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SOVEREIGNTY AT THE KARMAN LINE: RECONCILING AIRSPACE SOVEREIGNTY AND SPACE FREEDOM IN THE ERA OF COMMERCIAL SUBORBITAL TRANSIT

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ABSTRACT

Commercial suborbital flight, hypersonic civil transport concepts and stratospheric pseudo-satellites now operate in a band of altitude that international law has never assigned to either the air regime or the space regime. The Chicago Convention gives each State complete and exclusive sovereignty over the airspace above its territory, while the Outer Space Treaty places outer space beyond national appropriation and open to all. No treaty says where one ends and the other begins, and a vehicle such as SpaceShipTwo or New Shepard passes through both within minutes. This paper uses comparative doctrinal analysis to set the air law instruments, the Chicago, Rome and Montreal Conventions, against the space law instruments, the Outer Space Treaty, the Liability Convention and the Registration Convention. It shows that the spatialist and functionalist approaches to delimitation each fail on hybrid vehicles, that State practice brackets the boundary only loosely, between roughly 20 and 100 kilometres, that passengers and third parties fall between the Montreal and Liability Conventions, and that ICAO and UNCOPUOS work on the same flights without a shared legal framework. The paper argues that neither theory can be rescued by further argument. It proposes instead a sui generis near-space transit regime for the band between 20 and 100 kilometres, under which States keep safety and security oversight but notified, peaceful transit is open to all, supported by a joint ICAO and UNCOPUOS consultative mechanism.

Keywords: Chicago Convention; Outer Space Treaty; Karman line; airspace sovereignty; delimitation of outer space; suborbital flight; Liability Convention; Montreal Convention; ICAO; UNCOPUOS.

INTRODUCTION

For most of the twentieth century the question where the air ends and space begins could be treated as academic. Aircraft flew at altitudes that no one doubted belonged to the territorial State below. Satellites orbited at altitudes that no State had tried to close. The region in between was crossed briefly by rockets on the way up and by capsules on the way down, and almost nothing lingered in it. That has changed. In July 2021, nine days apart, two privately operated crewed vehicles carried their passengers to the edge of space, one released from beneath a carrier aircraft and flown home as a glider, the other launched vertically and recovered under parachutes. The first peaked at about 86 kilometres and the second a little above 100.¹ Virgin Galactic has since retired its first SpaceShipTwo, and its successor Delta-class vehicle is not now expected to carry paying customers before February 2027, while Blue Origin continues to fly New Shepard.² Around these flights have grown others of the same uncertain character: military hypersonic glide vehicles that fly much of their trajectory in the upper atmosphere, civil hypersonic transport concepts, and solar-powered high-altitude platforms that stay aloft for weeks above 20 kilometres and are offered as substitutes for satellites.³

International law meets these vehicles with two systems that were built for different purposes and were never designed to meet. Air law grew out of the experience of aerial warfare. The 1919 Paris Convention declared that every State has complete and exclusive sovereignty over the airspace above its territory, and the 1944 Chicago Convention repeated the rule in its first article.⁴ Space law grew out of the Cold War and the shock, and then the acceptance, of the first satellites. The 1967 Outer Space Treaty declares the exploration and use of outer space to be the province of all mankind and forbids national appropriation of outer space by claim of sovereignty, by use or occupation, or by any other means.⁵ One system is built on exclusion and the other on access. Neither says where it stops. The Chicago Convention speaks of the

¹ Virgin Galactic's *Unity 22* flew on July 11, 2021, and Blue Origin's *NS-16* on July 20, 2021. Altitudes are those publicly reported by the operators and are approximate.

² *Virgin Galactic Postpones Its New Spaceship's First Commercial Flight to 2027*, Engadget, <https://engadget.com/2236080/virgin-galactic-postpones-commercial-flight-to-2027> (last visited Oct. 5, 2026).

³ The International Telecommunication Union defines a high-altitude platform station as a station on an object at an altitude of 20 to 50 kilometres at a specified, nominal, fixed point relative to the Earth. Int'l Telecomm. Union, Radio Regulations art. 1, No. 1.66A (2020 ed.).

⁴ Convention Relating to the Regulation of Aerial Navigation art. 1, Oct. 13, 1919, 11 L.N.T.S. 173 [hereinafter Paris Convention]; Convention on International Civil Aviation art. 1, Dec. 7, 1944, 61 Stat. 1180, 15 U.N.T.S. 295 [hereinafter Chicago Convention].

⁵ Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies arts. I–II, Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 205 [hereinafter Outer Space Treaty].

airspace above a State's territory without giving that airspace a ceiling, and the Outer Space Treaty speaks of outer space without defining it.

The silence was tolerable while few vehicles needed an answer. It is not tolerable now that a single vehicle may be carried aloft by an aircraft, fly as a rocket, glide home as a plane and, depending on the regulator and the moment, be treated as an aircraft, a space object or neither. This paper argues that the pressure for an answer should not be met by choosing one of the two familiar theories of delimitation. A spatial line cannot say which rules govern a hybrid vehicle that has not yet reached it, and a functional test cannot say whose consent a vehicle needs while it is still above someone's territory. The paper proposes instead a sui generis regime of near-space transit for the band between about 20 and 100 kilometres, administered through a joint mandate of the International Civil Aviation Organization (ICAO) and the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS).

Two research questions structure the argument. The first is at what altitude State sovereignty terminates, and whether customary international law already recognises a boundary at 100 kilometres, the Karman line. The second is which liability regime governs when a suborbital vehicle carrying paying passengers suffers a catastrophic malfunction while in transit through the upper airspace of a foreign State.

