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# Private Entities in Outer Space Activities: Liability Regime Reconsidered



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## ABSTRACT

This article discusses the current state of the law concerning the liability of private entities for damages caused with respect to space activities. A significant and continuous increase in the involvement of private companies in space activities risks damages being caused to other entities as multilateral treaties of international law, adopted between 1967 and 1979, are outdated and do not correspond well with contemporary reality. They do not comprehensively regulate the responsibility in relations between states and, even more so, with private entities. In general, these treaties regulate damages caused by private entities by giving responsibility to states, which seems unfounded in today's world.

States can also conclude bilateral treaties on space projects that involve private entities. Usually, such agreements contain a standard third-party liability clause concerning the Liability Convention or mention of the possibility of commencing consultations on the apportionment of the liability between states as the parties to these treaties. These have no specific norms dedicated to the liability of private launchers toward potential victims of the damage caused by space objects or another harm related to space activities of such companies. Some bilateral treaties on the joint space projects of states also contain cross-waiver liability clauses, which release private companies from liability. Furthermore, there is a tendency in the domestic law of limiting the liability of private entities for space activities (e.g., in the United States, even state regulations require the exclusion of the liability of space launch operators for damages caused to third parties).

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## 1. The current state of space law and space activities

The conquest of space began with the launch of the first artificial satellite by the Soviet Union in 1957—from the Baikonur Cosmodrome in Kazakhstan. Shortly after, the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) was created (1958), the first man was sent to space (1961), and the first man landed on the Moon (1969). For decades, only states continued activity in outer space because of the extremely high costs as well as the threat of enemies using space for military purposes—a typical position during the Cold War. In 1984, the first commercial satellite

entered outer space and since then, private companies have progressively taken over the initiative in space activities.

As a result of the aforementioned conditions, in 2010, NASA retired its space shuttle fleet and temporarily used Russian Soyuz rockets before engaging with private operators [1]. Then, in 2012, NASA signed a \$1.6 billion contract with SpaceX to deliver supplies to the International Space Station [2,3]. The reason for this change was that private companies operate much more efficiently than state agencies; thus, they perform the tasks more cheaply. The cost of space flights has always been incredibly high. Claude Lafleur calculated that each Apollo mission cost almost US\$10 billion and, since 1957, the United States has spent on average \$8.4 billion per year on space

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operations [4]. Construction by a private investor (SpaceShipOne), used to win the Prize X competition in 2004<sup>3</sup> [1], cost ‘only’ \$20 million—which is extremely cheap compared to NASA spacecraft.

As mentioned previously, the participation of private companies in space activities started with satellite launches has evolved since then [3,5–7] and is currently focused on branching out to space tourism, space mining [1], and landing on Mars as soon as possible [8]. Such activities could contribute to developments in many areas of science and industry such as medicine, biotechnology, electronics, and energy [9]. Currently, in the United States, 11 private corporations (e.g., Space Exploration Technologies Corporation [SpaceX], Virgin Galactic, and Lockheed Martin Commercial Launch Services [10]) have been granted licenses for space launches. The stability of the legal environment is critical for these companies’ long-term investments but, unfortunately, the current state of the law is unsatisfactory.

International space law was developed by states in the 1960s and 1970s and includes five treaties drafted by the COPUOS. The primary concern of states at that time was the militarization and appropriation of outer space rather than the participation of private actors in space activities [11]. The treaties were preceded by the Declaration of Legal Principles Governing the Activities of States in the Exploration and Uses of Outer Space [12] and include the 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 (the ‘Outer Space Treaty’) [13], the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space of 1968 (the ‘Rescue Agreement’) [14], the Convention on International Liability for Damage Caused by Space Objects of 1972 (the ‘Liability Convention’) [15], the Convention on Registration of Objects Launched into Outer Space of 1976 (the ‘Registration Convention’) [16], and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies of 1979 (the ‘Moon Treaty’) [17]. Unlike other conventions, the Moon Treaty has been ratified by few states, among which there are no space leaders.

By that time, the original euphoria had been exhausted [18] and although the development of space activity had changed dramatically, the law has still not been updated. The United Nations returned to passing declarations of principles and adopted four: the ‘Broadcasting Principles’ [19], the ‘Remote Sensing Principles’ [20], the ‘Nuclear Power Sources’ Principles [21], and the ‘Benefits Declaration’ [22]. The newest is already over two decades old and none are legally binding. Notably, related to the discussion in this paper, the existing regime does not recognize the status that private companies have achieved and, consequently, several practical problems have been observed that are difficult to solve under current law [23]. The problem discussed in this paper is liability. As Ricky J. Lee said, “the fundamental concerns of any enterprise in outer space would likely be liability.” [24].

The commercial space industry is also called personal spaceflight, space tourism, or NewSpace [25]. Although the recent development of this industry has been significantly slower than originally predicted,<sup>4</sup> perhaps inevitably, space will

soon host adventure-seeking civilians—there is even a project to open a space hotel [25]. Coming back to liability, the greatest liability risk of private operators is catastrophic accidents that result in death. The lack of sufficient international law regulations on the liability of private operators is one of the reasons for which many states have adopted national laws in this area. This problem is discussed in more detail in another section of this article.

The satellite industry is equally risky despite the fact that these accidents ordinarily do not directly threaten individuals’ lives but private property. Some satellites are very expensive, weigh many tons, are the size of a minibus, travel thousands of kilometers per hour on crowded geostationary arcs, and must be regularly replaced or relocated [26]. There is also, however, a significant trend of putting small satellites into orbit—a circumstance in which the risk of accidents is very high. Neither international law nor COPUOS coordinates such operations hence major satellite operators formed the Space Data Association to interactively share all necessary data for the safe maneuvering of those objects [26]. Serious concerns about the possible harm to the environment by an increased number of space flights have also been raised [27] but scientists are still unable to assess the results of such impacts. In addition, space debris is a concern. As the COPUOS stated, the existing international regime is insufficient concerning the challenge created by space debris, and stakeholders should consider additional initiatives [28].

Companies with space projects have encountered bigger problems than expected (e.g., the expense and difficulty of sending individuals to outer space). As a result, XCOR Aerospace has filed for bankruptcy [29] and both Virgin Galactic [30] and SpaceX [31] have postponed their launches many times. Furthermore, spaceships crashing during tests and concerns about passengers’ safety are the main reasons for these postponements—it goes without saying that space voyages have risks. As Jeff Foust calculated in 2003, 4% of astronauts (18 of 430) who went into space died during such operations [32] and Richard Branson, leader of Virgin Galactic stated, “A private program can’t afford to lose anybody.” [33] Given that the first clients of space tourism companies are likely to be very wealthy (due to the high costs of ‘tickets’ for space adventures), they (and their families) would undoubtedly be capable of suing for damages in cases of any harm or death. The most important consequence of any accident, however, would be that potential tourists could be discouraged from taking the risk of spaceflights.

Current international space law is widely considered an obstacle to space activities by private actors—as mentioned by Michael Tse, who said, “The existing system is a mishmash of international agreements, federal statutes and regulations, and state laws which combine to form an asynergistic regime that is simultaneously outdated and untested.” [34] In particular, the wording of the Outer Space Treaty leaves room for speculation on the possible appropriation of space bodies by non-state actors, namely, individuals [1]. Johnatan Thomas said, “Current international space conventions are a roadblock to the privatization of space activity. These conventions impose restraints on the development, alienability, and appropriation of outer space. These conventions ignore the realities of our ultra-competitive capitalistic global society where some corporations enjoy larger annual revenues than the gross national product of many small countries.” [35] Wanlu Zhang pointed to the problem of the jurisdiction of states to manage cases of tortious acts between private entities in outer space [36]. The conventions are obsolete and incomplete with regard to liability for space activities—a problem discussed further in this paper.

<sup>3</sup> In 1996, the X Prize Foundation and Ansari family funded a 10 million dollar prize for the first team to build and launch a spacecraft carrying three persons to 100 km twice within 2 weeks. The competition was won by Scaled Composites led by Burt Rutan and Paul Allen. The company later merged with Virgin Galactic.

<sup>4</sup> One of the reasons is crashes of spacecraft during test flights. See for example, K. Chang, J. Schwartz, Virgin Galactic’s SpaceShipTwo Crashes in New Setback for Commercial Spaceflight, The New York Times (2014) [https://www.nytimes.com/2014/11/01/science/virgin-galactics-spaceshiptwo-crashes-during-test-flight.html?\\_r=0](https://www.nytimes.com/2014/11/01/science/virgin-galactics-spaceshiptwo-crashes-during-test-flight.html?_r=0).

## 2. General international space law on liability for space activities and its shortcomings

The liability of states for outer space activities has been one of the primary concerns since the inception of space exploration [37]. The rules of such liability are regulated in the Outer Space Treaty and the Liability Convention and pertain exclusively to states and not private operators; however, even with regard to states, many questions are unanswered—as described in this section. This analysis is preceded by some general remarks as follows.

