

Thirty Years of Functionalism

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Recently an excellent monograph was published bearing the following meaningful title: „The never-ending Dispute: Delimitation of Air Space and Outer Space.” (1)

Praising the Space Treaty of 1967 the reasonable question arises, how did live this fundamental source of space law three decades without an amendment or specific agreement on spatial definition of Outer Space. The title given to my paper „Thirty Years of Functionalism” demonstrates that my modest observations attempt to examine whether this theory could stand the test in the light of positive law and international practice.

Before the Treaty

All movements connected with human activities in the presatellite age were regulated according to the legal nature of the space where these activities occurred. Forty years ago (October 4, 1957) with Sputnik-1 a revolutionary new kind of human activity, movement of a man-made, artificial satellite appeared — following the rules of celestial mechanics. It is worth remembering the basic scientific facts underlying all space activities.

Objects launched at a velocity less than 7.9 km/sec will follow a ballistic trajectory and fall back to the Earth. In case of Sputnik-1 the first time in history a launch vehicle gave the necessary energy to an object resulting a velocity exceeding 7.9 km/sec but less than 11 km/sec. This carries satellites on an elliptical orbit, one of the focuses of which coincides with the centre of the Earth (Kepler's first law). Meanwhile

the line connecting the satellite and Earth (radius vector) sweeps out equal areas in equal times. The velocity of orbiting satellites therefore will be the higher when nearest the Earth (perigee) and the lower when farthest from it (apogee — Kepler's second law). The minimum velocity for an object to enter a parabolic trajectory i.e. escape velocity from the Earth's surface is about 11.2 km/sec from the Moon 2.4 km/sec. Above this velocity the object will follow a hyperbolic path. (2)

The path followed by a celestial object (natural or artificial) that is moving in a gravitational field is the orbit. Movement on this path an orbital movement. (Fig. 1-2.) This kind of movement connected with human activity meant a real challenge for traditional legal thinking. First of all because it was an inertial movement which could not have respect for state sovereignties theoretically extended in vertical space ad infinitum.

The answer to this problem seemed to be obvious: space law will be the body of rules governing movements in a spatially delimited outer (cosmic) space, while air law remains the legal order of an other space fixed vertically by this delimitation: the air space in the sense of Article I. of the Chicago Convention. Accordingly air law and space law would cover the space above the Earth's surface split into two slices by different legal regimes as the legal status of territorial sea differs from that of the free open sea.

Those who found this solution unreasonable held that this new legal domain, other than all earlier norms of human conduct

can not be associated with a limited space, but only with the character of the activity under regulation.

Thirty-seven years ago I joined this theory. The conclusions of my treaties on Air Space and Outer Space were the following:

1. An infinite air space is a conceptual impossibility. 2. The facts of astronautics cannot be squeezed into the conventional framework of international air law. 3. The synthesis of territorial air space and free outer space can only be assured by an international agreement which can break away from the conventional forms and lay emphasis on the *activity element* of rockets, artificial satellites and planets launched by the states. (3) This is the main idea of the functionalist approach I have been representing since the very beginning before and after the conclusion of the Space Treaty.

The functionalist element determining space activity i.e. the basis of space law to my mind has been the orbital character of the activity, namely the orbital movement involved or intended.

Nevertheless before the Treaty the „never-ending dispute” on delimitation was going on. In my book published in 1964 I could already list not less than 49 proposals from 12 km (Beresford) to 384000 km (Rinck) *and ad infinitum*. (4)

A very realistic position was taken by the U.N. Ad Hoc Committee on the Peaceful Uses of Outer Space. Its report of July 14, 1959 stated:

It was generally believed that the determination of precise limits for air space and outer space did not present a legal problem calling for primary consideration at this moment. The Committee noted that the solution of the problems which it had identified as susceptible of primary treatment *was not dependent upon the establishment of such limits*. (III.A.28) (5)

It was true also for the fundamental principle of space law: freedom of outer space declared and not constituted by GA. Res. 1721/XVI — December 20, 1961. (6) This meant freedom of space (orbital) activity generally accepted as customary law rule — without any delimitation of air space and outer space.

The Treaty

Fortunately the creation of the Space Treaty itself was not made dependent of the establishment of delimitation, respectively on definition of outer space. The Treaty refers not less than 37 times to „outer space” without attempting to give an authentic definition to it. No wonder, the Scientific and Technical Subcommittee of CUPUOS stated at the same time (1967) that „it is not possible at the present time to identify scientific or technical criteria which would permit a precise and lasting definition of outer space”.

