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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

Algeria¹

[Original: French]
[29 December 2022]

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

The growth of space traffic calls for the management both of space objects and of debris orbiting the Earth.

Space traffic must be internationally regulated if the activity is to be sustainable. A system of management based 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 to all space users.

The almost total lack of a legal framework for the regulation of space traffic leaves room for risks and disputes. The laws governing airspace and outer space are different: the former emphasize sovereignty, while the latter emphasize freedom.

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

The fact that outer space is neither defined nor delimited prevents us from establishing a legal definition of “suborbital flight”. This leaves room for legal gaps with respect to the nature and status of such flights, especially since the development of suborbital activities – like any human activity – could give rise to disputes in respect of which liability cannot be established.

Question (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?

In order to formulate a legal definition of “suborbital flight”, technical and legal questions must be asked. Depending on how suborbital flights are defined, the status of travellers on board and the liability of States in case of damage could be determined. The answer to all these questions brings us back once again to the question of the delimitation of outer space and the notion of “fault” in space law.

In that light, in terms of form, clear answers to the above-mentioned questions would provide legal certainty with respect to current and future space activities, whether scientific or otherwise.

The lack of a definition highlights the difficulties related to the applicable treaties – namely, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies, article V; the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space, articles 5 (3), 10 and 12 (3); and the 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.

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

A legal definition of the two types of suborbital flights would depend on the purpose of the flight and on what was being transported.

¹ Algeria provided replies to questions (i), (ii), (iii), (iv), (v) and (vi).

Accordingly, the scientific community should resolve technical questions relating to such matters as velocity and placement in orbit in order to pave the way for the work of jurists and experts, eliminating any ambiguity.

Suborbital flights for scientific missions and/or for human transportation also raise new questions in terms of radiocommunication regulations, given 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 resolution 772 or the World Radio Conference (WRC-19) on the consideration of regulatory provisions to facilitate the introduction of suborbital vehicles).

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

No answer to this question can be found in law, because the application of specific legislation would depend on how the law defined the object and how the object is used in a given environment. However, neither suborbital flights nor outer space are defined. Moreover, the legal status of astronauts and travellers, who are neither subject to the same conditions nor faced with the same challenges in space, is unclear.

For technical reasons and owing to atmospheric conditions, it is difficult to establish a vertical limit for the purposes of delimiting outer space. A consensus with regard to the Karman line would resolve a number of problems with respect to space activities.

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

A precise definition would make it possible to establish the responsibilities, rights and obligations of space actors. This would contribute to legal certainty and the sustainability of space activities. Furthermore, the existing instruments on outer space should be revised to reflect the current situation with regard to such activities.

A functional approach with respect to the applicable law, based on the area of application, should be adopted in order to close the gap between the legal problem to be resolved and existing law.

Croatia²

[Original: English]
[16 December 2022]

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

Yes, there is a relationship between plans to establish a system of space traffic management and the definition and delimitation of outer space.

Question (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, there is a relationship between suborbital flights for scientific missions and/or for human transportation and the definition and delimitation of outer space.

Question (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?

Suborbital flights are interesting for several reasons, including the fact that they are technically the easiest and the least expensive types of flights to carry out and the fact that they could facilitate high-speed global travel. The legal framework around such

² Croatia provided replies to questions (i), (ii), (iii), (iv), (v) and (vi).

flights determines how easy or difficult it is for companies to carry them out and can, therefore, have an impact on the global environment (in particular with regard to travel), innovation and business development (e.g., the development of new launcher vehicles).

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

A basic definition might be “flights at velocities insufficient for unpowered orbiting for longer than [X] months”, or “flying at an altitude of less than [X] km above the planet’s surface”.

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

Croatia does not have or apply its own separate national legislation. We share the position of the European Union.

Question (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 will have a significant impact on the development of space law.

Indonesia

[Original: English]
[2 January 2023]

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

Indonesia takes note of the issue of space traffic management discussed under the agenda item of the Legal Subcommittee entitled “General exchange of views on the legal aspects of space traffic management”. To date, no consensus has been reached on the definition of space traffic management. Currently, Indonesia does not have any regulations on a system of space traffic management. Indonesia has already established the definition and delimitation of outer space in Law Number 21 of 2013 on Space Activities, as provided in document A/AC.105/C.2/2017/CRP.31.

