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Committee on the Peaceful Uses of Outer Space

Questions on suborbital flights for scientific missions and/or for human transportation

Note by the Secretariat

Addendum

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II. Replies received from Member States

Bahrain

[Original: English]

[4 January 2021]

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

We think there is a strong relationship between space traffic management and the definition and delimitation of outer space from the legal standpoint, since this is strongly related to ownership of space objects, intellectual property and advanced technologies.

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

This is highly dependent on the definition of the suborbital flights in each country and on which law applies if the law differentiates between orbital and suborbital flights.

Question (c). 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?

That will depend on the nature of the suborbital flight and its path, which differs from that of orbital flight, as the path of the latter crosses over other countries with different legal consequences.

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

A suborbital flight can be defined as a flight of which the velocity at any given point in its path produces a trajectory that reaches the atmosphere of the planet.

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

Given the current nature of suborbital flights, it is more appropriate to apply space law than aviation law to such activities. However, given the increased activities, a more flexible law should be adopted.

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

Space law should account for such activities, especially in relation to those countries with launch capabilities, or a separate law should be drafted.

Question (g). 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.

(a) Should suborbital flights not reaching the demarcation of space be treated the same as those going beyond the demarcation?

(b) Should suborbital flights have a separate law or should it be integrated with space law?

Cuba¹

[Original: Spanish]
[20 January 2021]

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

There is a close relationship, since the definition or delimitation of outer space will essentially determine how suborbital flights for scientific missions and/or for human transportation can be coordinated between States.

Suborbital flights could be governed by regulations similar to the regulations that apply to air travel and national airspace.

A zonal boundary has not been established in legislation and a functional approach is being applied.

Question (c). 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?

Suborbital flights for scientific missions or for tourist transportation would be of great practical use if, in the case of scientific missions, the purpose of such flights was to benefit all peoples rather than only the most industrialized countries. In the case of tourist transportation, only a minority of people could afford the high cost of space travel.

The legal definition of suborbital flights would enable the establishment of laws and regulations to safeguard the sovereignty of States and ensure that such flights were not used for military purposes but, rather, for the benefit of humanity.

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

Suborbital flights for scientific missions are, in terms of development in the present-day context, essential for the discovery of and research into natural phenomena observed and knowledge made possible through the exploration of outer space. Suborbital flights for human transportation are aimed at those who derive pleasure from and are interested in novel experiences and who wish to experience challenges that have not been possible until now.

Such flights could be defined as flights that take place outside the orbits and beyond the atmospheric altitudes established in space law and that are carried out for purposes such as tourism, research, science, human transportation and the exploration of the Earth for peaceful purposes.

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

The Committee on the Peaceful Uses of Outer Space has studied and is continuing to study this issue. It has not been possible to reach a decision. If it is considered appropriate to delimit outer space, at least up to the altitude of low Earth orbit, regulations similar to those established for air travel would apply.

The legal framework for these activities should be developed – and the activities themselves should be implemented – taking into account regulations governing the use of the electromagnetic spectrum, in particular the Radio Regulations of the International Telecommunication Union, to ensure that there is no harmful interference with the radio systems and services of States and that such systems and services are not used to carry out attacks or other activities in which electromagnetic energy or directed energy are used as new-generation weapons.

¹ Cuba provided replies only to questions (b), (c), (d) and (e).

It is important for international legislation on suborbital flights to be established within the framework of the United Nations to prevent the development of an arms race and the use of such flights for military espionage, subversion or other activities that could damage health and infringe upon national sovereignty.

Democratic People's Republic of Korea²

[Original: English]
[26 January 2021]

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

We believe that the definition and delimitation of outer space is a prerequisite for the legal definition of suborbital flights for scientific missions and/or for human transportation.

We are of the view that the legal definition of suborbital flights requires the clarification of their scope and purpose and for that, the definition and delimitation of outer space is positively necessary. In particular, the contradiction in legal status between airspace under the ownership of a sovereign State and outer space, the ownership of which a sovereign State is deprived, calls for a boundary between them as a must.