According to Article VI of the Outer Space Treaty, “States Parties to the Treaty shall bear international responsibility for national activities in outer space (...) whether such activities are carried on by governmental agencies or by non-governmental entities, and for assuring that national activities are carried out in conformity with the provisions set forth in the present Treaty.” In the opinion of Steven Freeland, the liability principle from Article VI—which determines that states are exclusively liable for space activities—has a status of international customary law [38]. Article VII adds, “[e]ach State Party to the Treaty that launches or procures the launching of an object into outer space, (...) and each State Party from whose territory or facility an object is launched, is internationally liable for damage to another State Party to the Treaty or to its natural or juridical persons by such object (...).” Taking the above into account, the wording of this article does not require fault to be attributed to bear liability [3]. A careful reader notices that Article VI uses the word “responsibility,” whereas Article VII uses “liability.” However, other authentic texts (in Russian, Spanish, and French) do not make these distinctions, which leads to the conclusion that such differences in wording are—in this case—accidental and irrelevant [24].

The Liability Convention elaborates on general provisions of the Outer Space Treaty and, according to Article II of the Liability Convention, “a launching State shall be absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight.” Michael Tse praises this strict liability as proving negligence in an industry in which technology is largely kept secret would be very difficult [34]. Article III adds, “In the event of damage being caused elsewhere than on the surface of the Earth to a space object of one launching State or to persons or property on board such a space object by a space object of another launching State, the latter shall be liable only if the damage is because of its fault or the fault of persons for whom it is responsible.” The wording of these articles leaves no doubt that fault is a condition of liability only in the latter circumstances. The liability is further limited as the damage must be caused by a space object; therefore, the damage caused simply by natural persons is not covered [7,39]—although, in this case, liability for non-governmental space objects is not specifically mentioned, it fits within the scope of this article [40]. What is missing, however, is liability for space objects not sent to outer space, but those built there [41]. In addition, this provision only pertains to international damage and not to damage that is domestic in nature [24]. Article IV addresses collisions in outer space in which more than one state is liable. In such a case, the liability is joint and several.

State liability has limitations and Article VI provides whole or partial exemption from liability in case of gross negligence or an act or omission performed with the intent to cause damage on the part of a claimant state or of the natural/juridical persons it represents. In addition, no exoneration shall be granted in cases where the damage has resulted from activities conducted by a launching state that do not conform with international law (i.e., the United Nations Charter and the Outer Space Treaty). In addition, according to Article VII, a launching State is not liable to its nationals and foreign nationals but only insofar as they are participating in the operation

of the space object. The wording of the Liability Convention makes it difficult to determine whether, for example, foreign tourists injured during a spaceport visit could claim damages [34].

Article VIII of the Liability Convention contains a hierarchy of claims—the right to claim first (which belongs to the state of nationality of the victim), the state where the damage was sustained, and finally, the state of permanent residence of the victim. The limit in which to present a claim is 1 year, but the duration of time that must be given to a privileged state before the next-in-line state may present its own claim remains unclear [24]. Compensation shall be determined in accordance with international law and the principles of justice and equity (Article XII). If diplomatic negotiations fail, a Claims Commission should be established (Article XIV). International law hardly regulates the procedure for handling the claims—the Commission shall determine its own procedure (Article XVI [3]). The decision of the Commission is, by default, merely advisory (Article XIX [2]). The claiming state may alternatively pursue the claim in the courts, tribunals, or agencies of a launching state; however, the exhaustion of local remedies is not a legal requirement for the establishment of the Claims Commission (Article XI [1,2]).

Because the greatest space catastrophes have, thus far, occurred in outer space and during the launch (e.g., the seven fatalities in the explosion of *Challenger* in 1986) or atmospheric entry (e.g., the seven fatalities in the disintegration of *Columbia* in 2003), the only case in which the Liability Convention was invoked was after the collapse of the Soviet satellite *Cosmos 954* in the territory of Canada in 1978. The case was settled by the parties and the Soviet Union paid \$3 million [39]. However, whether the Liability Convention applied to this case is doubtful as it is unclear if the radioactive remains of *Cosmos 954* caused damages to Canada under the Liability Convention’s definition of damages [42]. Therefore, how would a state behave if the damages were caused by a commercial company [3], and would that state be eager to pay compensation? Perhaps it would invoke the doctrine of effective nationality<sup>5</sup> and attempt to prove no real connection between the state and a private entity. By contrast, in international air law, states are responsible for the domestic regulation of private entities such as airlines, but not for damages caused by these entities [40]. In international maritime law, the situation is similar.<sup>6</sup>

If a catastrophe occurs after the craft has been launched, another problem is presented (i.e., how to differentiate a space flight from an air flight). Firstly, there is no precise border between outer space and aerial territory delineated by international law, meaning that if we do not know where outer space begins [43], how can we say for certain whether a flight is a space flight and, if so, from which moment? In addition, what if a spacecraft only spends a few minutes in orbit and the majority of the flight is in aerial territory? Should that flight be classified as a spaceflight [7]? Notably, a functional rather than formal approach could be applied, with the decisive factor being the purpose of the flight [40]—this, however, is one of the many possible interpretations. Another scenario is possible as such technology is already in use today (i.e., what if a spaceship is transported through aerial territory on a specially designed airplane that acted as its launch pad) [40]? Is that type of flight: one space flight, one air flight, or two separate flights? Karl-Heinz Böckstiegel considered the state from which the aircraft was launched as the launching state because, in his view, this is the first stage of the launch of the space object [44]. Stephen Gorove has a

<sup>5</sup> See *Nottebohm case* (International Court of Justice, *Liechtenstein v. Guatemala*), Judgement of 6 April 1955.

<sup>6</sup> See the United Nations Convention on the Law of the Sea, signed on the 10 December 1982 in Montego Bay, Jamaica, Annex III, Article 22.

different view—he posits that a more appropriate classification would be as follows: the state in which the spacecraft was launched from the aircraft would be the launching state [45]. Based on the aforementioned analysis, space flights organized by commercial operators result in many new questions to which contemporary international law provides no answers. The law should be ready to be applied when the time comes but, as for now, there are many doubts as to whether the law could work effectively.

The Liability Convention also defines a few important terms: “damage” means loss of life, personal injury, or other impairment of health; or loss of or damage to property of states or of persons, natural or juridical, or property of international intergovernmental organizations. The Convention is obviously “victim-oriented” [46], but what is doubtful is whether it includes environmental harm [24]. The term “launching” includes attempted launching, the term “launching State” means a state that launches or procures the launching of a space object or a state from whose territory or facility a space object is launched, and the term “space object” includes component parts of a space object as well as its launch vehicle and parts thereof. However, many important areas remain uncovered by this Convention—as alluded to by Ricky J. Lee, who said, “The United Nations space treaties, in particular the Liability Convention, are proving to be inadequate in addressing the issues of third-party liability, private space activities and the settlement of disputes.” [24] He further elaborated, “The Liability Convention is an international legal instrument that deals only with liability between States, even where it is not the State itself that suffers damage caused by space activities. Consequently, the right to claim under the Liability Convention is held by States and not private nationals.” [24] Notably, victims can only rely on the state, which is not bound by any such wish of the private individuals—the first step to recovering damages is through diplomatic channels (Article IX). Finally, even if damages are paid, the state which claimed them has no legal obligation (at least not under international law) to transfer them to the victims [46].

Some scholars have proposed the establishment of an international court for space disputes in which natural persons would have standing to sue [7]. If drafted carefully, this institution could additionally solve the problem of “lifting of the corporate veil” (i.e., no liability of parent companies for damages caused by their subsidiary companies).<sup>7</sup> For now, as no such disputes have occurred, the international community has no motivation to actually establish the court. Notably, granting companies the right to be a party to a dispute before an international court has been performed in international law (e.g., in international law of the sea [Seabed Disputes Chamber of the International Tribunal for the Law of the Sea] [47] international human rights law [European Court of Human Rights] [48], international criminal law [Special Tribunal for Lebanon] [49], and international investment law [arbitration within the International Center for Settlement of Investment Disputes] [50]).

A very illustrative example demonstrating the need for international regulation of liability for damages caused by private companies in the space industry is the case of Swarm Technologies—a spacecraft producer and American-based company. In January 2018, Swarm Technologies filed for a license with the US Federal Communications Commission (FCC) to launch four satellites (of a size of 10 cm<sup>3</sup>) called “SpaceBees.” The FCC rejected the application because there was “a particularly high risk of collision because SpaceBees could be difficult to detect track space debris in

orbit with the radar currently used. Even tiny pieces of debris can destroy expensive satellites or put the lives of astronauts on board the International Space Station at risk” due to the inherent size [51]. Nevertheless, Swarm Technologies—through the US company Spaceflight Industries—entered into a contract with the Indian company Antrix to get a seat on the Indian rocket and launch SpaceBees into outer space. On January 12, 2018, the four micro-satellites were launched into space onboard the Indian Polar Satellite Launch Vehicle from the territory of India [51].

