

Extraterrestrial Extraterritoriality

Enforceability of Patents from the Earth to the Moon

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Abstract

As technological developments make it increasingly possible to conduct activities in areas once regarded as inaccessible, including outer space, the boundary, scope and application of national patent law become uncertain. This paper will analyze some of the legal issues related to the enforcement of patent rights with respect to rocket launches. It will also look at the question of whether a patent awarded by an individual country may be enforced with respect to a rocket travelling through the airspace above international waters, in outer space, or on the high seas. More specifically, it will demonstrate the difficulty of enforcing domestic patent law where steps of the patented method are practiced outside the jurisdiction of the patent, which would arise, for example with respect to launch and re-entry technologies employed by spacecraft or methods for safely deorbiting satellites. It will also consider the role of Article VIII of the Outer Space Treaty in determining where and how to apply the law of the State of registration of a space object, especially prior to and after a return from orbit.

I. Introduction

In 2014, there were 92 rockets launched into outer space worldwide and that number is steadily growing.¹ Additionally, innovative private launch companies looking to reduce costs and improve efficiency are investigating new launch methods, including launching from sea or from airplanes.² While the

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1 Stephen Clark, *2014's: Launch Tally Highest in Two Decades*, SPACEFLIGHT NOW (Jan. 4, 2015), <http://spaceflightnow.com/2015/01/04/2014s-launch-tally-highest-in-two-decades/>.

2 Virgin Galactic, for example, is attempting to launch from airplanes, while Sea Launch launches from movable barges. See, e.g., *Your Flight to Space*, VIRGIN GALACTIC, www.virgingalactic.com/human-spaceflight/your-flight-to-space/ (last visited Sept. 18, 2015); *Launch System – Marine Segment*, SEA LAUNCH, www.sea-launch.com/launch/11142 (last visited Sept. 18, 2015).

cartoon view of a rocket taking off shows a perfectly vertical ascent from the launch pad to space, the reality is that in order to achieve the requisite tangential velocity to remain in orbit, a rocket quickly changes course once it clears the launch pad and directs much of its thrust downrange. As it lifts off toward orbit or descends during its return to Earth, the rocket has the potential to pass through multiple regions during its travels, including areas outside the reach of any State's jurisdiction. Thus, a rocket may traverse the territory of the country of launch, the airspace over a neighboring country (with permission),³ and the airspace over international waters, before entering outer space. On its return journey, the rocket may pass through several of these same regions, before splashing into the ocean. And the complexities could further increase when the launch occurs from a ship or airplane.

While the technical challenges of determining the rocket's precise flight path and trajectory, clearing the relevant airspaces, and ultimately ensuring a successful lift-off are no doubt carefully considered by engineers and flight operations managers, one aspect of this process that is likely not considered carefully is whether a third party has patented certain aspects of the launch or the rocket itself, and whether such patents are applicable to the rocket's flight. The question of infringement becomes complicated when it comes to space activities because of the fact that "the national or territorial concept of intellectual property rights [...] clashes with the trans-boundary or international"⁴ nature of space activities.⁵ Clearly intellectual property rights and obligations will have an influence on the commercial exploitation of outer space.⁶ Less clear, however, is what specific intellectual property regime will apply.

A considerable number of legal scholars have focused on the rules governing inventions made in outer space or on the International Space Station.⁷ Some

3 See, e.g., Bernhard Schmidt-Tedd & Stephan Mick, *Article VIII, in COLOGNE COMMENTARY ON SPACE LAW, VOLUME 1: OUTER SPACE TREATY 146, 161* (Stephan Hobe, Bernhard Schmidt-Tedd, & Kai-Uwe Schrogl eds., 2009) (noting that countries currently avoid flying through foreign airspace during launch and instead execute passes over their own territory or over the high seas) [hereinafter COLOGNE COMMENTARY].

4 Ruwantissa Abeyratne, *The Application of Intellectual Property Rights to Outer Space Activities*, 29 J. SPACE L. 1, 2 (2003).

5 As has been noted, "it seems only logical that inventions made in the course of producing space-utilized hardware are treated in accordance with the regulations and procedures that are adopted within the jurisdiction where the inventions are made or applications are filed for the patent. However, the nexus to outer space may complicate otherwise clear situations." Catherine Doldirina, *Intellectual Property Rights in the Context of Space Activities*, in HANDBOOK OF SPACE LAW 949, 980 (Frans von der Dunk & Fabio Tronchetti eds., 2015).

6 Hanneke van Traa-Engelman, *The Commercial Exploitation of Outer Space: Issues of Intellectual Property Rights and Liability*, 4 LEIDEN J. INT'L L. 293 (1991).

7 See, e.g., SA'ID MOSTESHAR, *Issues Arising in Determining the Legal Regime Applicable to Intellectual Property Rights in Outer Space*, in RESEARCH AND INVENTION IN

of them have also proposed new international or space patent regimes to address issues related to the application of intellectual property law to outer space activities.⁸ Little consideration, however, has been given to questions of enforceability of patents as rockets are launched into and return from outer space. Yet as launch and landing methods improve and become more complex, companies will look to familiar legal protections to try to maintain their monopolies over the techniques and technologies they have worked hard to develop and these questions will become all the more important. The enforcement of patent rights raises issues of appropriate jurisdiction any time the potential infringement occurs in outer space or in other areas beyond the territory of the issuing State.⁹ For example, can domestic patent law be infringed where certain steps of a patented launching method are practiced outside the jurisdiction of the State issuing the patent, for example, when a rocket is launched from a platform on the high seas? Can Article VIII of the Outer Space Treaty (“OST”)¹⁰ be used to apply the jurisdiction of the State of registration of a rocket that is intended to be launched into outer space (as opposed to a suborbital rocket), even before the rocket reaches space? And what if a space object is not registered with any State party to the OST or is registered with a State party different from the one in which the patent has been granted?

After briefly introducing patent law and its relevance to outer space activities (section II), this article will analyze the current international legal regime in order to provide a framework for addressing some of these questions. In particular, section III will focus on whether and to what extent domestic patent law might be applied extraterritorially. To focus our analysis, we will consider

OUTER SPACE: LIABILITY AND INTELLECTUAL PROPERTY RIGHTS 133 (Sa'id Mosteshar ed., 1995) [hereinafter RESEARCH AND INVENTION]; Sandeepa B. Bhat, *Inventions in Outer Space: Need for Reconsideration of the Patent Regime*, 36 *J. Space L.* 1, 1-18 (2010). See generally O. VOROBIEVA, *Intellectual Property Rights with Respect to Inventions Created in Space*, in RESEARCH AND INVENTION 179; L.B. Malagar & M.A. Magdoza-Malagar, *International Law of Outer Space and the Protection of Intellectual Property Rights*, 17 *B.U. INT'L L. J.* 311-364 (1999).

8 See, e.g., Y. Zhao, *Protection of Intellectual Property Rights in Outer Space*, 49 *PROC. COLLOQ. L. OUTER SPACE* 160, 166 (2006).

9 Cf. Comm. on the Peaceful Uses of Outer Space, Questions on the Definition and Delimitation of Outer Space: Replies from Member States, U.N. Doc. A/AC.105/889/Add.6 (Mar. 4, 2010) at 3 (although discussing liability regimes, the statement made by the representative of the United Kingdom is equally applicable to patent law: “the development of space transportation systems functioning seamlessly between airspace and outer space, relying on lift to fly through the air for part of their flight profile, will create uncertainties about the legal regime applicable to them”).

