Air & Space Law Norms Governing Space Transportation

by

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INTRODUCTION

In 2004, Space Ship One became the first privately designed, financed and developed spacecraft to fly humans into suborbital space. Plans soon were announced for the development of a fleet of space vehicles to take tourists into space. Though the trip is quite expensive, reservations are robust.

Space tourism is but the threshold step in the commercial development of privately financed and built space transportation systems. Once the technology is developed and has proven safe for the occasional wealthy tourist eager to float weightlessly and gaze down upon mother Earth, it is likely that entrepreneurs will take the next logical step and employ aerospace vehicles as suborbital transportation vehicles, sharply reducing transit times between the world's major cities. As there was once a high-end business and luxury market for the supersonic Concorde, there will be a high-end market for space transportation as well. And as the move from propeller driven aircraft to jet engine powered aircraft revolutionized global transportation, aerospace technology will revolutionize the transportation of persons and cargo around the planet. The suborbital Earth-to-Earth transportation market likely poses the most promising long-term commercial opportunity for aerospace vehicles. Over time, it is likely that space transportation will eclipse space tourism in commercial importance.

Already, one sees increased private entrepreneurial activity in space,. For example, since the 1980s, the United States has encouraged "domestic commercial exploration of space capabilities, technology, and systems for national economic benefit."[1] In the U.S., "greatly increased commercial space activity",[2] private sector transportation systems,[3] and the private commercial launch industry are to be encouraged, facilitated and promoted.[4] With promulgation of the Commercial Space Launch Amendments Act of 2004,[5] the U.S. Congress established a strong policy in favor of promoting commercial launches and launch sites with minimal regulatory oversight.[6]

Though different legal rules may govern the launch of space objects into orbit and beyond, or space tourism, or the movement of State aerospace vehicles such as the Space Shuttle from Earth to space to Earth again, this essay evaluates the narrower question of what legal rules may govern the private commercial transportation of passengers from one State to another via space.

Both the existing regimes of Air Law and Space Law were developed at a time when the technology for Earth-to-Earth aerospace movements did not yet exist. Thus, there is not yet a unified or integrated regime of Aerospace Law, and there appears to be much overlap and inconsistency between the regimes of Air Law and Space Law. At the outset, one must determine which regime applies – Air Law, Space Law, or in some instances, both – and then determine what the governing rules are.

The international legal regime governing air transport on issues such as liability, security, navigation and air traffic management are well developed, and set forth in various conventions, treaties and various "soft law" standards. Five Space Law conventions also define legal rights and duties. Yet is unclear whether space vehicles fall under established principles of Air Law, and if they do, whether these laws follow them into space. Indeed, it unclear where the legal limits of Air Law expire and the regime of Space Law begins.

In instances where both regimes apply, there will be a certain amount of inevitable inconsistency. As commercial aerospace vehicles become more numerous, their use of airspace also inhabited by aircraft will proliferate, creating a need for defined rules of safety, security, and liability.

THE FUNCTIONALIST APPROACH: WHAT IS IT?

One approach to the question of which legal rules govern the movement is to examine what kind of object is in question. Is the vehicle in question an aircraft, a space object, or an aerospace object?

There are several ways to answer this question. One is to identify its purpose and function, or its destination. Is the vehicle's primary purpose for going into outer space for purposes of orbit, the conduct of outer space activities (an Earth-Space mission), or to provide transportation from one point on Earth to another (an Earth-to-Earth mission)? In the former case, arguably it is a space object, while in the latter case, arguably it is an aircraft.

Another approach to answering this question is to consider the technological properties, functional characteristics, design and aerodynamics of the vehicle. Is it capable of acquiring lift through the air, for example?

