treaties may not provide for any reasonably substantial clues as to where outer space begins (or ends); they leave little doubt that outer space presents a distinct legal realm as such. Article II of the Outer Space Treaty[5] by excluding any application of full-fledged sovereignty - i.e. on a territorial basis - to outer space clearly distinguishes that area from the underlying airspace where sovereignty rules supreme.[6]

Consequently, Article VI of the Outer Space Treaty provides for responsibility of states for "activities *in outer space*" as opposed to, for example, 'space activities' or 'activities involving outer space (objects)'.[7] Furthermore, Article VIII of the Outer Space Treaty and the ensuing Registration Convention[8] have the specific aim of providing for some measure of jurisdiction and legal control over activities in the area of outer space in the absence of territorial sovereignty, by means of the tool of registration of space objects. In other words: the basis of 'space law' as a distinct legal regime *is* a spatialist one, as its application hinges on the involvement of the *area* of outer space.

At the same time, it goes without saying that a number of important exceptions to this spatialist character are to be noted. Most prominently the liability regime of Article VII of the Outer Space Treaty and the Liability Convention[9] - perhaps the most directly substantive part of international space law - does not hinge, at least in the first instance, on *where* damage is caused and/or suffered, but on *how* it is caused - namely by a space object.

Also, by their very nature the legal regimes of Rescue Agreement[10] and Registration Convention attach to space objects largely irrespective of where they are, as opposed to outer space as such. Not only are these regimes, as important functionalist exceptions to the spatialist 'rule', the underlying cause for the whole spatialism-functionalism debate; they are no doubt at least in part also responsible for the fact that no borderline between outer space and airspace has yet been drawn.

Thus, the foregoing analysis confirms in more detail that the space treaties do not and cannot settle the matter of the delimitation (and definition) of outer space at the international level. This is where the national space laws of the five states mentioned before come into their own. National space legislation, especially in such cases of major players in the space endeavour, constitutes state practice and *opinio juris* relevant for the formation of international (customary) law.

To what extent do these laws proceed, explicitly or implicitly, from the concept of outer space as a distinct legal realm? To what extent would they perhaps provide arguments to establish the borderline of outer space at a certain height, assuming that the need for such delimitation is confirmed? In sum, to what extent do, or can these five pieces of domestic legislation contribute to the further codification and development of international space law, amongst others as undertaken by UNCOPUOS?

4. Russian Federation

On 20 August 1993, the President of the Russian Federation signed the Law of the Russian Federation on Space Activities into force.[11] The scope of the Russian Law comprises all activities "immediately connected with operations to explore and use outer space".[12] Also included, however, by the relevant term "space activities"

are the creation, use and transfer of "space technics, space technology, and other products and services necessary for carrying out" space activities.[13] Hence, the Russian Law's provisions in this regard go much further than what usually would be understood by 'space activities' - let alone by 'activities *in* outer space'.

On the other hand, the Russian Law provides for the registration of space objects of the Russian Federation.[14] The Russian Federation shall thus "retain jurisdiction and control" over such registered space objects in an area where such exercise cannot be justified on the basis of territorial sovereignty.[15] This applies on the ground, while heading for outer space and while staying there, and "also on return to the Earth outside the [territorial] jurisdiction of any state".[16]

As a consequence of the registration of the space object, the Russian Federation furthermore "shall retain jurisdiction and control over any crew" of the space object concerned.[17] This applies comprehensively throughout the flight programme unless international obligations of the Russian Federation, such as those relating to the exercise of jurisdiction by other states, go against this.

Finally, the Russian government ensures the protection of intellectual property rights under existing or prospective Russian legislation of "technologies and commercial secrets".[18] Hereby, the basis is laid for an intellectual property rights protection regime which applies, for example, equally to inventions on board of Russian-registered space objects and to inventions on earth in relation to space activities.[19] The point of departure with respect to space activities is that the property right applies to "physical product[s] created in outer space" or "information product[s] created as a result of space activities".[20]

In conclusion, on several important counts does the Russian Law acknowledge the special status of outer space as an area falling outside the territorial sovereignty of any state. While activities *outside* outer space itself are relevant for the purposes of the Russian Law, activities *in* outer space are indeeed considered legally distinct. At the same time, no clue is given as to where such an area begins. This is especially interesting in the light of the well-known efforts of Russia, and more in particular its predecessor the Soviet Union, in establishing a firm borderline.[21]

5. The United States

The situation regarding national space legislation is most complicated in the United States, as a number of relevant acts have been enunciated. In view of the definition of national space legislation used *supra*, attention will be paid at this juncture only to the National Aeronautics and Space Act and the specific pieces of legislation dealing with launching, satellite communications and satellite remote sensing.

