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# METHODS OF CONDUCTING SPACE TOURISM ACTIVITIES IN THE LIGHT OF INTERNATIONAL LAW – HOW TO REMEDY POTENTIAL CONFLICT OF LAWS?

**Abstract:** This paper analyses the concept of space tourism in terms of methods required to conduct such activities within the scope of international law. It highlights challenges that emerge for the international space law, especially regarding the suborbital flights. It's not clear from the point of view of international law which legal regime might be applicable to such endeavor. Unlike any other space flights, suborbital flights consists both of elements from international aviation law and international space law. This paper discuss hypothetical solutions to potential conflicts of law that may arise in connection to such activities. It also aims to provide clarity to ambiguities regarding international law in this area.

**Keywords:** international space law, international aviation law, space tourism, suborbital flights, orbital flights

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## Introduction

On 4th of October 1957 a breakthrough event took place in the history of mankind. On this day mankind for the first time penetrated the veil of the cosmos due to the launch of Sputnik-1 satellite to Earth's orbit. Since then, the outer space has been seen not just as an object of philosophical reflections, but as a resource that can be used.

The emergence of this completely new area of human activity, like no other in many respects, gave rise to the need to provide it with special legal regulation, which would define the rules for the use of techniques enabling activities in outer space (Górbiel, 1985). It resulted in establishment of entirely new field of international law – the international space law. The whole international space law system is composed of many treaties. Nevertheless, the most important of them all is Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies of 1967, commonly known as the Outer Space Treaty. This treaty introduced the main principles which countries must abide in their use of the outer space. Most of them are aimed at ensuring that space wouldn't become the next frontier of super powers aggressive rivalry during the cold war era and promoting the exploration of space, such as the principle of non-appropriation or that outer space and celestial bodies shall be used for peaceful purposes.

Nowadays, space is being used in ways that haven't been envisioned by the scope of the treaties. This applies specifically to the commercial use of space, a subject absent from the regulations of the Outer Space Treaty. Therefore many researchers claim that current international space law system is outdated (Meyers, 2015). One of these ways is space tourism. It is currently the most dynamically developed type of commercial use of space. Due to the way in which this activity is conducted, doubts may arise as to which legal regime is applicable to their assessment.

This article will indicate, based on a comparative analysis, the potential conflict with another regime of international law, i.e. international aviation law. It will also consider the directions in which international space law might evolve to ensure proper protection of participants in outer space activities.

## Discussion

The term "space tourism" has been defined as "any commercial activity offering customers direct or indirect experience with space travel" (Freeland, 2010). Although there were previous examples of individuals engaging in such activity, it was only recently, in the year 2021 which marked the breakthrough in space tourism.

On 11th of July 2021, the "spaceplane" V.S.S. Virgin Galactic's Unity detached from the carrier vehicle of the "mothership" (another, larger craft) and went to the upper parts of the atmosphere, and then allowed the crew, i.e. the pilots and other people on board to see the curvature Earth and feel the zero gravity conditions for a few minutes. After that time, the suborbital craft descended in a controlled manner and landed on the runway at the Virgin Galactic mission operations center in the state of New Mexico, USA (National Geographic, 2021).

On 20th of July 2021, Blue Origin launched tourists into space using a reusable rocket called New Shepard, with a crew capsule installed above it. The rocket took off from the launch site in the US state of Texas and rose to an altitude of 107 km above sea level, after which the crew capsule was detached and the rocket itself returned to the launch site. After disconnection, the tourists in the capsule (including the company's owner, Jeff Bezos) remained in space for some time, able to observe the planet, space and experience the effect of lack of gravity. The capsule then descended back to the Earth's surface and, using parachutes, landed at its final destination, close to the launch site (Space.com, 2021).

The flight of the New Shepard rocket is significantly different from the previously carried out Unity 22 mission, primarily in terms of technology (Wood, 2022). The main difference was that New Shepard crew was launched into space by a rocket, not a suborbital plane. This means another way of launching into the outer space, where the elements of regular aviation travel, as were present during Unity 22 mission, are absent.