The method is comparative and doctrinal. The paper reads the principal air law instruments, the Chicago Convention, the Rome Convention of 1952 and the Montreal Convention of 1999, against the principal space law instruments, the Outer Space Treaty, the Liability Convention of 1972 and the Registration Convention of 1975, and tests both sets against State practice, the case law of the International Court of Justice, national legislation in the United States, the United Kingdom and New Zealand, and recent documents of ICAO and UNCOPUOS. It does not address orbital licensing, lunar activities or space resources except where they bear on transit through the near-space band. Facts about vehicles and missions are taken from public statements by operators and regulators and are stated approximately.

Part II examines the spatialist and functionalist approaches to delimitation and asks what State practice has already settled. Part III sets the sovereignty rule of air law against the freedom rule of space law and considers passage and security. Part IV compares the liability and safety regimes and the legal position of persons on board. Part V turns to ICAO and UNCOPUOS

and to the problem of integrating launch and re-entry into air traffic management. Part VI concludes and sets out the proposed near-space transit regime.

THE DEMARCATION DILEMMA: SPATIALIST AND FUNCTIONALIST APPROACHES

A. The Spatialist Approach

The spatialist position holds that law should fix a physical altitude at which the airspace regime ends and the space regime begins. Its attraction is certainty. A State would know the height to which its sovereignty extends, an operator would know which regime governs at each point on its trajectory, and a court would have a rule it could apply to a fact it could measure.

The candidates are familiar. The best known is the Karman line, which takes its name from the aerodynamicist Theodore von Karman, who calculated that at roughly 84 kilometres the speed a winged vehicle needs to generate lift approaches orbital velocity. The Fédération Aéronautique Internationale later adopted 100 kilometres as a round figure, and that figure is now the usual shorthand for the edge of space.⁶ Others would place the boundary at the lowest perigee at which a satellite can complete an orbit, a figure that estimates place in the region of 100 kilometres or a little above, or at the limit of effective control. United States practice adds a further marker, since the Federal Aviation Administration's commercial astronaut programme has used 50 statute miles, about 80 kilometres, as its threshold.⁷ Australia has written a figure of 100 kilometres into its space legislation, and the Soviet Union proposed in 1979 that the limit be set at between 100 and 110 kilometres.⁸

The objections are well known and they are strong. A boundary built on the physics of lift describes the performance of one kind of vehicle and says nothing about the interests that sovereignty protects. Atmospheric density does not change abruptly at any altitude, and the figure moves with the choice of criterion by 20 kilometres or more. More important, the principal space powers have resisted any fixed limit. The United States in particular has held that a boundary is unnecessary because activity has gone on for more than sixty years without one, and a fixed limit would risk conceding sovereign rights over altitudes through which

⁶ Bin Cheng, *The Legal Regime of Airspace and Outer Space: The Boundary Problem. Functionalism versus Spatialism: The Major Premises*, 5 ANNALS AIR & SPACE L. 323 (1980); GBENGA ODUNTAN, SOVEREIGNTY AND JURISDICTION IN THE AIRSPACE AND OUTER SPACE: LEGAL CRITERIA FOR SPATIAL DELIMITATION (2012).

⁷ Cong. Rsch. Serv., IN12555, *Safety Implications for Commercial Human Spaceflight*, https://www.congress.gov/crs_external_products/IN/PDF/IN12555/IN12555.4.pdf (last visited Oct. 5, 2026) (describing the FAA Commercial Space Astronaut Wings programme).

⁸ Space (Launches and Returns) Act 2018 (Cth) (Austl.); COLOGNE COMMENTARY ON SPACE LAW (Stephan Hobe, Bernhard Schmidt-Tedd & Kai-Uwe Schrogl eds., 2009) (vol. I).

reconnaissance satellites pass.⁹ The United Kingdom has said the same thing in terms, telling the Legal Subcommittee that defining where space begins is not necessary to regulate suborbital and orbital launch activity or to build space traffic management.¹⁰ The question has been on the agenda of the Legal Subcommittee since the 1960s without producing agreement, and the Working Group on the definition and delimitation of outer space was reconvened in 2023 to consider, among other things, suborbital flights and the relationship between delimitation and space traffic management. Its work continued at the sixty-fifth session of the Subcommittee in April 2026.¹¹

B. The Functionalist Approach

The functionalist position holds that the applicable law should depend on what is being done and by what kind of craft, whatever the altitude. A vehicle that moves through the atmosphere on aerodynamic lift and carries cargo or passengers between airports is an aircraft and is governed by air law. A vehicle that is launched to reach outer space and operates there is a space object and is governed by space law. The approach has a respectable lineage, running from the policy-oriented work of McDougal, Lasswell and Vlasic to Cheng's own preference for regulating by activity.¹² It also describes what many national regulators do. The United States licenses launch and re-entry without reference to an altitude, and the United Kingdom's Space Industry Act 2018 regulates "spaceflight activities" that include suborbital flight without saying where space begins.¹³

ICAO has in effect adopted the functional view. The definition of aircraft in the Annexes to the Chicago Convention turns on whether a machine derives support in the atmosphere from the reactions of the air, and at the Forty-second Session of the ICAO Assembly in 2025 the Organization recorded that space vehicles do not meet the definition of aircraft and that integrating space transport operations into airspace is to be handled in separate workstreams.¹⁴

⁹ U.N. Off. for Outer Space Affs., *Definition and Delimitation of Outer Space*, <https://www.unoosa.org/oosa/en/SpaceLaw/aero/index.html> (last visited Oct. 5, 2026); FRANCIS LYALL & PAUL B. LARSEN, *SPACE LAW: A TREATISE* (2d ed. 2018).

¹⁰ *UK Statement on Definition and Delimitation at the 61st Legal Sub-committee of COPUOS*, GOV.UK, <https://www.gov.uk/government/speeches/uk-statement-on-definition-and-delimitation-at-copuos> (last visited Oct. 5, 2026).