This situation caused a scandal in the US and resulted in an investigation concerning the actions of Swarm Technologies [52]. Such unprecedented cases of “rogue satellites” (as the media called it) present a great challenge to international legal regulation—especially with respect to liability [53]. The US denied its liability in a case of potential collision by noting that India—the state from whose territory the space object was launched—would be liable. India also denied responsibility even if it had been liable [52]. It became apparent that Articles VI and VII of the Outer Space Treaty were interpreted differently by the states involved and that the current space law regime is unable to resolve this type of transnational disagreement. For this reason, we believe a special clause must be introduced in international law that would guarantee that the home state of a private company, which intends to launch its spacecraft from the territory of another state, shall be informed and involved in the process and will, therefore, be able to effectively exercise national control over the space object and the activities of the private company in the outer space according to Articles VI and VIII of the Outer Space Treaty. The clause could be included as the new second paragraph of Article VII of the Outer Space Treaty and be worded as follows:

*“Each State Party to the Treaty shall be obliged not to allow spacecraft of another State Party’s (natural or juridical) to be launched from its territory without the permits and licenses required by the other State mentioned. If consent is granted, the State Parties involved may agree on the distribution of liability with respect to this launch. In the absence of such an agreement, the liability will be distributed in accordance with the Convention on International Liability for Damage Caused by Space Objects of 29 March 1972. In all cases, the issue of responsibility shall be resolved in accordance with Article VI of this Treaty.”*

At the same time, the aforementioned case shows that the home state of a private entity attempting to launch a spacecraft may not be the “launching state” in a given case with respect to the purpose of the Liability Convention (it does not launch or procure the launching and does not provide the territory or facility for launching) and should not be liable for the launch or any damage occurred during that launch. Similarly, the launching state from whose territory a space object is launched should not be liable for damage caused in outer space after the undocking of a foreign spacecraft from a rocket booster as this space object would no longer be under its control. The clause proposed above could solve this problem—provided that some amendments are also made to the Registry Convention (for example, that not only the launching state could register a space object but also the home state of a private company that owns the object) and to the Liability Convention (that liability may be transferred from the original launching state to the state of registry on the moment of undocking of the spacecraft from the rocket booster) [54]. If that were to happen, the home state of the company that owns the spacecraft would have reasons and obligations to enter this spacecraft in its national registry and take not only control and jurisdiction (according to Article VIII of the OST) but also the liability for the

<sup>7</sup> International Center for Settlement of Investment Disputes (ICSID) under auspices of the World Bank Group is an example of an international court, in which parent companies represent in disputes their subsidiary companies.

damage caused by this object in the outer space after undocking and whilst returning to Earth.

### 3. Liability for space activities in bilateral treaties and treaties with a limited number of participants

#### 3.1. Third-party liability regime

The first part of this research revealed imperfections in the Liability Convention—especially its inability to manage the liability of private legal entities. Article XXIII, however, allows states to enter into “international agreements reaffirming, supplementing or extending its provisions.” Therefore, it enables the creation of *lex specialis* to the Liability Convention, although the Liability Convention is already a *lex specialis* to the Outer Space Treaty. The assumption can be that such a clause is the result of no consensus on many issues, as evidenced by *travaux préparatoires* of the Liability Convention [55].

While elaborating on the Liability Convention, only three private or mixed public-private companies were involved in the space activities: EUROSPACE (France), Canadian Telsat Corporation, and COMSAT (Commercial Satellite Corporation, the United States) [56]. The last one launched the world's first operational commercial satellite—the Early Bird—on April 6, 1965 [56]. Despite this launch and the substantial discussion within academic community on the possible involvement of private entities in space activities [56]—and even on the possibility of the primary responsibility of these entities [57], the drafters only focused on the states' activities and liability, and considered outer space an “area of high military sensitivity” [58].

Times have changed but even today, when a significant number of space launches have been conducted by private companies, the liability regime in multilateral outer space treaties remains the same as that at the beginning of the space era. Obviously, after all these years of silence, the political will remains insufficient to amend the Liability Convention or adopt a new one, meaning that the only way to solve this issue is through Article XXIII, which provides the possibility of conclusion of other international agreements (especially of a bilateral nature).

For example, the agreement between the Government of the Russian Federation and the Government of the French Republic on long-term cooperation in the development, creation, and use of launch vehicles and the deployment of the Soyuz-ST launch vehicle from the Guiana Space Center (CSG) in 2003 [59] contains detailed provisions on the financial liability of the *Arianespace* joint-stock company<sup>8</sup> as a launch operator. Despite the significant portion of shares held by state-controlled entities (e.g., the Centre national d'études spatiales [The National Centre for Space Studies]), *Arianespace* remains a private entity [60]. According to Article 10 Paragraph 2, “the financial costs of damages caused to a third party as a result of the launch of the Soyuz-ST from the CSG by the launch operator are borne by the launch operator within €60 million per launch.” The agreement also provides the possibility of sharing the burden of financial liability between Russia and France based on the parity principle if the costs of the damages exceed the aforementioned amount. Notably, in 2008, the French Senate adopted the French Space Operation Act and established a limit of €60 million for compensation claims from space operators [61].

The channeling of third-party liability to *Arianespace* as a launch service provider can also be observed in the new Declaration by Certain European Governments on the Launchers Exploitation

Phase of Ariane, Vega, and Soyuz from the Guiana Space Centre of 2007 [62]. This treaty<sup>9</sup> is a successor of the Declaration by Certain European Governments Relating to the Ariane Launcher Production Phase [63] and contains specific provisions on third-party liability. According to the preamble of this declaration, the European Space Agency (ESA) “has accepted the provisions” of the Liability Convention thus, in a case of transboundary harm caused by a space launch from CSG under the ESA control, the process of claiming compensation would be governed by norms of the Liability Convention and the compensation's burden would be borne by the ESA or France. Provisions of Article IV of the declaration confirm this statement. This article distinguishes between the projects involving Ariane and Soyuz launches and the projects involving Vega launches. In the former group, the liability and the compensation's burden are born by France (Article IV paragraph [a]), and the amount of any damages “caused by an Ariane launch or a Soyuz launch carried out by the launch service provider from the CSG during the exploitation phase” must be reimbursed to the French Government (by *Arianespace*) “with a ceiling of €60 million per launch” (Article III Paragraph 1[h]). In the second case, when the damage is caused by a Vega launch, the amount of compensation is divided between France and the ESA in the proportion of one-third and two-thirds, respectively (Article IV Paragraph [b]). The amount of such damages must be reimbursed (by *Arianespace*) within a sum of €60 million to the French Government and the ESA “*pro rata* to their respective shares of liability” (Article III Paragraph 1[i]).

Another example of a bilateral treaty between states is when they cooperate to create and launch space objects into outer space with the participation of companies. In 2004, Kazakhstan and Russia signed an agreement on the development of the Baiterek Space Rocket Complex (the Baiterek SRC) at the Baikonur Facility (i.e., the Baiterek Agreement) [64], to be operated by a newly established Baiterek joint-stock company (a joint Kazakh–Russian venture) under the provisions of the agreement (Article 3). The stake is divided equally between the Kazakh state authority and Russian state enterprise, but the Kazakh shares may not be subject to privatization [65], meaning that the Baiterek JSC cannot be regarded as a private legal entity in the context of this research. Nevertheless, in July 2019, Kazakh legislation on joint-stock companies was amended [66] and now, realistically, the owners of Baiterek JSC may change.

Unfortunately, the norms of the Baiterek Agreement are very general and no specific provisions determine the space launch operator; thus, whether or not Baiterek JSC would perform this function remains unclear. The only norm related to this issue is the provision of Article 12 Paragraph 1: the functions of the launching state during the exploitation of Baiterek SRC are performed by the Russian Federation. However, this norm in combination with Article 12 Paragraph 2 creates an internal contradiction within the agreement. Article 12 Paragraph 2 stipulates joint and several third-party liability of Kazakhstan and Russia in accordance with the Liability Convention of 1972. Notably, as aforementioned, in the case of a joint space launch, the Liability Convention regards all the states involved as launching states hence a sensible action would be to avoid this collision by indicating that Russia should be regarded as the launching state only for the purpose of the Registration Convention of 1976.

<sup>8</sup> For detailed information about *Arianespace* JSC, visit the website of the company <http://www.arianespace.com>.

<sup>9</sup> The Declaration meets all the criteria of the term “treaty” established by the Vienna Convention on the Law of Treaties, 1969: it is an agreement between States containing legal obligations and governed by international law (the Declaration contains provisions on entry of the document into force, duration, validity, and modifications, and does not contain any reference to national law applicable to this document).

As mentioned previously, the Baiterek Agreement stipulates joint and several third-party liability of Kazakhstan and Russia for the damage caused by space objects during the exploitation of the Baiterek Facility (Article 12 Paragraph 2). There is no direct provision on the financial liability of Baiterek JSC for damages caused to a third party or state by a failed space launch. JSC was created to exploit the Baiterek SRC—including space launches—and, for that purpose, the Baiterek Agreement provides various advantages, including exemption from corporate income tax for 15 years from the inception date of putting the complex into operation, as well as exemption from property taxes and land taxes (Article 8). Although JSC is not a private legal entity and its shareholding is divided equally between the state authority of Kazakhstan and the Russian state enterprise [65], Baiterek has its own equity. As for the insurance of risks during the preparation and execution of space rocket launches from the Baiterek Facility, the Baiterek Agreement states that this issue will be determined by an agreement between the competent authorities of the Parties (Paragraph 3 Article 12). This, apparently, has not been concluded thus far.