Question (c). 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?

We believe that the legal definition of suborbital flights for scientific missions and/or for human transportation is practically useful for States and other actors with regard to space activities.

It is thought that relying on the national legislation of individual States without making a clear legal definition of suborbital flights in international laws or regulations can cause not only the technology of suborbital flights and the intellectual property of humanity to be abused but also cause the space activities of States and other actors to be in disorder and confusion.

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

It is recommended that suborbital flights be defined in view of their scope.

Considering the fact that their purposes are to transport people or payloads and that such suborbital flight is not appropriate for satellites, we are of the opinion that a suborbital flight can be defined as a "flight to the highest altitude but not reaching a satellite orbit".

In addition, they should be defined in accordance with their technical characteristics and the principle of full respect for State sovereignty.

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

We believe that it is reasonable to adopt new international laws or regulations for suborbital flights.

However, at present, as the adoption of new international laws requires much time and the seeking of adequate understanding and compromise among States, both

² The Democratic People's Republic of Korea provided replies only to questions (b), (c), (d), (e), (f) and (g).

international aeronautical law and international space law should be applied all together.

As suborbital vehicles have characteristics of both aircraft and spacecraft, we are of the view that, with regard to safety, liability for damage and the prevention of crime, suborbital flights should be restricted by international aeronautical law, which is more specific than international space law, in combination with space-related treaties such as 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 the Convention on Registration of Objects Launched into Outer Space.

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

As there is currently no international law or regulation that specially defines suborbital flights, and the application of international space law cannot be excluded for several reasons, we believe that the legal definition of suborbital flights is in itself one of the urgent tasks of international space law.

In the end, the course of the legal definition of suborbital flights will in itself constitute the course of achieving development in international space law and of overcoming the weaknesses of the existing five space-related treaties.

Question (g). 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.

(a) What could be considered in the manufacture and use of suborbital vehicles with regard to safety?

(b) What could be considered for the observation of suborbital flights and the prevention of loss of life and property?

(c) How could the legal obligations that must be fulfilled by the actors relevant to suborbital flights be defined with regard to environmental protection?

Greece³

[Original: English]
[19 January 2021]

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

The issue of the definition and delimitation of outer space could have an impact on plans to establish a system of space traffic management. However, the international community must be prepared to provide answers in this respect, even in the absence of such a definition or delimitation.

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

The definition and delimitation of outer space is linked with suborbital flights for scientific missions or crewed space flights. In this context, it has to be underlined that the functionalist approach to the definition and delimitation of outer space may provide greater clarity than the spatialist one, as it would result in the application of only one legal regime (i.e., space law) to suborbital flights, whose primary function is to enter outer space (despite the fact that they are also designed to traverse airspace). The functionalist approach distinguishes between aeronautical and astronautical activities on the basis of the primary purpose of a vehicle's design rather

³ Greece provided replies only to questions (a), (b), (c), (d), (e) and (f).

than on the location of the vehicle at any single point in time. Under this approach, a company's suborbital operations would be governed under space law only (with the exception of air traffic management rules for that portion of the flight that crosses airspace), because suborbital flights are designed for space travel.

Question (c). 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?

The legal definition of suborbital flights for scientific missions or crewed space flights would be useful for States and other actors with regard to space activities, as it is closely linked with and would contribute to the setting up of a system of global space governance.

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

The definition of suborbital flights for scientific missions or crewed space flights has particularities, making it a complex subject that requires careful study, which we believe should be done within the competent United Nations bodies, following a wide-ranging, open consultation.

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

The choice whether or not to apply international or national law is related to the content of the definition of suborbital flights and to the specific characteristics of the flight.

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

We consider that it will have a significant impact on the development of space law, and that the extent of the impact is directly related to the content of the definition of suborbital flights for scientific missions and crewed space flights.

Lithuania⁴

[Original: English]

[11 January 2021]

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

In the view of Lithuania, the definition and delimitation of outer space, as well as its relation to a system of space traffic management and/or suborbital flights, should incorporate a functional perspective, stressing both the need to achieve the safety of space operations and technological advancement in space operations.

