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Item 7(a) of the provisional agenda*
Matters relating to the definition and delimitation of outer space

Definition and delimitation of outer space

Additional contributions received from States members of the Committee

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Algeria

[original: French]

(c) (i) Is there a relationship between plans to establish a system of space traffic management and the definition and delimitation of outer space?

The development of space traffic requires management of both space objects and debris orbiting the Earth.

Space traffic must be internationally regulated if the activity is to be sustainable. Management that relies solely on (non-binding) best practices that are not properly applied will be ineffective in the long term. In addition, although technical solutions exist, they are not fully reliable and are not always accessible for all space users.

Moreover, such management cannot be the subject of a "highway code", which would involve the establishment of a police force. The idea is anachronistic and unworkable, because it would undermine the principle of freedom of exploration and use of space.

The almost total lack of a legal framework to regulate space traffic leaves room for risks and disputes. Space activities require geographical and physical space in order to be carried out, and legal stability to ensure the economic opportunities that they offer. The definition and delimitation of space would help to clarify each user's rights and obligations.

That is because, although international treaties ensure freedom in the use and exploitation of outer space, air law is based on State sovereignty. The laws governing airspace and outer space are different.

A separate definition of the boundary between the two spaces is important for a number of reasons, since the matter affects various rights and obligations of States and operators, and the status of travellers themselves, which represents a guarantee of safety. Such a definition would entail clarifying the notions of liability and fault in space law.

The lack of a definition highlights the difficulties related to the applicable treaties – namely, the 1967 Outer Space Treaty, article V; the 1968 Agreement on the protection of astronauts, articles 5(3), 10 and 12(3); and the 1979 Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, article 13 – with regard to the obligation to provide information, collaboration in operations to rescue astronauts in danger and the repatriation of rescued astronauts.

In that context, the establishment of a United Nations body is proposed in order to bring space actors together to regulate space traffic and improve safety in orbit.

The body must take a functional approach in order to match the legal problems to be solved with existing norms and practices without compromising the interests of all spacefaring States, with the aim of ensuring successful coexistence.

(c) (ii) Is there a relationship between suborbital flights for scientific missions and/or for human transportation and the definition and delimitation of outer space?

(c) (v) Which legislation applies or could be applied to suborbital flights for scientific missions and/or for human transportation?

(c) (vi) How will the legal definition of suborbital flights for scientific missions and/or for human transportation impact the progressive development of space law?

Combined response to questions (ii), (v) and (vi)

Today, it goes without saying that every technological advance gives lawyers the opportunity to travel to the frontiers of law. That is all the more true in the absence of specific international regulations.

Response to question (ii): The legal vacuum, particularly in terms of the definition and delimitation of outer space, prevents us from defining suborbital flight precisely. The standard definition is that a suborbital flight is a flight up to a very high altitude – more than 100 km above sea level – during which, however, the vehicle concerned does not enter orbit (i.e. does not reach an orbital velocity of more than 11.2 km/s).

There is no consensual definition of the legal status of suborbital flight that could be respected in terms of air law, space law or a form of law as yet undefined.

Indeed, while suborbital activities have been developing for several decades, a degree of legal uncertainty remains in terms of the regime applicable to suborbital devices. That uncertainty is linked to the fact that the debate is focused on the establishment of a boundary between airspace and outer space, and on the justification for establishing that boundary at the Karman line – at an altitude of 100 km – or elsewhere.

Discussing suborbital flights also involves discussing such matters as liability, the cross-waiver and the status of astronauts.

Response to question (v): One possibility would be the legal rules applicable to objects operating in airspace. Airspace is well-delimited in theory, although the vertical dimension is somewhat more problematic, because airspace has no upper limit. That would pose no difficulty if outer space were not subject to different legal rules, in particular the principle of non-appropriation, which arises from article II of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, and limits the sovereignty of States to the objects that they launch into outer space. That principle is incompatible with the regime of delimited areas of sovereignty established in air law and the 1919 Paris Convention on Aerial Navigation.