Of course, the rationale behind the Baiterek Agreement is that third-party liability regime is easy to understand. States are significantly involved in the implementation of this project so the company was created and operates with the financial support of states—especially Kazakhstan. Obviously, today, states consider the creation of a special liability regime such as Baiterek JSC unnecessary; however, we posit that this model is unsatisfactory for the potential privatization of the JSC.

In 2019, Kazakhstan and Russia signed an agreement on the cooperation (in the implementation of launches) of carrier rockets of the Soyuz-2 type from the Baikonur Cosmodrome for spacecraft launches in the northern direction to circumpolar orbits. The government of Kazakhstan, as per Resolution No. 1013 dated December 30, 2019, submitted a draft law on the ratification of the agreement to the lower house of parliament, the Majilis. According to the documentation attached to the draft law, this agreement will create a “legal basis for launching spacecraft from the Baikonur Cosmodrome for the implementation of the large international project OneWeb, aimed at providing the whole world with broadband Internet access, increasing the load of the Baikonur Cosmodrome with commercial launches.” [67] We believe that this agreement is the first one in the history of Kazakh–Russian relations on the cooperation in space activities that contains the regulation of liability of companies (albeit not yet private) involved in the cooperation covered by this treaty. According to the second paragraph of Article 6, “environmental damage caused during a regular launch of a Soyuz-2 launch vehicle (environmental impact not provided for in the EIA documentation), as well as by search and rescue forces and means, is compensated by the organization operating the fall area (in relation to the area of the fall and the adjacent territory), and the organization making launches (in relation to the Baikonur Cosmodrome). At the same time, the amount of environmental damage and the procedure for its compensation are determined in accordance with the legislation of the Republic of Kazakhstan.” For the purpose of the agreement, the “organization operating the fall area” refers to Baiterek joint-stock company (joint Kazakh-Russian venture) already mentioned in the present research and the “organization making launches” refers to the Russian federal state unitary enterprise Center for Operation of Ground-Based Space Infrastructure Facilities (Article 3). As to the failed launches, the damage caused to Kazakhstan shall be compensated by the Russian Federation in accordance with a special treaty [68]. Unfortunately, no provisions or references to other treaties can be found in the treaty regarding the regulation of liability towards third states or natural and juridical persons of these third states.

Another joint space project involving a legal entity is provided by the Kazakh–French Agreement on Conditions for the Creation and Use of the Earth Remote Sensing Space System and the Spacecraft Assembly Test Complex of 2009 (the Remote Sensing Agreement) [69]. For the purpose of this agreement, Kazakhstan and France defined the “cooperating organizations” from both sides: Kazakhstan Garysh Sapary National Company JSC (the shareholder is a State) from Kazakhstan, and EADS Astrium—one of the largest transnational aerospace companies<sup>10</sup> from France. The companies were supposed to sign several contracts for implementation (Article 9 of the Agreement of 2009) of the project under the auspices of this intergovernmental treaty and this project became an example of joint outer space activities involving two levels of cooperation: intergovernmental (between states) and contractual (between legal entities).

The provisions of this intergovernmental arrangement raise several questions regarding liability. The preamble of this treaty mentions the Liability Convention but the main part of the 2009 agreement does not contain provisions on the liability regime. According to Article 6, the space launch is carried out from the Kourou Cosmodrome (French Guiana, French Overseas Department) to ensure the protection of technologies for creating a spacecraft for Earth remote sensing—however, there are no provisions on the launching state and the launch operator. Of course, according to the Vienna Convention on the Law of Treaties of 1969, the preamble must be regarded as an integral part of a treaty to interpret and apply this treaty (Article 31). Nevertheless, the preamble only mentions the Liability Convention and the agreement omits norms on liability in the agreement, meaning that who and to what extent should bear liability in case of damage remains uncertain.

Although it is problematic to find specific and clear norms on the liability issues in the Remote Sensing Agreement as a *lex specialis* treaty, we attempt to find something relevant to the liability issue in the framework agreement on cooperation in the field of space activities between Kazakhstan and France. Usually, such treaties contain clauses on liability, including third-party liability provisions that at least repeat the provisions of the Liability Convention<sup>11</sup> or contain a clause on the consultation for apportionment of the burden of compensation.<sup>12</sup> Unfortunately, the Kazakh–French Agreement on Cooperation in the Field of Exploration and Use of Outer Space for Peaceful Purposes of 2009 (the Space Activities Agreement) [70] also omits provisions on third-party liability. This omission is unusual for a framework

<sup>10</sup> The company was created in 2000 and was controlled by European Aeronautic Defence and Space Company, the third largest aerospace company in the world (after Boeing and Lockheed Martin). The successor is Airbus Defence and Space in which 26.4% of shares is owned by French, German, and Spanish governments, 73.6% of shares belongs to private owners. See for more detailed information: Stanley I. Weiss, Amir R. Amir, European Aeronautic Defence and Space Company, Encyclopedia Britannica Inc., 2015. <https://www.britannica.com/topic/European-Aeronautic-Defence-and-Space-Company>.

<sup>11</sup> See for example, Article 14 of the Agreement between the Government of the Republic of Korea and the Cabinet of Ministers of Ukraine on the Cooperation in Peaceful Uses of Outer Space, signed at Seoul December 12, 2006/United Nations Treaty Collection, No. 54021.

<sup>12</sup> See for example, Article 11 of the Framework Agreement between the Government of Canada and the Government of the United States of America for Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes, signed at Washington September 9, 2009, United Nations Treaty Collection, No. 53323; Article 9 of the Agreement between the Government of the Russian Federation and the Government of the Federal Republic of Germany on Cooperation in the Field of Exploration and Utilization of Outer Space for Peaceful Purposes, signed at Saint-Petersburg 10 April 2001, United Nations Treaty Collection, No. 41815.

agreement on cooperation in outer space activities and may be regarded as negligence of the parties to this treaty.

In relation to the aforementioned, the launches of the remote sensing spacecraft KazEOSat-1 and KazEOSat-2 procured by EADS Astrium within the framework of the Remote Sensing Agreement were successful. The remote sensing objects remain in operation and no defects have been reported; thus, the concern about the absence of specific norms in bilateral Kazakh–French agreements seems to be unjustified based on the success of the project.

Nevertheless, such omissions in treaties related to space activities should not be regarded as a good legal practice because in a case of a failed space launch or other cases of damage, the determination of who is to bear responsibility would be problematic. This is relevant for states and any private individuals or legal entities that could be affected by space objects. Van C. Ernest emphasizes that “international agreements, specifying more precisely the causes of action and damages available to parties injured by foreign outer space activities, are needed.” [71] In addition, such agreements must regulate the activities of private legal entities involved in outer space activities and then, a “treaty would create an exclusive cause of action under which an injured third party could seek damages directly from the organization that conducted the outer space activity.” [71] We propose that this approach is the most reasonable in circumstances where the majority of space launches are conducted by private companies. Even if a space launch is supposed to be procured by a legal entity from one of the state parties (to a joint outer space project and from its territory), a third-party liability clause providing at least a reference to the national legislation of this state would be very useful.

### 3.2. Cross-waiver liability clause

Another legal option to regulate the liability of private legal entities as participants in space launches is cross-waiver liability clauses. These clauses are common in the framework of bilateral agreements [72] regarding cooperation on the exploration and use of outer space and in agreements on specific joint space projects. The level of specification of these clauses varies among the treaties—usually, the clause defines the meaning of the terms “damage” and “related entities” and contains a standard cross-waiver liability clause, types of claims, and exceptions from this regime.

For example, such a provision is included in the intergovernmental agreement on the Civil International Space Station (ISS IGA) [73]. Yun Zhao analyzed this treaty and denoted the essence of this clause, “The cooperating parties shall not claim compensation from each other for losses caused by any activities under the agreement, with certain exceptions to be agreed upon by the cooperating parties. The objective of this arrangement, as identified in the ISS IGA is to encourage the participation of the cooperating parties in the exploration, exploitation, and use of outer space.” [74] Katarzyna Malinowska stated that the cross-waiver liability clause in ISS IGA applies “to any claims of third parties for damage, whatever the legal basis of such claims against another Partner State, a related entity of another Partner State and the employees of any of the above entities.” [72].

Detailed norms on the cross-waiver of liability related to private legal entities are contained in the agreement between Russia and Australia on the Cooperation in Exploration and Use of Outer Space for Peaceful Purposes of 2001 [75]. Article 10 defines the term “related entity,” which includes contractors and subcontractors as a user or client “at any tier” and should be interpreted as including private legal entities. According to Article 10 Paragraph 4, “In respect to a protected activity, each Party agrees to a cross-waiver of liability and, accordingly, each Party waives any claims for damages against the other Party, related entities of the other Party and

employees of the other Party or employees of related entities of the other Party, whatever the legal basis for such claims, including, among others, claims under the Liability Convention or other claims under international law or claims in contract.” This article also establishes a specific norm for related entities and, according to Paragraph 6, “Each Party shall extend the application of the principle of cross-waiver of liability to its related entities through contract or other means.” Notably, this agreement was developed for the purpose of joint space activities—especially commercial operation and outer space launches. Therefore, the term “commercial” is mentioned nine times: twice in the preamble, once in Article 1 to define the purposes of the agreement (“creating a framework for commercial and other activities related to the launching of space apparatus”), once in Article 5 regarding the forms of cooperation (and the possibility of private organizations’ participation in joint programs), and in other provisions. Space launches were supposed to be carried out from the Christmas Island facility [76] but although this Russian–Australian agreement has never been used in practice, it still remains an excellent example of a cross-waiver liability clause.