Question (c). 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, we think it would be practically useful.

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

We believe that the definition must be agreed by all United Nations Member States and should be acceptable to both the public and private sectors.

⁴ Lithuania provided replies only to questions (b), (c), (d), (e) and (f).

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

Lithuania does not have and does not apply its own separate national legislation. We are guided by a common European Union position.

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

It will depend on the type of regulation that will be enforced. A proper definition would certainly not interfere with the development of space law.

Mexico

[Original: Spanish]
[19 January 2021]

Since the Working Group on the Definition and Delimitation of Outer Space is mandated to consider matters relating to the definition and delimitation of outer space, the questions posed should be confined to that topic. However, the questions cover such issues as space traffic management, suborbital flights (for scientific missions or human transportation), definitions and other issues that, while essentially relating to activities in airspace and outer space, go beyond the mandate of the Working Group.

III. Replies received from permanent observers of the Committee**International Civil Aviation Organization**

[Original: English]
[20 January 2021]

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

No comment further to the response provided in document A/AC.105/1112/Add.9.

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

No comment further to the response provided in document A/AC.105/1112/Add.9, and the responses provided to questions (c) and (e) below.

Question (c). 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?

Within the context of the Convention on International Civil Aviation, the usefulness of a legal definition of “suborbital flight” will greatly depend upon whether it is compatible with the Convention and its annexes. For example, at times, vehicles performing suborbital flights may fit within the definition of “aircraft” provided in part 1 of annex 7 to the Convention on International Civil Aviation, wherein “aircraft” is defined as “any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the Earth’s surface.” Conversely, suborbital flights may also be performed by vehicles that never function as aircraft. Any legal definition of “suborbital flight” must therefore take into account not only the spatial location of the suborbital vehicle, but also the aerodynamics and function of the vehicle.

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

No comment further to the response provided in document A/AC.105/1112/Add.9, and the responses provided to questions (c) above and (e) below.

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

The Convention on International Civil Aviation and its annexes provide the legal regime for international civil air transport and will govern all suborbital vehicles and operations that fall within its scope of application.

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

No comment further to the response provided in document A/AC.105/1112/Add.9, and the responses provided to questions (c) and (e) above.

Question (g). 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.

The Convention on International Civil Aviation and its annexes apply to all civil aircraft engaged in international air navigation, without regard to whether the flight is scientific (versus, for example, commercial) or for the transport of passengers (versus cargo). So, can a legal definition of suborbital flights for scientific missions and/or for human transportation be established that is applicable both to suborbital vehicles and flights that fall within the scope of the Convention framework and to those that fall outside of its scope?

International Society for Photogrammetry and Remote Sensing

[Original: English]
[14 January 2021]

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

Space traffic management refers to the set of technical means and regulatory instruments intended to enable safe access to space, the safety of operations in outer space and the safe return from space, free from interference and physical damage, including radiofrequency radiation damage. The absence of international agreement on the definition and delimitation of outer space has significant implications on the ability to implement an effective space traffic management system. In particular, the lack of consensus on the lower physical boundary of outer space and the consequent uncertainty regarding the law applicable to the area comprising between 80 to 110 km of altitude complicates the sharing of data, the supervision of activities and the coordination of operations necessary for the realization of a successful space traffic management system.

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

Yes, there is. Suborbital flights are expected to operate in the area located at the boundary between airspace and outer space; the lack of international consensus on the delimitation between the two realms complicates the question regarding the law applicable to suborbital flights and leaves, for the time being, the matter in the hands of domestic regulators. International agreement on the definition and delimitation of outer space, as well as on the rules applicable to these activities, would bring clarity and enable coordination between national and international regulatory frameworks.

Question (c). 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?

Currently, there is no international consensus on the definition of suborbital flights, either for scientific missions or human transportation. This situation allows States to define them differently in their domestic legislation, thus leading to inconsistencies in the approaches used and the applicable rules.