¹¹ U.N. Off. for Outer Space Affs., Legal Subcommittee: 2026, Sixty-fifth Session (15–22 April 2026), <https://www.unoosa.org/oosa/en/ourwork/copuos/lsc/2026/statements.html> (last visited Oct. 5, 2026); *Report of the Chair of the Working Group on the Definition and Delimitation of Outer Space*, U.N. Doc. A/AC.105/C.2/2023/DEF/L.1 (2023).

¹² MYRES S. MCDUGAL, HAROLD D. LASSWELL & IVAN A. VLASIC, *LAW AND PUBLIC ORDER IN SPACE* (1963); BIN CHENG, *STUDIES IN INTERNATIONAL SPACE LAW* (1997).

¹³ 51 U.S.C. §§ 50901–50923; Space Industry Act 2018, c. 5 (UK).

¹⁴ Int'l Civil Aviation Org. [ICAO], *Outcomes of the 42nd ICAO Assembly (A42)* (Nov. 2025) (presentation citing

The difficulty is the hybrid vehicle. SpaceShipTwo was carried to about 14 kilometres under an aircraft, accelerated on rocket power to an apogee near the Karman line, and returned as a glider to a runway. The X-37B is launched on a rocket and orbits, but it lands on a runway. A functional test must decide which of these characteristics counts, and any choice is arbitrary. The United States Congress has in effect admitted as much. Its statutory definition of a suborbital rocket depends on whether thrust exceeds lift for the majority of the powered ascent, a ratio that would allow a small change in design to move a vehicle from one regime to the other.¹⁵ Russia has argued for a category of “aerospace object” for vehicles that operate in both media, but the proposal has not been accepted and would only add a third regime to the two that already collide.¹⁶

There is a deeper problem. Functionalism answers the question which rules apply to the vehicle. It does not answer the question whose sovereignty the vehicle is crossing. Sovereignty is territorial, and its extent depends on where the vehicle is and not on what it is. A State whose territory lies beneath a hybrid vehicle in the upper atmosphere will ask whether it has a right to be consulted, and the answer cannot be given by classifying the machine. Functionalism therefore settles the law of the vehicle and leaves the law of the place unsettled. Spatialism does the opposite, and neither supplies both halves.

C. What Custom Has Already Settled

The question whether a boundary has already formed in custom is a question about practice and belief. A rule of customary international law requires general and consistent practice accepted as law, and the International Court of Justice has asked for practice that is both extensive and virtually uniform.¹⁷ The International Law Commission has added that a failure to react over time may be evidence of acceptance as law if States were in a position to react and the circumstances called for a reaction.¹⁸

On that standard the practice at the upper end is clear. Since Sputnik in 1957 satellites have passed over every State without protest, and writers have long treated the silence as the foundation of a customary freedom of orbital overflight.¹⁹ The one attempt to claim sovereignty

Fourteenth Air Navigation Conference); ICAO, *Integration During Space Transportation Operations*, Working Paper A42-WP/289 (2025).

¹⁵ 51 U.S.C. § 50902.

¹⁶ U.N. Off. for Outer Space Affs., *supra* note 9.

¹⁷ *North Sea Continental Shelf* (Ger./Den.; Ger./Neth.), Judgment, 1969 I.C.J. 3, ¶¶ 74, 77 (Feb. 20); Int'l L. Comm'n, *Draft Conclusions on Identification of Customary International Law*, concls. 8–10, U.N. Doc. A/73/10 (2018).

¹⁸ Int'l L. Comm'n, *supra* note 17, concl. 10(3).

¹⁹ Vladlen S. Vereshchetin & Gennady M. Danilenko, *Custom as a Source of International Law of Outer Space*,

over an orbital region, the 1976 Bogota Declaration by eight equatorial States in respect of the geostationary orbit, was rejected by other States and has not been followed.²⁰

At the lower end the practice is equally clear in the opposite direction. When the Soviet Union shot down a United States U-2 reconnaissance aircraft at about 21 kilometres in 1960, it treated the flight as a violation of its sovereignty, and the United States disputed the facts of the case and not the principle. In February 2023 the United States shot down a Chinese high-altitude balloon at roughly 18 kilometres off its coast and described the overflight as a violation of its sovereignty, while China described the balloon as a civilian research craft that had strayed.²¹ The International Court has treated sovereignty over the airspace above territory as part of customary law, without naming a ceiling.²²

Between roughly 20 and 100 kilometres, and in practice somewhat above, there is no settled practice. National positions differ. Australia has used a figure of 100 kilometres, the United States and the United Kingdom decline to fix one, New Zealand regulates “high-altitude vehicles” without defining outer space, and the Working Group at UNCOPUOS has been unable to find consensus.²³ The Group of 77 and China told the Legal Subcommittee in 2024 that the question should stay on the agenda because the legal regimes governing airspace and outer space are different, which is a statement that the problem exists and not a statement of a rule.²⁴

The answer to the first research question is therefore that customary law has not fixed a boundary at 100 kilometres. It recognises sovereignty at the altitudes where aircraft and balloons fly and freedom of passage at the altitudes where satellites orbit, and the Karman line is a focal point in national legislation and scholarship and not a rule of law. The gap between about 20 and 100 kilometres is a region in which the practice of States does not yet determine the rights of anyone.

13 J. SPACE L. 22 (1985).

²⁰ COLOGNE COMMENTARY, *supra* note 8.

²¹ On the U-2 incident, *see* ODUNTAN, *supra* note 6. (Citation to be confirmed for the February 2023 balloon incident: official United States and Chinese statements.)

²² *Military and Paramilitary Activities in and Against Nicaragua* (Nicar. v. U.S.), Merits, Judgment, 1986 I.C.J. 14, ¶ 212 (June 27).