Aircraft

If it is an aircraft, Air Law applies to it. The *Chicago Convention of 1944*,[7] - the *Magna Carta* of Public International Air Law – does not define what is contemplated by the term "aircraft". In 1967, well before commercial space transportation was feasible, the International Civil Aviation Organization [ICAO] amended Annex 7 to define an *aircraft* as "Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface."[8] This revised definition was aimed at making it clear that all air-cushion-type vehicles, such as hovercraft and other ground-effect machines, should not be classified as aircraft.[9] At the time, no thought apparently was given to the issue of whether an aerospace craft should be placed under ICAO's jurisdiction. ICAO has the authority to amend Annex 7 to include aerospace vehicles within its definition, but as yet, has failed to do so. Thus, under the current definition, an aerospace vehicle launched by rocket would not be considered an aircraft on the ascent phase of its flight, but might well on the descent phase, as it is using its wings to glide to destination.

The *Chicago Convention* exempts State aircraft from its scope.[10] Thus, NASA's

Space Shuttle would fall outside its scope. However, the Convention provides that when issuing regulations for State aircraft, due regard must be given to the navigational safety of civil aircraft.[11]

Given that aerospace vehicles use the same airspace as aircraft, at least for a period of time, it would seem desirable to apply a single regime of air navigation to both. Moreover, ICAO's 17 Annexes to the *Chicago Convention* governing issues such as safety, airworthiness, navigation, licensing, and communications would seem appropriate to govern both aircraft and aerospace vehicles occupying common airspace, rather than reinventing the wheel and crafting wholly new rules to govern only aerospace vehicles.[12] The ICAO Council is evaluating the question of whether it should exert jurisdiction over sub-orbital flight.[13]

Space Object

If the space transportation vehicle is a "space object", presumably Space Law applies to it. However, none of the five Space Law Conventions[14] define precisely what is a space object,[15] and none were drafted with any thought given to commercial space transportation.[16] Presumably, a spacecraft should be capable of moving in outer space (either orbital or suborbital) without any support from the air, and it would have a power source not dependent upon external oxygen.

Aerospace Vehicle

What if the space transportation vehicle is a hybrid aerospace object, one capable of achieving lift and thereby flying in airspace (on ascent, descent, or both), and also traveling in outer space? Thus, a vehicle like the NASA Space Shuttle might be considered a space object during its takeoff supported by rockets, and during the weightless portion of its flight through space, then an aircraft during descent and landing.

It is likely that parts of Air Law and Space Law both apply to such an aerospace object. Some rules of Space Law would apply from launch to landing, while some rules of Air Law would apply during the time the object is in airspace.

Problems with the Functionalist Approach

Because aerospace vehicles share airspace with commercial aircraft, the rules of air safety and navigation must be harmonious. If they operate under two separate regimes, the danger of aircraft and aerospace vehicle collision arises. Moreover, the spatialist approach offers greater certainty as to the legal regime applicable, particularly on the rules of navigation governing commonly used airspace.

THE SPATIALIST APPROACH: WHERE IS IT?

One way of determining what law applies is to assess where the object is. For example, an amphibious vehicle may be subjected to the Law of the Sea when upon the high seas, and subject to the laws governing land transport when it comes ashore. Thus, an aerospace vehicle might be considered a spacecraft while in space, and an aircraft while in airspace.

Yet the two regimes could not be more different. Airspace over national territory is subject to State sovereignty, while States are explicitly denied territorial sovereignty in space.

Territorial Airspace

Article 1 of the *Chicago Convention* affirms the preexisting customary international law rule that each State enjoys complete and exclusive sovereignty in the airspace above its territory.[17] Airspace over territorial seas also belongs to the coastal State.[18] Thus, an object flying through territorial airspace would fall under the domestic aviation laws of the underlying State. Under Chicago's Article 6, scheduled international air services may not enter the airspace of a State without its permission, and subject to any conditions the State may impose.[19] Unlike the high seas, there is no customary right of innocent passage through airspace. Multilaterally, many States have exchanged reciprocal transit rights through the Transit Agreement.[20] Commercial rights are usually exchanged through bilateral air transport agreements.