In the end, it is the Karman line that has won the support of almost all institutional players and legal writers. The Karman line is a theoretical line beyond which an aircraft cannot fly by aerodynamic means alone unless it reaches the first cosmic velocity, namely, the velocity at which it can escape the Earth’s pull and enter terrestrial orbit. The problem then was to calculate the altitude of the Karman line, theoretically located between 83 or 84 km and 110 km. That point raises questions about the status of astronauts under the 1967 Agreement on the Rescue of Astronauts.

In conclusion, the question of the delimitation of the legal regime for suborbital flight is rather complex, because the many parameters involved result in a great deal of variation in the equation: are we in airspace or outer space? Are we talking about an aircraft or a space object? Is this an international case or a purely national one? Which institution is best suited to regulating suborbital activities? These are all fascinating questions that must be answered in order to arrive at a complete legal definition.

Response to question (vi): We believe that the Committee on the Peaceful Uses of Outer Space, with the active and dynamic participation of all its members, could begin the process of drafting legislation specific to suborbital flights. In that legislation, suborbital flights would be legally defined with precision in order to reconcile a number of aspects related to this new activity, in particular the protection of the safety of space passengers and the constraints related to new tourist activities.

(c) (iii) Will the legal definition of suborbital flights for scientific missions and/or for human transportation be practically useful for States and other actors with regard to space activities?

Legally defining a suborbital flight involves asking such technical questions as the following, in order to arrive, ultimately, at the question of which law is applicable to the flight: are borders crossed? If so, at what altitude? What is the maximum altitude reached by the suborbital vehicle?

Depending on its classification, a suborbital flight may be subject to air law, space law or both at the same time.

Classifying a suborbital flight in one of those categories has many consequences, in particular in terms of State sovereignty, responsibility and liability, the flight's incorporation into air traffic or space traffic, and safety.

In accordance with the Constitution of Algeria, in particular its article 14, the State exercises sovereignty over its land surface, airspace and waters. In the field of air law, therefore, sovereignty is exercised over a population (aircraft making international flights) and a territory (the airspace).

Neither of those notions, however, is defined precisely, especially in terms of suborbital flights. The airspace has no defined vertical limit, and a similar observation applies to the suborbital vehicle: should it be regarded as an aircraft under air law?

That ability to enter airspace calls into question the effective exercise of State sovereignty over national airspace, which suborbital flights pass through, thereby further relativizing the effectiveness of a boundary between airspace and outer space in determining, on the one hand, an international space and, on the other, a fragmented space controlled by States.

The legal definition of suborbital flights is related to a number of unresolved questions related to space, namely, the delimitation of outer space, the status of travellers on such flights and State liability for damage.

The liability of active States under space law is related to fault in the event of damage caused in outer space and is absolute in the event of damage caused on the surface of the Earth or to an aircraft; in this context, no effective, concrete liability can be established.

It follows from this observation that, in terms of form, a clear definition related to the above-mentioned questions would provide legal certainty for the various current and future space activities, whether scientific or otherwise.

The legal definition of suborbital flights for scientific missions and/or for human transportation could also be practically useful to States with regard to space traffic, as explained in our response to question (i) above.

(c) (iv) How could suborbital flights for scientific missions and/or for human transportation be defined?

To carry out a suborbital flight, the object must be launched at sufficient speed to reach an altitude of approximately 80.5 km. That speed is lower than the first cosmic velocity, which is the minimum velocity that needs to be imparted to an object leaving a celestial body to put it into a circular orbit as close as possible to that celestial body.

Suborbital flights for scientific missions and/or for human transportation could therefore be considered to be controlled flights of spacecraft moving at a "suborbital" speed, namely, a speed lower than that required to put a satellite into orbit, in a space that is not delimited and not defined in the Outer Space Treaty. These suborbital flights raise new questions, particularly in terms of radiocommunication regulations, in view of the "separation" between what is related to space and what is related to aeronautics, because the vehicle is neither an aircraft nor a satellite nor an orbital station (see International Telecommunication Union resolution 772 (WRC-19), on the consideration of regulatory provisions to facilitate the introduction of suborbital vehicles).