²³ Outer Space and High-altitude Activities Act 2017 (N.Z.); N.Z. Ministry of Bus., Innovation & Emp., *Regulatory Impact Statement: Outer Space and High-altitude Activities Regulations 2017*, <https://www.mbie.govt.nz/dmsdocument/1464-ris-outer-space-high-altitude-activities-2017-regulations-pdf> (last visited Oct. 5, 2026) (noting that New Zealand is the only country to introduce a high-altitude vehicle regime).

²⁴ Statement of the Group of 77 and China, Sixty-third Session of the Legal Subcommittee of COPUOS, Agenda Item 7(a) (Apr. 15–26, 2024).

THE CLASH OF REGIMES: AIR SOVEREIGNTY AND SPACE FREEDOM

A. Article 1 of the Chicago Convention and Article II of the Outer Space Treaty

The two provisions look incompatible, but they do not collide at the same altitude. Article 1 of the Chicago Convention recognises complete and exclusive sovereignty over airspace, and Article 2 extends the State's territory to its land areas and adjacent territorial waters.²⁵ Article II of the Outer Space Treaty forbids national appropriation of outer space.²⁶ Each is clear about its own domain and silent about the other. The conflict arises only for a vehicle that begins in one domain and ends in the other.

Consider a private rocket launched from a sea platform or from the territory of a neighbouring State that must cross another State's airspace on its way to microgravity. If the vehicle is an aircraft in the sense of the Chicago Convention, the Convention provides the rules. Scheduled international air services require permission under Article 6, aircraft not engaged in scheduled services may make non-stop flights across foreign territory without prior permission under Article 5 subject to the right of the State flown over to impose routes and require landing, pilotless aircraft require special authorisation under Article 8, and States may prohibit flight over designated areas under Article 9.²⁷ If the vehicle is a space object, the Convention does not apply to it, and ICAO now says so. The Convention then supplies neither a permission nor a prohibition, and the question falls back to customary law, which recognises sovereignty over the airspace above territory.²⁸

On the better view of the existing law a launch whose trajectory enters the airspace of a foreign State below the unsettled upper limit needs that State's consent. Practice avoids the question rather than answering it. Launch sites are chosen so that ascent and downrange tracks lie over the launching State's territory or over the sea, and a platform on the high seas ascends through airspace over which no State holds sovereignty, since the high seas are open to overflight.²⁹ The design works for orbital launch from coastal sites. It fails for abort scenarios, for debris and for any point-to-point suborbital service in which the departure and arrival points lie in different States. In January 2025 a Starship vehicle broke up after launch and debris fell near the Turks and Caicos Islands, a British Overseas Territory. The United States Federal Aviation

²⁵ Chicago Convention arts. 1–2.

²⁶ Outer Space Treaty art. II.

²⁷ Chicago Convention arts. 5, 6, 8, 9.

²⁸ *Nicaragua*, 1986 I.C.J. 14, ¶ 212.

²⁹ United Nations Convention on the Law of the Sea arts. 2(2), 87, Dec. 10, 1982, 1833 U.N.T.S. 3 [hereinafter UNCLOS].

Administration activated a debris response area, dozens of commercial flights were diverted or delayed, and the territory's government confirmed that it had diverted all flights from its airspace.³⁰ Nothing in the law of either regime clearly told the launching State or the affected State what each was owed.

B. The Missing Right of Innocent Passage

Maritime law gives the ships of all States a right of innocent passage through the territorial sea of another State, and the Corfu Channel case confirmed that right in the context of international straits.³¹ Air law has never recognised an equivalent. UNCLOS extends the coastal State's sovereignty to the airspace above its territorial sea and gives the right of innocent passage to ships alone, and in straits and archipelagic sea lanes it grants aircraft a right of overflight in the more limited forms of transit passage and archipelagic sea lanes passage.³² The Paris Convention of 1919 had gone further and obliged each contracting State in time of peace to accord freedom of innocent passage above its territory to the aircraft of the other contracting States, but the Chicago Convention replaced that rule with the bargain of Articles 5 and 6, in which access to foreign territory depends on consent or on a limited right for non-scheduled flights.³³ The reason lay in speed and security. An aircraft reaches a capital in minutes, and States were unwilling to give up the power to say who may fly over them.

Space law cannot do without a transit right, and in orbit it has one, since the freedom of use of outer space carries the freedom to pass over any territory below. The unresolved case is ascent and descent. A rocket cannot turn back once it has burned, a capsule on re-entry cannot choose its landing site freely, and a launching State that must ask permission of every State beneath its trajectory has in practice a veto placed in the hands of others. Some writers therefore argue that a limited right of innocent passage for space objects in transit through foreign airspace should be implied, on the ground that it is the only reading that makes the freedom in Article I of the Outer Space Treaty effective.³⁴

The argument is attractive and unproven. An implied right would need State practice and belief,

³⁰ *FAA Grounds SpaceX's Starship After Midflight Explosion, Reports Property Damage on Turks and Caicos*, CNBC, <https://www.nbclosangeles.com/news/business/money-report/faa-groundspacexs-starship-after-mid-flight-explosion-reports-property-damage-on-turks-and-caicos/3608187/> (last visited Oct. 5, 2026); *US Grounds SpaceX's Starship After Fiery Mid-Air Explosion*, Gulf News, <https://gulfnews.com/world/americas/us-groundspacexs-starship-after-fiery-mid-air-explosion-1.500018537> (last visited Oct. 5, 2026).

³¹ UNCLOS arts. 17–19; *Corfu Channel* (U.K. v. Alb.), Merits, Judgment, 1949 I.C.J. 4, 28 (Apr. 9).

³² UNCLOS arts. 2(2), 38, 53.

³³ Paris Convention art. 2; Chicago Convention arts. 5–6; MICHAEL MILDE, *INTERNATIONAL AIR LAW AND ICAO* (3d ed. 2016).

³⁴ CHENG, *supra* note 12; LYALL & LARSEN, *supra* note 9.

and the practice that exists is practice of avoidance and not of entitlement. A right that took away the veto of the State below would take away part of what sovereignty means, and States have been careful not to concede that. If a passage right exists at all, it should be created by agreement, with conditions that protect the State below, and that is the course Part VI recommends.