As a consequence no right and obligation regulated by the Treaty has been restricted to a definite area or altitude where the legally relevant act occurs. I venture the statement: the rules of the Treaty bear fundamentally and necessarily functional character. Its carrying out necessitates such an approach. In functional sense space activity is an orbital activity. The Treaty regulates consequently activities carried out by orbital movement of means of space exploration and uses of outer space.

At the same time I have to admit that the Treaty contains rules of seemingly spatial character. E.g. in Article V „astronauts as envoys of mankind *in outer space*”, VI „responsibility for national activities *in outer space*” or VIII „...the state of registry retains jurisdiction and control over objects launched *while in outer space*”. Any movement in outer space is necessarily orbital and any activity on the Moon or other celestial body is the result of an orbital movement. In this context spatial elements of the wording of the Treaty may be harmonised with the functional approach.

Other main sources of international space law following the Treaty are not inconsistent with this interpretation. In this respect the Convention of Registration deserves attention. Space objects are to be registered in a national register when it is launched *into Earth orbit or beyond* (Article II). The state of the registry has to furnish information to the Secretary General of the United Nations, among others *basic orbital parameters* including nodal period, inclination, apogee and perigee. (Article IV.1) Elements of spatial delimitation do not appear in this system of international registration, and suborbital launchings are clearly excluded from the obligation of registry. Though the term *space object* has no real definition in the convention (Article I.b) it is obvious, that objects can be qualified as space object by a *functional attribute namely orbital movement*.

National air laws

Failing spatial delimitation in space law the question reasonably arises: what was the reaction of municipal air laws, if any, to this insufficiency of space law regulation? To cast a glance at sea law analogies in this respect may be thought-provoking for the space lawyer. Security by self-defence is elementary postulate both for littoral and subjacent states.

In the presatellite age this demand was firmly linked with spatiality i.e. this principle was the essence of territorial sovereignty. Security meant effective control over definite land and sea areas.

In sea law the principle of sovereignty of the littoral state over territorial sea developed contemporaneously with the doctrine of freedom of open seas (7) As formulated by *Bynkershoek*: the littoral state could dominate only such width of coastal waters as lay within the range of cannon shot from shore batteries. (8) This „cannon-shot rule” became amalgamated with a three-miles limit which in the nineteenth century received widespread adop-

tion in theory and state practice. It never became a general rule of international law. Municipal sea law legislations determined the width of territorial seas adopting the three-miles or a wider limit corresponding to the security demand of the state concerned.

At the very beginning of air law literature for drawing the upper limit of state air space („territorial air”) some authors supported the principle of effective control (*Bluntschli* (9), *Rivier* (10)). This theory even after the Paris and Chicago Conventions could refer to such authorities as *H. Kelsen*: „It stands for reason, that a state can enforce the provisions of this Convention or its own legal order... within that part of the air space over which it has effective control”, (11) or *A. Verdross*: „The Convention in question does not know any limit nevertheless we must suppose the existence of such a limit... the entire air column capable of being ruled (beherrschbar) above the state territory”. (12)

As far as I know in positive air law only the Bolivian Air Code of October 24, 1930 accepted this idea in this form: state sovereignty extend to the column of air which covers the surface of the national territory within the limits of the frontiers the height being determined by the range of defensive methods of the country. (13)

Needless to say that this modern form of „cannon-shot rule” apparently would mean that the upper limit of air sovereignty in case of each country would depend on its technical level of defence capability. Consequently free outer space would have no general but singular limits of big variety according to the conditions of the subjacent states.

In the presatellite age there was no need to be concerned with the ultimate consequences of the concepts of „completeness” and „exclusiveness” of sovereignty in vertical direction. Theoretical extension „*usque ad coelum*” and downwards to the centre of the Earth presented no difficulty.

of astronautics the international lawyers will once more face the question which they believe to have banned from science for ever, and have definitely solved in favour of the boundlessness in height of air sovereignty." (14)

After launching of Sputnik-1 international law really was faced this question. Ten years elapsed before signing the Treaty and thirty years after. The dispute in the theory has been going on between spatial and functional approach now for more than forty years.

Delimitation of air space and outer space in absence of international agreement could be expected logically from national legislations. However, the link between security demand and upper limit of air sovereignty had no technical reality anymore. In the age of ICBM-s self-defence would be impossible within a delimited space above the territory of subjacent states as it could be effective against an attack from the open sea outside territorial waters of littoral states. (15)

Spatiality in this respect is not feasible anymore. To my knowledge not a single municipal air law in the thirty years of the Treaty undertook a spatial delimitation of air sovereignty. Complete and exclusive sovereignty of states over their air space (Chicago Conv. Art. 1) and freedom of outer space (S. T. Art. 1) are living together.