The next step towards mass and accessible space tourism was the Inspiration4 mission, carried out by SpaceX on 15th of September 2021. As part of this mission, a reusable rocket belonging to SpaceX carried the Dragon capsule with the crew to an altitude of 590 km above sea level. The crew spent three days in orbit during this flight, at a higher altitude than the ISS (approx. 400 km above sea level). After this time, on 18th of September of the same year, the Dragon capsule and its crew returned to the Earth's atmosphere and landed in the ocean, off the coast of Florida.

It is worth noting that space tourism in particular has benefited from the development of GPS technology, even more than any other type of tourism. The GPS was developed to increase US military capabilities. Security considerations which were the major emphasis in its development (Lyall & Larsen, 2017). Although it began as military project, the GPS is also now common in civilian use. International co-ordination and interoperability of GPS is arranged through the International Civil Aviation Organization (ICAO), the International Maritime Organization (IMO), the International Telecommunication Union (ITU), a COPUOS International Committee on GNSS (ICG), and by bilateral arrangements with the EU, Russia, China, India and Japan (Lyall & Larsen, 2017). Regarding space tourism, the GPS can be used to provide entry locations for civilian space flights.

Taking the above into account, it should be concluded that we can currently distinguish two types of space tourism:

- the suborbital space tourism; and
- the orbital space tourism.

Suborbital flight is a type of space tourism defined as travel into space that does not involve the flight of a launched craft in orbit. This means that this kind of space flights do not fully reach the orbital height and this is related – in simple language – to flights up and down, to an altitude of approximately 100 km above sea level, where, after stopping the engines of the craft, people present on it can experience weightlessness for approximately three to six or ten minutes. After this time, the vehicle re-enters the Earth's atmosphere and returns to the surface. The type of flight indicated may resemble

a jump from point A to point B, which is why it is also referred to as a "suborbital jump" (Kumar Pandey & Tiwari, 2014).

Orbital flight is a further step compared to suborbital flights. It is a type of space tourism that takes place at an altitude that allows to enter Earth's orbit and stay there for a certain period of time (Kumar Pandey & Tiwari, 2014). In this type of space tourism, an object launched from the Earth's surface is required to be able to cross the barrier of 100 km above sea level and continue flying along the curvature of the planet (Polkowska, 2021). The object must reach the appropriate orbital velocity to stay in orbit, depending on the height of the orbit.

Achieving such velocity is naturally much more difficult in technical terms and at the same time more expensive in terms of costs, which constitutes a clear barrier between orbital space tourism and suborbital space tourism. Due to these differences, different solutions are needed for orbital flights than for suborbital flights. Therefore, to conduct this type of activity, it is necessary to launch the object from the ground using a rocket system, not a lifting aircraft.

The types of space tourism indicated above prompt consideration of the application of appropriate legal regimes relating to suborbital space tourism and orbital space tourism respectively. Particularly in the context of conducting activities within the framework of suborbital space tourism, there are arguments pointing to the need to create a new branch of international law, i.e. aerospace law, which would combine some elements of aviation and space law.

In academic discourse, the topics of conflict of legal regimes caused by suborbital flights are negligible. However, due to the current undertakings of large, cross-border enterprises, this is a niche that requires development.

Creating a separate branch of international law would solve the complicated issue of categorizing certain activities, including: entities already indicated in the text and the nature of their activity, which, thanks to the development of technology, cannot be definitely classified as space or air activity. However, it is difficult to expect the emergence of new treaty regulations similar to the Outer Space Treaty in the current international climate. These types of activities should therefore be considered on the basis of the existing framework of international law, without attempting to design new treaties.