C. National Security and the Weaponisation of Ambiguity

The ambiguity is not only commercial. Hypersonic glide vehicles, high-altitude balloons and manoeuvring reconnaissance platforms operate in or through the band between the two regimes, and the same vehicle can be presented in two ways. A State that wishes to defend against an incoming object can call it an aircraft and invoke sovereignty. A State that wishes to send one can call it a space object and invoke freedom. The 2023 balloon incident illustrates the first move and the second.

Air defence identification zones show the difficulty from a different direction. They are not creatures of the Chicago Convention. Coastal States established them to require identification of aircraft approaching their territory, and their legality beyond the territorial airspace remains contested. They are drawn horizontally and carry no vertical limit. If near-space belongs to the territorial State, a State may extend its identification and defence arrangements upward without limit. If it does not, the same State has weaker claims, and no rule tells it or anyone else which is true.³⁵

The law of the use of force offers little help. The Outer Space Treaty bars nuclear weapons and other weapons of mass destruction in orbit and bars all military activity on celestial bodies, but it leaves other military uses of outer space, and a fortiori of near-space, unregulated.³⁶ The Chicago Convention does restrain States from using weapons against civil aircraft in flight. Article 3 bis was added after the Soviet destruction of Korean Air Lines Flight 007 in 1983, and it requires interception to avoid endangering the lives of persons on board.³⁷ The protection applies to civil aircraft, and a commercial suborbital vehicle carrying passengers is not clearly an aircraft. A vehicle in that position may be in a legal grey zone at exactly the moment it is most exposed, and the protection that followed KAL 007 may not reach it.

³⁵ MILDE, *supra* note 33; PAUL STEPHEN DEMPSEY, PUBLIC INTERNATIONAL AIR LAW (2d ed. 2017).

³⁶ Outer Space Treaty art. IV.

³⁷ Protocol Relating to an Amendment to the Convention on International Civil Aviation [Article 3 bis], May 10, 1984, ICAO Doc. 9436 (entered into force Oct. 1, 1998); Chicago Convention art. 3(a).

CONFLICTING LIABILITY AND SAFETY REGIMES

A. The Air Law Framework

Air law answers the questions of passenger and third-party liability with a settled set of instruments. The Montreal Convention of 1999 governs liability for death or bodily injury of passengers in international carriage by aircraft for reward.³⁸ It sets a two-tier regime. Under the first tier the carrier is liable for proven damage up to a fixed sum in special drawing rights whatever its fault, and that sum was raised to 128,821 special drawing rights in 2019. Under the second tier the carrier is liable above that sum unless it proves that the damage was not due to its negligence or was due solely to the negligence of a third party.³⁹ The Convention declares void any contractual provision that tends to relieve the carrier of liability or to fix a lower limit than the Convention lays down.⁴⁰ The term “accident” in Article 17 has been read to mean an unexpected or unusual event external to the passenger, a definition that a catastrophic vehicle failure plainly satisfies.⁴¹ Third parties on the surface are protected by the Rome Convention of 1952, which makes the operator of a foreign aircraft liable for surface damage on proof of damage and causation, subject to limits that vary with the weight of the aircraft.⁴² The Rome Convention has attracted limited ratification, and the 2009 conventions that were meant to replace it had not attracted enough ratifications to enter into force at the time of writing.

Applying these instruments to suborbital passengers meets three obstacles. The first is that the Montreal Convention applies to carriage “by aircraft” and does not define the word, and ICAO has now said that space vehicles are not aircraft. The second is that the Convention applies only to international carriage, which requires that the places of departure and destination lie in two States Parties, or in a single State Party with an agreed stopping place in another State.⁴³ A suborbital flight that departs from and returns to the same spaceport is not international in that sense. The third obstacle is that the Convention assumes a carrier operating a transport service, and the early suborbital flights were experiences or tests and not carriage between places. A future point-to-point suborbital service between two States would meet the second condition and strengthen the argument for application by analogy, but it would not remove the first obstacle.

³⁸ Convention for the Unification of Certain Rules for International Carriage by Air arts. 1, 17, May 28, 1999, S. Treaty Doc. No. 106-45, 2242 U.N.T.S. 309 [hereinafter Montreal Convention].

³⁹ Montreal Convention art. 21.

⁴⁰ Montreal Convention art. 26.

⁴¹ *Air France v. Saks*, 470 U.S. 392, 405 (1985).

⁴² Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface, Oct. 7, 1952, 310 U.N.T.S. 181 [hereinafter Rome Convention].

⁴³ Montreal Convention art. 1(2).

B. The Space Law Framework

The Liability Convention of 1972 applies a different logic. A launching State is absolutely liable to pay compensation for damage caused by its space object on the surface of the Earth or to aircraft in flight, and liable on proof of fault for damage caused elsewhere to the space objects of another launching State or to persons or property on board them.⁴⁴ The reference to aircraft in flight is notable, because the drafters knew the two regimes would share airspace and chose a strict standard to protect it. Claims are made by States, not by injured persons, through diplomatic channels, and a Claims Commission whose award is binding only if the parties have agreed that it shall be is available if negotiation fails.⁴⁵ The practice is thin. The only fully developed claim, Canada's claim for the radioactive debris of Cosmos 954 in 1978, was settled by negotiation in 1981 for about half the sum Canada had claimed.⁴⁶

For suborbital vehicles the Convention's reach depends on two points that the missing boundary leaves open. The first is whether a suborbital vehicle is a "space object" at all. The Convention defines the term only by saying that it includes component parts of a space object as well as its launch vehicle and parts of the launch vehicle, and it treats attempted launching as launching.⁴⁷ Most commentators conclude that a vehicle launched toward outer space is a space object even if it does not reach orbit, but that conclusion depends on a view of where outer space begins.⁴⁸ The Registration Convention supplies a contrary signal, since it requires registration of objects launched "into earth orbit or beyond," and a suborbital vehicle is therefore outside the register on which jurisdiction under Article VIII of the Outer Space Treaty depends.⁴⁹ The second point is that the answer governs whether the third-party victim relies on the Liability Convention or on the Rome Convention and domestic law. A fragment that falls on a village or an airliner is treated differently depending on whether it came from a space object or an aircraft, and nothing in the instruments says which a hybrid vehicle's debris is.