Hungarian air law is but an exception standing beside the rule. The new air code „Act Nr. 97 of 1995 on the Air Traffic” declares that the Hungarian Republic has complete and exclusive sovereignty over Hungarian airspace i.e. „the part of air-space above the territory surrounded by confines of the state to the altitude where air traffic is physically possible” (§ 4.1.) It is not meaningless that the first draft of the Act would have accepted the theory of effective control stating that „the Hungarian airspace ends at the altitude of air navigation and the effective range of anti-aircraft defence.” This new air law, having been valid since July 1, 1996 could be hardly interpreted otherwise than accep-

tance of the aerodynamic theory of delimitation. Under the present-day conditions — at least above Hungary — outer space would begin somewhere in an altitude of 35-40 km.

Anyhow this definition of Hungarian air-space is not bound on a numerically fixed upper limit, and — concerning security do not exclude making use of the right of self-defence beyond this sovereign air space under Article 51 of the UN Charter.

Municipal space law

In the last years space activities has been carried out more and more by private entities. This development demanded space legislation especially for space-faring nations. According to the Treaty „Space activities of non-governmental entities shall require authorisation and continuing supervision by the appropriate State Party to the Treaty”. (S. T. Art. VI.) Municipal space acts intend to fulfil this obligation last not least the possibility of shifting damages upon the non-governmental entity, in case the authorising state will be internationally liable for damage caused by the private space activity. (S. T. Art. VII.)

The system of regulation in this municipal space laws is clearly functional.

The *Outer Space Act of the United Kingdom* (16) of 1983 sets as its aim to secure compliance with the international obligations of the United Kingdom with respect to the launching and operation of space objects and carrying on other space activities *in outer space* by persons connected with this country.

The act applies to a) launching or procuring the launch of space object, b) operating a space object, c) *any activity in outer space*. As definition of outer space it contains only the statement that it „includes the Moon or other celestial bodies. To space object: „it includes the component parts of a space object, its launch vehicle and the component parts of that.” The two unsatisfactory definitions follow the wording of the Liability Convention (Art.

I.d) and the Convention on Registration (Art. I.b)

The above phrase *in outer space* seems to refer to spatially determined activities being subjects of authorization. The systematic interpretation of the Act, however, excludes such a conclusion.

According to Sec. 5.1 namely the licence shall describe the activities authorised by it. In particular this licence may contain the basic *orbital parameters* including nodal period, inclination, apogee and perigee, possibly the advance approval for deviation from the *orbital parameters* and „disposal of the payload *in outer space* on the termination of operations under the licence” (Sec.5/2 b,d,g)

The Secretary of State maintains a register of space objects corresponding to international obligations of the United Kingdom. This is a clear reference to the Convention on Registration obliging launching states to furnish to the U.N. Register „basic orbital parameters” of the space objects.

The British space act accordingly concerns activities carried on by *orbital movement* — without any reference to spatial determination.

The *Swedish act (Act on Space Activities 1982:963)* (17) seems to follow spatial concept stating: „This Act applies to *activities in outer space* (space activities)”. To activities carried on entirely in outer space in addition are included the launching of space objects into outer space and all measures to manoeuvre or in any other way affect objects launched into outer space. The decree on Space Activities (1982:1069) is clear in respect of activities: ruled by the Act. Sec. 4 provides the National Board for Space Activities shall keep a register of the space objects for which Sweden is a contracting State in accordance with Article 1 of the Convention on Registration. The data to be registered are accordingly among others basic orbital parameters. Exclusion of suborbital undertakings from the notion of space activities is clear from Sec.1 „Merely receiving signals or information in some other

form from object in outer space is not designated as space activities according to this Act, *nor is launching of sounding rockets designated as space activities.*

The *Law of the Russian Federation on Space Activities* of August 20, 1993 represents an essentially different system. Definition of space activity (18) covers an extraordinary wide range of uses of space devices: space communications, remote sensing, manned space flights, space research, manufacture of products in outer space and „other kinds of activities performed with the aid of space technologies.”

The *South African Space Affairs Act (No. 84 of 1983)* (19) covers a similarly wide range of activities. Space Activities are defined as activities directly contributing to the launching of spacecraft and the *operation of such crafts in outer space*. From this definition logically follows that the act applies to launching with orbital aim and resulting operation by orbital movement. Similarly to the Russian Act the South African Space Act includes to space acts as „space related activities” all activities supporting or sharing mutual technologies with space activities.

