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PATENT BOUNDARIES

Elizabeth I. Winston *

A patent grants a limited right to exclude others from practicing an invention within the United States, its territories and possessions. Much has been written about the limits of the patent grant and how to determine what the protected invention may be. At the same time, scholars have not systemically analyzed the geographic limitations of United States patents, a critical component of a patentee's limited right. A patent's geographical scope is not simple to discern. Commentators have neither analyzed the patent boundaries collectively nor delineated the scope of patent sovereignty on land, in the air, and at sea. Technology has spread to every corner of the earth, bringing once hostile territory under the spell of deepwater oil drilling and satellite communication systems, within the reach of mobile phone technology, and beyond the scope of our current understanding of patent law. United States patents are only enforceable within the United States, which now extends from the International Space Station to the Outer Continental Shelf. As the limits of technology and geography increase, the delineation of the patent boundaries of the United States becomes increasingly important.

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I. INTRODUCTION

Patent law is territorial.¹ Technology is not. Innovation is occurring at the outer boundaries of the world, through scientific research on the International Space Station, deep underwater drilling on the continental shelf, and mobile data servers on the high seas. “Patent boundaries” has been used to refer to the scope of a patent’s claims and the meaning of claim terms.² However, there is another type of patent boundary that has been virtually ignored to date, but is becoming increasingly important with the expansion of technology. The territorial limitations on the rights granted by a patent allow patent law to extend to the United States, its territories and possessions, and no farther, while technology is increasingly finding its way to parts of the world where the claim to United States patent law is at best tenuous.³ This Article is the first to systemically analyze law, policy, and historical precedent to define the territorial reach of United States patent law.

Consider the case of GlobalSantaFe’s *GSF Development Driller I*, a mobile offshore drilling unit based in the Gulf of Mexico within the United States Exclusive Economic Zone (EEZ).⁴ *GSF Development Driller I* was built in Singapore, initially leased by a Cayman Islands company, and operated by a Swiss company under a Panamanian flag. This multicultural drilling unit raises many questions of sovereignty, not the least of which is whether the EEZ is within the United States, and, therefore, whether the *GSF Development Driller I* is subject to United States patent law when in the Gulf of Mexico. Can an injunction against the use of the *GSF Development Driller I* prevent its use in the Gulf of Mexico?⁵ The *GSF Development Driller I* case typifies a growing question in patent litigation: namely, what protection exists when the

1. The United States patent laws “do not, and were not intended to, operate beyond the limits of the United States.” *Brown v. Duchesne*, 60 U.S. (19 How.) 183, 195 (1856). “It is the general rule under United States patent law that no infringement occurs when a patented product is made and sold in another country.” *Microsoft Corp. v. AT&T Corp.*, 550 U.S. 437, 441 (2007).

2. See, e.g., Tun-Jen Chiang, *Fixing Patent Boundaries*, 108 MICH. L. REV. 523 (2010).

3. International treaties recognize the territorial limitations to patent law, without delineating those distinctions. Article 4*bis*(1) of the Paris Convention states, “Patents applied for in the various countries of the Union by nationals of countries of the Union shall be independent of patents obtained for the same invention in other countries, whether members of the Union or not.” Paris Convention for the Protection of Industrial Property, art. 4*bis*, Mar. 20, 1883, 24 U.S.T. 2140, 828 U.N.T.S. 305. The preamble to the World Trade Organization’s Agreement on Trade Related Aspects of Intellectual Property Rights states that its members recognize “the underlying public policy objectives of national systems for the protection of intellectual property.” Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), Apr. 15, 1994, 33 I.L.M. 1197, 1869 U.N.T.S. 299. Neither of these treaties defines the countries or national systems, but both recognize the territoriality of patent law.

4. *GSF Development Driller I Drilling Rig*, SUBSEA OIL & GAS DIRECTORY, <http://www.subsea.org/drilling-rigs/rigspec.asp?rigID=231> (last visited May 15, 2015); *Neptune Field, United States of America*, OFFSHORE TECHNOLOGY.COM, <http://www.offshore-technology.com/projects/neptune-field/> (last visited May 15, 2015).