The problem for passengers is sharper still. The Liability Convention was written for damage caused by one object to another object or to persons outside it. Its fault-based provision covers damage "caused" by a space object of one launching State to persons or property on board the space object of another, and it excludes damage to the nationals of the launching State and to

⁴⁴ Convention on International Liability for Damage Caused by Space Objects arts. II–III, Mar. 29, 1972, 24 U.S.T. 2389, 961 U.N.T.S. 187 [hereinafter Liability Convention].

⁴⁵ Liability Convention arts. VIII–IX, XIV–XX.

⁴⁶ Protocol on Settlement of Canada's Claim for Damages Caused by "Cosmos 954," Apr. 2, 1981, 20 I.L.M. 689 (1981).

⁴⁷ Liability Convention art. I(b), (d).

⁴⁸ LYALL & LARSEN, *supra* note 9.

⁴⁹ Convention on Registration of Objects Launched into Outer Space art. II(1), Jan. 14, 1975, 28 U.S.T. 695, 1023 U.N.T.S. 15 [hereinafter Registration Convention]; Outer Space Treaty art. VIII.

foreign nationals participating in the operation of the space object.⁵⁰ Injury to occupants caused by the failure of their own vehicle is not within the structure of the Convention. There is therefore no international instrument that allocates liability to a paying passenger on a vehicle classed as a space object. If the vehicle is an aircraft in international carriage, the Montreal Convention gives the passenger a regime that cannot be waived. If it is a space object, the passenger is left with the law of contract and tort of whichever State's courts will hear the claim. The same hardware can fall on either side of the line, and so can the same passenger.⁵¹

C. The Status of Spaceflight Participants

The traditional space law concept of the astronaut as an envoy of mankind belongs to a world of State employees. Article V of the Outer Space Treaty requires States to treat astronauts as envoys of mankind and to render them all possible assistance in case of accident, distress or emergency landing, and the 1968 Rescue Agreement elaborates duties of notification, rescue and return in respect of the "personnel of a spacecraft."⁵² Neither instrument defines the person protected, and the better reading of "personnel of a spacecraft" includes private passengers. Whether the Rescue Agreement applies to a suborbital flight depends again on whether the vehicle is a spacecraft launched into outer space, which returns the argument to the missing boundary.⁵³ The jurisdictional position is similarly unsettled. The Tokyo Convention gives the State of registration jurisdiction over offences on board aircraft in flight, and treats an aircraft as in flight from the moment power is applied for take-off until the landing run ends, while Article VIII of the Outer Space Treaty gives the State of registry jurisdiction over a space object and its personnel while in outer space.⁵⁴

The domestic regime that actually governs most commercial passengers rests on a different principle. Under the United States Commercial Space Launch Act as amended in 2004, an operator must inform each spaceflight participant in writing of the risks of the flight and of the fact that the United States government has not certified the vehicle as safe for carrying crew or participants.⁵⁵ The same statute bars the Federal Aviation Administration from regulating the

⁵⁰ Liability Convention arts. III, VII.

⁵¹ Frans G. von der Dunk, *Passing the Buck to Rogers: International Liability Issues in Private Spaceflight*, 86 NEB. L. REV. 400 (2007).

⁵² Outer Space Treaty art. V; Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space arts. 1–4, Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119 [hereinafter Rescue Agreement].

⁵³ COLOGNE COMMENTARY, *supra* note 8; Steven Freeland, *Up, Up and ... Back: The Emergence of Space Tourism and Its Impact on the International Law of Outer Space*, 6 Chi. J. Int'l L. 1 (2005).

⁵⁴ Convention on Offences and Certain Other Acts Committed on Board Aircraft arts. 1(2)–(3), Sept. 14, 1963, 20 U.S.T. 2941, 704 U.N.T.S. 219; Outer Space Treaty art. VIII.

⁵⁵ 51 U.S.C. § 50905(b)(5); 14 C.F.R. § 460.45.

safety of occupants beyond a narrow set of areas during a “learning period” that was meant to end in 2012 and has been extended several times, most recently to January 1, 2028.⁵⁶ Operators must also carry insurance sized to the maximum probable loss to third parties, with federal indemnification above the insured layer, subject to appropriation and a cap.⁵⁷ The logic is that of promotion. It treats passengers as informed risk-takers and not as consumers of a certified service, and it gives them none of the minimum protections that an airline passenger holds under the Montreal Convention. The United Kingdom regulates suborbital activity through licences issued by the Civil Aviation Authority under the Space Industry Act 2018, which brings the flights within a licensing system but does not fix a uniform standard of passenger compensation.⁵⁸ The result is a patchwork in which the right of an injured passenger depends on the flag of the vehicle, the forum, and the enforceability of a waiver under the local law.

D. Safety Certification and Accident Investigation

Safety regimes diverge in the same way. Airworthiness certification, personnel licensing and accident investigation in civil aviation rest on ICAO Annexes that States have accepted and that ICAO audits. For space vehicles there is no international equivalent. A vehicle carrying passengers may receive a launch and re-entry licence that regulates public safety without certifying the vehicle’s safety for its occupants. The loss of SpaceShipTwo in October 2014 showed the gap. The United States National Transportation Safety Board found that the co-pilot unlocked the vehicle’s feather system prematurely, that the design lacked safeguards against a predictable human error, and it made recommendations to the Federal Aviation Administration on human factors and hazard analysis.⁵⁹ The investigation proceeded under national procedures, since Annex 13 on accident investigation concerns aircraft, and a foreign State whose nationals were on board would have had no corresponding right of participation.