10 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, 18 *U.S.T.* 2410, *T.I.A.S.* 6347, 610 *U.N.T.S.* 205.

a hypothetical patent consisting of method claims, where different steps occur in each extraterritorial region (*e.g.*, a method for reaching a particular orbit and returning the rocket safely back to Earth for re-use, which involves firing thrusters on the rocket at precise times, for specified burn lengths and at the proper angle). Finally, in light of the importance of State practice in determining the current status of international law,¹¹ section IV will analyze how some States have found ways, both legislatively and judicially, of applying patent law extraterritorially in the context of certain space activities. In section V, we conclude that the application of domestic law to method patents in which the patented steps occur in multiple regions during the rocket's ascent and descent is problematic, unless one can prevail over the strong presumption against the extraterritorial application of patent law. And even if such territoriality limitations are overcome, flags of convenience may easily allow a would-be infringer to avoid liability by carefully selecting the location of launch, and therefore the launching state.

II. Brief Overview of Patent Law and Its Relevance to Space Activities

Intellectual property ("IP") refers to creative works, for example, of an inventor or author, which can be protected for the creator's exclusive use for a limited period of time. Typically divided into industrial property (covering inventions and trademarks) and copyright (covering literary and artistic works), an IP right grants the owner the exclusive right to benefit from the IP during the applicable term of protection. Upon expiration of the term of the IP right, the limited monopoly ends and the invention or work enters the public domain, free for all to use. The monopoly granted to the IP rights-holder is usually justified on policy grounds as being a *quid pro quo*: exclusivity provides incentives to creators to encourage the development of new works or inventions and disclosure and dedication to the public domain allows others to benefit at the end of that monopoly period.

Patents are a form of IP right that grant the patentee exclusive rights to an invention, product or process that provides a new means of doing something. One fundamental aspect of patent protection, however, is that it is territorial.¹² A patent only gives the patentee the rights, for example, to prevent a third party from making, using or selling a patented invention, within the jurisdiction in which the patent has been granted. Thus, a company that

11 See, *e.g.*, Int'l L. Comm., Third Report on Identification of Customary International Law by Michael Wood, Special Rapporteur, U.N. Doc. A/CN.4/682 (Mar. 27, 2015).

12 See, *e.g.*, Paris Convention for the Protection of Industrial Property, of 20 March 1883, as revised at Brussels on 14 December 1900, at Washington on 2 June 1911, at The Hague on 6 November 1925, at London on 2 June 1934, at Lisbon on 31 October 1958, and at Stockholm on 14 July 1967, and as amended on 2 October 1979, Art. 4bis(1), 21 U.S.T. 1538, 828 U.N.T.S. 305 [hereinafter Paris Convention].

makes and sells its products primarily in the United States and China might seek patent protection in those two countries. Such patents, would not, however, prevent a competitor from manufacturing the patented article in Germany and selling it in France.

The national focus of patent protection results from concerns regarding national sovereignty. In general, each country only has the authority to govern activity that occurs within its borders. Although the Paris Convention and the TRIPS¹³ Agreement have implemented certain minimum standards with respect to patents, each country is free to pass its own specific laws regarding patentable subject matter, requirements for registration and the exact protections afforded against infringers.

From advances in robotics to aeronautics, materials science to communications and computers to biotech, the space industry is characterized by rapid developments in technology. Many of these advances require large research and development costs, and often results in spin-off technologies that can be used in a number of terrestrial applications. Experiments conducted in the microgravity environment of the International Space Station (“ISS”) lead to technological breakthroughs and allow for the development of products that cannot be produced on Earth. In each of these cases, the inventor may wish to use patents to secure a limited monopoly and recoup the initial investment of resources.¹⁴ The Intergovernmental Agreement establishing the ISS (“IGA”), for example, has clear rules regarding jurisdiction over inventions made or used in outer space.¹⁵ Additionally, recognizing the importance of the patent rights resulting from such activities, NASA often waives its statutory right to take title to inventions in favor of the contractor that created it,

13 Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, Marrakesh Agreement Establishing the World Trade Organization, Annex 1C, 1869 U.N.T.S. 183, 33 I.L.M. 1197 (1994) [hereinafter TRIPS Agreement].

14 See Statement of James E. Denny, Acting Assistant Commissioner for Patents, U.S. Patent and Trademark Office, before the Subcommittee on Courts, Intellectual Property, and the Administration of Justice, Comm. on the Judiciary, U.S. House of Representatives, H.R. 2946 (“Patents in Space Act”), Oct. 4, 1989.

15 Agreement among the Government of Canada, Governments of Member States of the European Space Agency, the Government of Japan, the Government of the Russian Federation, and the Government of the United States of America Concerning Cooperation on the Civil International Space Station (Washington, 29 January 1998; entered into force on 17 March 2001), Art. 21 (stating that “for purposes of intellectual property law, an activity occurring in or on a Space Station flight element shall be deemed to have occurred only in the territory of the Partner State of that element’s registry except that for ESA-registered elements any European Partner State may deem the activity to have occurred within its territory”) [hereinafter IGA].

in order to more quickly and efficiently commercialize the invention and allow the public to benefit therefrom.¹⁶

III. The Application of Domestic Patent Law to Space Activities: The International Legal Framework

In light of the territoriality principle of patent law and the inherent trans-boundary and international nature of space activities, there is an open question as to whether a patent with method claims relating to achieving a certain orbit is enforceable outside the strict physical bounds of the State in which the patent is held. The rocket that is practicing the patent will necessarily traverse areas governed by different legal regimes on its journey from Earth to space. This section will thus explore whether, under the current international legal landscape, a patent granted in one country can be infringed by activities taking place in any of the multiple regions described above.

III.1. Outer Space Treaties

When the space law treaties were negotiated in the 1960s and 1970s, the commercialization of outer space activities was far from being a reality. The government programs of two superpowers dominated the space arena, and as a result, IP issues were not perceived as an urgent problem in need of regulation. The only provisions explicitly dealing with IP rights in the *corpus juris spatialis* are contained in soft-law instruments: the 1982 Direct Broadcasting Principles¹⁷ and the 1996 Declaration on Space Benefits.¹⁸ Principle 11 of the DBS Principles encourages States to work together to protect copyright and Principle 2 of the Declaration on Space Benefits says that States are free to determine how they participate in cooperative space ventures and that contractual terms “should be fair and reasonable and they should be in full compliance with the legitimate rights and interests of the parties concerned, as, for example, with *intellectual property rights*” (emphasis added). It has been noted that this provision of the Declaration on Space Benefits recognizes the

16 R. Locke Bell, Intellectual Property in an Emerging Commercial Spaceflight Market: Taking Advantage of Other Transaction Authority to Keep Pace with Changing Commercial Practices, 43 PUBLIC CONTRACT L. J. 715, 733 (2014).

17 Principles Governing the Use by States of Artificial Earth Satellites for International Direct Television Broadcasting, G.A. Res. 37/92, U.N. GAOR, 37th Sess., 100th plen. Mtg., U.N. Doc. A/Res/37/92 (December 10, 1982) [hereinafter DBS Principles].

18 Declaration on International Cooperation in the Exploration and Use of Outer Space for the Benefit and in the Interest of All States, Taking into Particular Account the Needs of Developing Countries, G.A. Res. 51/122, U.N. GAOR, 51st Sess., 83d plen. Mtg., U.N. Doc. A/Res/51/122 (Dec. 13, 1996) [hereinafter Declaration on Space Benefits]. For a discussion of the legal value of this Declaration, See, e.g., Elena Carpanelli and Brendan Cohen, *A Legal Assessment of the 1996 Declaration on Space Benefits on the Occasion of its Fifteenth Anniversary*, 38 J. SPACE L. 1 (2012).

importance of IP and encourages States to cooperate and share expertise and technology,¹⁹ but neither this Declaration, nor any of the treaties relating to outer space contain any provision specifically addressing the application of national IP rights in the context of international outer space activities.