5.1. The National Aeronautics and Space Act

The National Aeronautics and Space Act[22] was specifically enacted on 29 July 1958 for the purpose of providing for "research into problems of flight within and *outside* the earth's atmosphere, and for other purposes".[23] This fundamental distinction is reflected in a number of other provisions where the terms "aeronautical" respectively "space activities" figure prominently.[24]

In other words, the Space Act implies that the earth's atmosphere equates with the notion of 'airspace' whereas conversely outer space is the area outside of the earth's atmosphere. Consequently, these provisions do seem to point to a distinct borderline, most probably at some 80 to 100 kms.[25]

The only provision of the Space Act of further interest, albeit indirectly, relates to the status of outer space as a *terra communis* with a view to the issue of intellectual property rights. Inventions made in outer space or used in outer space are not explicitly mentioned. However, "any invention (...) made in the performance of any work under any contract" with NASA under determination of the NASA Administrator falls within the ambit of the relevant provisions.[26] This system by implication would apply to inventions made in outer space as well, albeit within the parameters of the *corpus juris spatialis internationalis*. This means it applies to inventions on board United States registered space objects, and potentially also by United States nationals anywhere in space.[27]

In other words, this provision takes on special importance when seen in the light of the special status of outer space.

5.2. The Launch Acts

The Commercial Space Launch Act was enacted on 30 October 1984 specifically to deal with one of the three fields of interest to private enterprise: launching activities.[28] The absence of substantial success in the prodding of private enterprise to enter the business led to the enactment of Amendments to the Launch Act in 1988.[29] In 1994 finally the Act in its amended version was codified under the title Commercial Space Transportation - Commercial Space Launch Activities.[30]

The scope of application of the Launch Act in terms of activities encompasses both the operation of launch vehicles and the operation of launch sites.[31] The Amendments of 1988 did not result in a change with regard to this issue, and the same applies to the 1994 codification. Thus, the Launch Acts deal with *access to* outer space and related activities, rather than activities *in* outer space; and it does not therefore really deal with the status of outer space as *terra communis*. The only existing relevant provision on the issue of status, however, actually confirms that conclusion since it deals *inter alia* with entry into outer space. Space objects, including payloads, launched into outer space are not to be considered as exports for the purposes of any relevant national law.[32] The inclusion of this clause implies that, in its absence, *a contrario* any space object launched into outer space might have constituted export.

In other words: outer space is seen as principally falling outside the territorial sovereignty and jurisdiction of the United States. Nothing, however, is provided here about where the relevant borderline would be.

5.3. The Satellite Communications Acts

In 1934 the Communications Act was enunciated in the United States, in order to deal with telecommunications on the federal level.[33] The Federal Communications Commission (FCC) was established in order to monitor and implement its provisions.[34] It declared in 1970 that the Communications Act was to be applied to space telecommunications as well.[35]

No provisions on registration or other issues related to the status of outer space are found in the Communications Act. The FCC has extensive powers to collect information on operations to be licensed or already licensed.[36] These powers do not amount to registration proper, however, so as to allow the exercise of United States jurisdiction under Article VIII of the Outer Space Treaty.

5.4. The Satellite Remote Sensing Acts

In 1984, the Land Remote Sensing Commercialization Act was enacted to stimulate the commercial development of space remote sensing especially by private enterprise.[37] The commercial viability of private remote sensing, however, never developed as expected, and this led to enactment of the Land Remote Sensing Policy Act in 1992, repealing the first Remote Sensing Act.[38] Since on relevant issues the second Remote Sensing Act closely relates to the first, both Acts are best analyzed together.

The first Remote Sensing Act and the relevant license requirement applied to any private person "who is subject to the jurisdiction and control of the United States" operating a remote sensing satellite system.[39] Such "jurisdiction and control" encompassed United States citizens, corporations and firms organized under United States law, and private entities "having substantial connections with the United States or deriving substantial benefit from United States law".[40] The last phrase would logically include private entities operating remote sensing satellites which are registered in the United States.