The Kazakh–Russian Agreement on Cooperation in the Field of the Exploration and Use of Outer Space for Peaceful Purposes of 2011 [77] also provides the cross-waiver liability clause in Article 12 of this bilateral treaty. In addition to a standard cross-waiver norm, Article 12 adds the possibility “to limit the scope or otherwise change” the framework provisions “in relation to a specific type of joint activity” (Paragraph 4), and hence some agreements on specific types of space activities or contracts may create a *lex specialis* regime for Article 12 of the Kazakh–Russian Space Activities Agreement.

Unfortunately, it is challenging to find any relevant application of a cross-waiver of a liability clause. This is likely due to the nature of obligation enshrined in such clauses (i.e., it is negative, which means that parties and private entities involved *do not* make any claims and *do not bring* any suits against other participants of the joint space project for activities covered by this project and relevant bilateral treaties). As to the effectiveness of this clause, it should be noted that “cross-waiver provisions are essential to limiting cost and need for additional liability insurance, thereby restricting launch costs.” [78] We believe that this type of guarantee is a strong incentive for private companies as participants of joint space projects, especially when taking into account that the space industry deals with large costs and their additional increase may adversely affect the profitability of those projects.

## 4. Liability for space activities under national law

Experts generally agree that the liability of commercial flight operators will sooner or later be tested. One of the commentaries noted, “From an operator’s perspective, it is nearly inevitable that an accident will occur, and companies will be sued.” [79] However, the current state of law provides no answers to critical questions on the issue. Blake Gilson wrote (referring to moon property), “If lunar property litigation were to happen tomorrow, it would prove messy, expensive, and unpredictable.” [80] Although most experts agree that the application of national tort law to damages originating from space activities is an unsatisfying solution [39] and may result in serious jurisdictional problems [7], it may be inevitable because on an international level, only states are liable for damages caused by companies, and the liability of private companies is, therefore, subject to national law.

Domestic law has different approaches to the liability of private companies. As of 1988, in the United States, space companies are generally liable for damages up to \$500 million and then the state is liable for up to \$1.5 billion, (taking inflation into account). Beyond

that limit, the companies (again) are liable [3]. In China, Russia, and Europe, the first threshold is much lower and the third threshold does not exist [3]. These differences may result in a “forum shopping” problem [3] in which companies could search for the least strict regulations—such a practice is evidenced by the “flags of convenience” problem in the international law of the sea regime [3]. Notably, these are internal regulations and, internationally, only the state is liable. But the following question remains: Private companies operate for profit and provide services to other private entities so, why should states be liable for their activities? [3] As mentioned previously, international air law and international maritime law have no such principle that states are liable for private entities’ activities [39].

In federal states, space legislation may be divided between the federal and local authorities. This case applies to the United States (US) and the US Congress passed legislation on private spaceflights in 1984—the Commercial Space Launch Act, which has been amended multiple times since then. The first amendment was adopted in 1988 to reflect the necessity of compensating individuals for damages incurred in the course of space exploration and was adopted after the fatal explosion of space shuttle *Challenger* in January 1986. As Lauren Bornemann explained, “these amendments added provisions for mandatory cross-waivers of liability and limits on required insurance and availability of government funds to satisfy legitimate damage claims against private launch contractors and other private licensees to the extent that those licensees’ mandatory insurance coverage is insufficient.” [81] As aforesaid, it means that the federal government is liable for damages (caused by private operators) that exceed US\$500 million, and the liability limit is \$2 billion. Liability for the remaining sums was not regulated on the federal level therefore the “race to the bottom” between states began and, eventually, all of those involved in space activities (Virginia, Florida, New Mexico, Texas, California) completely excluded private operators’ liability (except for gross negligence and intentional torts). Those regulations may be interpreted as contradicting the principles and ideals of the Liability Convention [34]. US domestic space law also disregards other international treaties. A new bill—American Space Commerce Free Enterprise Act of 2017—argues that not all the obligations of the Outer Space Treaty are imputable to private entities and also claims that outer space is not a global commons [82].

As Michael Tse explained, space law concerning the activities of private operators should promote two goals: encouraging commercial spaceflights and ensuring compensation for possible victims. In his view, those goals are not contradictory and, in the long run, the development of the space industry depends on the responsible actions of space companies such as risk management and prioritizing safety. Therefore, the exclusion of any liability is in Tse’s view counterproductive [34] as it encourages companies to take greater risks, which ultimately decreases the demand for space flights [34].

Zeldine Niamh O’Brien noted that liability in tort law may be excluded directly by a clause or waived [11]. She presents a detailed analysis on the exclusions of liability of private companies for space activities under US law and emphasizes that in air law, the Warsaw [83] and Montreal Conventions [84], as well as maritime law and the Athens Convention [85] limit the ability of the carrier to exclude liability for death or personal injury [11]. State law not only allows for full liability exclusion, but even requires it. Virginia was the first state to introduce such regulation. The exception is only for gross negligence evidenced by willful or wanton disregard for the safety of the participant or intentional harms [11]. In her view, “There is no moral rationale for shifting the burden of risk-actualization so heavily against one party, particularly where that party is traditionally in the more economically vulnerable bargaining position.”

She also mentioned, “There are however strong policy grounds, namely the protection and encouragement of the developing industry, which justify risk allocation favored by the Act.” [11] Federal law—Commercial Space Launch Activities Act of 1984 with amendments—only requires that flight participants waive any claims toward the government [11].

Several European states (i.e., France, Belgium, Germany, Sweden, and the UK) have introduced “reimbursement/indemnification clauses” in an effort to establish a compromise between fulfilling the international liability obligations and not paying for space damage when they were not involved in space operations carried out by private persons. Many of them include direct reference to Article VII of the Outer Space Treaty and Liability Convention [86]. The general framework entitles a state to present a claim against an operator of space activities for reimbursement of the compensation paid by the state according to international law for damages caused by private space objects. For example, Article 14 of France’s “LOI no 2008-518 du 3 juin 2008 relative aux opérations spatiales” (also known as the French Space Operations Act) contains very detailed regulations on indemnification in various situations of damage caused by space operations, including the guarantee that “the Government shall not present a claim for indemnification if the damage was caused by a space object used as a part of an operation authorized according to the terms of the present Act and resulting from acts targeting governmental interests.” [87].

A similar clause exists in the South Korean legislation on space activities.<sup>13</sup> This country has very progressive regulations on liability issues considering its rather humble experience in space activities in comparison with the US or the European states [88]. Articles 14 and 15 of the Space Development Promotion Act (Law No. 7538, May 31, 2005) clearly determine the obligation of any person who is to launch a space object into outer space to bear liability for any damages caused by this object and to have third-party liability insurance to obtain a launch permit [89]. Furthermore, the Space Liability Act (Law No. 8852, December 21, 2007) establishes detailed rules on the liability for damage caused in the course of space activities, including a version of the aforementioned “indemnification clause” (Article 3) and even the limit on compensation (Article 5) at two hundred billion (200,000,000,000) KRW (approximately \$168 million). We believe this is a responsible, exemplary approach not only for Korea’s own natural and juridical persons but also for the international community, other countries, and their nationals.

The example of South Korea should be regarded as inspiration and an “excellent model” [90] for other states such as Kazakhstan to develop their own space industries and to aspire to enter into the “space powers club.” Unfortunately, despite possessing the Baikonur Cosmodrome on its territory, several joint space projects with Russia, France, and other states (and even satellites in orbit), the Central Asian state still does not have the adequate legislation regulating liability for damage caused by space objects. Although no special chapter on such liability can be found in the Law on Space Activities of 2012, the chapter titled “Safety of Space Activities” contains Article 27—which outlines three items dedicated to the compensation of damage caused by space activities and reads as follows:

<sup>13</sup> “In the event the Korean government has paid compensation for damage to a foreign state according to the “Convention on International Liability for Damage caused by Space Objects” the Korean government may present a claim for indemnification to the launching party.” Law dated 21 December 2007 No. 8852 Space Liability Act, United Nations Office for Outer Space Affairs, <https://www.unoosa.org/documents/pdf/spacelaw/national/Korean-Space-Liability-Act-unauthorized-translated-version.pdf>.