Although there is no mention of IP in the treaties, Article VIII of the Outer Space Treaty is nonetheless relevant to the application of IP law in space. This provision reads in part: “A State Party to the Treaty on whose registry an object 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” (emphasis added). In many ways an artifice to prevent space objects from “pass[ing] into a legal vacuum during their sojourn in the extra-terrestrial zone,”²⁰ Article VIII provides a means by which the State of registry can extend the reach of its national law (including IP law) to objects in outer space or on a celestial body on a quasi-territorial basis.²¹

This provision, however, is far from a magic formula capable of addressing all issues that might arise with respect to the enforceability of patents related to space activities.²² It is certainly true that as a result of Article VIII, a State of registry may choose to extend its national patent laws to spacecraft in outer space or on a celestial body, for example, to protect a patented feature of a telecommunications satellite. Many other scenarios exist, however, which are likely outside the scope of Article VIII. Assuming the relevant countries are even party to the OST,²³ the patented invention may be used on a space object for which the State of registry differs from the State in which the patent issued, or may be used on an object that is not registered to any State (because such State is not party to the Registration Convention²⁴ or has just ignored its obligations thereunder). It is also not clear whether Article VIII would apply to objects constructed in space and initially launched from a space station or from the surface of a celestial body. All these issues make

19 Anna-Maria Balsano & Bradford Smith, *Intellectual Property and Space Activities: A New Role for COPUOS?*, in *OUTLOOK ON SPACE LAW OVER THE NEXT 30 YEARS* 363, 366 (Gabriel Lafferranderie & Daphné Crowther eds., 1997).

20 K.H. Böckstiegel, P.M. Krämer & I. Polley, *Patent Protection for the Operation of Telecommunication Satellite Systems in Outer Space?*, 47 *Zeitschrift für Luft und Weltraumrecht* 3, 15 (1998).

21 See, e.g., Carla Sharpe & Fabio Tronchetti, *Legal Aspects of Public Manned Space-flight and Space Station Operations* in *HANDBOOK OF SPACE LAW*, 618, *supra* note 5, at 627; Bernhard Schmidt-Tedd & Stephan Mick, *supra* note 3, at 159.

22 On the potential issues that may arise with respect to OST and modern patent practice See, B.L. Smith & E. Mazzoli, *Problems and Realities in Applying the Provisions of the Outer Space Treaty to Intellectual Property Issues*, 40 *PROC. COLLOQ. L. OUTER SPACE* 169 (1998).

23 As of Aug. 31, 2015, the OST has been ratified by 94 States.

24 *Convention on Registration of Objects Launched into Outer Space, opened for signature* Jan. 14, 1975, 28 U.S.T. 695, T.I.A.S. 8480, 1023 U.N.T.S 15.

clear that the OST (or any of the other existing space treaties, for that matter) does not provide all of the answers.

Even in the scenario where the State of registry and the issued patent is the same, there are still questions that Article VIII does not seem to address. The provision says that the State of registry retains jurisdiction over space objects “while in outer space or on a celestial body.” Pursuant to the Vienna Convention on the Law of Treaties, one should interpret a treaty using the ordinary meaning of the terms, in context and in light of its object and purpose, and should consider other factors, including subsequent State practice.²⁵ Considering just the ordinary meaning of the text of Article VIII, the registration State’s law would be applicable only to the extent the space object is actually in outer space. During its trajectory from the Earth to space, the OST could not be used as a hook for the application of domestic patent law.

On the other hand, a holistic approach that takes into consideration the object and purpose of the OST, which was intended to set forth a comprehensive set of principles and rules governing the activities of States in the exploration of the moon and other celestial bodies, provides an argument for a broader interpretation of Article VIII. Such a reading could extend the scope of national law (including domestic patent law) to the space object during the entire space operation, from the moment of launch to the final return of the spacecraft. This general view that a determination of whether space law applies depends solely on the nature of the activity is in line with what has been deemed the “functionalist approach”²⁶ and has been developed by certain States in connection with the issue of the definition and delimitation of outer space.²⁷ At its core, this position assumes that: (a) space law covers the area of transport through airspace; (b) all vehicles not falling in the definition of “aircraft” in Annex 7 of the Chicago Convention and passing through and beyond the atmosphere should be classified as spacecraft; and (c) given the absence of a clear demarcation in the OST and the lack of a definition of spacecraft in other space treaties, the OST should be considered a functional

25 Vienna Convention on the Law of Treaties, Art. 31(1), May 23 1969, 1155 U.N.T.S. 331, 8 I.L.M. 679.

26 See generally Bin Cheng, *International Responsibility and Liability for Launch Activities*, 20 AIR & SPACE LAW, 297, 299 (1995).

27 This view has been put forward from the beginning of the space era. See, e.g., *The Question of the Definition and/or the Delimitation of Outer Space (background paper prepared by the Secretariat)*, Comm. on the Peaceful Uses of Outer Space, Legal Subcomm, 8th Sess., § 13, U.N. Doc. A/AC.105/C.2/7 (May 7, 1970). See also M. Benko & W. de Graaff, *Questions related to the Definition/Delimitation of Outer Space and Outer Space Activities and the Character and Utilization of the Geostationary Orbit*, in *SPACE LAW IN THE UNITED NATIONS* 121, 129 (M. Benko, W. De Graaff & G.C.M. Reijnen eds. 1985).

treaty.²⁸ Therefore, pursuant to this approach, the legal regime provided for in OST would apply to all space activities, including activities performed on Earth, but directed towards space, as “outer space is to begin where space activities can be said to have begun.”²⁹

One advantage that this “functionalist approach” has is that it provides one clear legal regime that governs the entire flight path of the space object. Additionally, as the definition and delimitation of outer space is still under debate,³⁰ this interpretation would sweep in any object that was intended to be launched into outer space, regardless of whether it actually made it (though the applicability to suborbital flights remains murky),³¹ and would apply to traditionally launched rockets, as well as those launched from ships or airplanes. As nice as a clean legal framework would be, however, whether such an interpretation is consistent with the scope and object of the OST remains unsettled. Furthermore, the functionalist approach is anything but unanimous: several States have rejected the view and stressed the need for a clear delimitation between airspace and outer space.³² As a result, there is not the kind of consistent State practice necessary for the purposes of interpretation under Article 31(3)(b) of the Vienna Convention to establish “agreement of the parties.”³³

28 See G. Oduntan, *Sovereignty and Jurisdiction in the Airspace and Outer Space: Legal Criteria for Spatial Delimitation* 294 (2012).

29 *Id.* at 293.

30 See, e.g. H. Qizhi, *The Problem of Definition and Delimitation of Outer Space*, 10 J. SPACE L. 157, 157-163 (1982); B. CHENG, *The Legal Status of Outer Space and Relevant Issues: Delimitation of Outer Space and Definition of Peaceful Use*, 11 J. SPACE L. 89, 89-105 (1983); O. de Olivera Bittencourt Neto, *The Elusive Frontier: Revisiting the Delimitation of Outer Space*, 55 PROC. COLLOQ. L. OUTER SPACE 23, 23 (2012); J. Su, *The Delimitation between Air Space and Outer Space and the Emergence of Aerospace Objects*, 78 J. AIR L. & COMM. 355-378 (2013). SEE ALSO O.O. OGUNBANWO, *INTERNATIONAL LAW AND OUTER SPACE ACTIVITIES* 50 (2013) and O. DE OLIVERA BITTENCOURT NETO, *DEFINING THE LIMITS OF OUTER SPACE FOR REGULATORY PURPOSES* (2015).