In addition, in the absence of a definition and delimitation of outer space, and of a definition of the status of travellers on board a suborbital flight, any related definition related to such flights remains incomplete and incorrect from a legal point of view.

Colombia

[original: Spanish]

Matters relating to the definition and delimitation of outer space and the character and utilization of the geostationary orbit, including consideration of ways and means to ensure the rational and equitable use of the geostationary orbit without prejudice to the role of the International Telecommunication Union

(a) Information on national legislation or any national practices that may exist or are being developed that relate directly or indirectly to the definition and/or delimitation of outer space and airspace;

Current status of the treaties on outer space

To date, Colombia has ratified the following treaties on outer space:

- Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water, adopted by the International Atomic Energy Agency on 5 August 1963 and in force since 10 October 1963. The Treaty was approved through Act No. 6 of 1969 (27 October 1969) and ratified on 17 October 1985.
- Convention on International Liability for Damage Caused by Space Objects, adopted by the United Nations General Assembly on 29 November 1971 in its resolution 2777 (XXVI); opened for signature on 29 March 1972 and entered into force on 11 September 1972. The Convention was approved through Act No. 1591 of 20 November 2012, reviewed by the Constitutional Court (Ruling No. C-829/2013) and promulgated through Decree No. 328 of 24 February 2016.
- Convention on Registration of Objects Launched into Outer Space, adopted by the United Nations General Assembly on 12 November 1974 in its resolution 3235 (XXIX); opened for signature on 14 January 1975 and entered into force on 15 September 1976. The Convention was approved through Act No. 1569 of 2 August 2012, reviewed by the Constitutional Court (Ruling No. C-220/2013) and promulgated through Decree No. 1065 of 10 June 2014. It was ratified on 10 January 2014.
- Lastly, although not yet approved, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, should be mentioned here. It was submitted to Congress at the start of 2020 by the Ministry of Foreign Affairs and the Ministry of Science, Technology and Innovation in line with the commitments undertaken by the Government in document No. 3983 of the National Council on Economic and Social Policy, entitled “Space Development Policy: enabling conditions for boosting national competitiveness”. The relevant bill has already been passed, on final reading, by the plenary of the House of Representatives. Accordingly, Bill No. 496 (2020) of the House and No. 202 (2020) of the Senate, approving the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (signed on 27 January 1967 in Washington, London and Moscow), is now to be submitted to the President for approval and to the Constitutional Court for review.

The Colombian Air Force has taken the initiative to draw up a “Space Policy of the Colombian Air Force”. It has also supported efforts to ratify the treaties on the peaceful uses of outer space; promoted decrees such as Decree No. 2258 of 6 December 2018 establishing rules and procedures for the registration of objects launched into outer space, in compliance with the international regulatory provisions laid down by the United Nations, namely the Convention on Registration of Objects Launched into Outer Space; and set up the Single Colombian Register of Objects Launched into Outer Space, thereby establishing good practices and serving as a role model for Latin American countries in the field of space law.

Additionally, Colombia is pursuing the creation of a Regulation of Space Activities Act (initiated by the Ministry of Foreign Affairs) with a view to ensuring national compliance with the United Nations treaties on outer space.