The second Remote Sensing Act applies to private persons "subject to the jurisdiction *or* control of the United States".[41] Private persons merely controlled by the United States, without falling under its jurisdiction as such, are now also falling under the applicable legal regime. As a consequence, a non-United States national undertaking a private remote sensing activity from outside United States territory, but nevertheless controlled by the United States, also requires a United States license.

Effectively, however, this would logically relate to registration with the United States of space objects operated neither by United States nationals nor from United States territory. Any

other interpretation would lead to forms of extra-territorial jurisdiction not based on any sound international legal premise. Therefore, the license presumably would also deal with registration, although registration as such is not dealt with by the Acts - similar to the case of satellite communications.
Yet, all these clauses at the most are of indirect relevance to the issue presently under consideration. No provisions deal directly with the questions of definition and delimitation of outer space, let alone provide an answer to them.

6. The United Kingdom

On 18 July 1986 the United Kingdom promulgated the Outer Space Act.[42] The UK Act in practical terms applies to the launching, or procuring of launching, of a space object, the operation thereof, or "any activity in outer space".[43] Rather sweepingly, carrying on an activity in outer space is then defined as "caus[ing] it to occur or [being] responsible for its continuing".[44] As to space activities proper, the UK Act encompasses both launching, and satellite communication and remote sensing activities.
The main, albeit indirect reference to the status of outer space arises from the aforementioned provisions on the scope of the Act. Phrasing the third category of activities included as "any activity in outer space" actually sets it in juxtaposition to the first two categories mentioned; those of the launch respectively operation of a space object. Otherwise, the third category should have been defined as 'any *other* activity in outer space'.
Thus, these clauses reflect an acknowledgement that launching a space object and the operation thereof are of a different legal brand than activities *in* outer space. This last category essentially equals space activities which take place comprehensively in outer space, i.e. manned space activities: also the actors undertaking the relevant activities are present in that area.
The other two categories at least partly take place on earth (albeit each in a different sense): the second category (of operating a space object) is akin to space activities where the actors are to be found down on earth, whereas the first category (of launching) largely takes place in airspace, regarding actors and activities alike. This categorization clearly is of a spatialist character, as the dividing lines are drawn on the basis of where the actors find themselves and/or where their actions result in relevant activities.
However, the only substantive provisions following from this acknowledgement of outer space's different status relate to the registration of space objects. A national register is established by the Act,[45] and the British National Space Centre (BNSC), established in 1985, was charged with maintaining the United Kingdom's national register of space objects.[46]

7. Sweden

On 18 November 1982 the Act on Space Activities had been promulgated in Sweden, followed by a Decree on Space Activities.[47] Thereby Sweden had become the first member both of the European Space Agency and of the European Community to establish a national act specifically dealing with space activities.
The Swedish Act applies to space activities defined as including "activities carried on entirely in outer space" as well as "the launching of objects into outer space and all measures to manoeuvre or in any other way affect objects launched into outer space".[48] The exception, from a spatialist point of view, is provided by the launch of sounding rockets, which is excluded even if they might reach outer space.[49]
The differentiation made between "activities carried on entirely in outer space" and (other) activities in any way affecting objects launched into outer space by the Act is noteworthy, leading to a further *de facto* legal differentiation under another provision which is of some interest.
Someone undertaking unlicensed activities of the first kind, i.e. activities *in* outer space, will *automatically* fall under the provision providing for criminalization of such activities undertaken *outside* Sweden. Such activities are to be prosecuted upon presence of the perpetrator in Sweden, since otherwise these activities could not

be brought within the scope of Swedish enforcement jurisdiction.[50]
On the other hand, unlicensed activities of the second kind, i.e. activities conducted at least partly on earth, might *not* necessitate invocation of such a specific provision, depending upon whether the actors are on Swedish territory or outside of it. Hence, application of this criminalization-clause is of different impact and importance as between the two kinds of 'space activities'.
Although no further and more substantive consequences are (explicitly) attached to these two different categories, the wording of the provision on scope implies a difference between outer space as an area and other, earthbound realms. This therefore at the least confirms the special legal status of outer space.
Finally, the National Board for Space Activities (NBSA) is to keep a national register of space objects in respect of which Sweden is to be considered the sole launching state.[51] In the case where other states also qualify as a launching state of the space object in question, registration by Sweden will depend upon agreement with those other states.[52] These clauses of the Swedish Decree consequently mean that Sweden retains its option to exercise jurisdiction on board of or with respect to the space objects concerned also in the sovereignty-free area of outer space.