The *Chicago Convention* defines an *international air service* as "an air service which passes through the air space over the territory of more than one State". An *air service* is defined as a scheduled service performed by aircraft for the movement of passengers or property.[21] The term *aircraft,* however, is undefined in the Convention.

To ensure uniformity of rules of the air, under the *Chicago Convention*, States are obliged to adopt domestic aviation laws that conform to the Standards and Recommended Practices [SARPs] promulgated by ICAO, and included as Annexes to the Convention.[22] States also are obliged to ensure that aircraft flying over their territory or carrying their nationality mark observe the rules and regulations governing flight and navigation there in force.[23] For example, the United States has promulgated laws governing commercial space launches, vehicles, crew, and navigation, vesting jurisdiction in its Federal Aviation Administration [FAA], which has comprehensive jurisdiction over aircraft and aviation safety and navigation.[24] The Federal German Aviation Code also specifies that "spacecraft, rockets and similar flying objects" are considered to be aircraft while in airspace, and thus subject to the prevailing rules and regulations governig aircraft.[25]

The right of innocent passage through territorial airspace for ascending or descending space objects has not been established under either conventional or customary international law. The U.S. Space Shuttle usually ascends and descends over U.S. airspace or over the oceans. On relatively few occasions has a space object flown over the territorial airspace of a State other than the launching State; when territorial airspace has been entered, the reason for the absence of objection usually is because the underlying State was unaware of the territorial intrusion, not because it acquiesced sovereignty over its airspace. On other occasions, entry was requested and granted, as in 1990 when the Soviet Union granted the United States permission to overfly its territory on the final flight stage of the Atlantis shuttle.[26]

Arguably, one could infer such a right during periods of *force majeur* ("accident, distress, emergency, or unintended landing") from the *Rescue Agreement*.[27]

Airspace above the High Seas

Airspace beyond the territorial seas, and above the high seas, is open for use by all. However, under the *Chicago Convention*, the rules governing such airspace are those promulgated by ICAO in SARPs.[28]

Outer Space

The *Outer Space Treaty* provides that the "exploration and use of outer space . . . shall be the province of all mankind."[29] It declares outer space to be the common property of mankind, to be used freely "for exploration and use by all States",[30] and not to be subjected to national appropriation or otherwise subjected to the sovereignty of any State.[31] Thus, outer space is free for use by all.

Certain equatorial States have attempted to assert sovereignty over the geostationary orbit above their territories.[32] But these declarations have not been recognized by other States.

No rule of conventional or customary international law defines where airspace ends and outer space begins. Some have suggested the Karman Line be adopted as the dividing line between airspace and outer space, approximately 100 km above the Earth's surface.[33] Certain national laws, such as the legislation of Australia, define outer space as that above 100 km. Although the issue has been debated at the U.N. Committee on Peaceful Uses of Outer Space [COPUOUS] since 1962, no consensus has been reached.[34] Arguably, both orbital and sub-orbital flights in space, though enjoying the right of free transit, would fall under Space Law.[35]

Problems with the Spatialist Approach

The spatialist approach poses problems as well. One problem is that there is no consensus as to where to draw the line of demarcation between airspace and outer space. Another is that an aerospace vehicle may enter suborbital space for only a short time, while its primary activity and mission is in airspace. Thus, it may be more appropriate to apply Air Law to the entire movement.

WHAT SUBSTANTIVE RULES OF LAW APPLY?

Registration, Safety and Navigation

An aerospace vehicle may be subject to registration both as an aircraft and as a space object.