*"2. Compensation for harm to the health of individuals, damage to the environment, property of individuals and legal entities, the state, arising from the implementation of space activities, shall be made voluntarily or by a court decision in accordance with the laws of the Republic of Kazakhstan.*

*The harm is subject to compensation in full, taking into account the degree of disability of the victim, the cost of his treatment and restoration of health, and the cost of caring for the patient. [...]*

*4. In the event of death of people or animals, as well as damage to citizens and the environment as a result of the launch of a space object, participants in space activities must compensate for the damage in accordance with Paragraph 2 of this article." [91].*

Several questions arise after the first glance at these rules. Firstly, what purpose does Paragraph 4 serve when Paragraph 2 covers the same issues? Paragraph 4 seems to narrow down the list of compensable cases and even the list of subjects who are entitled to compensation by referring only to "citizens." If the intention were to make "participants in space activities" liable only in cases mentioned in Paragraph 4, then who would bear liability for other cases mentioned in Paragraph 2? Secondly, why is there no clear and direct obligation in the Law on Space Activities for participants in space activities to have third-party liability insurance? Certainly, this law mentions that most of the activities of individuals and legal entities involving the use of outer space are carried out under a license regulated by special legislation in which the owners of space objects are obligated to insure civil liability, but there is no similar regulation concerning launch operators and other participants in space activities [92]. Based on the best practices of "space powers," we firmly believe that space legislation should contain the accurate and unequivocal obligation of operators of space activities (e.g., producers, owners, launchers, etc.) to insure third-party liability. In our view, the chaotic complexity in legislation—characterized by endless references to other regulations, internal collisions, and legal uncertainty—will not contribute to the development of space activities and the participation of private entities in it.

## 5. Conclusion and recommendations

The space industry has changed dramatically in the last 50 years and private companies have taken over the initiative as space pioneers from governments. However, the law fails to play its role—which is to adequately regulate potential conflict situations. Although it is true that, thus far, private companies have not caused significant damages to other entities (because society is on the brink of a space revolution and the volume of space tourism could be high), the law should be ready for effective use; however, it is obviously not. Multinational treaties are obsolete and full of archaic mechanisms. They provide exclusive liability of states, even for damages caused by private companies while pursuing the commercial activity. Such regulations seem unjustified in the modern world and contrary to the practice of other branches of international law—air law and maritime law.

Bilateral agreements, adopted later than the multilateral treaties, did not change the situation. As for third-party liability, most agreements include a standard clause that repeats the Liability Convention norms on the joint and several liability of the parties in the case of a joint space launch and any damage caused by this launch. Only a few treaties include more detailed regulations. Several agreements provide reimbursement of the compensation paid by states or directly channel the liability onto a private launcher. We argue that in the absence of specific liability

regulations in the universal space regime, this practice is the best to construe treaties on space projects involving private companies in the modern space industry. Bilateral agreements on joint space programs should include the clause on the liability of private launchers, which should at least contain a reference to the contract or insurance required by domestic law. Ignoring liability issues, demonstrated by some states in their bilateral agreements, is malpractice that may lead to unpredictable consequences and inconveniences for victims of damages caused by space activities.

Domestic space law is obviously much newer than its international counterpart, at least when compared with a multilateral regime. It does, however, provide only very limited liability of private companies. This liability is domestic in nature and, on an international level, only states are liable. In some cases, determining which state should bear responsibility is difficult; however, even in terms of domestic liability, it is very limited for private companies with low fixed caps. The United States goes even further on the state level in that regulations require full exclusion of liability toward third parties directly by a clause or a waiver.

We posit that the crews of commercial spacecraft should not be considered envoys of all humankind and that commercial space activity is not a province of all mankind. Encouragement to engage in such a risky undertaking can be achieved with alternative tools such as insurance, and not through deprivation of the rights to claim by innocent victims of potential damages. For those reasons, we argue that the law must be amended in a superior manner on an international level. Almost 50 years since the adoption of the Liability Convention is a sufficient duration to observe what is missing or ill-regulated and to correct it. The inability of the international community to effectively regulate the participation of private companies in space activities is becoming increasingly frustrating and dangerous. We propose that now is the time to introduce new laws on liability for space activities that free states from their responsibility for private companies and precisely regulate the unsolved problems under the current regime before—and not after—accidents occur.

## CRedit authorship contribution statement

**Bartosz Ziemblicki:** Conceptualization, Methodology, Investigation, Resources, Writing – original draft, Writing – review & editing, Supervision, Project administration. **Yevgeniya Oralova:** Conceptualization, Methodology, Investigation, Resources, Writing – original draft, Writing – review & editing, Supervision, Project administration.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## References

- [1] Z. Meyer, Private commercialization of space in an international regime: a proposal for a space district, *Northwest. J. Int. Law Bus.* 30 (2010) 241–261. <https://scholarlycommons.law.northwestern.edu/njilb/vol30/iss1/8>.
- [2] The New York Times, First outing for SpaceX. <https://www.nytimes.com/2012/10/30/opinion/first-outing-for-spacex-pleases-nasa.html>, 2012. (Accessed 25 April 2019).
- [3] C. Albert, Liability in international law and the ramifications on commercial space launches and space tourism, *Loyola of Los Angel, Int. Comp. Law Rev.* 36 (2014) 233–261. <https://digitalcommons.lmu.edu/ilr/vol36/iss2/2>.
- [4] C. Lafleur, Costs of US Piloted Programs, *The Space Review*, 2010. <http://www.thespacereview.com/article/1579/1>. (Accessed 25 April 2019).
- [5] H. Svonavec, Saving space with un-authorized acts: questioning the authority of the united Nations to Oversee humankind's exploration and development

