

Black Market Launches of Small Satellites

A New Challenge for the Space Law Regime

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Abstract

Small satellites encompass a spectrum of space objects with various designations but generally the category refers to space objects having a mass of less than 500 kg. Small satellites can perform certain functions of larger satellites but for a shorter temporal duration and, for now, lesser efficiency. These objects are generally placed into orbit as part of a secondary payload on other space launches and are often deployed in groups referred to as a constellation. As more cost efficient means emerge for deploying small satellites, it is reasonable to anticipate a corresponding proliferation in their use among non-state actors. This opens the door for conduct by non-state actors which can encompass black market launches.

The Outer Space Treaty and the Liability Convention are each predicated on the launch of space objects under the auspices of a State or a governmental organization. Accordingly, a black market launch is best defined as the placement of an object in space without any governmental oversight or knowledge. Such launches will become plausible upon the anticipated development and proliferation of technology which allows launching small satellites into orbit from aircraft, high altitude balloons or other alternative platforms.

This paper will examine the concept of black market launches of small satellites and analyze the associated issues of State responsibility under the Outer Space Treaty Article VI, State liability under Liability Convention and the legality of a State removing a space object placed into orbit by a black market launch.

I. Introduction

The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (“Outer Space Treaty”)¹ is the cornerstone of the international space legal framework. Its principles are expanded by, the Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched

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1 Entered into Force Oct. 10, 1967, 18 UST 2410; TIAS 6347; 610 UNTS 205; 6 ILM 386 (1967).

into Outer Space (“Rescue Agreement”),² the Convention on International Liability for Damage Caused by Space Objects (“Liability Convention”),³ the Convention on Registration of Objects Launched into Outer Space (“Registration Convention”),⁴ and the Agreement Governing the Activities of States on the Moon and Other Celestial Bodies (“Moon Treaty”).⁵ These five treaties comprise the space law treaty regime which establish the international framework for regulating space activities.

The space law treaty regime predicates launching of space objects as being under the auspices of a State.⁶ Indeed, Outer Space Treaty Article VII,⁷ Liability Convention Article 1(c)⁸ and Registration Convention Article 1(a)⁹ each defines the term “launching State” as being:

1. A State that launches a space object, or
2. A State that procures the launch of a space object, or
3. A State from whose territory a space object is launched or
4. A State from whose facility a space object is launched.

This State centric regime does not contemplate launches without State supervision or authorization.¹⁰ The re-emergence of Small Satellites (“SmallSats”)¹¹ will, in time, undermine this premise.

2 Entered into Force Dec. 3, 1968, 19 UST 7570; TIAS 6599; 672 UNTS 119; 7 ILM 151 (1968).

3 Entered into Force Sept. 1, 1972, 24 UST 2389; TIAS 7762; (961 UNTS 187; 10 ILM 965 (1971).

4 Entered into Force Sept. 15, 1976, 28 UST 695; TIAS 8480; 1023 UNTS 15; 14 ILM 43 (1975).

5 Entered into Force July 1, 1984, 1363 UNTS 3; 18 ILM 1434 (1979).

6 See Steven Freeland and Michael Davis, *Space treaties are a challenge to launching small satellites in orbit* at 2, the conversation.com, (April 16, 2015) available at <http://theconversation.com/space-treaties-are-a-challenge-to-launching-small-satellites-in-orbit-37971> (last visited Sept. 20, 2016).

7 The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies entered into Force Oct. 10, 1967, 18 UST 2410; TIAS 6347; 610 UNTS 205; 6 ILM 386 (1967).

8 The Convention on International Liability for Damages Caused By Space Objects, entered into Force Oct. 10, 1967, 18 UST 2410; TIAS 6347; 610 UNTS 205; 6 ILM 386 (1967).

9 Convention on Registration of Objects Launched into Outer Space, entered into Force Sept. 15, 1976, 28 UST 695; TIAS 8480; 1023 UNTS 15; 14 ILM 43 (1975).

10 See Freeland and Davis, *supra* Note 6, at 3-4.

11 Smallsats are not new. Rather they are the contemporary reincarnation of the initial artificial space object, Sputnik 1 launched on October 4, 1957, which was a 58.0 cm-diameter aluminum sphere having a mass of 83.6 kg. *Sputnik 1 – NSSDC/COSPAR ID: 1957-001B*, NASA National Space Science Data Center, nasa.gov published at <http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1957-001B> (last visited Oct. 4, 2015).

SmallSats accelerate access to and use of outer space by all categories of non-governmental actors as they lower the costs and overhead associated with non-crewed space objects. Additionally, the advent of new technologies will broaden the scope and nature of SmallSat endeavors. In fact, some envision that within the next generation SmallSats will transition into a consumer product like previous innovations associated with technological advances in the communication and informational industries such as radio, television, personal computers and mobile phones.¹² It has been specifically noted that the potential of SmallSats can be likened “to the way mobile phones have transformed terrestrial communications over the decades.”¹³

SmallSat is essentially a generic term referring to a space asset having a mass of less than 500 kg.¹⁴ SmallSats are normally deployed in a collective referred to as a constellation or swarm¹⁵ which operate in unison to accomplish a common goal.¹⁶ There are various sub-categories of SmallSats designated as Mini Satellites (“Minisats”), Micro Satellites (“Microsats”), Nano Satellites (“Nanosats”), Pico Satellites (“Picosats”), Femto Satellites (“Femtosats”)¹⁷ and Spires.¹⁸ Although the definitions for these varying sub-categories are arbitrary, the object’s mass generally serves as the point of differentiation among SmallSats.¹⁹ A SmallSat’s mass for classification purposes is based on