8. South Africa

On 6 September 1993, the Space Affairs Act of the Republic of South Africa entered into force.[53] The Act deals with "space activities", being "activities directly contributing to the launching of spacecraft and the operation of such craft in outer space".[54]
This formulation seems to exclude the last part of a return to earth, namely that after re-entry into the earth's airspaces. This in turn confirms the distinction noted earlier as between space activities taking place comprehensively in outer space, i.e. with the relevant actors being present there, and space activities where the actors are down on earth while the consequences of their actions are being felt (at least for the main part) in outer space. This does point, again, to the fact that outer space is envisaged as a distinct realm in international legal terms.
Launching operations, satellite communication and remote sensing activities are obviously included. Furthermore, South Africa's territorial jurisdiction has been asserted with respect to the activities of launching itself and - presumably - operating a launch facility.[55] On the other hand, the assertion of active personal jurisdiction, i.e. on the basis of the nationality of the relevant actors, is comprehensive and applies to *all* space activities entailing obligations for South Africa under applicable international treaties.[56]
Actually, also this distinction between launching activities on the one hand and for example satellite communications and satellite remote sensing activities on the other hand points to spatialist premises. Launching takes place for a major part in national (South African) airspace, hence falls under South African territorial jurisdiction, whereas the other activities as such take place in outer space, where South African territorial sovereignty and territorial jurisdiction do not operate.
Most interestingly, outer space is defined in the SA Act as "the space above the surface of the earth from a height at which it is in practice possible to operate an object in an orbit around the earth".[57] The aforementioned definition of space activities for the purpose of the Act includes operating spacecraft in outer space.[58] Therefore, to begin with, this is a relevant as well as a logical clause.
Moreover, it distinctly points to a borderline somewhere between 100 and 120 kms, as the minimum height at which so far satellites seem to have been operated in orbits.[59] In line with this provision, "spacecraft" is defined as an "object launched with the purpose of being put and operated *in outer space*",[60] and "suborbital trajectory" as a notion applies only to objects launched from the earth but "without completing an orbit around the earth".[61]
It is clear, however, that, while the South African Act itself refrains from putting any exact figure on it, it *does* provide for a borderline between outer space and airspace, and this moreover in a fairly circumscribed zone between areas clearly constituting airspace respectively outer space.

9. Conclusion

Summing up, it has become clear, that all national space laws under consideration one way or another through the definition of their own scope envisage outer space as a special legal realm outside their territorial sovereignty. In addition, most of the national space laws for example arrange for registration, which serves as a special tool to make up to some extent for the lack of territorial sovereignty in outer space. Also, some national intellectual property rights matters have been dealt with taking this into account.

More particular examples of heeding the special status of outer space are to be found in the cases of the United States, where legislation acknowledges the special status of outer space through export regulations, and Sweden, in the *de facto* application of criminal enforcement jurisdiction.

While acknowledging that the debate on the practical relevance and usefulness of establishing any particular borderline is not yet concluded, the foregoing evaluation raises the question where that legal realm of outer space begins at least in theory.

Moreover, in some cases a particular borderline is very much suggested, albeit without as of yet any exact figure being named. Most notably this concerns the South African Act and the National Aeronautics and Space Act: the first refers to the 'orbital criterion', the second to the earth's atmosphere as the decisive criterion. Both would lead most probably to conclude on a borderline between airspace and outer space in the range of 80 to 120 kms above the earth's surface, if one wants to put a figure on it.

From the perspective of international customary law on the definition-and-delimitation-issue, the consequences of the foregoing are not yet substantial enough to warrant any definite statement. It is not clear, for example, how in the case of the United States the formal position that there is no need or use for establishment of a borderline squares, in terms of state practice and *opinio juris*, with the national legal provisions providing precisely for such a borderline. *Vice versa*, the value in terms of the development of customary law of the former Soviet Union's repeated efforts to establish a particular borderline might be diminished by the absence of any related provision in the Russian Law of 1993.