- of outer space, *J. Law Commer.* 36 (2017) 57–76, <https://doi.org/10.5195/jlc.2017.129>.
- [6] J. McKinley, Space Tourism Is Here! Wealthy Adventurers Wanted, *The New York Times*, 2012. <https://www.nytimes.com/2012/09/09/travel/space-tourism-is-here-wealthy-adventurers-wanted.html>. (Accessed 25 April 2019).
- [7] B. Abrams, First contact: establishing jurisdiction over activities in outer space, *Ga. J. Int. Comp. Law* 42 (2014) 797–824. <https://digitalcommons.law.uga.edu/gjci/vol42/iss3/5>.
- [8] SpaceX website. <https://www.spacex.com/mars>. (Accessed 25 April 2019).
- [9] T.S. Twibell, Space law: legal restraints on commercialization and development of outer space, *Univ. Mo.-Kans. City Law Rev.* 65 (1997) 589–641. <https://ssrn.com/abstract=3635851>.
- [10] United States Department of Transportation, Federal Aviation Administration. [https://www.faa.gov/data\\_research/commercial\\_space\\_data/licenses/](https://www.faa.gov/data_research/commercial_space_data/licenses/). (Accessed 25 April 2019).
- [11] Z.N. O'Brien, To boldly go? Private contractors for the carriage of persons in space, exclusion clauses and inter-party waivers of tortious liability, *Dublin University Law J.* 29 (2007) 341–373.
- [12] Declaration of legal principles governing the activities of states in the exploration and uses of outer space, adopted by the general assembly in its resolution 1962 (XVIII) of 13 December 1963. <https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/legal-principles.html>. (Accessed 10 October 2020).
- [13] Treaty on principles governing the activities of states in the exploration and use of outer space, including the moon and other celestial bodies, adopted by the general assembly in its resolution 2222 (XXI), opened for signature on 27 January 1967, entered into force on 10 October 1967, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/outerspacetreaty.html>. (Accessed 10 October 2020).
- [14] Agreement on the rescue of astronauts, the Return of astronauts and the Return of objects launched into outer space, adopted by the general assembly in its resolution 2345 (XXII), opened for signature on 22 April 1968, entered into force on 3 December 1968, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/rescueagreement.html>. (Accessed 10 October 2020).
- [15] Convention on international liability for damage caused by space objects, adopted by the general assembly in its resolution 3235 (XXVI), opened for signature on 29 March 1972, entered into force on 1 September 1972, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/liability-convention.html>. (Accessed 10 October 2010).
- [16] Convention on registration of objects launched into outer space, adopted by the general assembly in its resolution 3235 (XXIX), opened for signature on 14 January 1975, entered into force on 15 September 1976, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/registration-convention.html>. (Accessed 10 October 2020).
- [17] Agreement governing the activities of states on the moon and other celestial bodies of 1979, adopted by the general assembly in its resolution 34/68, opened for signature on 18 December 1979, entered into force on 11 July 1984, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/moon-agreement.html>. (Accessed 10 October 2020).
- [18] V. Kopal, The role of united Nations declarations of principles in the progressive development of space law, *J. Space Law* 16 (1988) 20.
- [19] Principles governing the use by states of artificial Earth satellites for international direct television broadcasting, adopted by the general assembly in its resolution 37/92 of 10 December 1982, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/dbs-principles.html>. (Accessed 10 October 2020).
- [20] Principles relating to remote sensing of the Earth from outer space, adopted by the general assembly in its resolution 41/65 of 3 December 1986. <https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/remote-sensing-principles.html>. (Accessed 10 October 2020).
- [21] Principles relevant to the use of nuclear power Sources in outer space, adopted by the general assembly in its resolution 47/68 of 14 December 1992, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/nps-principles.html>. (Accessed 10 October 2020).
- [22] Declaration on international cooperation in the exploration and use of outer space for the benefit and in the interest of all states, taking into particular account the needs of developing countries, adopted by the general assembly in its resolution 51/122 of 13 December 1996, <https://www.unoosa.org/oosa/en/ourwork/spacelaw/principles/space-benefits-declaration.html>. (Accessed 10 October 2020).
- [23] B. Cheng, The commercial development of space: the need for new treaties, *J. Space Law* 19 (1991).
- [24] R.J. Lee, The liability convention and private space launch services – domestic regulatory responses, *Ann. Air Space Law* XXXI (2006) 351–380.
- [25] D. Griffith, Rocketing Private Citizens into Space. A Consideration of Liability, *The Brief* (2009) 30–33. Spring.
- [26] R. DalBello, M. Mendelson, Private risk management in orbital operations, *Z. zum Luft- Weltraumr.* 60 (Heft 2) (2011) 218–230.
- [27] J. Friedberg, Bracing for the impending rocket revolution: how to regulate international environmental harm caused by commercial space flight, *Colorado J. Int. Environ. Law Pol.* 24 (1) (2013).
- [28] A Report of the International Interdisciplinary Congress on Space Debris, Towards Long-Term Sustainability of Space Activities: Overcoming the Challenges of Space Debris, United Nations Committee on the Peaceful Uses of Outer Space Scientific and Technical Subcommittee, 48th Session, Vienna, 2011, p. 5. UN Doc. A/AC.105/C.1/2011/CRP.14.
- [29] J. Foust, XCOR Aerospace Files for Bankruptcy, *SPACENEWS*, 2017. <https://spacenews.com/xcor-aerospace-files-for-bankruptcy/>. (Accessed 25 April 2019).
- [30] A. Pasztor, Problems plagued Virgin galactic rocket ship long before crash. Richard Branson's projections on launch ran counter to technical capabilities., *Wall St. J.* (2014). <https://www.wsj.com/articles/problems-plagued-virgin-galactic-rocket-ship-long-before-crash-1415838171>.
- [31] M. Wall, SpaceX Crew Dragon Accident Another Bump in the Road for Commercial Crew, *SPACE.COM*, 2019. <https://www.space.com/spacex-dragon-accident-nasa-commercial-crew.html>. (Accessed 25 April 2019).
- [32] J. Foust, Weighing the Risks of Human Spaceflight, *The Space Review*, 2003. <http://thespacereview.com/article/36/2>. (Accessed 25 April 2019).
- [33] L. Buchanan, Richard Branson: 'Screw it. Let's Do It', *Inc.*, 2012. <https://www.inc.com/magazine/201211/leigh-buchanan/sir-audacity-richard-branson.html>. (Accessed 25 April 2019).
- [34] M. Tse, One giant leap [backwards] for mankind. Limited liability in private commercial spaceflight, *Brooklyn Law Rev.* 7 (2013) 291–320.
- [35] J. Thomas, Privatization of Space Ventures: Proposing a Proven Regulatory Theory for Future Extraterrestrial Appropriation, *Brigh. Young University International Law & Management Review*, 2005, pp. 191–235, 1 issue 1.
- [36] W. Zhang, Extraterritorial jurisdiction on celestial bodies, *Space Pol.* 47 (2019) 148–157, <https://doi.org/10.1016/j.spacepol.2018.11.002>.
- [37] I.H.Ph. Rode-Verschoor, The responsibility of states for the damages caused by launched space-bodies, in: *Proceedings of the 1st Colloquium on the Law of Outer Space*, 1958.
- [38] S. Freeland, Fly me to the moon: how will international law cope with commercial space tourism? *Melb. J. Int. Law* 11 (17) (2010) 90–118.
- [39] B. Beck, The next, small, step for mankind: fixing the inadequacies of the international space law treaty regime to accommodate the modern space flight industry, *Albany Law J. Sci. Technol.* 19 (1) (2009) 1–38.
- [40] A. Ferreira-Snyman, Legal challenges relating to the commercial use of outer space, with specific reference to space tourism, *Potchefstroom Electron. Law J.* 17 (1) (2014) 2–50, <https://doi.org/10.4314/pej.v17i1.01>.
- [41] D. St. John, The trouble with Westphalia in space: the space-centric liability regime, *Denver J. Int. Law Policy* 40 (2012) 686–713.
- [42] A.F. Cohen, Cosmos 954 and the international law of satellite accidents, *10, Yale J. Int. Law* 10 (1984) 89.
- [43] F.G. Van der Dunk, The sky's the limit – but where does it end?, in: *Proceedings of the 48th Colloquium on the Law of Outer Space*, 2005, pp. 84–94.
- [44] K.-H. Böckstiegel, The term 'launching state' in international space law, in: *Proceedings of the 37th Colloquium on the Law of Outer Space*, 1995, pp. 80–83.
- [45] S. Gorove, Definitional issues pertaining to 'space object', in: *Proceedings of the 37th Colloquium on the Law of Outer Space*, vol. 2, 1994, pp. 87–98.
- [46] B.A. Hurwitz, State Liability for Outer Space Activities in Accordance with the 1972 Convention on International Liability for Damage Caused by Space Objects, *Springer Netherlands*, 1992, p. 264.
- [47] L. Sun, Dispute settlement relating to deep seabed minings: a participant's perspective, *Melb. J. Int. Law* 18 (1) (2017) 71–94.
- [48] M. Emberland, *The Human Rights of Companies: Exploring the Structure of ECHR Protection*, 2006, p. 268. Oxford.
- [49] New TV S.A.L., Karma Mohamed Tahsin Al Khayat, Case no: STL-14-05/PT/AP/AR126.1, special tribunal for Lebanon, the appeals panel, decision on interlocutory appeal concerning personal jurisdiction in contempt proceedings, 2 Oct 2014 and Akhbar Beirut S.A.L, Ibrahim Mohamed Ali Al Amin, Cas no: STL-14-06/PT/AP/AR126.1, Special Tribunal for Lebanon, the Appeals Panel, Decision on Interlocutory Appeal Concerning Personal Jurisdiction in Contempt Proceedings, 23 Jan 2015.
- [50] J. Arato, Corporations as lawmakers, *Harv. Int. Law Rev.* 56 (2) (2015) 229–296.
- [51] Quartz, An unauthorized satellite launch in India threatens US regulatory reform in space, <https://qz.com/1226962/an-unauthorized-satellite-launch-in-india-threatens-us-regulatory-reform-in-space/>. (Accessed 24 July 2020).
- [52] Space News, Op-ed | NewSpace must be regulated, <https://spacenews.com/newspace-must-be-regulated/>. (Accessed 24 July 2020).
- [53] Just Security, Rogue satellites launched into outer space: legal and policy implications, <https://www.justsecurity.org/57496/rogue-satellites-launched-outer-space-legal-policy-implications/>. (Accessed 24 July 2020).
- [54] A. Kerrest, Legal aspects of transfer of ownership and transfer of activities, in: M. Hofmann, A. Loukakis (Eds.), *Ownership of Satellites*, 4th Luxembourg Workshop on Space and Satellite Communication Law 1, 2017, pp. 75–84.
- [55] Report of the legal sub-committee on the work of its seventh session (4–28 June 1968) to the committee on the peaceful uses of outer space, A/AC.105/45, 11 July 1968 [http://www.unoosa.org/pdf/reports/ac105/AC105\\_045E-1c.pdf](http://www.unoosa.org/pdf/reports/ac105/AC105_045E-1c.pdf). (Accessed 30 June 2019).
- [56] Ph. Diederiks-Verschoor, W.P. Gormley, Future legal status of nongovernmental entities in outer space: private individuals and companies as subjects and beneficiaries of international space law, *J. Space Law* 5 (1977) 125–155.
- [57] K. Hailbronner, Liability for Damage Caused by Spacecraft Proposals of Belgium, Max-Planck-Institut für ausländisches öffentliches Recht und Völkerrecht, U.S.A., Hungary, India and Italy, 1970, pp. 125–141.
- [58] G. Doeker, T. Gehring, Private or international liability for transnational environmental damage - the precedent of conventional liability regimes, *J. Environ. Law* 2 (1990) 1–16, <https://doi.org/10.20378/jrbo-51905>.