In the context of suborbital flight, as described above, it can be performed in two ways. The first is to release the capsule to an altitude of approximately 100 km above sea level, using a launch rocket. The second is the launch of a suborbital aircraft equipped with rocket engines from the deck of another aircraft that was used to carry this craft to the appropriate height. As for the first method of lifting the object to approximately orbital altitudes, there is no doubt that in this case the usual methods of launching the object into space are used. However, the use of a suborbital aircraft effectively uses two areas to fulfill its function, i.e. air, in the case of the mothership, and space, in the case of the suborbital aircraft. This means that this type of suborbital flight in its first phase of flight is subject to the provisions of the Convention on International Civil Aviation of 1944 and in the second phase to the provisions of the Outer Space

Treaty, which consequently results in different requirements for conducting the flight and forms of liability for the same flight.

What is the easiest to point out in the above case is the different view on the issue of territoriality in airspace and outer space. In the case of international space law, firstly, there is no treaty regulating the delimitation of outer space, and secondly, in accordance with art. II of the Outer Space Treaty, the outer space does not constitute the territory of any state. The provisions of the treaties constituting international space law system repeatedly contain provisions confirming the lack of national jurisdiction in outer space.

However, in the provisions of the Chicago Convention of 1944, unlike in international space law, there are numerous references to the extension of a state's sovereignty into air space beyond its land and water territory. The regulations in question are already included in art. 1 of this treaty: "The contracting States recognize that every State has complete and exclusive sovereignty over the airspace above its territory". Moreover, the entire Chicago Convention of 1944 is much more precise than the Outer Space Treaty, which confirms its narrow definitions. According to art. 2: "For the purposes of this Convention the territory of a State shall be deemed to be the land areas and territorial waters adjacent thereto under the sovereignty, suzerainty, protection or mandate of such State".

Another confirmation of the contrast between international aviation law and international space law in the context of territoriality is the issue of overflight in a given zone. In the international space law treaties, in line with the principle of non-appropriation of outer space, there are no provisions regulating flight over the territory of other countries.

The Chicago Convention of 1944 on the other hand, devotes its entire second chapter to the rules of flight in the airspace (which, in accordance with articles 1 and 2 of this treaty, is part of the territory of a state) by aircraft of other states. Particular mention should be made of art. 5 paragraph 1 of this treaty: "Each contracting State agrees that all aircraft of the other contracting States, being aircraft not engaged in scheduled international air services shall have the right, subject to the observance of the terms of this Convention, to make flights into or in transit non-stop across its territory and to make stops for non-traffic purposes without the necessity of obtaining prior permission, and subject to the right of the State flown over to require landing. Each contracting State nevertheless reserves the right, for reasons of safety of flight, to require aircraft desiring to proceed over regions which are inaccessible or without adequate air navigation facilities to follow prescribed routes, or to obtain special permission for such flights".

The above provision means, if a country's consent is required to fly over its territory, such a flight may also be refused. Examples of such behavior include numerous sanctions against specific countries caused by their i.e. internationally wrongful acts. As a result, the aircrafts of these countries cannot cross the airspace of another country that has imposed these sanctions, making it necessary to find another route.

*A contrario*, in outer space, the consent of states is not required for the flight of space objects. It is confirmed by the treaties regulating the international space law.

There are no provisions in treaties relating to the outer space analogous to art. 5 of the Chicago Convention of 1944. On the contrary, art. I and art. II of the Outer Space Treaty provide for free access of outer space for all states, and because no state can exercise control over it, it cannot prohibit space flights.

This means that objects making a flight as part of a suborbital space tourism in a manner where more than one craft is used, will be subject to two legal systems, separately during different stages of the flight. To illustrate this situation in practice, the object in question will start flying in the airspace, and then would be launched to space. It is worth noting that one of these crafts composing the whole flight system would remain in the airspace for the whole duration of the flight.

Considering every step of mentioned suborbital flight, there are not only additional challenges regarding the use of new technologies, but also the application of a specific type of law. There are several theoretical possibilities to solve this issue.

One of them is to create an entirely new field of law that would combine elements of international space law and international aviation law to the extent necessary to conduct such a flight. The "aerospace" law would definitely facilitate the conduct of the activity in question, provide protection for entities performing it and offer transparency in resolving disputes. Creating such a law might be the most beneficial solution for all actors involved in activities in this area. Moreover, it would solve a number of problems related to the choice of applicable law, including: assessment of the entity's jurisdiction, liability issues or entity registration.