Under Article 17 of the *Chicago Convention*, an aircraft has the nationality of, and remains subject to, the law of the State where it is registered.[36] Each State's domestic law determines eligibility and criteria for aircraft registration. The registering State has an obligation to ensure that its aircraft observes the rules of air safety and navigation locally in force.[37] It must issue certificates of airworthiness for registered aircraft, and certificates of competency for flight crew.[38] To promote uniformity, States are obliged to promulgate domestic aviation laws

consistent with ICAO SARPs, unless it is impracticable to do so.[39]

Similarly, in Space Law, under the *Registration Convention*, the "launching State" (defined as the State that either launches or procures the launch of a space object, or a State from whose territory or facility such an object is launched),[40] of a space object must register the object in its domestic registry, and with the United Nations.[41] Under the *Outer Space Treaty*, a State on whose registry an object is launched must retain jurisdiction and control over the object and any persons thereon. Ownership of the objects so launched is not changed by their presence in outer space.[42]

Security

The law of aviation security is well developed. *The Tokyo Convention of 1963*[43] gives the aircraft commander and crew authority to suppress an unruly or dangerous passenger, and requires that a hijacked aircraft be restored to the aircraft commander and passengers be permitted to continue their journey. *The Hague Convention of 1970*[44] declares aircraft hijacking to be an international "offense" and requires the State to which an aircraft is hijacked to extradite or exert jurisdiction over the hijacker and prosecute him, imposing "severe penalties" if he is found guilty. *The Montreal Convention of 1971*[45] expands the definition of "offense" to include communications of false information and unlawful acts against aircraft or air navigation facilities, and requires prosecution thereof.

The term "aircraft" is nowhere defined in these treaties, though they are inapplicable to aircraft used for military, police or customs purposes. Thus, it is unclear whether these treaties apply to aerospace vehicles. No comparable international Space Laws exist.

Liability

Depending upon which treaty the State of origin and destination have ratified, the Warsaw system, or the more recent *Montreal Convention of 1999*,[46] applies to the "international carriage" of persons or property by aircraft, though the term "aircraft" is nowhere defined in the treaties. International carriage is defined as transportation between two State Parties to the convention, or between two points in the same State Party where an agreed stopping point is in another State.[47] Hence, the approach is both functionalist and spatialist.

Liability rests with the air carrier for accidents that cause death or physical injury on board the aircraft or during the process of embarking or disembarking.[48] Liability is presumed subject to the ability of the carrier to prove specified defenses. Liability limits were imposed in aviation to facilitate its early development in the *Warsaw Convention of 1929*.[49] The limits of liability are more generous under the *Montreal Convention,* providing presumed liability for damages up to 100,000 SDRs under principles of comparative fault.[50]

The *Rome Convention of 1952* governs surface damage by aircraft. Liability to the owner or operator of the aircraft is limited, based upon the weight of the aircraft.[51]

Unlike the Air Law regime, the international Space Law regime places

liability upon the State rather than the carrier, and provides no liability limits.[52] The *Outer Space Treaty* provides that any State that launches or procures the launch of an object into outer space, and each State from whose territory or facility a space object is launched, is internationally liable for damage to another State or its natural or juridicial persons whether such damage occurs on the Earth, in the air, or in space.[53] A State has international responsibility for its national activities in space, even those conducted by non-governmental entities. Moreover, the State must require authorization and exert continued supervision of such non-governmental space activities.[54]

Under the Liability Convention, the launching State is absolute liable for surface damage or to aircraft flight by a space object.[55] It is liable for negligence if a space object caused damage to persons or property on board a space object of another launching State.[56] There are a few defenses from liability under the Convention. A launching State may be exonerated from absolute liability for surface damage or damage to an aircraft if it proves that the damage resulted, either wholly or partially, from the "gross negligence or from an act or omission done with intent to cause damage on part of the claimant State or of natural or juridicial persons it represents."[57] Also, the launching State is exonerated from liability if the damage is to its nationals, or foreign nationals participating in the operation of the space object.[58]

Certain domestic Space Laws, such as those of the United States, attempt to limit liability for purposes of promotion commercial space activity.

THE NEED FOR A UNIFIED LEGAL REGIME

Future transportation systems will be highly influenced by the legal regime in which they are developed. Commercial development of space would be much enhanced by clarity, stability and predictability of law.[59] Lack of uniformity of law, and conflicting and overlapping laws will impair the market's interest in investment in space transportation, and the insurance industry's ability to assess and price risk.[60]

Commercial investment in space transportation systems is expensive, depends on as yet unproved technology, and is fraught with risk. Clear legal rules can help define the degree, or consequences, of risk, and reduce uncertainty, providing the predictability necessary to support commercial investment. Conversely, legal uncertainty can increase risk, and dampen enthusiasm for investment.