12 Leonard David, *Small Satellites Prompt Big Ideas for Next 25 Years* at 4, space.com (Oct. 17, 2011) published at <http://www.space.com/13283-small-satellites-cubesats-research-technology.html> (last visited Oct. 4, 2015). It is anticipated that individuals will have a personal link to their personally owned SmallSat. *Id.*

13 Freeland and Davis, *supra* note 6, at 2.

14 Zach Rosenberg, *The Coming Revolution in Orbit – How space went from a superpowers-only club to a DIY playground* at 1, foreignpolicy.com (March 12, 2014) http://www.foreignpolicy.com/articles/2014/03/12/the_coming_revolution_in_orbit_space_diy (last visited Oct. 4, 2015). For instance, the U.S. Defense Advanced Research Projects Agency refers to SmallSats as “LightSats,” the U.S. Naval Space Command calls them SPINsats (Single Purpose Inexpensive Satellite Systems), while the U.S. Air Force refers to them as TACsats (Tactical Satellites). *Satellite Mass Categories*, The World of David Darling, Encyclopedia of Science, http://www.daviddarling.info/encyclopedia/S/satellite_mass_categories.html (last visited Oct. 4, 2015).

15 Declan Butler, *Many eyes on Earth*, nature.com (Jan. 8, 2014) <http://www.nature.com/news/many-eyes-on-earth-1.14475>.

16 *Id.*

17 Leonard David, *supra* note 12.

18 *See Nanosats are go!* at 2, Economist.com (June 7, 2014), <http://www.economist.com/news/technology-quarterly/21603240-small-satellites-taking-advantage-smartphones-and-other-consumer-technologies> (last visited Oct. 4, 2015).

19 Sa’id Mosteshar, *Authorization of Small Satellites Under National Space Legislation* at 1, *Small Satellites: Chances and Challenges* Faculty of Law, University of Vienna (March 29, 2014) published at www.spacelaw.at/documents/2014/6_Authorization_Mosteshar.pdf.

its in-orbit fully fueled mass.²⁰ Minisats' mass range between 100 and 500 kg.²¹ Microsats have a mass between 10 and 100 kg.²² Nanosats have a mass of 1 to 10 kg.²³ Picosats possess a mass of 10g to 1 kg while the mass of Femtosats is less than 10 g.²⁴ Spires are about the size of a postage stamp and they contain all the essentials for a satellite such as a radio, a solar cell and instruments.²⁵ It is estimated that about 100 Spires can fit inside a Cube Satellite ("CubeSat").²⁶ While CubeSats ("CubeSats") come within the SmallSat classification, they are not truly a distinct sub-category as their name derives from their design and not their mass. Cubesats normally fall within the nanosat or picosat classification.²⁷ The Cubesat design, however, is the standard most utilized by SmallSats.²⁸ A newer design known as a Tube Satellite ("TubeSat") is emerging to compete with the CubeSat design.²⁹ TubeSats are a low cost alternative to CubeSats and have a maximum mass of 0.75 kg.³⁰ Over time, newer categories and classifications will probably emerge.

SmallSats are currently deployed in space under the auspices of a State as a secondary payload on a traditional launch vehicle or from the International Space Station ("ISS"). These launch methods "can be prohibitively expensive for an organization, at several times the cost" of the SmallSat.³¹ As a consequence, the SmallSat industry is developing launch and deployment systems specifically tailored for SmallSats.³² Air launch systems are currently the fashionable alternative being designed to accommodate SmallSats. One

20 *Satellite Mass Categories*, *supra* note 14.

21 *Id.*

22 *Id.*; Sa'id Mosteshar, *supra* note 19, at 1.

23 *Id.*

24 Sa'id Mosteshar, *supra* note 19 at 1; *Satellite Mass Categories*, *supra* note 14.

25 *Nanosats are go!*, *supra* note 18, at 2.

26 Alan Farnham, *Do-It-Yourself Satellites: Put Yours In Orbit For \$1,000 And Up* at 2 abcnews.go.com (Sept. 6, 2012) <http://abcnews.go.com/Business/cheap-space-satellites/story?id=17165740> (last visited on Oct. 4, 2015).

27 Matthew Kivel, *Sometimes, Smaller is Better*, aerospace.org (Aug. 14, 2013) published at <http://www.aerospace.org/2013/08/14/sometimes-smaller-is-better/>.

28 *See Nanosats are go!* *supra* note 18, at 1-2.

29 Brian Dodson, *Launch Your own satellite for US\$8000* at 2-3, gizmag.com, (Aug. 22, 2012) <http://www.gizmag.com/tubesat-personal-satellite/22211/> (last visited on Oct. 4, 2015).

30 *Id.* at 2.

31 NASA Space Academy at Glenn Research Center, *Proposal for a Balloon Assisted Launch System*, NASA Space Academy at Glenn Research Center, space-academy.grc.nasa.gov, (2008) available at <https://space-academy.grc.nasa.gov/y2008/group-project/proposal-for-a-balloon-assisted-launch-system/>.

32 Jeff Foust, *Small satellites, small launchers, big business?* at 4, Space.com (Aug. 11, 2014) <http://www.thespacereview.com/article/2577/1> (Last visited on Sept. 18, 2016).

such launch platform uses aircraft,³³ while another employs high altitude balloons.³⁴ Launching SmallSats from a dedicated launcher such as an aircraft or a high altitude balloon, rather than as a secondary payload or from the ISS, vests SmallSat operators with the flexibility to specify the launch date, launch site and “the exact orbital parameters” the operator desires.³⁵ It also drastically reduces the cost of placing SmallSats into orbit.³⁶ This innovation will not only generate an exponential growth of the SmallSat industry, but it will also create the opportunity for enterprising non governmental actors to launch and deploy SmallSats without governmental oversight, supervision or approval.