Indonesia is of the view that there is a relationship between plans to establish a system of space traffic management and the definition and delimitation of outer space. Space traffic dimensions and phases relate to the definition and delimitation of outer space, in particular with regard to determining the boundaries within which a system of space traffic management should operate, the delimitation of outer space, where air law and air traffic management apply and where space law applies.

Question (ii). 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 relationship between suborbital flights and the definition and delimitation of outer space. Air law and space law are governed by different legal regimes. There are major differences between air law and space law.

As increasing numbers of suborbital flights for scientific missions and/or for human transportation are being carried out, there is a need for clarified rules on safety, security, navigation and traffic control for these activities.

A legal regime governing aerospace vehicles, including for suborbital flights, should be defined; this would, in turn, require the definition and delimitation of airspace and outer space. Such a legal regime would enable States to determine the agency most suited to the regulation and oversight of suborbital flights for scientific missions and/or for human transportation, the associated risks, and the international obligations and liabilities of States.

Question (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?

Indonesia is of the view that establishing a legal definition of suborbital flights for scientific missions and/or for human transportation will be useful for States and other actors with regard to space activities. A firm and clear legal definition of suborbital flights for scientific missions and/or for human transportation will provide a clearer understanding for reaching consensus on the issue of the definition and delimitation of outer space, particularly in respect of when to apply air law and when to apply space law in relation to suborbital activities.

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

Indonesia is of the view that such definition should take into account, inter alia, major international treaties, national sovereignty and factors such as geographical location, actors and technical characteristics for suborbital flights for scientific missions and/or for human transportation. Furthermore, Indonesia believes that such definition should be agreed on by all States Members of the United Nations.

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

Given that there is currently no international law governing suborbital flights, suborbital flights for scientific missions and/or for human transportation could be governed by both air law and space law, subject to existing regulations.

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

The legal definition of suborbital flights for scientific missions and/or for human transportation could help to accelerate measures to regulate current trends in space activities. Such legal definition could bring clarity not only to the activities themselves, but also to other related problems, including the scope of application of air law and space law, consensus on the definition and delimitation of outer space, and the rights and obligations of operators and launchers.

Question (vii). 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.

At what point will the discussion include best practices in the area of suborbital flights for scientific missions and/or for human transportation as modalities for a future legal framework?

In order to ensure the long-term sustainability of outer space and in view of current trends in space commercialization, particularly with regard to suborbital flights, Indonesia is of the view that best practices and other relevant aspects should be included in the discussion on the framework of the legal definition of suborbital flights for scientific missions and/or for human transportation. In particular, this would be beneficial to expedite the process of establishing a clear definition and delimitation of outer space.

Myanmar

[Original: English]
[30 December 2022]

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

Yes, there is a relationship between plans to establish a system of space traffic management and the definition and delimitation of outer space.

Space traffic management is defined by the International Academy of Astronautics as “the set of technical and regulatory provisions for promoting safe access into outer space, operations in outer space and return from outer space to Earth free from physical or radio-frequency interference”.

The International Association for the Advancement of Space Safety defines the delimitation of outer space and airspace as follows:

The following operational boundaries exist between aviation and space:

- (a) 160 km, lowest practical operating orbit for satellites;
- (b) 120 km, re-entry threshold for space systems;
- (c) 50 km, upper limit of atmospheric buoyancy (balloons);
- (d) 18 km, upper limit of civil aviation traffic.

One alternative would be to define altitudes of 50 to 160 km as “near space” for legal purposes.

We also agree with the concepts put forward by Professor Paul Stephen Dempsey, Director Emeritus of the McGill University Institute of Air and Space Law, regarding the definition and delimitation of outer space, as presented to the Committee on 30 March 2017.

Question (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. Suborbital flights fly in outer space for a limited duration; they are unable to remain in orbit and must re-enter the Earth’s atmosphere. Therefore, they can be said to operate in the areas of outer space, near space and airspace, which means that they can easily affect the sovereignty of nations and their airspace in the event of any failures. It follows that there is a direct relationship between suborbital flights and the definition and delimitation of outer space.

Question (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?

The establishment of a clear, stable and unified legal definition of suborbital flights will be practically useful for States and other actors that plan to operate such flights/vehicles.

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

They could be defined as future space transportation vehicles that are constructed for commercial benefit, intended for wealthy people who want to travel to outer space for recreational purposes.

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

Both air law and space law could be applied to suborbital flights for scientific missions and/or for human transportation, because suborbital flights operate in the

three zones above the Earth. In addition, a new, delineated regime of aerospace law should be applied to them.