Many commentators have urged that legal rules be refined to take account of commercial needs in space.[61] Some have suggested that the emerging legal regime should be one of Air Law.[62] Others prefer the regime of Space Law.[63] Still others have urged immunity from liability for commercial activities in space for a developmental period.[64]

Probably the simplest, and most sensible initial effort would be for ICAO to amend its Annexes to redefine aircraft to include aerospace vehicles, so that when they fly in airspace with civil aircraft, the rules of safety and navigation are the same.[65]

Beyond that, some clarification of what law applies would be useful. The regimes of liability, for example, are quite different – one recognizing territorial sovereignty, and the other denying it; one imposing limited liability upon the carrier, and the other imposing unlimited liability on the State. These conflicts and inconsistencies may unravel the uniformity of law that the Conventions seek to attain, and inhibit investment in commercial space transportation systems.

The time has come for the international community to promulgate conventional international Space Laws with an eye to facilitating – and indeed, promoting – commercial activity in space. Space transportation would also be facilitated by harmonizing Space Laws with the prevailing rules of safety, navigation, security and liability applicable under Air Law.

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[1] Ronald Reagan, National Space Policy, National Security Decision Directive No. 42 (July 4, 1982). "The United States Government will provide a climate conducive to expanded private sector investment and involvement in civil space activities, with due regard to public safety and national security. " Id.

[2] National Aeronautics and Space Administration Authorization Act of 1986 § 202(3), Pub. L. 99-170, 99 Stat. 1012 (Dec. 5, 1985).

[3] National Aeronautics and Space Administration Authorization Act of 1989 § 101(16)(C), Pub. L. 100-685, 102 Stat. 4083 (Nov. 17, 1988).

[4] Launch Services Purchases Act of 1990, 42 U.S.C. § 2465b.

[5] Pub. L. 108-492.

[6] 49 U.S.C. § 70101(a)(5), (6).

[7] *Convention on International Civil Aviation*, 61 Stat. 1180 (1944), Art. 3(a) [hereinafter Chicago Convention].

[8] Chicago Convention, Annex 7. Moreover, the word *aeroplane* was defined as, "A power-driven heavier-than-air aircraft, deriving its lift in flight chiefly from aerodynamic reactions on surfaces which remain fixed under given conditions of flight." See also, South Africa Aviation Act No. 74 of 1962 § 1.

[9] ICAO, The Concept of Sub-Orbital Flights, Working Paper C-WP/12436 (30/05/05).,available at: http://www.icao.int/ICDB/HTML/English/Representative%20Bodies/Council/Working%20Papers%20by%20Session/175/C.175.WP.12436.EN/C.175.WP.12436.EN.HTM (visited August 1, 2007) [hereinafter ICAO Working Paper].

[10] Chicago Convention, Art. 3(a).

[11] Chicago Convention, Art. 3(d).

[12] Ram Jakhu & Yaw Nyampong, Are the Current International Space Treaties Sufficient to Regulate Space Safety, and Establish Responsibility and Liability? (unpublished paper 2007) [hereinafter Jakhu et al.].

[13] ICAO Assembly Resolution A29-11 provides that ICAO shall continue to be responsible for stating the position of civil aviation on all related outer space matters.

[14] These treaties are: (1) The Treaty on Principles Governing the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies; (2) The Agreement on the Rescue of Astronauts, Return of Astronauts, and the Return of Objects Launched into Outer Space; (3) The Convention on International Liability for Damage Caused by Space Objects; (4) The Convention on the Registration of Objects Launched into Outer Space; and (5) The Agreement Governing the Activities of States on the Moon and other Celestial Bodies. See XXX-II Annals of Air & Space L. (2005).