(b) Concrete and detailed proposals regarding the need to define and delimit outer space, or justifying the absence of such a need, or to provide the Working Group with specific cases of a practical nature relating to the definition and delimitation of outer space and the safety of aerospace operations. Such structured, consistent and grounded contributions will be considered by the Working Group at its future meetings;

With regard to the definition and delimitation of outer space, Colombia does not currently have any legislation establishing a specific altitude as the boundary between airspace and outer space. Although some States have taken the position that outer space begins at 100 km above sea level, no significant progress has been made in this regard, since it is obvious that States have differing views on the subject. According to the working paper entitled “Promoting the discussion of the matters relating to the definition and delimitation of outer space with a view to elaborating a common position of States members of the Committee on the Peaceful Uses of Outer Space” (A/AC.105/C.2/L.302), prepared by the Chair of the Working Group on the Definition and Delimitation of Outer Space of the Legal Subcommittee, the delimitation of the boundary between airspace and outer space constitutes a relevant legal issue, with practical implications for airspace, suborbital and space activities. Therefore, it is proposed to work together to find a multilateral legal solution, as long as such a solution does not infringe upon national security or the sovereignty of States, bearing in mind that any solution to the problem of defining and delimiting outer space will have certain implications. Finally, we welcome the Working Group’s decision to reconvene every second year, which means that the Group would not meet during the sixty-first session of the Subcommittee, in 2022, but during the sixty-second session, to be held in 2023.

(c) A response to the following questions:

(i) Is there a relationship between plans to establish a system of space traffic management and the definition and delimitation of outer space?

Yes, the establishment of a system of space traffic management is directly linked to space monitoring and space situational awareness; consequently, once such a system is in place, it will have a bearing on the definition and delimitation of outer space. In establishing such a system, it is necessary to take into account sovereignty over airspace, liability for damage caused to third parties and proper application of the other United Nations treaties and principles pertaining to the peaceful use of outer space.

(ii) Is there a relationship between suborbital flights for scientific missions and/or for human transportation and the definition and delimitation of outer space?

Yes, for the purposes of liability and jurisdiction, it is of great importance to determine whether an incident occurs in outer space or below, in airspace. This is essentially no different for scientific payloads or for human transportation.

(iii) Will the legal definition of suborbital flights for scientific missions and/or for human transportation be practically useful for States and other actors with regard to space activities?

Yes, the States members of the Committee on the Peaceful Uses of Outer Space strive for international cooperation on space matters. Standardization of the terms in question would clarify the rules that need to be set by each State or, alternatively, allow for suborbital flights to be covered by space law.

(iv) How could suborbital flights for scientific missions and/or for human transportation be defined?

According to document A/AC.105/C.2/2010/CRP.9, entitled “Concept of suborbital flights: information from the International Civil Aviation Organization (ICAO)”, a suborbital flight is a flight up to a very high altitude which does not involve sending the vehicle into orbit. It is worth noting that “suborbital trajectory” is defined in United States legislation as “the intentional flight path of a launch vehicle, reentry vehicle, or any portion thereof, whose vacuum instantaneous impact point does not leave the surface of the Earth” (United States Code (2004), title 49, section 70102, paragraph 20).

Moreover, some States concur that altitude should not be a determining criterion for determining whether an activity is an outer space activity; rather, that should be determined a priori according to the function of the space object and the purpose of the activity. Therefore, it would be appropriate that the legal framework applied to suborbital flights be determined not by the criterion of altitude but according to the characteristics of the activity and the legal issues arising from it.

These matters should be discussed by the Legal Subcommittee.

(v) Which legislation applies or could be applied to suborbital flights for scientific missions and/or for human transportation?

There is no clear indication in international law as regards the delimitation between airspace and outer space that would allow any conclusion as to whether air law or space law is applicable to suborbital flights.

However, it might be argued from a functionalist viewpoint that air law would prevail, since airspace would be the main centre of activities for suborbital vehicles in the course of Earth-to-Earth transportation, any crossing of outer space being brief and only incidental to the flight.

These matters should be discussed by the Legal Subcommittee.

(vi) How will the legal definition of suborbital flights for scientific missions and/or for human transportation impact the progressive development of space law?

It should be taken into consideration that any decision taken with respect to the regulation of suborbital flights could have implications for the economic, technological and space development of countries conducting such activities and for other States. Nevertheless, it may be possible for States to conclude bilateral agreements or, more generally, to reach agreement within the United Nations on establishing a non-binding legal framework.