The anticipated proliferation and consumerization of SmallSats arising from the development of low cost alternative launch platforms are viewed by some as presenting a new challenge to the space law treaty regime³⁷ as it “democratizes” access to space³⁸ and thereby unleashes “the most powerful force in the universe – human creativity.”³⁹ As has been aptly noted, the emergence of SmallSats and the “instruments that they can carry into space opens up a plethora of possibilities, many of which we are simply not in a position to comprehend or even imagine at this point.”⁴⁰ History teaches, however, that human creativity does not always confine itself to the protocol, procedures, regulations and norms adopted or recognized by a State or the community of nations. Accordingly, human ingenuity can and, in all likelihood, will eventually result in some non governmental actors circumventing the framework established by the space law treaty regime

33 Stephen Dowling, *The 1950s jet launching tiny satellites*, bbc.com (Aug. 29, 2016) <http://www.bbc.com/future/story/20160826-the-1950s-jet-launching-tiny-satellites> (last visited Sept. 20, 2016). See Denise Chow, *Can Billionaire Paul Allen's Mega-Plane Really Launch Private Rockets Into Space?*, Space.com, (Dec. 16, 2011) <http://www.space.com/13954-paul-allen-stratolaunch-megaplane-space.html> (last visited on Oct. 5, 2015); Jeff Foust, *supra* note 32.

34 Tarek Bazley, *Ballon Space Launch System Could Open Space To All*, Al Jazeera English, Science & Technology (May 24, 2015) <http://www.aljazeera.com/news/2015/05/balloon-space-launch-system-open-space-150524084640258.html>.

35 George Whitesides, *Op-ed | Launching the Small-satellite Revolution*, spacenews.com (May 11, 2015) <http://spacenews.com/op-ed-launching-the-small-satellite-revolution/> (last visited Oct. 5, 2015).

36 See Bazley, *supra* note 34 (noting that 75% of the rocket cost for a satellite launch is incurred within the first 3 minutes).

37 Freeland and *supra* note 6 at 1-7.

38 Nitorina Andoni and Federico Bergamasco, *To Orbit and Beyond: The Risks and Liability Issues From the Launching Of Small Satellites at 2*, presented at the 65th IAC in Toronto Canada on October 2014, paper to be published in the Proceedings of the 57th (2014) Colloquium on the Law of Outer Space, International Institute of Space Law (Eleven International Publishing). See Zach Rosenberg, *supra* note 14.

39 Declan Butler, *supra* note 15 quoting Matt Bille, an associate with Booz Allen Hamilton in Colorado Springs, Colo.

40 Freeland and Davis, *supra* note 6, at 1.

regulating access to space. This paper will examine the ramifications of SmallSat launches conducted in contravention of governmental oversight or approval as contemplated by the space law treaty regime.

II. Black Market Launches and the Space Law Regime

The term “Black Market” refers to a transaction or activity conducted without official government consent or control which violates national and/or international law.⁴¹ Black markets exist for a diverse range of activities at the international level. They include nuclear technology,⁴² art,⁴³ antiquities,⁴⁴ drugs,⁴⁵ animals,⁴⁶ body parts,⁴⁷ babies,⁴⁸ movement of people (human trafficking),⁴⁹ smartphones,⁵⁰ e-waste,⁵¹ and oil.⁵² Space related activities are not immune to black market transactions. For instance, satellite

41 “An illegal black market trade occurs when there is a “clear violation of national and/or international law and without official government consent or control.” Jorene Soto, *Show Me The Money, Part II – The Application of the Asset Forfeiture Provisions of the U.S. Arms Export Control Act and the RICO Act and Suggestions for the Future*, 13 Or. Rev. Int’l L. 141, 146 (2011) citing Small Arms Survey 2001: Profiling The Problem, Ch. 5 (2001), available at <http://www.smallarmssurvey.org/publications/bytype/yearbook/small-arms-survey-2001.html>.

42 Thomas Burch, *Non-State Actors In The Nuclear Black Market: Proposing An International Legal Framework For Preventing Nuclear Expertise Proliferation & Nuclear Smuggling By Non-State Actors*, 2 Santa Clara J. Int’l L. 84 (2004).

43 David N. Chang, *Stealing Beauty: Stopping The Madness Of Illicit Art Trafficking*, 28 Hous. J. Int’l L. 829, 832-838 (Spring 2006).

44 Alia Szopa, *Hoarding History: A Survey of Antiquity Looting and Black Market Trade*, 13 U. Miami Bus. L. Rev. 55, 65 (Fall/Winter 2004); Sue J. Park, *The Cultural Property Regime In Italy: An Industrialized Source Nation’ Difficulties In Retaining And Recovering Its Antiquities*, 23 U. Pa. J. Int’l Econ. L. 931, 954 (Winter 2002).

45 Steven Wisotskya, *Exposing The War on Cocaine: The Futility and Destructiveness of Prohibition*, 1983 Wis. L. Rev. 1305, 1306 (1983).

46 Shennie Patel, *The Convention on International Trade in Endangered Species: Enforcement and the Last Unicorn*, 18 Hous. J. Int’l L. 157, 168 n. 68 (Fall 1995).

47 Michele Goodwin, *Formalism and the Legal Status of Body Parts*, U. Chicago. Legal Forum. 317, 320 (2006).

48 Linda Jean Davie, *Babies and Barristers: Legal Ethics and Lawyer-Facilitated Independent Adoptions*, 12 Hofstra L. Rev. 933, 937 n. 26 – 938 (Summer 1984).

49 Aristides Díaz-Pedrosa, *A Tale of Competing Policies: The Creation of Havens for Illegal Immigrants and the Black Market Economy In the European Union*, 37 Cornell Int’l L.J. 431(2004).