[15] The Liability and Registration Conventions indicate that a "space object" includes its component parts and its launch vehicle and parts thereof.

[16] ICAO Working Paper, supra. These treaties are: (1) The Treaty on Principles Governing the Exploration and Use of Outer Space including the Moon and Other Celestial Bodies; (2) The Agreement on the Rescue of Astronauts, Return

of Astronauts, and the Return of Objects Launched into Outer Space; (3) The Convention on International Liability for Damage Caused by Space Objects; (4) The Convention on the Registration of Objects Launched into Outer Space; and (5) The Agreement Governing the Activities of States on the Moon and other Celestial Bodies. See XXX-II Annals of Air & Space L. (2005).

[17] Chicago Convention, Art. 1. A nearly identical provision was included in Article 1 of the Paris Convention of 1919.

[18] Chicago Convention, Art. 2. Article 3 of the Law of the Sea Convention extends the jurisdiction of coastal States to 12 miles, while Article 38 establishes a right of transit through the straits for aircraft.

[19] Chicago Convention, Art. 6. Pilotless aircraft also may not be operated over a State's territory without its permission. Chicago Convention, Art. 8. Non-scheduled flights, however, enjoy the right of transit for non-traffic purposes. Chicago Convention; Art. 5. However, the State may establish prohibited areas for reasons of military necessity or public safety. Chicago Convention, Art. 9.

[20] *International Air Services Transit Agreement* (IASTA), ICAO Doc. 7500 (7th December 1944) also known as the Two Freedoms Agreement.

[21] Chicago Convention, Art. 96.

[22] Chicago Convention, Art. 37.

[23] Chicago Convention, Art. 12.

[24] See http://www.faa.gov/about/office_org/headquarters_offices/ast/ (visited August 1, 2007).

[25] Comments of Germany in A/AC.105/635/Add. 11 (Jan. 26, 2005) in COPUOUS, Compilation of Replies Received from Member States to the Questionnaire on Possible Legal Issues with Regard to Aerospace Objects, http://www.unoosa.org/oosa/en/SpaceLaw/aero/index.html (visited August 1, 2007).

[26] Comments of the Russian Federation A/AC.105/635/Add. 1 (Mar. 15, 1996) in Compilation of Replies Received from Member States to the Questionnaire on Possible Legal Issues with Regard to Aerospace Objects in http://www.unoosa.org/oosa/en/SpaceLaw/aero/index.html (visited August 1, 2007). Article 19 of the Russian Federation Act on Space Activity of 1993 authorizes a single innocent flight through its airspace provided sufficient notice of the time, location and flight path is conferred in advance.

[27] *Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space*, opened for signature Apr. 22, 1968, 19 U.S.T. 7570, 672 U.N.T.S. 119, G.A. Res. 2345 (XXII), entered into force on 3 December 1968, 89 ratifications, 25 signatures, and 1 acceptance of rights and obligations (as of January 1, 2007), Art. II.

[28] Chicago Convention, Art. 12.

[29] *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies,* opened for signature Jan. 27, 1967, 19 U.S.T. 2410, T.I.A.S. 6347, 610 U.N.T.S. 205, 6 I.L.M. 386, G.A. Res. 2222 (XXI), opened for signature on 27 January 1967, entered into force on 10 October 1967, 98 ratifications (of January 1, 2007); reprinted in XXX(1) Annals of Air & Space L. 3 (2005) [hereinafter Outer Space Treaty]. http://www.unoosa.org/oosa/en/SpaceLaw/treaties.html (visited July 29, 2007).

[30] Outer Space Treaty Art. 1.

[31] Outer Space Treaty, Art. 2.

[32] The 1967 Bogota Declaration sought to achieve sovereignty by equatorial States over the geostationary orbit above them. See Space Law I.B14.5 (P. Dempsey, ed. Oceana 2006).