Therefore, probably the final conclusion should run as follows. Firstly, national space legislation in the abstract calls for definition and delimitation of outer space, as a consequence of its acknowledgment of its special legal status. Secondly, national space legislation provides as of yet relatively little clue as to what such a definition should be and where any relevant borderline should be drawn.

And thirdly, chances are that more substantial differentiation will soon follow as a result from more poignant legal issues, debates and conflicts - and then will be given shape through national legislative means. The time seems ripe therefore, to help states in doing so in a uniform manner, i.e. at the international level, before they would feel confronted by a particular legal dispute or claim necessitating swift legislative or adjudicative action. Such a development would certainly threaten to disturb the coherence of international space law and the development of international customary law in an orderly fashion.

Notes

1. The immediate causes sparkling this debate were the legal problems surrounding aerospace planes respectively geostationary orbit; see e.g. M. Benkö & K.U. Schrogl, *The UN Committee on the Peaceful Uses of Outer Space: Adoption of a Declaration on "Space Benefits" and other Recent Developments*, 46 Zeitschrift für Luft- und Weltraumrecht (1997), 234; S. Gorove, *Aerospace Object - Legal and Policy Issues for Air and Space Law*, 25 Journal of Space Law (1997), 102-3; J.S. Thaker, *Events of Interest*, 25 Journal of Space Law (1997), esp. 124-6.

2. Cf. also e.g. G. Gál, *Thirty Years of Functionalism*, in Proceedings of the Fortieth Colloquium on the Law of Outer Space (1998), 125-32.

3. See e.g. L. Condorelli, *Custom*, in International Law: Achievements and Prospects

(Ed. M. Bedjaoui)(1991), 181, 187-92; also I. Brownlie, Principles of Public International Law (3rd ed.)(1979), 4-10.

4. The essence of national space legislation is considered to be its transparent and stable character covering comprehensively the space activities - especially the private ones - within the jurisdiction of a particular state (as opposed to for example individual licenses or authorizations). See for a more substantial argument the author's Private Enterprise and Public Interest in the 'European Spacescape' (1998), e.g. 3, 9, 107, 297-300.

5. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (hereafter Outer Space Treaty), London/Moscow/Washington, adopted 19 December 1966, opened for signature 27 January 1967, entered into force 10 October 1967; 6 ILM 386 (1967); 18 UST 2410; TIAS 6347; 610 UNTS 205.

6. See e.g. Art. 1, Convention on International Civil Aviation, Chicago, done 7 December 1944, entered into force 4 April 1947; 15 UNTS 296; TIAS 1591.

7. Art. VI, Outer Space Treaty; emphasis added.

8. Convention on Registration of Objects Launched into Outer Space (hereafter Registration Convention), New York, adopted 12 November 1974, opened for signature 14 January 1975, entered into force 15 September 1976; 14 ILM 43 (1975); 28 UST 695; TIAS 8480; 1023 UNTS 15. Cf. esp. Art. II.

9. Convention on International Liability for Damage Caused by Space Objects (hereafter Liability Convention), London/Moscow/ Washington, adopted 29 November 1971, opened for signature 29 March 1972, entered into force 1 September 1972; 10 ILM 965 (1971); 24 UST 2389; TIAS 7762; 961 UNTS 187.

10. Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, London/Moscow/ Washington, adopted 19 December 1967, opened for signature 22 April 1968, entered into force 3 December 1968; 19 UST 7570; TIAS 6599; 672 UNTS 119.

11. Law of the Russian Federation on Space Activities (hereafter Russian Law), 20 August 1993, effective 6 October 1993. Unofficial English translations: in the ESALex computer database with the European Space Agency in Paris, and by ANSER CIAC, a Moscow-based branch of a United States public service research institute. Since both versions are not authorized and show traces of flawed translation, the German version, provided by a certified translator, was also used; 44 Zeitschrift für Luft- und Weltraumrecht (1995), at 43.

12. Art. 2(1), Russian Law.

13. Art. 2(2), Russian Law.

14. See Art. 17(1), Russian Law.

15. Art. 17(2), Russian Law.

16. Art. 17(2), Russian Law.

17. Art. 20(4), Russian Law.

18. Art. 27(2), 1st sent., Russian Law. Cf. also O. Vorobyeva, *Intellectual Property Rights and Space Activities: Russian Experience and Point of View*, in Intellectual Property Rights and Space Activities (1995), 48-9.