An internationally agreed definition of suborbital flights for scientific missions and human transportation could be beneficial on multiple fronts. First, it could facilitate international discussions on the setting up of a legal regime applicable to such activities. Second, it could help States to elaborate rules regulating these activities at the domestic level, as well as to provide legal certainty to private entities.

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

Suborbital flights are flights capable of reaching outer space but not of achieving the necessary velocity to reach and stay in an orbit around the Earth.

Suborbital flights for scientific missions are flights capable of reaching very high altitudes without achieving orbital velocity and whose primary purpose is to serve scientific research goals.

Suborbital flights for human transportation are flights capable of reaching very high altitudes without achieving orbital velocity and whose primary task is to transport humans from point A to point B on Earth.

In addition to the above definitions, it might be useful to also distinguish between suborbital flights that carry humans (which are currently labelled as space tourism flights) and suborbital transportation (where indeed passengers are carried from country A to country B), as the latter raises international legal issues, including space traffic management issues.

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

In principle, suborbital flights could be regulated by a combination of rules of customary law and national law, as well as those of international air law and space law.

From the perspective of the applicability of international air and space law, the following issues have paramount importance: authorization, registration, liability and rescue.

International space law regulates the issue of authorization in article VI 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, according to which States are under the obligation to authorize and supervise national space activities. This raises the question of whether standards should be developed internationally to avoid discrepancies among domestic approaches. One should also wonder if the standards and requirements for airworthiness laid out in article 8 of the Convention on International Civil Aviation could be applied to suborbital crafts. Notably, countries such as the United Kingdom and the United Arab Emirates have regulated suborbital flights through their national space legislation, thus not under civil aviation laws, although provisions on the collaboration between national space agencies and civil aviation authorities are provided.

As far as the issue of registration is concerned, it is questionable whether article II of the Convention on Registration of Objects Launched into Outer Space applies, as it links registration to the launching of a space object into an Earth orbit or beyond. On the contrary, international aviation law does not foresee an international system of aircraft registration, instead leaving the matter in the hands of the individual States, pursuant to the requirements set out in the Convention on International Civil Aviation.

Once again, this raises the question of whether an international system of registration for suborbital flights should be established as a means to enable better safety management and coordination of suborbital activities.

With regard to liability, questions arise as to whether the existing rules of both international air and space law are suitable to suborbital activities, especially those involving human transportation. Indeed, in international space law, the Convention on International Liability for Damage Caused by Space Objects only addresses damage caused to space objects in outer space, on Earth or in airspace, but does not apply to nationals of the launching State or participants in the flight. Conversely, international air law provides, through the Convention for the Unification of Certain Rules Relating to International Carriage by Air of 1929 and the Convention for the Unification of Certain Rules for International Carriage by Air of 1999, an elaborated liability regime that might be too detailed, especially in the early days of human transportation by suborbital means.

Also, with regard to the issue of rescuing participants in suborbital flights, international rules would be needed to bring clarity to the matter. Indeed, questions remain as to whether the rights attributed to personnel of a spacecraft under the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space could be extended to the crew and passengers of suborbital flights, in particular to those taking part in such activities for purposes other than scientific ones.

Ultimately, as neither international air law nor international space law provides a comprehensive regulatory framework for the management of suborbital activities, international discussions would be needed to set up an adequate legal regime to govern such activities that takes into consideration the specificities of missions for scientific and human transportation purposes. Importantly, such an international regime would be mostly needed in connection with suborbital flights transporting passengers from country A to country B, that is, flights crossing State borders; in this context, also having a space traffic management would be beneficial. Conversely, in the case of suborbital flights that are merely hyperbolic flights over a single country, and that do not exit its national airspace (a type of flight often described as space tourism), the need for international regulation would be less strong, as other States' airspaces and territories would not be concerned.

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

A legal definition would be beneficial at both the international and national levels. On the one hand, it would contribute to determining the scope for international discussions aimed at establishing a legal regime for suborbital flights. On the other hand, it would offer guidance to domestic lawmakers in their process of regulating suborbital operations.