The *National Aeronautics and Space Act of the United States 1958 as amended 1983* (20) regulates both legal domains together. Aims and definitions correspond to this combined system.

The act intends to provide for research into problems of flight *within and outside the Earth's atmosphere*. Sec 103 accordingly defines *aeronautical and space activities*:

A/ research into and the solution of, problems of flight *within and outside the Earth's atmosphere*

B/ the development, construction, testing and operation for research purposes of aeronautical and space vehicles

C/ the operation of a space transportation system including the space shuttle, upper stages, space platforms and related equipment, and

D/ such other activities as may be required for the exploration of space.

Aeronautical and space vehicles are: aircraft, missiles, satellites and other space vehicles manned and unmanned together with related equipment, devices, components and parts.

Concerning differentiation between aeronautical and space activities in the Act no elements are to be found, which would refer to any spatial criterion. The same can be stated also for other basic sources of municipal space law of the United States such as Communication Satellite Act of 1962 and Commercial Space Act of 1984.

As it appears to me from the foregoing can be stated, *municipal space laws do not contain elements referring to delimitation. Facts provided by them are bound to launching into orbit respectively operation in orbit.* State authorization and supervision is by no means restricted to activities carried out in a space above certain limits. Consequently neither municipal air laws nor space laws of the past thirty years support the spatial approach against functionalism.

It should be considered that state practice of thirty years demonstrates: effectiveness of the Treaty never was made dependent on any limits between air space and free outer space by states. On the contrary the Treaty has been living without any delimitation.

This is why I venture the conclusion that thirty years of the Treaty demonstrate the necessary application of the functional approach without express acceptance.

De lege ferenda

Professor A. Górbiel named me in 1980 „the most unequivocal adherent of the functional theory in the literature of socialist countries.” (21) Not only at colloquia of our Institute but also at Space Law Seminars of INTERCOSMOS my papers on various subjects were built upon this footing indeed. (22)

Nevertheless, I admit the practicability and usefulness of delimitation by an international agreement. At any rate in addition to functional basis of the system of space law.

May I refer as a possible solution to the Soviet proposals of 1983 and 1987. The Soviet Union in a working paper of April 14, 1983 suggested the conclusion of an agreement on delimitation: „The boundary between air space and outer space shall be established by agreement among states at an altitude not exceeding 110 km above sea level.”

The „compromise proposal” of 1987 added a new element to above formula: „an object launched into outer space shall be considered as being in outer space at all stages of its flight after launch at which its altitude above sea level is 110 km or more” (23)

A functionalist can be fully satisfied with this formula except one point: the Russian proposal seems to exclude attempted launches in case the object after lift-off do not gain the altitude of 110 km. Theoretically this could be interpreted in the way that e.g. launching of an object carrying nuclear weapons would not constitute a delict of international law, breach of Space Treaty Article IV — if it fails and the carrier rocket crashes from an altitude of 50 km. The solution is only that all launches aiming orbital movement should be governed by space law from the very moment of the lift-off.

The altitude of 110 km otherwise corresponds about to the lowest possible perigee of satellites, according to some authors being excepted as customary-law rule.

The „compromise proposal” is not less than an attempt to harmonize two opposite concepts. To my humble opinion an international agreement following this line would successfully end the „never-ending dispute”.

Footnotes

1. By *R. F. A. Goedhart*: Forum for Air and Space Law. Ed. by M. Benkő in cooperation with Willem de Graaf. Vol. 4. 1995
2. Collins Dictionary of Astronomy. Ed. by *V. Illingworth*, Galsgow 1994, pp. 87-88, 316-318. Űrhajózási lexikon (Encyclopedia of Astronautics) Budapest 1981 pp. 345-346. Űrtan (Space Science) — SH-Atlasz — Springer, Budapest 1966 pp. 41-44
3. *G. Gál*: Légítér és világűr (Air Space and Outer Space) Jogtudományi közlöny, Budapest 1960, pp. 565-575. English transl. in Legal Problems of Space Exploration. A Symposium U.S. Senate, Washington 1961, pp. 1141-1157
4. *G. Gál*: Világűrjog (Space Law) Budapest 1964, pp. 146-150
5. U.S. Senate Symposium p. 1270
6. „Outer space and celestial bodies are free for exploration and use for all states...”
7. *J. G. Starke*: Introduction to International Law, London 1977, pp. 228-229
8. *Bynkershoek*: De dominio maris dissertatio. 1702 „Terrae potestas finitur ubi finitur armorum vis.”
9. *Bluntschli*: Das moderne Völkerrecht der zivilisierten staaten 2. Aufl. 1878
10. *Rivier*: Principes du droit des gens, 1896
11. *H. Kelsen*: General Theory of Law and State. Cambridge 1946, p. 217
12. *A. Verdross*: Völkerrecht, Wien 1955, pp. 198-199
13. Quoted by *A. G. Haley*: Survey of Legal Opinion on Extraterrestrial Jurisdiction. III Coll. IISL. 1960 Proceedings, p. 69
14. *V. Mandl*: Weltraumrecht, Mannheim-Berlin-Leipzig 1932, p. 31
15. *R. F. A. Goedhart* — otherwise not supporting functionalism — states: „Considering the real danger that ballistic missiles apparantly pose, it is actually not feasible to choose any upper limit of state territory meeting all security requirements of the target states under threat of attack.” op. cit. p. 112
16. *K.-H. Böckstiegel* — *M. Benkő* Ed. Space Law Basic Legal Documents Vol. 2/1, E. I.
17. Ibid. Vol. 2/1, E. II.
18. *F. G. von der Dunk*: Two New National Space Laws: Russia and South Africa. In Proceedings XXXVIII. Coll. 1995
19. Ibid.