A somewhat hybrid solution would be, as the name suggests, a combination of the above-mentioned provisions in the form of a new treaty that would apply to objects flying in both airspace and the outer space. Such a treaty would include the most important provisions on the registration of space objects and aircraft. Particular attention should be paid to the issues of the place of registration of facilities, their marking and notification of registration, as these are elements common to both treaties. Moreover, the provisions of such a treaty should also include technical data of such objects, such as orbital period, inclination angle and other orbital parameters, i.e. information provided for by art. IV Convention on the Registration of Space Objects of 1975.

That particular solution would improve legal transactions related to activities using space objects, as well as prevent a conflict of two legal regimes. Thanks to that solution the operator would avoid uncertainties related to the correct choice of applicable law, which would consequently facilitate issues related to conducting commercial activities in space and the protection of intellectual property. and pursuing claims for compensation.

However, agreeing on a treaty combining elements of international space law and international aviation law could prove to be a significant challenge. It would also be hard in the end to distinguish such a solution from the previously proposed due to the fact that it might to the creation of a completely new branch of international law, regardless. Therefore, another solution that could improve commercial activities in outer space in this field could be to propose a new international space law treaty.

In the context of space tourism, using the example of suborbital space flights, such a treaty should cover the issues of registration of space objects and liability for damages of the space flight operator. The above analysis has shown that the Chicago Convention of 1944 and treaties in the field of international space law differ significantly, especially in terms of detail and lack of specific definitions. Therefore, the new treaty should contain a number of definitions explaining the terms used in the regulations, and should also include elements from international aviation law, so that this treaty would constitute a kind of extension of the provisions regulating the flight in airspace. Thus, despite the existence of two legal regimes, in the event of a conflict of laws, determining the law applicable after i.e. the occurrence of a hypothetical in-flight event giving rise to a claim for compensation or the appropriate classification of such an object could prove simpler and produce the same result in the case of international aviation law, as well as international space law.

Consequently, this would result in the equalization of international air law and international space law in the areas in which they share their application to the entity taking flight. For example, in the case of a suborbital space flight, which takes place using two separate objects – the mothership and the suborbital plane – the applicable law would provide for the same rights and obligations for both of these objects, despite the fact that they move in zones governed by different legal regimes.

## Conclusions

The emergence of space tourism creates new challenges for over half a century old treaties of the international space law (Blount, 2011). Whereas the means to perform activities associated with orbital space tourism don't differ from the currently known means of space travel, the suborbital space tourism uses entirely new methods of travel (Garapich & Piotrowski, 2017). Although space tourism still isn't commonly available, due to its costs, if it becomes widely accessible, it would procure conflict of law issues between international law regimes, such as international aviation law and international space law.

When considering the legal nature of such a space flight, it is first of all necessary to determine what legal regime should be applied to suborbital flights. As analyzed in this article, based on currently applicable international aviation and international space law treaties, this will vary depending on the technology used.

In a situation where we are considering objects that move in a controlled manner in space, such as the case of suborbital craft that begin their flight in airspace, detaching from the mothership, two different regimes will apply to determine their legal status. These would be the Chicago Convention of 1944 for the latter and the treaties that constitute international space law, such as the Outer Space Treaty or Convention on the Registration of Space Objects of 1975, for the former.

Solutions proposed in this paper are only hypothetical assumptions. The current climate in the international community, as well as the decision to draw up the Artemis Accords, suggests that no new provisions of international space law can be expected in

the near future, and the factual situation will remain unchanged. Therefore, the space tourism activities that have been analyzed must still be assessed through the prism of current treaties, and the only solutions to the problems posed by the application of these treaties must be sought in the operators' practice and any resulting precedents.

Current system will most likely continue to be used. This means that whenever a space object performs a suborbital flight, especially if it has characteristics similar to a Virgin Galactic craft, the assessment of its jurisdiction after crossing the recognized boundary of the outer space wouldn't be obvious. If no other legal norm emerges, it would always be based on imperfect acts of international space law.

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