Question (g). 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.

- (a) Should international rules be developed to govern suborbital activities for both scientific and human transportation purposes?
- (b) What legal status should these rules have?
- (c) Which international organization or body should be responsible for the development of rules governing suborbital activities?
- (d) How could coordination among different bodies be organized?
- (e) How could a balance between the long-term sustainability of space activities and the promotion of commercial interests be reached in the process of regulating suborbital flights?

International Space University

[Original: English]
[19 January 2021]

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

The authors understand that there is indeed a relationship between space traffic management and the delimitation of outer space. This relationship primarily stems from the technical needs already influencing the organization of traffic in both airspace and outer space.

The need for tracking, monitoring and communication in airspace has led to the creation of air traffic services that enable the safe and orderly use of airspace by all actors, namely, collision avoidance services. A parallel can be found in outer space with the current space situational awareness capacities, also developed to respond to the crucial need for collision avoidance. However, space situational awareness is only a first step towards the space equivalent of air traffic services. Yet, the authors believe that lessons could be learned from the existing technical operations between space traffic and certain portions of airspace. In the context of launches or landing operations, current air law has proved to be able to accommodate space activity that involves passing through airspace. This exercise of space traffic management in airspace starts when the space object loses its orbital dynamic. This is when it is considered to be entering airspace, suggesting an operational distinction between airspace and outer space. On the basis of such existing activities, the authors consider that operational practices suggest a relationship between space traffic management and the definition and delimitation of outer space.

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

The authors are of the view that this relationship indeed exists. The nature and impact of such a relationship depends on the approach used to define the suborbital flight. In the “spatialist” approach, in which the location of the vehicle is critical, the delimitation plays a direct and primary role. In the “functionalist” approach, taking into account only the functions or activities of the vehicles, the delimitation appears as a secondary criterion.

Question (c). 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 adoption of the legal definition of suborbital flights will, firstly, identify the legal regime applicable – international air law or international space law, or the mixture of both – and, secondly, contribute to reducing inconsistencies in the practices of States. The authors underscore the importance of holding discussions on this matter at the international level and including both airspace and outer space actors in those discussions.

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

As regards the international air law regime, according to the International Civil Aviation Organization, “a suborbital flight is a flight up to a very high altitude which does not involve sending the vehicle into orbit.”⁵ As regards the international space law regime, there is no definition of a suborbital flight. Different entities have already tried to provide a definition of a suborbital flight, one of the most technical being the

⁵ International Civil Aviation Organization, Council, 175th session, “Concept of sub-orbital flights”, C-WP/12436 (2005); International Civil Aviation Organization, Legal Committee, 36th session, “Commercial space flights”, LC/36-WP/3-2 (2015).

one proposed by the International Association for the Advancement of Space Safety, defining a suborbital flight as a “flight up to an altitude at which the vehicle does not reach its corresponding orbital velocity”.⁶ Considering the aforementioned information, the authors kindly submit that a suborbital flight can be defined as a flight of a vehicle that reaches an altitude higher than 100 km above sea level and whose maximum speed is lower than the speed required to complete one orbital revolution.

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

Currently, there is no specifically designated international law governing suborbital flights. They are therefore regulated by national space laws, which can involve the application of either aviation law or space law, depending on the country’s position on the delimitation between airspace and outer space and its definition of suborbital flight.

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

Drafting an international definition of suborbital flights has the potential to influence present and future definitions at the national level. The authors are of the opinion that initiating an effort to reach such a common understanding on the subject would be beneficial for the creation of an enforcement mechanism in the near future.

Question (g). 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.

No other questions are proposed.

⁶ International Association for the Advancement of Space Safety, “Guidelines for the safe regulation, design and operation of suborbital vehicles” (December 2013), p. 2; available at www.faa.gov/about/office_org/headquarters_offices/ast/advisory_committee/meeting_news/media/2014/may/15_IAASSSuborbitalSafetyGuidelinesManual_Dec2013_Master.pdf.