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

In accordance with current technological developments in the space community, provisions should be added to existing space law to cover matters relating to suborbital flights inclusively.

In that way, the legal definition of suborbital flights for scientific missions and/or for human transportation will have an impact on the progressive development of space law.

Question (vii). 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) How will the travel and tour companies that initiate suborbital flights ensure the safety of space tourists or passengers on their trip?
- (b) How long should a suborbital flight last before leaving space?
- (c) How many times can a vehicle enter space within its lifetime?
- (d) What information should be added to the framework on the safety and peaceful use of suborbital flights so as to ensure that no harm is done to society and space communities?
- (e) What plans are in place for insurance or compensation if participants come to harm during space flights?

Paraguay³

[Original: Spanish]
[27 December 2022]

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

In the Republic of Paraguay, the implementing authority is preparing a bill on space activities, but not, for the time being, on plans to establish a system of space traffic management. However, we consider that there is such a relationship, because the definition and delimitation of outer space is necessary in order to determine which authority is responsible for implementation and space traffic monitoring, provided that the objects concerned can be regarded as space objects forming part of that traffic.

Question (ii). 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 there is a relationship between suborbital flights (for scientific missions and for human transportation) and the definition and delimitation of outer space, given that a suborbital flight can be considered as a flight that has not reached orbit or has not completed an orbit around the Earth.

Question (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?

A legal definition of suborbital flights for scientific missions or for human transportation will undoubtedly be of practical use for State and non-State actors

³ Paraguay provided a reply to questions (i), (ii), (iii), (iv), (vi) and (vii).

involved in space activities, since it will help to distinguish spacecraft governed by the regulations and provisions constituting space law from aircraft governed by air law.

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

Suborbital flights could be regarded as aerospace operations or voyages involving vehicles that travel beyond the limits of airspace and reach outer space but do not complete an orbit of the Earth.

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

Its impact will be positive in that it will represent a breakthrough for existing space law. Given the importance and significance of suborbital flights, such a definition could also be a topic of comparative research, taking into account existing space law and aviation law, since its application would concern the boundary between airspace and outer space.

Question (vii). 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.

We believe that the legal definition of suborbital flights for scientific missions or for human transportation should cover issues relating to the direct or indirect responsibility of the State under space law, and issues concerning space debris.

The term “suborbital operations” could also be considered instead of “suborbital flights”, given that the term “flight” is understood as referring more to fixed-wing or rotary-wing aircraft whose flight depends on four dynamic factors (thrust, drag, lift and weight), thus being possible only in airspace.

Slovakia⁴

[Original: English]
[19 December 2022]

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

This issue has not been discussed in Slovakia yet. However coordination on this matter within the European Union and at the global level is important and sure to happen.

III. Reply received from a permanent observer of the Committee

International Society for Photogrammetry and Remote Sensing

[Original: English]
[9 January 2023]

Question (i). 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,

⁴ Slovakia provided a reply to question (i).

including radio-frequency radiation damage. The absence of international agreement on the definition and delimitation of outer space affects the ability to effectively implement a space traffic management system. Particularly problematic are 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 (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, there is. Suborbital flights 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, and on the rules applicable to these activities, would bring clarity and enable coordination between national and international regulatory frameworks.

Question (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?

Currently, there is no international consensus on the definition of suborbital flights, either for scientific missions or human transportation. This 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 (iv). 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 stay in 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 (v). 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 international standards should be developed to reduce the risk of discrepancies among domestic approaches. There is also the question of whether the standards and requirements for airworthiness laid out in article 8 of the Convention on International Civil Aviation could be applied to suborbital craft. 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 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 individual States, pursuant to the requirements set out in the Chicago Convention. Once again, this raises the question of whether an international system of registration for suborbital flights should be established 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 and the Convention for the Unification of Certain Rules for International Carriage by Air, an elaborate liability regime that might be too detailed, especially in the early days of human transportation by suborbital means.

It would also be beneficial to develop rules related to the rescue of participants in suborbital flights. Indeed, questions remain as to whether the rights attributed to the 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 those taking part in such activities for purposes other than scientific ones.

Ultimately, as neither international air law nor international space law provide 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 needed mostly 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 system would be beneficial. Conversely, in the case of suborbital flights that are merely hyperbolic flights over a single country, and that do not exit that country's 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 (vi). 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 (vii). 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?
-