31 See e.g. Frans von der Dunk, *International Space Law*, in *HANDBOOK OF SPACE LAW* 29, 63 n. 126 (Frans von der Dunk & Fabio Tronchetti eds., 2015).

32 See U.N. Doc. A/AC. 105/C.2/7, *supra* note 27, at §§28-33 (analyzing both pronouncements and practice of States with regard to the question of delimitation of outer space). For the views of states on whether a formal definition and delimitation of outer space is needed, See *Questions on the Definition and Delimitation of Outer Space: Replies from Member States*, Comm. on the Peaceful Uses of Outer Space, Legal Subcomm, 46th-54th Sess., A/AC.105/889 (2007), along with addenda 1-16 (2008-2015) and *Questionnaire on Possible Legal Issues with Regard to Aerospace Objects: Replies from Member States*, Comm. on the Peaceful Uses of Outer Space, Legal Subcomm, 35th-48th Sess., A/AC.105/635 (1996), along with addenda 1-17 (1996-2009).

33 See Int'l L. Comm., *Second Report on Subsequent Agreements and Subsequent Practice in Relation to the Interpretation of Treaties* by Georg Nolte, Special Rapporteur,

III.2. General Rules of International Law

In light of the uncertainties surrounding the application of the current *corpus juris spatialis* to the non-space-based aspects of space activities, this section will look at relevant general rules of international law and discuss various internationally-recognized principles on which a State may exercise its jurisdiction extraterritorially, in order to assess whether the country in which the patent issued has the ability to extend its patent laws to space activities taking place outside its borders. Depending on the nature and location of the alleged patent infringement, several different legal regimes may be applicable. It is an established principle of international law that a State has exclusive and absolute authority over persons, things and activities within its territory and, therefore, may exercise jurisdiction over them.³⁴ Territorial jurisdiction involves the exercise of legislative, executive and judicial power over a specific territory and generally derives from territorial sovereignty. This means that any activity that takes place in the territory (including the airspace) of a State is subject to its jurisdiction.³⁵ There are, therefore, no issues when the relevant activity takes place within the territory of the State where the patent has issued. Domestic law clearly applies there and the patent will receive protection against third-party infringement. The reverse situation occurs when the rocket practicing the patented method crosses into the territory of another State that is not the one issuing the patent, including its airspace. In that case, jurisdiction over the activity will lie exclusively with the territorial State, rendering the patent unenforceable in that location.

Less clear is whether a State may exercise any form of jurisdiction over a launching activity taking place in the exclusive economic zone (“EEZ”),³⁶ the region extending up to 200 nautical miles from the baseline of the territorial sea, on the high seas or in the airspace above such regions.³⁷ With the recent increase in off-shore drilling in portions of the EEZ, the scope of patent enforcement in this region has come up in national legislation and in domestic case law in a number of countries, including Australia, the United Kingdom,

U.N. Doc. A/CN.4/671 (Mar. 26, 2014), paras. 44-48 (concluding that “[s]ubsequent practice under article 31(3)(b) can take a variety of forms and must reflect a common understanding of the parties regarding the interpretation of a treaty. Its value as a means of interpretation depends on the extent to which it is concordant, common and consistent.”).

34 See generally Christopher Staker, *Jurisdiction*, in INTERNATIONAL LAW 309 (Malcolm D. Evans, ed. 2014).

35 J. Crawford, *Brownlie’s Principles of Public International Law* 456 (8th ed. 2012).

36 Third U.N. Convention on the Law of the Sea [hereinafter UNCLOS III], Arts. 55, 57, opened for signature Dec. 10, 1982, 1833 U.N.T.S. 397.

37 *Id.* at Art. 86 (defining the high seas as “all parts of the sea that are not included in the exclusive economic zone, in the territorial sea or in the international water of a State, or in the archipelagic waters of an archipelagic State”).

South Africa and the United States.³⁸ The results are mixed, with some courts in these countries, and some interpretations of the relevant patent acts, finding that patent law *does* extend through portions of the EEZ, while others finding it does not. Article 56 of UNCLOS III, however, limits the coastal State's sovereign rights to the purpose of exploration and exploitation of the natural resources in the area or any economic exploitation and exploration of the zone.³⁹ Furthermore, pursuant to the same provision, the coastal State retains jurisdiction solely with regard to artificial islands, installations and structures, marine scientific research and the protection and preservation of the marine environment. Thus, while this legal framework may provide grounds on which to extend patent law with respect to oil-drilling activities, provided the State has chosen to do so⁴⁰ it seems less likely that space activities would fit in this framework.

With respect to the high seas, this is an area that does not fall under any State's territorial jurisdiction. As a result, unless the "functional interpretation" of Article VIII is applied, any activity taking place there is, in the absence of any other reason to extend national law, outside the reach of any State's jurisdiction. If certain of the activity occurs, however, on a ship or on an aircraft in flight (*e.g.*, from which the launch takes place), the principle of quasi-territorial jurisdiction would apply. Pursuant to this principle, vessels are subject to the jurisdiction of the State whose flag they bear.⁴¹ Similarly, aircraft are subject to the jurisdiction of the State where they have been registered. Still, if the flag State is not the one issuing the patent, the patent would not be enforceable with respect to that part of the launching method taking place on the ship or the aircraft while on the high seas or in the airspace above it.⁴²

38 See Elizabeth I. Winston, *Patent Boundaries*, 87 TEMPLE L. REV. 501, 509-512 (2014); G. Matthew McCloskey, Hiroshi Sheraton and Ashley Tarokh, *The extent of patent coverage in offshore waters: a comparison*, LEXOLOGY (Apr. 5, 2012), www.lexology.com/library/detail.aspx?g=4fd8f8b9-b426-4307-abb2-6d8a24ee136c.

39 *Supra* note 36, at Art. 56.

40 A court in the United Kingdom found that certain sections of the EEZ were subject to the UK Patents Act of 1977 and that a patent covering a pipelaying ship was infringed there. See Winston, *supra* note 38, at 509-10. In the United States, a court in Texas held that the United States' EEZs were "not U.S. territories or possessions for purposes of the Patent Act," but this was because Congress has not chosen to extend U.S. patent law there. See *WesternGeco v. Ion Geophysical Corp.* et al., 876 F.Supp. 2d 857, 907 (S.D. Tex. 2012).

41 See, *e.g.*, B. Simma & A.T. Müller, *Exercise and Limits of Jurisdiction*, in THE CAMBRIDGE COMPANION TO INTERNATIONAL LAW 134, 138 (J. Crawford & M. Koskenniemi, eds 2012).

42 See, *e.g.* *WesternGeco*, 776 F.Supp. at 367 (finding on jurisdictional grounds that activities conducted on a Norwegian flagged ship on the high seas could not infringe a U.S. patent).