20. Note 16, Vol. 2/1, E. III.
21. *A. Górbiel*: Legal Definition of Outer Space, Łódź 1980, p. 48
22. *G. Gál*: Space Law. Budapest—Leyden—Dobbs Ferry 1969, pp. 105-117: The Question of Delimitation—After Twenty Years. XXII Coll. IISL 1979 Proceedings pp. 125-129, — Fundamental Links and Conflicts Between Legal Rules of Air and Space Flights XXVI. Coll., 1983. pp. 77-80. — Territorial Sea and Airspace — Passage to Free Spaces? XXVIII. Coll., 1985, pp. 134-139. — Space Objects „While in Outer Space” XXXVII Coll., 1994, pp. 84-86, — Air Law and Space Law—Coincidences and Controversies. INTERCOSMOS Seminar Prague 1982 — Doklad pp. 185-193. — Problems of Delimitation and Geostationary Orbit at the Twenty-third Session of the Legal Subcommittee, Seminar Varna 1984 — Doklad pp. 151-175. etc.
23. U. N. Doc. A/AC.105/C.2/L.139, April 4, 1983 and U. N. Doc. A/AC.105/ L.168, June 5, 1987. See *A. D. Terekhov*: Passage of Space Objects Through Foreign Airspace. XXXII Coll. IISL Proceedings pp. 52-53

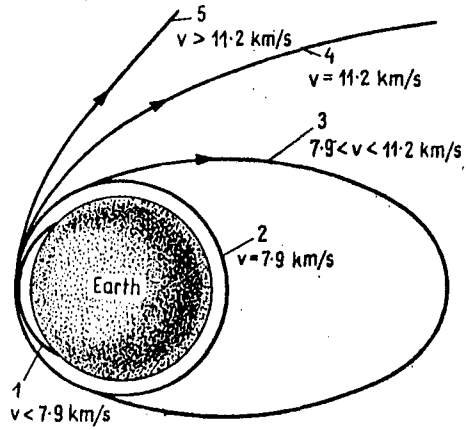


Fig. 1.— 1 trajectory of an ICBM, 2 circular orbit, 3 elliptic orbit, 4 parabolic orbit, 5 hyperbolic orbit

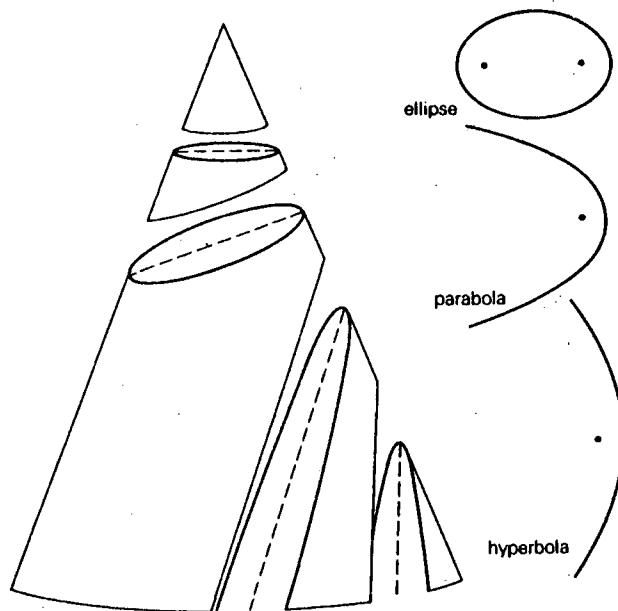


Fig. 2.— Conic sections.