50 William P. Schmitz, Jr, *A Fix for the Smartphone Glitch: Consumer Protection By Way of Legislative “Kill Switch,”* U. Ill. L. Rev. 285, 289-90 (2016).

51 Erin McIntire, *The International Tribunal For E-Waste: Ending The Race Towards Lethal Fallout*, 5 Seattle J. Envtl. L. 75, 92-102 (2015).

52 Crystal M. Flinn, *Black Gold in the Black Market: Tackling the Issue of International Oil Smuggling Through Technology, Public Policy, and Internal Corporate Controls*, 51 Tex. Int’l L.J. 119 (Summer 2016).

transmission decoder and satellite dishes have been a staple of black market transactions for more than 40 years or since the onset of satellite television in the 1970s.⁵³ Even more so, it is said that one of the motivations for the United States desiring Russian participation in the International Space Station was because Russian inclusion would “diminish the risk that the former Soviet Union’s space and rocket technology would be sold on the black market to states possibly hostile to America.”⁵⁴

Given the extensive range of international black market activities which include activities related to satellites and rockets, it is reasonable to conclude that SmallSats will eventually generate “black market launches.” A black market launch is best defined as the intentional launch or deployment of a space object without any governmental supervision or approval in contravention of domestic or international law. The event horizon for black market launches is foreseeable especially given the alternative launch platforms being developed by private actors. For instance, companies such as Virgin Galactic, Stratolaunch Systems, Firefly Space Systems and Rocket Lab are actively researching and developing technology to launch SmallSats from aircraft⁵⁵ while companies such as Zero2Infinity are researching, developing and testing technology to launch SmallSats from high altitude balloons.⁵⁶ SmallSat launch platforms will materialize sooner rather than later. This evolution in technology will eventually give rise to SmallSat launches by black market launches which will probably be undertaken by people or entities:

1. who believe that they possess the right to access space without governmental approval or supervision because space is the province of all mankind and no State can exercise sovereignty in outer space; or
2. who seek to further a criminal enterprise; or
3. who seek to further terrorist activity, freedom fighter activity or some other political agenda; or
4. who possess some personal or business agenda or motivation.

53 Stephen Keating, *File-Sharing, Copyright, and Privacy*, 25 Hastings Comm. & Ent L.J. 697, 697 (Spring-Summer 2003); Mei Ning Yan, *China and the Prior Consent Requirement: A Decade of Invasion and Counter-Invasion By Transfrontier Satellite Television*, 25 Hastings Comm. & Ent. L.J. 265, 292 (Winter 2003).

54 Lori Magee Laird, *Space Resuscitation: Capitalism to the Rescue? When International Cooperation Becomes International Complication*, 12©WTR Currents: Int’l Trade L.J. 87, 93 (Winter 2003).

55 See Samantha Masunaga, *Small satellites are back, with down-to-earth expectations*, LA times.com (May 27, 2016) <http://www.latimes.com/business/la-fi-adv-small-satellites-20160519-snap-story.html>; Foust, *supra* note 32.

56 Caleb Henry, *Zero2infinity Lays Out Goals for Balloon-Rocket Launch System*, satellitetoday.com (March 26, 2016) <http://www.satellitetoday.com/launch/2016/03/23/zero2infinity-lays-out-goals-for-balloon-rocket-launch-system/> (last visited Sept. 20, 2016).

For sure, resort to a black market launch can simply be the product of a person or entity not wanting to satisfy the onerous and burdensome national barriers placed on the launch of space objects such as the insurance and financial responsibility obligations.⁵⁷ Nevertheless, whatever the motivations, reasons or classification of the non-governmental actor, a black market launch will implicate issues of State liability, State responsibility and State jurisdiction as established by the space law treaty regime. A brief examination of each of these concepts will assist in understanding the challenges posed by black market launches of SmallSats.

II.A. Black Market Launches and State Liability

Outer Space Treaty Article VII imposes international liability on a State for damage⁵⁸ caused by a space object it is deemed to have launched or attempted to launch. Specifically, Article VII reads as follows:

“[e]ach State Party to the Treaty that launches or procures the launching of an object into outer space, including the Moon and other celestial bodies, 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 or its component parts on the Earth, in air space or in outer space, including the Moon and other celestial bodies.”

The Liability Convention establishes the framework for the application and scope for the international liability imposed by Outer Space Treaty Article VII.

Liability Convention Articles II through VII allocate fault and set the criteria for applying absolute or strict liability, shared liability, apportioned liability and exoneration of liability. The *locus* of the damage occurrence determines which liability scheme applies.⁵⁹

Articles II through VII allocate fault and set the criteria for applying absolute or strict liability, shared liability, apportioned liability and exoneration of

57 Freeland and Davis, *supra* note 6, at 2 and 6.

58 Liability Convention Article 1(a) Article 1(a) defines “damage” to mean “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 measure of recovery for damage is “determined in accordance with international law and the principles of justice and equity, in order to provide such reparation in respect of the damage as will restore the person, natural or juridical, State or international organization on whose behalf the claim is presented to the condition which would have existed if the damage had not occurred.” Liability Convention Article XII. There is not any financial limitation on the amount of recovery. However, it is unclear whether the recovery is limited to direct damages or whether it can include indirect damages. Carl Q. Christol, *International Liability For Damage Caused By Space Objects*, 74 *American Journal of International Law* 346, 360-362 (1980).

59 Liability Convention, Article VI(2).

liability. The *locus* of the damage occurrence determines which liability scheme applies. Article II imposes absolute or strict liability for damage “caused by” a space object on the surface of the Earth or to aircraft in flight. Article III provides for liability of a launching State when a space object causes damage in space or on a celestial body and the damage is “due to the fault” of the launching State or “the fault of persons” for whom the launching State is responsible. Articles IV and V address the allocation of fault between or among launching States when more than one launching State may be responsible for the damage, whereas Article V imposes joint and several liability “[w]henver two or more States jointly launch a space object.”