In spite of the general rules established above, there are still instances in which a country may seek to exercise its jurisdiction extraterritorially to influence activities that are, strictly speaking, outside of its territorial boundaries. Such an act, however, is highly controversial⁴³ because of “the presumption that jurisdiction (in all its forms) is territorial, and may be not exercised extraterritorially without some specific basis in international law.”⁴⁴ There are only a few exceptional circumstances, under which international law expressly *compels* States to exercise extraterritorial jurisdiction. Specific international treaties and, arguably, international customary law, impose a duty on States to establish jurisdiction over the most heinous of crimes, such as war crimes, genocide, and crimes against humanity, even when such crimes are committed abroad.⁴⁵ This leaves open the question of whether a State is *allowed*, under international law, to exercise its jurisdiction over acts taking place outside its territory, even if the States has no specific obligation to do so.

The 1927 decision by the Permanent Court of International Justice (“PCIJ”) in the *Lotus* case⁴⁶ is generally seen as the starting point for any analysis related to the exercise of extraterritorial jurisdiction. According to the Court:

“[T]he first and foremost restriction imposed by international law upon a State is that – failing the existence of a permissive rule to the contrary – it may not exercise its power in any form in the territory of another State. [...] Far from laying down a general prohibition to the effect that States may not extend the application of their law and the jurisdiction of their courts to persons, property and *acts outside their territory*, [international law as it stands at the present] leaves them in this respect a *wide measure of discretion*, which is only *limited in certain cases by prohibitive rules*; as regards other cases, every *State remains free to adopt the principles which it regards as best and most suitable*.”⁴⁷ (emphasis added).

Following the guidance of the PCIJ, the first step should be to determine whether a prohibitive rule limiting the exercise of a State’s extraterritorial jurisdiction exists.⁴⁸ While some scholars have argued that State sovereignty

43 See, e.g., H.G. Maier, *Jurisdiction Rules in Customary International Law*, in EXTRA-TERRITORIAL JURISDICTION IN THEORY AND PRACTICE 64 (K.M. Meeseen, ed. 1996).

44 CRAWFORD, *supra* note 35, at 456. See also Wade Estey, *The Five Bases for Jurisdiction and the Failure of the Presumption against Extraterritoriality*, 21 HASTINGS INT’L & COMP. L. REV. 177 (1997).

45 On the topic See O. de Schutter, *Extraterritorial Jurisdiction as a Tool for Improving the Human Rights Accountability of Transnational Corporations*, at 12 (Dec. 22, 2006), available at <http://cridho.uclouvain.be/documents/Working.Papers/ExtraterrRep22.12.06.pdf>.

46 The Case of the S.S. “*Lotus*” (*France v. Turkey*), PCIJ Series A no. 10, judgment of 26 July 1927 [hereinafter “*Lotus*”].

47 *Id.* at 18-19.

48 Some authors have noted, however, that this traditional reading of the PCIJ’s decision would not reflect what the Court actually meant to say, as this would mean that

and the principle of non-intervention could be a basis on which to limit a State's extraterritorial jurisdiction,⁴⁹ this argument seems contradicted by the language from the *Lotus* case that international law does *not* create such a general prohibition. Furthermore, while the foregoing principles could certainly constitute prohibitive rules with respect to activities taking place in other States' territories, they should not prevent the exercise of extraterritorial jurisdiction with respect to areas beyond the reach of any State's territorial jurisdiction. With regard to space activities, some scholars have argued that certain provisions of the OST, including the right to free exploration, the prohibition on non-appropriation, and the duty to share the benefits of space exploration could be considered prohibitive rules. The World Intellectual Property Organization ("WIPO") has even noted that these fundamental principles enshrined in the OST might go so far as to be at odds with the monopoly that comes from an IP right.⁵⁰ The problem with these arguments, however, is twofold. First, unless a very broad functional interpretation were adopted, these provisions of the OST deal only with activities taking place in outer space, so they could not act as prohibitive rules to prevent a State from exercising extraterritorial jurisdiction over activities that occur in other non-outer space regions, such as the airspace over the high seas. Second, even though the OST provisions do curtail a State's rights with respect to some outer space activities, none rises to the level of a prohibitive rule. The non-appropriation principle prohibits national appropriation of outer space or celestial bodies, but does not prevent a State from exercising some sort of authority over space objects; to the contrary, as discussed above, Article VIII makes it clear that there is actually an affirmative obligation to maintain such jurisdiction (and control).⁵¹ With respect to the principle of free exploration and the duty to share benefits, these provisions mainly require States to share information (which includes establishing effective knowledge-transfer and

the burden of proof would rest with those objecting the exercise of extraterritorial jurisdiction. See Staker, *supra* note 34, at 315.

49 R. Y. Jennings, *Extraterritorial Jurisdiction and the United States Antitrust Law*, 33 BRITISH Y.B. INT'L L. 153 (1957).

50 See *Patent Expert Issues: Inventions in Space*, WIPO, www.wipo.int/patents/en/topics/outer_space.html (last accessed Aug. 15, 2015). The possible tension between the duty to share benefits and the application of patent rights have also been noted with respect to the debate around bio-prospecting in marine areas beyond national jurisdiction. See, e.g., A. Jorem and M.W. Tvedt, *Bio-prospecting in the High Seas: Existing Rights and Obligations in View of a New Legal Regime for Marine Areas Beyond National Jurisdiction*, 29 INT'L J. MARINE & COASTAL L. 321-343 (2014).

51 Isabelle Bouvet, *Certain Aspects of Intellectual Property Rights in Outer Space 20* (1999) (unpublished L.L.M. thesis, McGill University) (on file with the McGill University Library, available at http://digitool.Library.McGill.CA:80/R/-?func=dbin-jump-full&object_id=30289&silolibrary=GEN01).

cooperation mechanisms).⁵² The 1996 Declaration on Space Benefits provides another argument that benefit sharing cannot constitute a prohibitive rule. Principle 2, which says that cooperative ventures relating to space exploration should take into consideration the legitimate rights of the parties concerned, including IP rights, implicitly acknowledges the compatibility between the duty to share benefits and the protection of IP rights.

In the absence of any rules prohibiting extraterritorial jurisdiction, States are “free to adopt the principles which [they] regard as best and most suitable.”⁵³ Traditionally, several different principles have provided a basis for States to exercise jurisdiction extraterritorially.⁵⁴ Under the “nationality principle,” for instance, either the nationality of the person engaging in the regulated activity (“active personality principle”) or the nationality of the person directly affected by it (“passive personality principle”) may serve as the basis for the exercise of extraterritorial jurisdiction.⁵⁵ Additional principles include the “protective principle,” under which a State is allowed to exercise jurisdiction beyond its borders when this is necessary to protect its security or other vital interests,⁵⁶ and the “universality principle,” according to which a State may prosecute certain offenses based on their nature, regardless of where they occurred and whether the State has any other link to them.⁵⁷ Finally, States have exercised extraterritorial jurisdiction based on the “effects doctrine” (or “objective territoriality” principle), in which a State may apply its national laws to activities taking place outside its borders when these activities have a substantial, direct and foreseeable effect in its territory. The United States and the European Union have both applied the effects doctrine in economic matters (especially antitrust and competition).⁵⁸

Depending on the circumstances, the jurisdictional principles discussed above might be used to extend domestic patent law to areas that are otherwise out-

52 *Id.* at 19.

53 “*Lotus*”, *supra* note 46, at 19.

54 CRAWFORD, *supra* note 35, at 456.

55 *Id.* at 459.

56 See Dapo Akande, *Protective Principle (Jurisdiction)*, in THE OXFORD COMPANION OF INTERNATIONAL CRIMINAL JUSTICE 474 (Antonio Cassese, ed. 2009).