Furthermore, it would be appropriate that the legal framework applied to suborbital flights be determined not only by the criterion of altitude but also according to the characteristics of the activity and the legal issues arising from it.

Ecuador

[original: Spanish]

Question: Is there a relationship between plans to establish a system of space traffic management and the definition and delimitation of outer space?

Answer: Public and private companies working in the field of space already maintain a space traffic management system that prevents or minimizes accidents that could result in losses of their spacecraft or even in harm to their human crews. This management system has been evolving owing to the existence of a large amount of space debris and the presence of large constellations of space objects, and the fact that outer space has not yet been delimited has not been a major consideration. As a result, spacecraft are maneuvered arbitrarily over national territories.

Comment: The sovereignty that States exercise over the space located above their territory implies the exercise of various powers (inter alia, setting rules and regulations on traffic, establishing prohibited or restricted areas and conducting surveillance in space). Therefore, the lack of a definition of the boundary is a legal

and security loophole for countries. However, the delimitation of outer space must not be prejudicial to the claims of sovereignty over the sectors of the geostationary orbit found above equatorial countries. Therefore, a discussion surrounding boundaries and the use of the space over national territories must involve the settlement of pending issues related to the geostationary orbit.

Reaching a consensus on the delimitation of outer space, in which the rights of equatorial countries are respected, will help to eliminate the current gaps between air law and space law. This will open space law up to commercial and private aspects and perspectives; contribute to, inter alia, the improvement of definitions and concepts (such as astronaut, space tourist and space object); and also bolster current and future national and international legislation and policies related to air and space and help States to reach an agreement on a space traffic management system.

Observation: Ecuador is an equatorial country whose space infrastructure requires investment. Therefore, it needs to draft legislation related to space issues, especially since it is a party to the Outer Space Treaty and has concluded treaties in this field with other countries.

Question: Is there a relationship between suborbital flights for scientific missions and/or for human transportation and the definition and delimitation of outer space?

Answer: If suborbital flights are to be conducted in an area over the territory of a State that includes airspace and outer space not currently used by aircraft, the lack of an international consensus on the delimitation between the two spaces makes it even more difficult to determine what laws should be applicable to such flights, especially when flights cross national borders.

Comment: First there has to be an agreed upon definition of suborbital flights, and then it will be possible to determine what missions such flights can perform (inter alia, scientific missions and human transportation). An international agreement on the definition and delimitation of suborbital flights, as well as on the rules applicable to the activities carried out, would bring clarity and permit coordination between national and international regulatory frameworks.

Observation: Ecuador does not yet have legislation on space issues, putting it at a clear disadvantage compared to those countries that do have legislation allowing them to carry out suborbital flights.

Question: Will the legal definition of suborbital flights for scientific missions and/or for human transportation be practically useful for States and other actors with regard to space activities?

Answer: The legal definition of suborbital flights should be of practical use. Such a definition would enable States and the international community to have regulations that would contribute to the evolution of space activities.

Comment: The question implies a precondition, namely the existence of national space policies that take into account all related issues and contain the necessary definitions to support such policies.

In this regard, each country will have to have a legal and technical definition of suborbital flight, and then countries must reach a consensus on the definition. That will make it possible to decide which legal framework applies and help to reduce inconsistencies in the practices of States, enabling the development of regulations necessary for conducting activities related to this type of flight.

Observation: The Ecuadorean authorities should view the discussions on suborbital flights as taking place in a context similar to the one leading up to the commencement of air flight. Therefore, Ecuador has an urgent need for a policy, legislation and regulations on the matter of space.

Question: How could suborbital flights for scientific missions and/or for human transportation be defined?

Answer: As mentioned above, a definition of suborbital flight is required first. That said, the International Civil Aviation Organization has determined that “a suborbital flight is a flight up to a very high altitude which does not involve sending the vehicle into orbit”.

The International Association for the Advancement of Space Safety defines a suborbital flight as a flight up to an altitude at which the vehicle does not reach its corresponding orbital velocity.