- [59] Agreement between the Government of the Russian Federation and the Government of the French Republic on Long-Term Cooperation in the Development, Creation, and Use of Launch Vehicles and the Deployment of the Soyuz-ST Launch Vehicle from the Guiana Space Center, came into force on 1 April 2007, Collection of Legislation of the Russian Federation of 2007, № 10, 1154, available in Russian <http://docs.cntd.ru/document/902030668>. (Accessed 22 August 2019).
- [60] V. Kayser, *Launching Space Objects: Issues of Liability and Future Prospects*, Springer Science & Business Media, 2006, p. 386.
- [61] The French Space Operation Act, Website of the European Centre for Space Law, 2008. [https://www.esa.int/About\\_Us/ECSL\\_European\\_Centre\\_for\\_Space\\_Law/National\\_Space\\_Legislations](https://www.esa.int/About_Us/ECSL_European_Centre_for_Space_Law/National_Space_Legislations). (Accessed 22 August 2019).
- [62] Declaration by Certain European Governments on the Launchers Exploitation Phase of Ariane, Vega, and Soyuz from the Guiana Space Centre, Came into Force in 2009, Crown Copyright, Miscellaneous No. 10 (2009).
- [63] F. von der Dunk, *Handbook of Space Law*, Edward Elgar Publishing, 2015, p. 1136.
- [64] Agreement between the Government of the Republic of Kazakhstan and the Government of the Russian Federation on the Development of the Baïterek Space Rocket Complex at the Baikonur Facility, Came into Force on December 15, 2005, Bulletin of the Parliament of the Republic of Kazakhstan, 2005, № 17-18, 74, available in Russian and Kazakh [http://adilet.zan.kz/rus/docs/Z050000082\\_](http://adilet.zan.kz/rus/docs/Z050000082_). (Accessed 30 June 2019).
- [65] Decree of the Government of the Republic of Kazakhstan dated March 4, 2005 № 207 on creation of joint-stock company "Kazakhstan-Russian enterprise" Baïterek (as amended by the Government of the Republic of Kazakhstan 04.26.2005, № 390).
- [66] Law of the Republic of Kazakhstan dated 13 May 2003 № 415 on joint stock companies, available in Russian and Kazakh [http://adilet.zan.kz/rus/docs/Z030000415\\_](http://adilet.zan.kz/rus/docs/Z030000415_). (Accessed 22 August 2019).
- [67] Decree of the Government of the Republic of Kazakhstan dated 30 December 2019 № 1013 on the draft Law of the Republic of Kazakhstan on the ratification of the Agreement between the Government of the Republic of Kazakhstan and the Government of the Russian Federation on cooperation in the implementation of launches of carrier rockets of the Soyuz-2 type from the Baikonur Cosmodrome for spacecraft launches in the northern direction to circumpolar orbits, available in Russian and Kazakh [https://online.zakon.kz/Document/?doc\\_id=37653866#pos=0;0](https://online.zakon.kz/Document/?doc_id=37653866#pos=0;0). (Accessed 3 August 2019).
- [68] Agreement between the government of the Republic of Kazakhstan and the government of the Russian Federation on the procedure for interaction in the event of accident during space launches from the Baikonur Cosmodrome, signed at Astana 18 November 1999, available in Russian and Kazakh. [https://online.zakon.kz/Document/?doc\\_id=1052681#pos=0;20](https://online.zakon.kz/Document/?doc_id=1052681#pos=0;20). (Accessed 3 August 2019).
- [69] Agreement between the Government of the Republic of Kazakhstan and the Government of the French Republic on Conditions for the Creation and Use of the Earth Remote Sensing Space System and the Spacecraft Assembly Test Complex of 2009, came into force on 24 August 2010, Bulletin of Treaties of the Republic of Kazakhstan, 2010, N 6, 58, available in Russian and Kazakh. <http://adilet.zan.kz/rus/docs/Z100000331>. (Accessed 22 August 2019).
- [70] Agreement between the government of the Republic of Kazakhstan and the government of the French Republic on Cooperation in the Field of Exploration and Use of outer Space for peaceful purposes, came into force on 1 August 2010, Bull. Int. Treaties Republ. Kazakhstan, 2010, No. 6, 51, available in Russian and Kazakh. [http://adilet.zan.kz/rus/docs/P090001484\\_](http://adilet.zan.kz/rus/docs/P090001484_). (Accessed 30 June 2019).
- [71] C. Van, Ernest, third party liability of the private space industry: to pay what No one has paid before, 41 case west, Reserv. Law Rev. 503 (1991) 503–541. <https://scholarlycommons.law.case.edu/caselrev/vol41/iss2/5>.
- [72] K. Malinowska, *Space Insurance: International Legal Aspects*, Kluwer Law International B.V., 2017. [https://books.google.de/books?id=KoyWDwAAQBAJ&pg=PT94&hl=ru&source=gbs\\_toc\\_r&cad=3#v=onepage&q&f=false](https://books.google.de/books?id=KoyWDwAAQBAJ&pg=PT94&hl=ru&source=gbs_toc_r&cad=3#v=onepage&q&f=false). (Accessed 30 June 2019).
- [73] Agreement Among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation and the Government of the United States of America concerning the Cooperation on the Civil International Space Station, signed at Washington January 29, 1998, Treaties and Other International Acts Series 12927, Department of States, United States of America.
- [74] Y. Zhao, The role of bilateral and multilateral agreements in international space cooperation, *Space Pol.* 36 (2016) 12–18, <https://doi.org/10.1016/j.spacepol.2016.02.007>.
- [75] Agreement between the Government of Australia and the Government of the Russian Federation on Cooperation in the Field of the Exploration and Use of Outer Space for Peaceful Purposes, Signed at Canberra May 23, 2001, United Nations Treaty Series, № 43916.
- [76] Steven Freeland, *When Laws Are Not Enough – The Stalled Development of an Australian Space Launch Industry*, vol. 8, University of Western Sydney Law Review, 2004, pp. 79–95.
- [77] Agreement the Government of the Republic of Kazakhstan and the Government of the Russian Federation on Cooperation in the Field of the Exploration and Use of Outer Space for Peaceful Purposes, Came into Force on 20 August 20 2014, Bulletin of Treaties of the Republic of Kazakhstan, 2014. No. 5 at 43.
- [78] Liability Risk-Sharing Regime for U.S. Commercial Space Transportation: Study and Analysis, 2002. [https://www.faa.gov/about/office\\_org/headquarters\\_offices/ast/media/faaliabilityrisksharing4-02.pdf](https://www.faa.gov/about/office_org/headquarters_offices/ast/media/faaliabilityrisksharing4-02.pdf). (Accessed 3 August 2020).
- [79] S. Adebola, et al., Great Expectations – An Assessment of the Potential for Suborbital Transportation: Masters 2008 Final Report, 2008, pp. 1–130. [https://isulibrary.isunet.edu/doc\\_num.php?explnum\\_id=95](https://isulibrary.isunet.edu/doc_num.php?explnum_id=95).
- [80] B. Gilson, Defending your client's property rights in space: a practical guide for the lunar litigator, *Fordham Law Rev.* 80 (3) (2011) 1367–1405. <https://ir.lawnet.fordham.edu/r/vol80/iss3/14>.
- [81] L.S.-B. Bornemann, This is ground control to major tom ... Your wife would like to sue but there's Nothing we can do... The unlikelihood that the FTCA waives sovereign immunity for torts committed by United States employees in outer space: a call for preemptive legislation, *J. Air Law Commer.* 63 (3) (1998) 517–546. <https://scholar.smu.edu/jalc/vol63/iss3/2>.
- [82] L. Hao, F. Tronchetti, The American space Commerce free enterprise act of 2017: the latest step in regulating the space Resources utilization industry or something more? *Space Pol.* 47 (2019) 1–6, <https://doi.org/10.1016/j.spacepol.2018.02.004>.
- [83] Convention for the Unification of certain rules relating to international carriage by air, adopted on 12 October 1929 in Warsaw, Entered into Force on 13 February 1933.
- [84] Convention for the unification of certain rules for international carriage by air, adopted on 28 May 1999 in Montreal, entered into force on 4 November 2003, [https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1494251256646&uri=CELEX:22001A0718\(01\)](https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1494251256646&uri=CELEX:22001A0718(01)). (Accessed 10 October 2020).
- [85] Athens Convention Relating to the Carriage of Passengers and Their Luggage by Sea (PAL), Adopted on 13 December 1974 in Athens, entered into force on 28 April 1987.
- [86] A. Kerest de Rozavel, F.G. von der Dunk, *Liability and insurance in the context of national authorisation*, in: F.G. von der Dunk (Ed.), *National Space Legislation in Europe: Issues of Authorisation of Private Space Activities in the Light of Developments in European Space Cooperation*, Studies in Space Law vol. 6, Nijhoff, Leiden, 2011, pp. 125–161.
- [87] Unofficial translation of France's LOI no 2008-518 du 3 juin 2008 relative aux operations spatiales, *J. Space Law* 34 (2008) 453–470.
- [88] C.Y. Hwang, Space activities in Korea—history, current programs and future plans, *Space Pol.* 22 (2006) 194–199, <https://doi.org/10.1016/j.spacepol.2006.06.007>.
- [89] Law dated 31 may 2005 № 7538 space development promotion act, United Nations Office for Outer Space Affairs, [https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/republic\\_of\\_korea/space\\_development\\_promotions\\_actE.html](https://www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/republic_of_korea/space_development_promotions_actE.html). (Accessed 3 August 2020).
- [90] K.D. Hwan, *Space Law and Policy in the Republic of Korea* (Report), United Nations Office for Outer Space Affairs, 2012. <https://www.unoosa.org/pdf/pres/2010/SLW2010/02-09.pdf>. (Accessed 3 August 2020).
- [91] Law of the Republic of Kazakhstan dated 6 January 2012 № 528-IV on space activities, available in Kazakh and Russian. [https://online.zakon.kz/document/?doc\\_id=31112199#pos=2;-88](https://online.zakon.kz/document/?doc_id=31112199#pos=2;-88). (Accessed 3 August 2020).
- [92] Law of the Republic of Kazakhstan dated 16 may 2014 № 202-V on permits and notifications, available in Kazakh and Russian [https://online.zakon.kz/document/?doc\\_id=31548200#pos=3;-106](https://online.zakon.kz/document/?doc_id=31548200#pos=3;-106). (Accessed 3 August 2020).