[33] Physicist Theodore von Karman calculated that this was the height at which a vehicle would have to travel at orbital velocity to have sufficient lift to derive support from the atmosphere. The air is not adequate to sustain flight at above approximately 80 km, and satellites begin to fall back into the Earth's atmospheres at about 120 km. See Dean N. Reinhardt, The Vertical Limit of State Sovereignty, 72 J. Air L. & Com. 65 (2007).

[34] In fact, COPUOUS has been unable to produce a treaty of any kind since the ill-fated Moon Agreement in 1979.

[35] U.S. law defines a sub-orbital flight as: "The intentional flight path of a launch vehicle, re-entry vehicle, or any portion thereof, whose vacuum instantaneous impact point does not leave the surface of the Earth." 49 U.S.C. § 70102 (20).

[36] Chicago Convention, Art. 17.

[37] Chicago Convention, Art. 12.

[38] Chicago Convention, Art. 31, 32.

[39] Chicago Convention, Art. 37, 38.

[40] *Convention on Registration of Objects Launched into Outer Space* (adopted by the General Assembly in its Res. 3235 (XXIX)), opened for signature on 14 January 1975, entered

into force on 15 September 1976, 47 ratifications, 4 signatures, and 2 acceptances of rights and obligations (as of 1 January 2007), Art. I(a) [hereinafter Registration Convention]. http://www.unoosa.org/oosa/en/SpaceLaw/treaties.html (visited July 29, 2007).

[41] Registration Convention, Art. II. The Secretary General shall maintain a publicly available registry of space objects launched. Registration Convention, Art. III.

[42] Outer Space Treaty, Art. VIII.

[43] *Convention on Offenses and Certain Other Acts Committed on Board Aircraft*, Sept. 14, 1963, 20 U.S.T. 2941, T.I.A.S. No. 6768, 704 U.N.T.S. 219, *reprinted in* 58 Am. J. Int'l L. 566 (1959) [hereinafter Tokyo Convention].

[44] *Convention for the Suppression of Unlawful Seizure of Aircraft*, Dec. 16, 1970, 22 U.S.T. 1641, T.I.A.S. No. 7192, *reprinted in* 10 I.L.M. 133 (1971) [hereinafter Hague Convention]. All subsequent cites are to the materials reprinted.

[45] *Convention for the Suppression of Unlawful Acts against the Safety of Civil Aviation*, Sept. 23, 1971, 24 U.S.T. 567, 974 U.N.T.S. 177 (entered into force on Jan. 26, 1973, with 150 ratifications). *See Paul Dempsey, William Thoms & Robert Hardaway, Aviation Law & Regulation* § 9.13 (Butterworth 1993).

[46] *Convention for the Unification of Certain Rules for International Carriage by Air*, opened 28 May 1999, ICAO Doc. 9740 [hereinafter Montreal Convention]. The Convention entered into force on November 4, 2003.

[47] Id. Art. 1(2).

[48] Id. Art. 17.

[49] *Convention for the Unification of Certain Rules Relating to International Transportation by Air*, 12 October 1929, 137 L.N.T.S. 11, 49 Stat. 3000, TS No. 876, ICAO Doc. 7838 [hereinafter Warsaw Convention].

[50] See Paul Dempsey & Michael Milde, International Air Carrier Liability: The Montreal Convention of 1999 (McGill 2005).

[51] The *Rome Convention of 1952* attempted to govern liability for surface damage by air transportation. Convention on Damage Caused by Foreign Aircraft to Third Parties on the Surface, Signed at Rome on 7 October 1952 (ICAO Doc 7364). The Rome Convention provides air operator liability for any person suffering damage on the surface who proves that "the damage was caused by an aircraft in flight or by any person or thing falling therefrom . . . ." Id. Art. 1, 2. The Convention excludes from recovery anyone who wrongfully caused the damage. Id. Art. 6. The Rome Convention limits liability to a maximum of about $33,000 per passenger, or up to $700,000 per incident, depending upon the weight of the aircraft. Id. Art. 11. But liability for intentional harm perpetrated by the aircraft operator's employees, acting within the scope of their employment, is unlimited. Id. Art. 12. However, there is no liability "if the damage is the direct consequence of armed conflict or civil disturbance . . . ." Id. Art. 5.