57 See, e.g., Naomi Roht-Arriaza & Menaka Fernando, *Universal Jurisdiction*, in RESEARCH HANDBOOK ON INTERNATIONAL CRIMINAL LAW 359 (Bartram Brown, ed. 2011).

58 As to the U.S. exercise of extraterritorial jurisdiction with respect to antitrust laws, See, e.g., J. M. Raymond, *A New Look at Jurisdiction in Alcoa*, 61 AM. J. INT’L L. 558-570 (1967). Concerning the EU, See, in particular, the decisions of the European Commission in the cases *Dyestuffs* (decision 69/243/EEC of July 24, 1969) and *Wood Pulp* (decision 85/2002/EC of Dec. 19, 1984). See also Florian Wagner-von Papp, *Competition Law and Extraterritoriality*, in RESEARCH HANDBOOK ON INTERNATIONAL COMPETITION LAW 21, 42 (Ariel Ezrachi, ed. 2012). See also J.J. Friedberg, *The Convergence of Law in an Era of Political Integration: The Wood Pulp Case and the Alcoa Effects Doctrine*, 52 U. PITTSBURGH L. REV. 289-326 (1991).

side a State's territorial boundaries. In the case of extraterritorial enforcement of patent rights, the effects doctrine might be the most suitable basis on which to assert jurisdiction, yet it remains highly controversial. One scholar has commented that "accepting an excessive 'cause and effect' approach could bring almost everything within the ambit of this principle and creat[e] the risk of a 'jurisdictional butterfly effect.'"⁵⁹

Other principles could also provide the requisite hook, namely, the passive personality principle (so long as the person or company affected by the infringement is a national of the State) and the protective principle (but only to the extent that one can argue that the protection of IP rights constitutes a general interest of the State). Each of these, however, is controversial and has mainly developed as a means of addressing the commission of crimes and offenses against the security of the State or fundamental governmental functions. Overall, protection of patent rights can thus hardly be seen as appropriate subject matter under these various principles to justify the exercise of extraterritorial jurisdiction.

IV. State Practice

Despite the fact that the various principles for the extraterritorial application of domestic law are controversial, some States have nonetheless found ways of extending their domestic patent law to certain activities taking place outside the traditional borders of the State issuing the patent. This section will analyze some of these State practices, as a way of understanding the contours of the law.

IV.1. United States

The United States Supreme Court has repeatedly maintained that it is a "longstanding principle of American law 'that legislation of Congress, unless a contrary intent appears, is meant to apply only within the territorial jurisdiction of the United States.'"⁶⁰ This presumption applies equally to patent law, as the Supreme Court discussed in *Deepsouth Packing Co. v. Laitrain Corp.*,⁶¹ as to all other forms of domestic legislation. Courts grappling with these boundary issues must keep in mind the will of Congress in order to determine the precise limits of

59 Christina Voigt, *Up in the Air: Aviation, the EU Emissions Trading Scheme and the Question of Jurisdiction*, 14 CAMBRIDGE Y.B. OF EUROPEAN LEGAL STUDIES 475, 497-98 (2011-2012).

60 *EEOC v. Arabian American Oil Co.*, 499 U.S. 244, 248 (1991) (*quoting* *Foley Bros., Inc. v. Filardo*, 336 U.S. 281, 285 (1949)).

61 406 U.S. 518, 531 (1972) (finding that U.S. patent laws are territorial and that activities that would be infringing if conducted in the U.S. are not infringing if conducted abroad); See also *Microsoft Corp. v. AT&T Corp.*, 550 U.S. 437 (2007) (noting that "[t]he presumption that United States law governs domestically but does not rule the world applies with particular force in patent law.").

the United States' "territorial jurisdiction," especially in light of changing technology and an ever more interconnected world.

The section of the U.S. Code dealing with infringement of patents, states that "whoever without authority makes, uses, offers to sell, or sells any patented invention, *within the United States* or imports into the United States any patented invention during the term of the patent therefor, infringes the patent"⁶² (emphasis added). On the face of the statute, it is not immediately clear what "within the United States" means, but over the years, courts have considered this language with respect to a range of activities in a variety of locations in order to sketch the bounds of the territorial reach of United States patent law. Early patent infringement cases extended U.S. patent laws to ships that were flying the U.S. flag.⁶³ Other cases held that U.S. patents could be protected in non-U.S. territories, as long as the U.S. otherwise had certain jurisdiction (for example, in a U.S. embassy).⁶⁴ These cases were based on language in the old patent statute that gave the inventor rights "throughout the United States, and the territories thereof," but which provided no further definition of what the "United States" included.⁶⁵ In 1952, the U.S. Code was amended and the "United States" was explicitly defined to be "the United States of America, its territories and possessions."⁶⁶ In light of this clarified definition, later courts have generally been less willing to rely on these earlier cases when considering how to extend the reach of U.S. patent laws,⁶⁷ though a recent decision by a federal court in Minnesota noted that the floating island doctrine had been criticized, but never overruled, and clearly used the principle as affirmative grounds to find that the U.S. Patent Act did apply on a U.S. flagged ship in international waters.⁶⁸

62 35 U.S.C. §271(a).

63 See *Gardiner v. Howe*, 9 F. Cas. 1157, 1158 (C.C.D. Mass. 1865) (No. 5219) (finding that U.S. patent protection "extends to the decks of American vessels on the high seas, as much as it does to all the territory of the country").

64 See *Marconi Wireless Tel. Co. v. United States*, 99 Ct. Cl. 1, 67-68 (Ct. Cl. 1942), *aff'd in part and vacated in part on other grounds*, 320 U.S. 1 (1943) (finding that U.S. patents were infringed by a group of receivers made and used at the United States Naval Radio Station at the American Legation in Peking, China, where the U.S. had extraterritorial rights).

65 Rev. Stat. §4884. See also *Decca Ltd. v. United States*, 544 F.2d 1070, 1073 (Ct. Cl. 1976) (per curiam) (noting that, in contrast to the present language, the older patent laws "did not define their own scope in a manner that so plainly confined them to states, territories and possessions").

66 35 U.S.C. §100(c).

67 See, e.g., *Decca* at 1073 ("[W]e think a decision founded on the fiction that for purposes of the Patent Laws, United States ships and planes wherever found, are United States territory, would be founded on water.").

68 *M-I Drilling Fluids UK Ltd. v. Dynamic Air Inc.*, No. 14-4857, 2015 WL 1608403, at *8 and *15 (D. Minn. Apr. 10, 2015) ("The doctrine of the flag must be saluted under the facts of this case.").

One of the critical, post-1952 examples of the attempt to find grounds other than flag jurisdiction by which to extend U.S. patent laws extraterritorially was *Decca Ltd. v. United States*. In that case, the Court of Claims considered the question of whether the United States Government's worldwide Omega system for positioning ships and aircraft infringed a patent held by Decca.⁶⁹ The Omega system consisted of radio-emitting broadcast stations located in the United States and Norway (with stations in other countries planned). These signals could be used by U.S. ships and aircraft to triangulate their positions. The Court declined to find jurisdiction on the basis of what it called the "juridical prop" of the flag state of the ships receiving the signals,⁷⁰ and instead looked to the location of the "master" station which was in Washington, D.C. The "master station" was used to monitor and synchronize the other stations, which were merely slaves that could be located anywhere.⁷¹ Thus, the Court of Claims held that U.S. patent law applied and the Government infringed, even though portions of the system were outside the U.S. As the Court noted, its analysis agreed with that of the Patent Office Board of Patent Interferences, which had previously held that "an invention concerning space satellites was reduced to practice in the United States because of the location of control stations [there]."⁷²

Following similar reasoning to the court in *Decca*, the Court of Federal Claims in *Hughes Aircraft Co. v. United States*, refused to find liability for patent infringement when the "master station" for the infringing system was not located in the United States.⁷³ In *Hughes*, the allegedly infringing Ariel 5 spacecraft was funded by, built in and registered to the United Kingdom, and was launched by a team of Italian engineers from Kenya. After the launch, the United States only provided tracking and data acquisition services; the "control point" or "master station" for the spacecraft itself was in England.⁷⁴ For this reason, the Court held that U.S. patent laws did not apply to the spacecraft.