BRIDGING INSTITUTIONAL SILOS: ICAO AND UNCOPUOS

A. Two Institutions with Different Powers

The two institutions that touch these flights differ in kind. ICAO is a specialised agency with near-universal membership and with power to adopt Standards and Recommended Practices

⁵⁶ 51 U.S.C. § 50905(c)(9); Cong. Rsch. Serv., IF12508, *Commercial Human Spaceflight Safety Regulations* (updated Feb. 4, 2025).

⁵⁷ 51 U.S.C. §§ 50914–50915.

⁵⁸ Space Industry Act 2018, c. 5 (UK).

⁵⁹ Nat’l Transp. Safety Bd., NTSB/AAR-15/02, *In-Flight Breakup During Test Flight, Scaled Composites SpaceShipTwo, N339SS, Near Koehn Dry Lake, California, October 31, 2014* (2015).

that become binding on member States unless a State notifies a difference.⁶⁰ Its work covers air traffic management, airworthiness, personnel licensing and accident investigation, and it audits implementation through its safety oversight programme. Its competence, however, extends to civil aircraft, and the amendment of the Convention itself requires a two-thirds vote of the Assembly and ratification by two-thirds of the contracting States.⁶¹

UNCOPUOS works differently. It has more than a hundred members and it decides by consensus, which gives each of the major space powers a veto. It produced five treaties between 1967 and 1979, and the last of them, the Moon Agreement, has attracted few parties. Since then its output has been non-binding, in the form of declarations of principles and guidelines on matters such as space debris mitigation and long-term sustainability.⁶² The Committee can produce principles that States accept in outline, but it cannot produce rules that bind them, and it has been unable to agree on a definition of outer space for more than half a century.

The two institutions have already moved toward each other. ICAO's Assembly adopted Resolution A40-26 in 2019 on commercial space transport, under which ICAO is to develop policy guidance where international commercial space transport intersects international civil aviation. In 2025 the Forty-second Assembly considered the integration of space transport operations into airspace, took note of the updated memorandum of understanding with the United Nations Office for Outer Space Affairs, and recognised the challenge that space debris re-entry poses to aviation.⁶³ ICAO's work on higher airspace operations, which takes roughly 60,000 feet as its starting point, has begun to address the layer immediately above conventional air traffic.⁶⁴ These are useful steps, but they are steps taken by two bodies that work to different mandates, in separate workstreams, on the same flights.

The domestic position of a State such as India shows the same divide. India is a party to the Outer Space Treaty, the Rescue Agreement, the Liability Convention and the Registration Convention, and it is an ICAO member with extensive airspace and a growing space sector regulated through IN-SPACE under the Indian Space Policy 2023.⁶⁵ Its civil aviation law was recast by the Bharatiya Vayuyan Adhiniyam, 2024, and, as far as the authors are aware, it had

⁶⁰ Chicago Convention arts. 37, 38, 54(l), 90.

⁶¹ Chicago Convention arts. 3(a), 94(a).

⁶² U.N. Off. for Outer Space Affs., *Status of International Agreements Relating to Activities in Outer Space* (annual).

⁶³ ICAO, Assembly Res. A40-26, *Commercial Space Transport*; ICAO, *Integration During Space Transportation Operations*, *supra* note 14.

⁶⁴ ICAO, Assembly Res. A40-7; ICAO, Assembly Res. A41-9 (higher airspace operations); ICAO, *ICAO's Role in the Safe Integration of Space Activities into the Airspace System*, Info. Paper NACC/DCA/11-IP/36 (2023).

⁶⁵ U.N. Off. for Outer Space Affs., *supra* note 62; Dep't of Space, Gov't of India, *Indian Space Policy-2023* (2023).

not enacted a comprehensive space activities statute at the time of writing. A State in that position must decide how its air and space regulators will treat a reusable suborbital or hypersonic vehicle without an international framework to guide it.

B. Space Traffic Management and Airspace Integration

The practical cost of the divide shows most clearly where launches and aircraft meet. A launch or a failed re-entry requires the closure or restriction of airspace, and the airspace closed is often over several States and over the high seas, each managed by a different air navigation service provider. The debris event over the Caribbean in January 2025 led to diversions and a temporary slowing or stopping of aircraft, and a further Starship failure in March 2025 led to ground stops at four Florida airports whose departures were delayed on average by about 45 minutes.⁶⁶ Each incident was handled by the State with the capacity to act, by closing airspace in the exercise of its Article 9 powers, and not under any agreed international procedure.⁶⁷ Unilateral closure is a legitimate use of sovereign authority, but it puts the cost of the lack of a shared framework on airlines and passengers, and it invites the affected State to respond in kind.

Space traffic management is the label under which proposals for coordination are discussed. The concept has an academic pedigree in the International Academy of Astronautics study of 2006, and it has been taken up in national policy, as in the United States Space Policy Directive-3 of 2018, and in the Legal Subcommittee, which carries an agenda item on its legal aspects.⁶⁸ But the model that already works is air traffic management, with its flight plans, separation standards and information regions, and any space traffic management that stops at the Karman line will have to hand over to it. Without a common legal basis for that handover, each launching State will go on setting its own hazard areas and each air navigation service provider will go on responding as it can.

⁶⁶ Reuters, *SpaceX Starship Failure Prompts Diversions, Florida Airports Ground Stops* (Mar. 7, 2025), <https://www.deccanherald.com/amp/story/world%2Fspacex-starship-failure-prompts-diversions-florida-airports-ground-stops-3436185>.