Articles VI and VII set forth the basis for exoneration from and defenses to liability. Exoneration from absolute liability occurs under Article VI if a launching State proves that the damage resulted wholly or partially, from gross negligence or an intention act or omission by the claimant State or natural or juridical persons on whose behalf it has brought the claim.⁶⁰ However, such exoneration is not available if the activities of a launching State were not in conformity with international law or the space law treaty regime. Article VII provides a defense to international liability for damage “caused by” a space object if the damage is suffered by a national of the launching State or to foreign nationals who participated in or associated with certain activities involving the space object. The Liability Convention does not contain a defense to or exoneration from liability based on a surreptitious launch lacking governmental supervision or consent.

As seen, the status of launching State is key to imposing liability under Outer Space Treaty Article VII and the Liability Convention. This means the definition of “launching State” sets the parameters for whether State liability exists for damage caused by a surreptitiously launched SmallSat. The fundamental act associated with being classified as a launching State is the launch of a “space object.” While the Liability Convention does not contain a precise definition of the term “space object,” Article 1(d) provides that a “space object” includes “component parts of a space object as well as its launch vehicle and parts thereof.” Despite the lack of a precise definition, the international community reflects tacit knowledge that the term “space object” encompasses an artificial object designed for movement or placement in outer space.⁶¹ SmallSats come within this definition.⁶²

⁶⁰ *Id.*, Article VI(1).

⁶¹ James P. Lampertius, *The Need For An Effective Liability Regime For Damage Caused By Debris In Outer Space*, 13 Mich. J. Int'l L. 447, 453 n. 48 (Winter 1992) citing W.F. Foster, *The Convention on International Liability for Damage Caused by Space Objects*, 10 Can.Y.B. Int'l L. 137, 145 (1973) [examining the various draft definitions submitted to the Legal Sub-Committee of the Liability Convention].

Since it is reasonable to view SmallSats as space objects, the issue surfaces as to whether how a SmallSat accesses space is relevant to its classification as a space object. The Liability Convention's definition of "space object" does not contain any qualification or restriction on how a space object accesses or attempts to access space. Since the definition is not contingent on how an artificial object accesses outer space, it is reasonable to conclude that a surreptitiously launched SmallSat remains a "space object" for purposes of the Liability Convention. This presents the key question of whether exposure exists under the Liability Convention for a SmallSat launch that is neither sanctioned nor authorized by a State.

By definition, a black market launch is not sanctioned, authorized or procured by a State.⁶³ This means State liability for a space object launched on the black market exists only if the launch occurred from the State's territory or from a State facility.

If some reason a black market launch occurs in the territory of a State instead of on the high seas or in another global commons, then the plain language of Liability Convention Article 1(c) imposes State liability for damage caused by the space object. This clarity is lacking with respect to the term "facility" as neither the Outer Space Treaty nor the Liability Convention defines the term "facility."⁶⁴ The tacit understanding in the space community appears to be, at a minimum, that the term facility refers to a spaceport or launch site.⁶⁵ It is unclear how broad or narrow the term "facility" is defined for launching State purposes. This suggests that it may have to be resolved at some future time whether a registered aircraft or balloon used for a black market launch is a "State facility" if they do not constitute the territory of a State.

State liability for a black market launch by aircraft or balloon depends upon whether the aircraft or balloon can be construed as the territory or a facility of a State. To this extent, it should be noted that by definition, the term "space object" includes "component parts of a space object *as well as its launch vehicle and parts thereof*."⁶⁶ A strong argument therefore exists that the aircraft or balloon being used for a SmallSat launch is a launch vehicle or part of a launch vehicle. If for some reason, a registered aircraft or balloon is used for a black market launch, then the State of Registry may very well be

62 See Andoni and Bergamasco, *supra* note 38, at 6-7. While a contrary argument can be made, *id* at 7, any such argument, in all likelihood, would prove unavailing and unpersuasive.

63 *Supra* at 2-3.

64 The Registration Convention also does not define the term "facility."

65 Michael C. Mineiro, *Law And Regulations Governing U.S. Commercial Spaceports: Licensing, Liability, And Legal Challenges*, 73 J. Air L. & Com. 759, 770 and 770 n. 78 (Fall 2008); Caley Albert, *Liability in International Law and the Ramifications on Commercial Space Launches and Space Tourism*, 36 Loy. L.A. Int'l & Comp. L. Rev. 233, 246 (Fall 2014).

66 Liability Convention Article 1(d) (emphasis added).

deemed to be a launching State if the aircraft or balloon constitutes the territory or a facility of the State to whom the vehicle is registered.⁶⁷ If the aircraft or balloon is not deemed to be the territory or a facility of its registry State or the launch uses an unregistered aircraft or high altitude balloon, then a potential basis for State exposure to international liability still exists.

Generally, aircraft and balloons have a terrestrial lift off and return. Additionally, air launch systems will launch SmallSats from either domestic or international airspace. A sound argument can be marshaled premised on the concept that the airport, air strip, or other terrestrial location from where an aircraft or balloon “lifts off” for purposes of surreptitiously launching a SmallSat into space constitutes the territory or “facility” of the State which exercises jurisdiction over the location or facility.⁶⁸ Similarly, it can be asserted that the State in whose airspace the aircraft or balloon actually launches the rocket for deploying the SmallSat is a launching State.⁶⁹ Thus, it appears that the strongest case for a black market launch not having a launching State is if an unregistered aircraft or balloon “lifts off” from the high seas or some other global commons and the aircraft or balloon deploys the SmallSat in the international airspace over the high seas or other global commons. In all other circumstances, a reasoned argument exists that there is a launching State for a black market launch. The fairness or rationality of State exposure to international liability for a black market launch, especially poor and underdeveloped States, is not within the purview of this paper. However, the space law treaty regime does not currently provide an express defense to liability based on a surreptitious launch without State approval or supervision.