69 Note that the Court in *Decca* was considering whether the U.S. government was infringing under 28 U.S.C. §1498, but the underlying question of infringement is still based on 35 U.S.C. §271.

70 *Decca* at 1072 (recognizing the "not unchallengeable proposition, that the territorial requirements of the United States Patent Laws are met simply because United States flag vessels or aircraft, receiving Omega signals while on or over the high seas, are ambulatory portions of United States territory").

71 *Id.* at 1074.

72 *Id.*, citing *Rosen v. NASA*, 152 U.S.P.Q. 757, 768 (1966) ("[W]e are inclined to view the operation of the integrated instrumentality including parts of the satellite and its control point, the latter being in the United States [Goddard Space Center], as not removed from the United States by reason of the satellite being necessarily distant from the several states of the United States.").

73 29 Fed. Cl. 197, 242 (Fed. Cl. 1993).

74 29 Fed. Cl. 197, 242 (Fed. Cl. 1993).

U.S. courts again considered the question of whether a defendant could be liable for infringement when the activity straddles jurisdictions in two cases involving the BlackBerry handheld device. In the BlackBerry cases, the technology at issue was a means for “pushing” email to mobile devices. When a message was received on a U.S. user’s computer, it would be encrypted and routed to a “relay” located in Canada, which would then wirelessly transmit the message to the user’s BlackBerry.⁷⁵ In the first BlackBerry case, the U.S. Court of Appeals for the Federal Circuit relied on *Decca* to find that, because all parts of the BlackBerry system (apart from the relay) were located in the United States, the “control and beneficial use of” the BlackBerry system occurred in the United States, establishing territoriality.⁷⁶ In the second BlackBerry case, the Court distinguished the system claims at issue in the first BlackBerry case from a patent written using method claims. With respect to the latter, the Court held that a method “necessarily involves doing or performing each of the steps recited,” and refused to find infringement under U.S. law “unless each of the steps is performed within this country.”⁷⁷

While cross-border and multi-jurisdictional infringement questions require courts to think carefully about how Congress intended U.S. patent law to apply, when it comes to activities occurring solely in outer space, Congress explicitly legislated for the expansion of U.S. patent law through bills introduced in the U.S. House of Representatives⁷⁸ and the U.S. Senate in 1989. Adopted into law in 1990, 35 U.S.C. §105 provides that inventions made, use or sold on U.S. spacecraft or other space objects under its jurisdiction or control “shall be considered to be made, used or sold within the United States for the purposes of this title,” except to the extent the U.S. is party to any international agreements specifying otherwise.

This legislation provides some clarity as to applicable protections available to an inventor who plans to perform experiments in a U.S. spacecraft, and it allows a telecommunications company to seek appropriate patent protection on the novel antenna technology it plans to incorporate into its satellite that will be placed in geosynchronous orbit. But unless one relies on the functional approach, described in Section III.1 above, the general expansion of U.S. patent law to space-related activities that cross territorial boundaries prior to and after their entry into outer space relies largely on the line of cases discussed above. While we have shown that there is precedent for U.S. law to apply *on the decks* of American ships, in light of the strong presumption that

75 NTP Inc. v. Research in Motion, Ltd., 392 F.3d 1336, 1342 (Fed. Cir. 2004), *withdrawn and substituted*, 418 F.3d 1282 (Fed. Cir. 2005), *cert. denied*, 546 U.S. 1157 (2006).

76 *Id.* at 1370.

77 NTP Inc. v. Research in Motion, Ltd., 418 F.3d 1282, 1318 (Fed. Cir. 2005), *cert. denied*, 546 U.S. 1157 (2006) [hereinafter *RIM*].

78 The Patents in Space Act, H.R. 2946, 101st Cong., 1st Sess. (1989).

U.S. law does not apply in the EEZ or on the high seas themselves, it would be difficult to make an argument that U.S. law applies to the airspace above either of these. Thus, any argument that U.S. patent law should protect multi-jurisdictional system patents would have to rely on a control test that considers where the beneficial use or the control is. While one could argue that a rocket launched from Cape Canaveral, Florida is “controlled” or would ultimately benefit users in the United States (for example if the rocket is launching a television satellite that will broadcast into the U.S.), the automated nature of most rockets’ operations means that it would be hard to say that the control is within the United States. Even if certain self-destruct or other emergency signals could be sent to the rocket, system claims would likely only be infringed if the patented technology is used in or over the landmass of the United States or its territorial sea. With respect to the hypothetical method patent we described earlier, it would be extremely difficult to show that every step occurs within the territorial bounds of the United States, as required under *RIM*.

IV.2 Other Countries

The United States is not the only country to provide specific provisions in their national legislation related to the application of IP rights for inventions made or used in outer space. Article 22 of the 2008 French Space Operations Act,⁷⁹ for instance, modified France’s *Code de la propriété intellectuelle* so that it applies to “inventions made or used in outer space, including on celestial bodies and into or onto space objects placed under national jurisdiction according to article VIII [of the OST].”⁸⁰ Like the U.S. Patents in Space Act, this provision ensures that France’s national patent law applies in *outer space* on French flagged spacecraft, but is similarly silent on the application of French patent law to launch methods that are performed across multiple jurisdictions. Article 16 of the Law of the Russian Federation “About Space Activity”⁸¹ provides a further example of an *ad hoc* regime for IP rights related to inventions used or made in outer space. Pursuant to this provision, “the use and transfer of space technology shall be effected with respect to the rights of

79 Loi n° 2008-518 of June 3, 2008.

80 Art. L611-1, unofficial English translation, available at <http://download.esa.int/docs/ECSL/France.pdf> (last visited Aug. 15, 2015). Original text available at <http://legifrance.prod.vdm.ext.dila.fr/affichCodeArticle.do?cidTexte=LEGITEXT000006069414&cidArticle=LEGIARTI000006279392&dateTexte=&categorieLien=cid>: “[L]es dispositions du présent article s’appliquent aux inventions réalisées ou utilisées dans l’espace extra-atmosphérique y compris sur les corps célestes ou dans ou sur des objets spatiaux placés sous juridiction nationale en application de l’article VIII du traité [OST].”

81 Decree no. 5663-1 of the Russian House of Soviets, unofficial English translation, available at www.unoosa.org/oosa/en/ourwork/spacelaw/nationalspacelaw/russian_federation/decree_5663-1_E.html (last visited Sept. 23, 2015).

intellectual property that are protected by the legislation of Russian Federation.”⁸² Article 16 specifically refers to inventions or information products created in outer space or as a result of a space activity.⁸³ Like the French Space Operations Act, the Russian Law “About Space Activity” extends the application of domestic IP legislation to inventions made in outer space, but does not provide any indication as to its possible extraterritorial application with regard to inventions used in regions different from outer space.