19. Cf. also Art. 16(1), (3), esp. (4), Russian Law.

20. See Art. 16(4), 1st and 2nd para., Russian Law.

21. See e.g. Gál, 130.

22. National Aeronautics and Space Act (hereafter Space Act), Public Law 85-568, 85th Congress, H.R. 12575, 29 July 1958; version as amended through 1983; 72 Stat. 426.

23. Preamble, Space Act; emphasis added.

24. So e.g. Secc. 102(b), (c) (where it is i.a. rephrased again as "atmosphere and space") and 103, Space Act, as well as the title of Title II of the Act.

25. See e.g. E. Vitt, *Grundbegriffe und Grundprinzipien des Weltraumrechts [Fundamental Concepts and Fundamental Principles of Space Law]*, in Handbuch des Weltraumrechts (Ed. K.H. Böckstiegel)(1991), 42; C.Q. Christol, The Modern International Law of Outer Space (1982), 503.

26. Sec 305(a), Space Act.

27. This also led to further amendment of existing patent and trademark laws; cf. S. Gorove, Developments in Space Law (1991), 7; R. Kempf & B. Gimeno, *Exploitation of Rights from the U.S. Space Program by NASA*, in Intellectual Property Rights and Space Activities (1995), esp. 38, and n. 30.

28. Commercial Space Launch Act (hereafter Launch Act), Public Law 98-575, 98th Congress, H.R. 3942, 30 October 1984; 98 Stat. 3055.

29. Commercial Space Launch Act Amendments, Public Law 100-657, 100th Congress, H.R. 4399, 15 November 1988; 49 U.S.C. App. 2615; 102 Stat. 3900. See also P.L. Meredith & G.S. Robinson, Space Law: A Case Study for the Practitioner (1992), 310, at n. 8; V. Kayser, *An Achievement of Domestic Space Law: U.S. Regulation of Private Commercial Launch Providers*, 16 Annals of Air and Space Law (1991), 345, 369-71; P.D. Nesgos, *Commercial Space Transportation: A New Industry Emerges*, 16 Annals of Air and Space Law (1991), 398, 403-4; V. Kayser, *Les Services Commerciaux de Lancement de Satellites [Commercial Launch Services]*, La Lettre du C.E.R.D.I. (Jan. 1993), 16-7.

30. 49 U.S.C. Subtitle IX - Commercial Space Transportation, Ch. 701, Commercial Space Launch Activities, 49 U.S.C. 70101-70119 (1994); see 14 CFR Parts 401, *et al.*, DoT, FAA, Federal Register Vol. 62, No. 53, 19 March 1997, 13216.

31. See e.g. Sec. 6(a)(1), Launch Act.

32. See Sec. 21(b), Launch Act.

33. Communications Act, 19 June 1934; 47 U.S.C. 151 (1988); 48 Stat. 1064. See Sec. 151. In 1996 the Telecommunications Act, Public Law 104-104, 104th Congress, 3 January 1996; 110 Stat. 56; signed into law 8 February 1996, amended the Communications Act in many respects, but did not result in significant changes from the present space law-perspective. See e.g. L.B. Sherman, *Introductory Note*, in 36 International Legal Materials (1997), 359; ITU News 4/97, 40-3.

34. See e.g. Secc. 151, 154, Communications Act. See further e.g. P.L. Meredith, *A Comparative Analysis of United States Domestic Licensing Regimes for Private Commercial Space Activities*, in Proceedings of the Thirty-Second Colloquium on the Law of Outer Space (1990), 373; J.A.K. Huntley & D.C. Pitt, *Dead-Ends, Bottlenecks and Gridlock: Regulatory Confusion on the US Telecommunications Superhighway*, in The Future of EC Telecommunications Law (Eds. C. Scott & O. Audéoud)(1996), 68-9.

35. See Communications Satellite Facilities, *First Report and Order*, 22 FCC 2d 86 (1970), Appendix C, p. 1; see further Meredith, 373.