II.B. Black Market Launches and State Responsibility

State responsibility “embraces all aspects of obligations incumbent upon States vis-à-vis other States, whether voluntarily contracted or imposed by custom.”⁷⁰ Outer Space Treaty Article VI subjects a State to international responsibility for the space conduct of its nationals. This supervisory responsibility includes a State assuring that its nationals space activities are conducted with due regard to the corresponding interests of all other States. Article VI’s State responsibility obligation is much broader in scope and application than the international liability assessed pursuant to Outer Space Treaty Article VII and the Liability Convention.

67 Ricky J Lee, *Reconciling International Space Law With the Commercial Realities of the Twenty-First Century*, 4 Sing. J. Int’l & Comp. L. 194, 230 (2000) [Recognizing that the State which owns or operates an aircraft used for accessing space may very well be considered a launching State.]

68 *Id.*

69 *Id.*

70 Sompong Sucharitkul, *State Responsibility and International Liability Under International Law*, 18 Loy. L.A. Int’l & Comp. L.J. 821, 832 (1996).

While international liability under Outer Space Treaty Article VII and the Liability Convention is limited in its scope and application, that is not the circumstance with respect to State responsibility imposed by Outer Space Treaty Article VI. Traditionally, State responsibility represents the classic concept for dealing with a State's violation of customary international law which causes injuries to another State or to nationals of another State.⁷¹ A State suffers a distinct and separate injury when one of its nationals is injured by another state.⁷² To this extent, the act does not have to be committed directly by a State as it is sufficient if the act or conduct can be attributable to the State.⁷³ A breach can be attributable to a State if the State plays an active role in causing the injury,⁷⁴ omits to perform an act,⁷⁵ or having knowledge of a hazardous condition fails to warn others of the hazard.⁷⁶ When a breach of international law attributable to a State inflicts injury on another State or the nationals of another State, the duty is to make reparations.⁷⁷ Reparations are a mandatory duty which attaches to a State violating an international obligation.⁷⁸ The remedy is generally owned only to another State as individuals and other non-state entities traditionally lack standing under international law to pursue or collect reparations under State responsibility jurisprudence.⁷⁹ Reparations are meant to restore the injured party to the condition that existed prior to the breach of the international obligation.⁸⁰ If that is not possible, then a monetary payment corresponding to the value of the restitution is appropriate. If neither of these are totally sufficient, then

71 *Id.*

72 *See Avena and Other Mexican Nationals (Mex. v. U.S.)*, 2004 I.C.J. 12, 36 (Mar. 31) [The court noted that could submit a claim in its own name for injuries "suffered both directly and through the violation of individual rights conferred on Mexican nationals."].

73 Dan St. John, *The Trouble with Westphalia in Space: The State-Centric Liability Regime*, 40 *Denv. J. Int'l L. & Pol'y* 686, 706 (2012).

74 Dr. William C.G. Burns, *A Voice for the Fish? Climate Change Litigation and Potential Causes of Action for Impacts Under the United Nations Fish Stocks Agreement*, 48 *Santa Clara L. Rev.* 605, 644 (2008).

75 *United States Diplomatic and Consular Staff in Tehran (U.S. v. Iran)*, 1980 I.C.J. 3 (May 24).

76 *Corfu Channel, U.K. v. Albania, Judgment*, 1949 I.C.J. 4 (Apr. 9).

77 Sompong Sucharitkul, *supra* note 70 at 823.

78 Michael F. Blevins, J.D., M. Div., *Restorative Justice, Slavery, and the American Soul, A Policy-Oriented (Fnaa1) Intercultural Human Rights Approach to the Question of Reparations*, 31 *T. Marshall L. Rev.* 253, 276 (2006); Jon M. Van Dyke, *The Fundamental Human Right to Prosecution and Compensation*, 29 *Denv. J. Int'l L. & Pol'y* 77, 89 (2001).

79 Libby Adler and Peer Zumbansen, *The Forgetfulness of Noblesse: A Critique of the German Foundation Law Compensating Slave and Forced Laborers of the Third Reich*, 39 *Harv. J. on Legis.* 1, 46 (2002).

80 *Factory at Chorzow (Ger. v. Pol.)*, 1928 P.C.I.J. (ser. A) No. 17, at 29 (Sept. 13).

reparations can take the form of an apology,⁸¹ official recognition of the injury,⁸² or promises or guarantees of non-repetition of the injurious act or conduct.⁸³ Thus, while the Liability Convention limits its remedy to the payment of compensation, State responsibility under Outer Space Treaty Article VI extends beyond compensation as it includes non-compensatory remedies.⁸⁴

Another divergence between State responsibility and international liability in space law is that the Liability Convention limits recovery to damage as defined in Article 1(a). Outer Space Treaty Article VI does not impose any such limitation. This means reparations for breach of Article VI can encompass economic harm and injury excluded by the Liability Convention.⁸⁵ Moreover, the Liability Convention limits recovery to third party damage claims arising from a space asset colliding with other space objects in space or an airplane in flight or anything on Earth.⁸⁶ Recovery for breach of State responsibility obligation is not limited to such third party claims.