Consequently, it follows that a suborbital flight allows a craft to operate at an altitude where it does not reach the velocity necessary for it to orbit the planet, much less maintain such an orbit around the Earth.

Therefore, depending on their purpose, suborbital flights can fall within the scope of either space or air law. In this sense, the lack of a definition of the boundary of outer space is a major obstacle to a consensus definition of such flights.

Short of defining suborbital flights, given their mission, flights dedicated to scientific activity may be seen as contributing to the expansion of knowledge in a specific scientific field, while those intended to carry human beings would take people from point A to point B on the Earth.

Comment: It seems there is confusion in the formulation of the question between the definition of suborbital flight and the mission or objective of such a flight. Therefore, it is recommended that the Ministry of Foreign Affairs and Human Mobility request clarification of this question.

Observation: Ecuador should consider existing definitions, with a view to including them in future regulations necessary to meet its commitments in the field of space.

Question: Which legislation applies or could be applied to suborbital flights for scientific missions and/or for human transportation?

Answer: At the moment there is no consensus on the most basic aspect – the definition of suborbital flight. Therefore, there is no international legal framework governing suborbital flights. Nevertheless, regulations based on air law and space law could be applied, because hypothetically a flight of this type could cross the boundary of airspace and could even cross national borders.

Comment: It may be necessary to consider new perspectives, since the legislation mentioned above cannot cover all the eventualities that suborbital flights might face. Therefore, an analysis should be conducted, taking into account national legislation and a consensual system. This may imply the need for new international laws or regulations, which would require achieving an adequate understanding and commitment among States. In this sense, the United Nations and the Office for Outer Space Affairs are seen as providing a framework where these agreements can be reached.

Observation: Ecuador does not have a space policy or legislation but, given the enormous developments in this field, it should consider the regulations being established in other countries so that it can develop its own national regulations in due course.

Question: How will the legal definition of suborbital flights for scientific missions and/or for human transportation impact the progressive development of space law?

Answer: The legal definition of suborbital flights can be linked to other legal issues, such as the delimitation of outer space. Therefore, by reaching agreements on its definition, including with regard to specificities related to flights for specific purposes (inter alia, scientific missions or human transport), States would be exercising equality and equity and giving support to less developed countries, especially

equatorial countries, which would motivate such countries to develop State policies and legislation in the field of space.

Comment: Apart from developing space law, this would also involve technical developments, since the technology to carry out flights of this kind will eventually become sufficiently affordable to allow all countries to have craft that can perform suborbital flights, just as happened with aviation.

Observation: Ecuador is a signatory to the Outer Space Treaty but it lacks space legislation. The Ministry of Foreign Affairs and Human Mobility should take the necessary steps to introduce such a legal framework.

Question: Please propose other questions to be considered in the framework of the legal definition of suborbital flights for scientific missions and/or for human transportation.

Answer: Considering that suborbital flights are more feasible than space flights, which rules should be considered if a consensus on the delimitation of outer space is not reached?

Since suborbital flights can reach outer space, could suborbital flight regulations provide for a moratorium on further space debris?

Question: Information relating to any practical case that would warrant the definition and delimitation of outer space.

Answer: Equatorial countries have made claims to sovereignty over the sectors of the geostationary orbit above their territories. Any definition of the delimitation of space should consider those claims.

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- Office for Outer Space Affairs, 2015, Questions on suborbital flights for scientific missions and/or for human transportation, document A/AC.105/1039/Add.15
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Conclusions

In accordance with official letter No. MREMH-DS-2021-0346-O dated 26 November 2021, the questionnaire on suborbital flights, to be submitted pursuant to the request by 22 January 2022, has been completed.

Ecuador does not have a policy or legislation on space and, as a result, has no guidelines on space matters. Therefore, although it was recommended that answers should be consistent with and related to the national approach, it has been necessary to review documents from international sources in order to provide the answers.