Nevertheless, it is important to note that, like the U.S., certain other countries and the European Union are trending towards creating exceptions to the exercise of jurisdiction solely within their territorial boundaries. An interesting example of this is the European Court of Justice’s (“ECJ”) ruling in the case *Air Transport Association of America v. Secretary of State for Energy and Climate Change*,⁸⁴ which seems to suggest an additional possible ground for applying domestic laws extraterritorially: the “territorial extension” principle.⁸⁵

Applied to our present question, the ECJ’s reasoning be extended to suggest that the existence of a “territorial connection” between the State and the spacecraft would suffice to extend domestic patent law to activities taking place outside the borders of the State.⁸⁶ Under the logic used by the court in *ATA*, however, the question remains as to whether a spacecraft that departs (or re-enters) the territory of the State would result in a sufficient territorial link to allow the extension of national patent law to the entire space activity (including those segments of the journey occurring in regions beyond the territorial borders of the State). That said, the ECJ’s “territorial extension” doctrine has also been heavily criticized as being incompatible with general international law.⁸⁷

While this trend toward extraterritorial expansion of certain laws is not specific to IP (*ATA*, for example, dealt with environmental law issues), IP is nonetheless an area of law in which these issues frequently arise. While a case-by-case analysis of all the instances in which various European countries have applied domestic patent law beyond their borders⁸⁸ would be beyond

82 *Id.* at Art. 16(1).

83 *Id.* at Art. 16(4).

84 Case C-366/10, *Air Transp. Ass’n of Am. (ATA) v. Sec’y of State for Energy & Climate Change*, 49(3) C.M.L.R. 1113 (2011) [hereinafter *ATA*].

85 See generally Kati Kulovesi, *Unilateral Extraterritorial Action or ‘Minilateralism’ within Territorial Jurisdiction? The EU Emissions Trading Scheme for Aviation Emissions and International Law*, 11 *QUESTIONS OF INTERNATIONAL LAW* 3, 14-15 (2015), available at www.qil-qdi.org/wp-content/uploads/2015/01/02_Aviation_Kulovesi.pdf.

86 *ATA*, 49(3) C.M.L.R. 1113 at §125.

87 See, e.g., Jed Odermatt, *Case C-366/10 Air Transport Association of America and Others v. Secretary of State for Energy and Climate Change Case Law*, 20 *COLUM. J. EUR. L.* 143, 158 (2013).

88 See, e.g., A. Peukert, *Territoriality and Extraterritoriality in Intellectual Property Law*, in *BEYOND TERRITORIALITY: TRANSNATIONAL LEGAL AUTHORITY IN AN AGE OF*

the scope of the present paper, it suffices here to stress that, like in the U.S., there are arguments that one could make for the broader enforcement of national patents to activities crossing territorial boundaries in their path from Earth to space.

V. Conclusion

Space activities and the associated research and development efforts are time intensive and costly, but often result in significant advances in technology. Companies engaged in this business must have a way of protecting these advances from competitors in order to recoup the resources they invested. Traditional domestic patent law doctrines are applicable to activities conducted entirely in outer space under Article VIII of the OST. For space activities that are conducted in multiple regions before or after the rocket enters or leaves outer space, the applicability of a particular nation's patent law is not obvious. This article has analyzed certain grounds on which States might argue for the extraterritorial enforceability of domestic patent law and has reviewed certain related State practices. As we have shown, the results are far from clear and certainly do not provide the sort of legal clarity that an innovative company, wishing to protect its large research and development costs, would want to rely on for protection.

Additionally, most of the analysis assumes that the patentee holds a patent in the country from which the launch occurs (or that is plausibly related to the launch).⁸⁹ An enterprising company, however, aware of a relevant patent in the United States, could instead conduct its launch from the Baikonur Cosmodrome in Kazakhstan or the Centre spatial guyanais in French Guiana. And as more and more countries become involved in space activities and achieve the capability of

GLOBALIZATION 189-227 (G. Handl, J. Zekoll, P. Zumbansen, eds. 2012); Marketa Trimble, *Extraterritorial Intellectual Property Enforcement in the European Union*, 18 SW. J. INT'L L. 233-244 (2011).

89 If the rocket is registered to a country that is different from the one in which the launch takes place (for example, registered in the U.K. and launched from India, and the rocket is practicing a technology that is patented in India, the launch company may be able to rely on the temporary presence defense in Art. 5ter of the Paris Convention. If the patented article is essential for the needs of the vessel and it is temporarily in the territory in which it would otherwise be infringing, this article could provide a defense. Importantly, however, the text of Art. 5ter does not explicitly mention "space objects," so such craft may not be automatically exempted. See *Intellectual Property and Space Activities*, WIPO (Apr. 2004) at § 74, available at www.wipo.int/export/sites/www/patent-law/en/developments/pdf/ip_space.pdf. Article 21(6) of the IGA establishing the ISS explicitly addresses this point and states that the temporary presence of articles, "including the components of a flight element, in transit between any place on Earth and any flight element of the [ISS] registered by another Partner State or ESA shall not" for the basis of patent infringement. IGA, *supra* note 15 at Art. 21(6).

conducting rocket launches on their own, the possible choices of a launch center to avoid otherwise interfering patents, only grows. While the payload may be registered to the State that procures the launch of that particular satellite, the rocket itself would likely be registered in the country from which the rocket is launched. This problem is akin to the flags of convenience in maritime law, in which a ship operator registers its ship under the flag of a country other than that of its owners in order to avoid certain regulations.⁹⁰ The patentee, wishing to protect its patented method or technology, would have to file for its patent in every possible jurisdiction in which a launch could take place. Under Article 4 of the Paris Convention, a patentee has one year from the date of first filing of a patent in any Paris Convention country to file in others and take advantage of his original priority date. In the United States, for example, the patentee's own foreign-filed patent may be used as prior art against him, if he files in the United States more than a year after the first filing.⁹¹ In light of these issues, the territorial scope of patents and the ease of launching from any location means that a patentee must consider carefully which countries might gain launch capabilities during the roughly 20-year term of the patent.⁹² It is also worth considering that certain countries have relatively weak intellectual property laws.⁹³

Especially in light of the fact that the mere process of applying for a patent discloses the unique and novel features of the invention to the world, companies considering patenting technology used on rockets that cross a number of regions on their trip from the Earth to space may wish to consider other forms of protection, like relying on trade secrets⁹⁴ instead. In the rocket context, patents directed to aspects of the launch and landing might be features of the rocket that must either be disclosed in order to comply with international obligations or they may be easily visible in video footage of the launch itself (e.g., when certain thrusters fire).

As more companies become involved in commercial space activities and seek innovative and ever more efficient ways of reaching outer space and returning to Earth, these patent enforcement issues will continue to grow in importance, begging for a clearer legal regime.

90 See Matthew J. Kleiman, *Patent rights and flags of convenience in outer space*, THE SPACE REVIEW (Feb. 7, 2011), available at www.thespacereview.com/article/1772/1.

91 35 U.S.C. §102.

92 TRIPS, Art. 33 (“The term of protection available [for patents] shall not end before the expiration of a period of twenty years counted from the filing date.”).

93 For example, in the Marshall Islands, there is inadequate protection for patents and other forms of IP; “[t]he only intellectual property-related legislation relates to locally produced music recordings.” Bureau of Economic and Business Affairs, *2012 Investment Climate Statement – Marshall Islands*, U.S. DEP’T OF STATE (June 2012), www.state.gov/e/eb/rls/othr/ics/2012/191946.htm (last visited Sept. 23, 2015).

94 Trade secrets are generally thought of as non-public information that has value because it is not generally known.