Unlike the imposition of State liability, State responsibility is not limited to launching States. It extends to any State with “national activities in outer space” or whose nationals engage in any outer space activity. The exact breath of this coverage is uncertain in as much as “activities in outer space” is an undefined term. The lack of a definition creates uncertainty on scope in as much as it is unresolved if the phrase “national activities in outer space” is restricted to acts performed in space or if it includes activities in space remotely controlled by a person on Earth. The lack of a restrictive definition suggests that Article VI’s responsibility encompasses “all the concomitant activities associated with what actually occurs in outer space, both before and after.”⁸⁷ Moreover, even a narrow reading of Article VI can reasonably lead to the conclusion that the supervising responsibility includes “terrestrial activities directly related to concurrent activities in outer space.”⁸⁸ This suggests that State responsibility for national activities in space not only applies to conduct which actually takes place in space, but also includes conduct on Earth which is integrally related to acts or events which transpire in space. This effectively

81 Dan St. John, *supra* note 73 at 706.

82 *Id.*

83 Daniel Bodansky, John R. Crook, et al, *Righting Wrongs: Reparations in the Articles on State Responsibility*, 96 Am. J. Int’l L. 833, 839 (2002).

84 *Supra* at 3.

85 See Sarah M. Mountin, *The Legality and Implications of Intentional Interference with Commercial Communication Satellite Signals*, 90 Int’l L. Stud. 101, 146 (2014).

86 Dr. Frans G. von der Dunk, *Passing the Buck to Rogers: International Liability Issues in Private Spaceflight*, 86 Neb. L. Rev. 400, 412 (2007).

87 Bin Cheng, *Article VI Of The 1967 Space Treaty Revisited: “International Responsibility,” “National Activities,” And “The Appropriate State.”* 26 Journal of Space Law 7, 19 (1998).

88 Michael C. Mineiro, *supra* note 65, at 768.

supports the conclusion that the launch of a SmallSat into space is a space activity. Since such a launch is a space activity, the nationals of a State participating in a black market launch of a SmallSat exposes their State to potential international responsibility for any harm caused by the launch.

Most importantly, State responsibility incorporates an obligation of “due diligence” which requires a State to take prophylactic measures to prevent harm or injury to another State or its nationals⁸⁹ or a part of the global commons,⁹⁰ which includes outer space.⁹¹ This due diligence obligation is not limited to State action, but it also extends to taking preventive measures in connection with the conduct of a State’s nationals.⁹² A breach of the due diligence standard gives rise to State responsibility and the reparations requirement.⁹³ Whether a State has exercised due diligence is a flexible standard which varies depending upon the particular facts and circumstances⁹⁴ taking into consideration a few objective factors.⁹⁵ The objective criteria consists of 1) the degree of foreseeability or predictability of the harm, 2) the importance of the interest needing protection,⁹⁶ and 3) the State’s capability.⁹⁷ Thus, due diligence is a sliding scale adjusted according to a State’s ability and resources.⁹⁸

The first “due diligence” step in regulating SmallSat deployment consists of a implementing licensing protocols and procedures for the launching of space

89 International Law Association, *ILA Study Group on Due Diligence in International Law, First Report* at 29, March 7, 2014) published at <http://www.ila-hq.org/download.cfm/docid/8AC4DFA1-4AB6-4687-A265FF9C0137A699> (last visited Sept. 16, 2014). citing Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area, Seabed Mining Advisory Opinion at ¶ 117 (Seabed Dispute Chamber of the International Tribunal of the Law of the Sea, Case No 17, 1 February 2011); Jan E. Messerschmidt, *Hackback: Permitting Retaliatory Hacking by Non-State Actors As Proportionate Countermeasures to Transboundary Cyberharm* Shearman & Sterling Student Writing Prize in Comparative and International Law, *Outstanding Note Aw*, 52 Colum. J. Transnat’l L. 275, 302-305 (2013). See *United States Diplomatic and Consular Staff in Tehran (U.S. v. Iran)*, 1980 I.C.J. 3, 61-67 (May 24).

90 See Mark Allan Gray, *The International Crime of Ecocide*, 26 Cal. W. Int’l L.J. 215, 242 (1996); Robert Rosenstock and Margo Kaplan, *The Fifty-Third Session of the International Law Commission*, 96 Am. J. Int’l L. 412, 416 (2002).

91 Frans G. von der Dunk, *Beyond What? Beyond Earth Orbit? ...! The Applicability of the Registration Convention to Private Commercial Manned Sub-Orbital Spaceflight*, 43 Cal. W. Int’l L.J. 269, 327 (2013).

92 Mark Allan Gray, *supra* note 90 at 243.

93 See Smita Narula, *The Right to Food: Holding Global Actors Accountable Under International Law*, 44 Colum. J. Transnat’l L. 691, 759-765 (2006).

94 ILA Study Group *supra* note 89 at 2.

95 *Id.*, at 3.

96 *Id.*

97 Robert Rosenstock and Margo Kaplan, *supra* note 90 at 416.

98 *Id.*; See ILA Study Group, *supra* note 89, at 4 and 31.

objects,⁹⁹ which many countries have done. Thus, as long as SmallSats are deployed as secondary payloads from launch vehicles or from the International Space Station (“ISS”)¹⁰⁰ such regulatory measures should satisfy the due diligence requirement. However, as previously noted, anticipated technological advances regarding the launch or deployment of SmallSats will eventually erode the effectiveness of any such licensing schemes, at least to the extent that some non-governmental actors may desire to circumvent the national regulatory protocols. This raises the complex problem of what constitutes sufficient State supervision or monitoring of a national’s space activities to prevent its nationals from engaging in a black market launch. While the sufficiency of due diligence is beyond this paper’s scope, it is noted that any resolution of this question will most likely be decided in the context of litigation.