[52] However, certain national laws, such as those of the United States, attempt to limit the liability of space transportation providers.

[53] Outer Space Treaty, Art. VII.

[54] Outer Space Treaty, Art. VI.

[55] *Convention on International Liability for Damage Caused by Space Objects*, adopted by the General Assembly in its Res. 2777 (XXVI)), opened for signature on 29 March 1972, entered into force on 1 September 1972, 84 ratifications, 24 signatures, and 3 acceptances of rights and obligations (as of 1 January 2007) Art. II [hereinafter Liability Convention]. http://www.unoosa.org/oosa/en/SpaceLaw/treaties.html (visited July 29, 2007). See generally, Dimitri Maniatis, The Law Governing Liability for Damage Caused by Space Objects, XXII-1 Annals of Air & Space L. 369 (1999).

[56] Liability Convention, Art. III. States which jointly launch a space object are jointly and severally liable for any damage they may cause. Id. Art. V(1).

[57] Liability Convention, Art. VI(1). However, this defense is not available if the activities of the launching State are not in conformity with principles of international law. Id. Art. VI(2).

[58] Liability Convention, Art. VII.

[59] See generally, Stephan Hobe, Aerospace Vehicles: Questions of Registration, Liability and Institutions, XXIX Annals of Air & Space L. 377 (2004) [hereinafter Hobe].

[60] What is needed is a "secure framework of regulations and legal responsibility ... [to] encourage increased activities in the future." Peter Nesgos, Commercial Space Transportaton: A New Industry Emerges, XVI Annals of Air & Space L. 393, 412 (1991).

[61] Henri Wassenbergh, Access of Private Entities to Airspace and Outer Space, XXIV Annals of Air & Space L. 311, 325 (1999); Henri Wassenbergh, The Art of Regulating International Air & Space Transportation, XXIII Annals of Air & Space L. 201 (1998); Bruce Stockfish, Space Transportatin and the Need for

New International Legal and Institutional regime, XVII-II Annals of Air & Space L. 323 (1992).

[62] Charity Ryabinkin, Let There Be Flight: It's Time to Reform the Regulation of Commercial Space Travel, 69 J. Air L. & Com. 101 (2004).

[63] 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). Blending functionalist and spatialist principles, Prof. Freeland argues, "the most appropriate approach seems to be the application of space law . . . to the entire journey on the basis of the proposed function of the spacecraft carrying tourists -- that is, the intention that it involves flight in outer space. The alternate 'exclusive' approach -- to apply air law to the entire space tourism activity -- appears unworkable given the lack of sovereignty that exists in outer space." Id. at 9. Prof. Hobe makes a similar argument: "the provisions of the Chicago Convention are based on the principle of sovereignty in national airspace and are therefore generally not applicable to activities which take place in outer space." Hobe, supra at 382. Similarly, Prof. Zhao argues, "The air transportation regime, characterized by state sovereignty over air space, substantially differs from the space travel regime . . . . This fundamental difference justifies the necessity of developing a distinct legal regime for space travel." Yun Zhao, Developing a Legal Regime for Space Tourism: Pioneering a Legal Framework for Space Commercialization (Am. Institute of Aeronautics and Astronautics 2005). It is unclear why it is unworkable to have an Air Law regime apply to non-territorial outer space, inasmuch as a sophisticated body of both Public and Private International Air Law has developed involving intercontinental flights over the high seas, where no state has sovereignty. Over the high seas, which comprise more than 70% of the planet, the rules of the air are those established by ICAO. See *Chicago Convention,* Art. 12.

[64] Susan Trepczynski, The Benefits of Granting Immunity to Private Companies Involved in Commercial Space Ventures, XXXI Annals of Air & Space L. 381, 403 (2006).

[65] Jakhu, et al, supra.