⁶⁷ Chicago Convention art. 9.

⁶⁸ Corinne Contant-Jorgenson, Petr Lála & Kai-Uwe Schrogl, *The IAA Cosmic Study on Space Traffic Management*, 22 SPACE POL'Y 283 (2006); Space Policy Directive-3, National Space Traffic Management Policy, 83 Fed. Reg. 28,969 (June 21, 2018).

CONCLUSION AND THE WAY FORWARD

A. Why Isolation Between the Regimes No Longer Works

The argument of this paper is that the separation between the air regime and the space regime, which served well when the two did not meet, now produces avoidable harm. The spatialist approach offers a line that no one has accepted and that does not capture hybrid vehicles. The functionalist approach classifies vehicles and says nothing about the rights of the States below them. Customary law supports freedom at the altitude of satellites and sovereignty at the altitude of aircraft and says nothing between them. Passengers and third parties cannot tell which of the Montreal, Rome or Liability Conventions applies, or whether any does. ICAO and UNCOPUOS are each dealing with part of the problem in separate workstreams. These are not separate defects. They are one defect, the absence of a legal regime for the layer through which every suborbital and hybrid vehicle must pass.

B. A Sui Generis Near-Space Transit Regime

The paper proposes that States establish an intermediate zone, between about 20 and 100 kilometres, governed by a regime that is neither the Chicago Convention nor the Outer Space Treaty. The lower limit is chosen because it approximates the upper limit of conventional civil aviation, the starting point of ICAO's work on higher airspace and the lower limit of the high-altitude platform category in the Radio Regulations. The upper limit is chosen because the Karman line is already the focal point of practice and scholarship, and it is used here as the edge of the zone and not as the boundary of sovereignty. The numbers are indicative and the zone is defined by function as well as by altitude. It would apply to vehicles in transit to or from outer space or in aerodynamic or ballistic flight within the band, and it would not alter the legal character of airspace below or of outer space above.

Four features would define it. First, sovereignty would be preserved. The State below would retain its authority over safety, security and the protection of persons and property on its territory, and nothing in the regime would constitute a claim of sovereignty over outer space or a waiver of airspace sovereignty below the zone. Second, transit would be qualified but open. A vehicle that had been authorised by its State of registry under common safety standards, had notified a flight plan to the States and air navigation service providers affected, and was engaged in peaceful civil transit would have a right of passage through the zone. The right would be modelled on Article 5 of the Chicago Convention and on the transit passage regimes of UNCLOS, and it would carry the same safeguards: prescribed routes, the right to require a landing or diversion in case of danger, and no immunity for a vehicle that did not comply.

Third, liability would be unified. The Liability Convention's standard of absolute liability for damage on the surface and to aircraft in flight would apply to every vehicle in transit, so that third-party victims need not first classify the vehicle. For passengers, a minimum non-waivable standard, set at the level of the first tier of Article 21 of the Montreal Convention, would apply to commercial carriage, and national informed-consent regimes would continue to govern risks above it. Fourth, military activity would be dealt with separately. State vehicles would fall outside the transit right, as State aircraft do under Article 3 of the Chicago Convention, but States would accept a duty to refrain from the use of weapons against civil vehicles in transit, extending the reasoning of Article 3 bis.

C. Institutional Reform

The regime requires an institution that can speak to both communities. The paper proposes a joint consultative framework between ICAO and UNCOPUOS, acting through the Office for Outer Space Affairs and building on the memorandum of understanding that the two bodies updated in 2025. Its first task would be technical: a common set of standards for certification of aerospace vehicles carrying persons, a common format for flight plans and hazard areas, and navigation and communication protocols that allow air navigation service providers to track a vehicle from take-off to re-entry. Its second task would be legal: to prepare the text of a protocol, to be opened for signature by States parties to both the Chicago Convention and the Outer Space Treaty, that would give the transit regime a treaty basis.

The route should be staged. Amending the Chicago Convention is slow, and a negotiated treaty will take years. In the interim ICAO can issue guidance under Resolution A40-26 and UNCOPUOS can adopt guidelines on due regard and notification under Article IX of the Outer Space Treaty, so that States and operators have a shared practice that can later be codified. Practice of that kind would also be evidence of the State acceptance on which custom depends.

D. Objections and Limits

Three objections deserve an answer. The first is that States will not concede any limit on sovereignty. The proposal does not ask them to. It preserves the sovereignty of the State below and asks only for a qualified and notified transit right, which is what Article 5 of the Chicago Convention and the straits regime of UNCLOS already give. The second is that the United States and other space powers have resisted any boundary. The proposal does not fix a boundary. It creates a zone whose limits are expressed as indicative figures, and it leaves the legal status of the airspace below and of outer space above untouched. The United Kingdom's

own statement that a boundary is unnecessary to regulate launch is consistent with a regime that regulates the activity and not the line. The third objection is that the proposal adds a third regime to two that already conflict. The answer is that it replaces the improvised practices that now govern the zone with agreed rules, and that it is the absence of any regime in that zone, and not the presence of a new one, that makes the two existing regimes collide.

The proposal has real limits. It does not settle the status of military vehicles. It does not resolve the question of where sovereignty ends, and it deliberately avoids doing so. It would require a measure of agreement among States that have not been able to agree on the definition of outer space for half a century, and the sixtieth anniversary of the Outer Space Treaty in 2027 is a natural occasion for a renewed attempt, but not a guarantee of success.

The vehicles will not wait. Commercial passengers are flying, hypersonic vehicles are being tested and debris from launch failures has already fallen on the territory of States that had no say in the flight. International law can continue to apply two incompatible regimes to one vehicle, and leave operators, passengers and affected States to bear the costs, or it can accept that the band between the air and outer space needs rules of its own. This paper has argued for the second course, and for beginning with an agreed framework of notification, passage, liability and safety, and not with an agreed line.

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