II.C. Black Market Launches and State Jurisdiction

Pursuant to Outer Space Treaty Article VIII, a State retains jurisdiction and control over a space object launched into outer space which is registered to the State while the object is in outer space or on a celestial body.¹⁰¹ This provision is the genesis of the Registration Convention. The Registration convention applies to a narrower category of space objects than Outer Space Treaty Article VIII. Unlike Outer Space Treaty Article VIII which grants jurisdiction and control over objects launched into outer space, the Registration Convention only applies to space objects “launched into Earth orbit or beyond.”¹⁰² Noticeably, neither Outer Space Treaty Article VIII nor the Registration Convention sets forth any time frame for registering a space object.¹⁰³ Likewise, neither treaty contains any enforcement mechanisms to ensure compliance with the registration process and neither assigns any penalty for failure to register.¹⁰⁴ It should also be noted that neither treaty contains any mechanism for disputing or challenging a State’s registration of a space object.

99 Andoni and Bergamasco, *supra* note 38, at 7[Noting that State responsibility under Outer Space Treaty Article VI is “implemented at a national level basically through the way of licensing.”].

100 George Whitesides, *supra* note 35.

101 The relevant portion of Article VIII provides that “[a] State Party to the Treaty on whose registry an object is launched into outer space is carried shall retain jurisdiction and control over such object and over any personnel thereof, while in outer space or on a celestial body.”

102 von der Dunk, *supra* note 91, at 279.

103 Lieutenant Colonel Joseph S. Imburgia, *Space Debris And Its Threat To National Security: A Proposal For A Binding International Agreement To Clean Up the Junk*, Vand. J. Transnat’l L. 589, 618-19 (May 2011).

104 Agatha Akers, *To Infinity And Beyond: Orbital Space Debris And How To Clean It Up*, 33 U. La Verne L. Rev. 285, 306-07 (May 2012).

Although the Outer Space Treaty and the Registration Convention do not provide any express penalty for failure to register a space object, the default penalty of loss of jurisdiction and control over the unregistered space object exists. However, since Outer Space Treaty Article VIII provides that ownership of an object launched into space “is not affected” by its presence in space, the curious circumstance exists that title to an unregistered space object remains with its terrestrial owner, but the object is not subject to the jurisdiction and control of any State. This means that a SmallSat launched on the black market remains owed by the person or entity that deployed the SmallSat, but the SmallSat is not subject to the jurisdiction and control of any State. This, however, does not preclude a State from subsequently registering a SmallSat launched on the black market and thereby gaining legal jurisdiction and control over the object. This ploy may become a viable option if a State desires to remove a SmallSat or a SmallSat constellation placed in orbit pursuant to a black market launch. It may not be deemed viable as such an act may undermine the current tradition regarding unregistered space objects.

While an unregistered ship on the high seas is deemed to be “stateless” and presumed to be engaged in illicit activity, there is currently no such clarity of “statelessness” or presumption of illegality associated with an unregistered space object.¹⁰⁵ Many satellites are not registered despite the registration obligations of Outer Space Treaty Article VIII and the Registration Convention.¹⁰⁶ As a matter of practice, States do not register military satellites, spy satellites, or other secret space object.¹⁰⁷ Space faring States have apparently treated such unregistered space objects the same as registered space objects. In other words, space faring States have traditionally refrained from interfering with, destroying, incapacitating or removing unregistered space objects from orbit when they did not launch the space object. An argument can be fashioned that this practice has produced the customary law that States do not destroy, incapacitate or remove from orbit an unregistered space object when they are not the launching State.¹⁰⁸ This is especially so

105 Elizabeth I. Winston, *Patent Boundaries*, 87 Temp. L. Rev. 501, 533-34 (Spring 2015).

106 See Gabrielle Hollingsworth, *Space Junk: Why the United Nations Must Step in to Save Access to Space*, 53 Santa Clara Law Review 239, 258 (2013); Justin Moor, “You’re Not Actually Going into an Asteroid Field?” – *the Threat of Man-Made Space Debris, and A Proposal to Extend Existing Law to Prevent It*, 23 Minn. J. Intl. L. 245, 267 (2014).

107 See Agatha Akers, *supra* note 104.

108 Customary international law is formed by State practice and does not derive from “any single, definitive, readily-identifiable source.” *United States v. Bellaizac-Hurtado*, 700 F.3d 1245, 1252 (11th Cir. 2012) citing and quoting *Flores*, 414 F.3d at 247-249 State conduct alone is insufficient. The State conduct or practice must be founded on a sense of legal obligation, meaning that States conform with the practice

with respect to an operational space object. Such a custom can arguably be construed as extending international protection to unregistered black market SmallSats.

III. Conclusion

Black market launches of SmallSats are an inevitable progression in the maturation of the space economy. The activity will challenge the status quo of the space law treaty regime as it should raise challenging issues regarding the definition of “launching State,” the scope of State liability and responsibility, as well as the practical consequences, if any, that accompany the failure to register a space object. One potential approach to diluting the enticement of a black market launch is the enactment of national legislation relaxing the stringent barriers for accessing space by certain types of SmallSats.¹⁰⁹ The reality, however, is that there cannot be any negation of black market launches associated with furthering a criminal enterprise or a political or ideological struggle. This suggests that at some point it may be necessary for States, in conjunction with the international community, to police Earth orbit for black market SmallSats if for no other reason than to locate and identify the black market space objects. Perhaps, the international community will, subsequently improvise a program on how to respond to black market space objects in Earth orbit.

in their dealings with each other because they consider it a legal requirement as opposed to it being “a good idea, or politically useful or otherwise desirable.” *Id.*, quoting *Buell v. Mitchell*, 274 F.3d 337, 372 (6th Cir. 2001); Restatement (Third) of Foreign Relations. The State conduct or practice does not have to be universal but it “should reflect wide acceptance among the States particularly involved in the relevant activity.” *Id.*

109 See Freeland and Davis, *supra* note 6, at 4-6.