36. Cf. Sec. 303, e.g. (j), (m), (n) and (r), Communications Act, including e.g. in (n) a reference to "provisions of any Act, treaty or convention binding on the United States", and hence *inter alia* to the Registration Convention.

37. Land Remote Sensing Commercialization Act (hereafter first Remote Sensing Act), Public Law 98-365, 98th Congress, H.R. 5155, 17 July 1984; 98 Stat. 451. See further P.A. Salin, *The New Landsat Set of Regulations as per the Land Remote Sensing Policy Act (1992)*, in Issues in International Air and Space Law, and in Commercial Law (1994), 363; H.L. van Traa-Engelman, Commercial Utilization of Outer

Space (1993), 286-9; M.A. Roberts, *US Remote Sensing Data From Earth Observation - Law, Policy and Practice*, 22 Air & Space Law (1997), 37-8; K. Tatsuzawa, *Policy and Law in Space Commercialization*, in Legal Aspects of Space Commercialization (Ed. K. Tatsuzawa)(1992), 25-6.

38. Land Remote Sensing Policy Act (hereafter second Remote Sensing Act), Public Law 102-555, 102nd Congress, H.R. 6133, 28 October 1992; 15 U.S.C. 5601; 106 Stat. 4163. Cf. e.g. Secc. 2(3)-(8), 4. Also M.K. Macauley, *NASA's Earth Observations Commercialization Applications Program*, 11 Space Policy (1995), 61, 64-5; Salin, 355 ff.; Roberts, 38-9.

39. Sec. 402, first Remote Sensing Act.

40. NOAA Regulations, 15 CFR 960.2, as quoted by Meredith, 379, n. 31.

41. Sec. 202(a), second Remote Sensing Act; emphasis added. Cf. further e.g. Salin, 359.

42. Outer Space Act (hereafter UK Act), 18 July 1986, 1986 Chapter 38; 36 Zeitschrift für Luft- und Weltraumrecht (1987), at 12. See further e.g. Van Traa-Engelman, 306-8; J. Reifarth, *Nationale Weltraumgesetze in Europa [National Space Laws in Europe]*, 36 Zeitschrift für Luft- und Weltraumrecht (1987), 6-7.

43. Sec. 1, resp. (a), (b) and (c), UK Act. Cf. also Tatsuzawa, 20-1.

44. Sec. 13, UK Act.

45. Cf. Sec. 7, UK Act.

46. See e.g. R. Troke, *British National Space Centre*, 6 ECSL News (Jan. 1991), 2.

47. Act on Space Activities (hereafter Swedish Act), 1982: 963, 18 November 1982; resp. Decree on Space Activities (hereafter Swedish Decree), 1982: 1069; 36 Zeitschrift für Luft- und Weltraumrecht (1987), at 11, resp. ibid. See further Van Traa-Engelman, 305-6; Reifarth, 5.

48. Sec. 1, Swedish Act. See also Tatsuzawa, 20.

49. See Sec. 1, last sent., Swedish Act.

50. Cf Sec. 5, 2nd sent., Swedish Act.

51. See Sec. 4, 1st sent., Swedish Act. Also S. Stromberg, *Swedish National Space Board*, 6 ECSL News (Jan. 1991), 3.

52. See Sec. 4, 2nd sent., Swedish Decree.

53. Space Affairs Act (hereafter SA Act), 6 September 1993, assented to on 23 June 1993, No. 84 of 1993; Statutes of the Republic of South Africa - Trade and Industry, Issue No. 27, 21-44, in both English and Afrikaans. See further I. de Villiers Lessing, *South Africa: Recent Development in Space Law*, 1 Telecommunications & Space Journal (1994), 139-49.

54. Sec. 1, 19th def., SA Act.

55. See Sec. 11(1)(a) resp. (c), SA Act; the absence of any further qualification regarding "the operation of a launch facility" in (c) can only logically be construed that (c) implies such operation on the territory of South Africa.

56. See Sec. 11(1)(b) resp. (d)(i), SA Act.

57. Sec. 1, 15th def., SA Act.

58. See Sec. 1, 19th def., SA Act.

59. See e.g. Gál, 130.

60. Sec. 1, 20th def., SA Act; emphasis added. Note also that the definition of something very similar to a 'space object', as the usual point of attachment of functionalists, hinges on a spatialist criterion here!

61. Sec. 1, 24th def., SA Act.