5. *Transocean Offshore Deepwater Drilling, Inc. v. GlobalSantaFe Corp.*, No. H-03-2910, 2006 WL 3813778, at *1 (S.D. Tex. Dec. 27, 2006).

globalization of technology has not kept pace with the patent regulation of the same?⁶

In order to understand United States patent law and its territorial limits, the first question to be asked is: What is the United States? Patent infringement must occur within the United States, and yet the term is vague and ambiguous.⁷ The Patent Act of 1952 set forth for the first time a definition of the “United States” with respect to patent law, stating simply that “the terms ‘United States’ and ‘this country’ mean the United States of America, its territories and possessions.”⁸ This cursory and circular definition provides little guidance as to the geographic limits on patent rights, and the notes in the legislative history are of no further help, evidencing only that the definition was “added to avoid the use of long expressions in various parts of the revised title.”⁹ There is no further legislative history,¹⁰ but a later essay written by one of the primary forces behind the Patent Act of 1952, P.J. Federico, states:

The phrase “and the Territories thereof” which followed “United States” in the old statute has been omitted in the new section since “United States” is defined in section 100(c) as meaning “the United States of America, its territories and possessions.” It should be noted that the territorial scope of the patent is now more broadly and more definitely stated.¹¹

Other bodies of law set forth a variety of definitions of the United States.¹² The Tariff Act of 1930, which is still used to exclude the importation of infringing

6. The sale of an oil rig was held subject to United States patent law by the Federal Circuit recently because “an offer which is made in Norway by a U.S. company to a U.S. company to sell a product within the U.S., for delivery and use within the U.S. constitutes an offer to sell within the U.S.” *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Contractors USA, Inc.*, 617 F.3d 1296, 1309 (Fed. Cir. 2010). No analysis of the location of the use, which was the Gulf of Mexico, was made.

7. *Hooven & Allison Co. v. Evatt*, 324 U.S. 652, 671–72 (1945), *overruled by* *Limbach v. Hooven & Allison Co.*, 466 U.S. 353 (1984) (“The term ‘United States’ may be used in any one of several senses. It may be merely the name of a sovereign occupying the position analogous to that of other sovereigns in the family of nations. It may designate the territory over which the sovereignty of the United States extends, or it may be the collective name of the states which are united by and under the Constitution.”).

8. Patent Act of 1952, Pub. L. No. 82-593, ch. 950, § 100, 66 Stat. 797 (codified at 35 U.S.C. § 100(c) (2012)).

9. *Id.*

10. Proposed amendments to the Patent Act did not specifically define United States, but instead in defining patent infringement stated that a patent could be infringed by “[a]ny person who makes, uses or sells any patented machine, manufacture, composition of matter or improvement, or uses any patented process or improvement, within the territory of the United States and its Territories . . . infringes the patent.” STAFF OF THE H. COMM. ON THE JUDICIARY, 81ST CONG., PROPOSED REVISION AND AMENDMENT OF THE PATENT LAWS 59 (Comm. Print 1950).

11. P.J. Federico, *Commentary on the New Patent Act*, reprinted in 75 J. PAT. & TRADEMARK OFF. SOC’Y 161, 201 (1993).

12. *U.S. Lines Co. v. Eastburn Marine Chem. Co., Inc.*, 221 F. Supp. 881, 883–84 (S.D.N.Y. 1963) (“Normally the word ‘territories’ is used as including only the portions of the United States territorial possessions which are organized and exercising governmental functions under act of Congress. But the use of the word ‘territories’ depends on the character and aim of the act. The Panama Canal Zone is not always included as ‘Territory of the United States.’ A beacon owned by the

devices into the United States, defines the “United States” as including “all Territories and possessions of the United States except the Virgin Islands, American Samoa, Wake Island, Midway Islands, Kingman Reef, Johnston Island, and the island of Guam.”¹³ The Homeland Security Act of 2002 defines the term “United States,” when used in the “geographic sense,” as “any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, any possession of the United States, and any waters within the jurisdiction of the United States.”¹⁴ Yet another definition can be found in the Immigration and Nationality Act and its geographic definition of the “United States” as including “the continental United States, Alaska, Hawaii, Puerto Rico, Guam, the Virgin Islands of the United States, and the Commonwealth of the Northern Mariana Islands.”¹⁵ What is included in the United States for immigration purposes is excluded for purposes of the Tariff Act of 1930, while the Patent Act of 1952 appears to have the broadest definition of all.

This Article is the first to show the sheer indeterminacy of the legal constraints that currently apply to patent activities and the fatal flaws in the ambiguity inherent in defining the United States patent boundaries only as “the United States of America, its territories and possessions.”¹⁶ Section II of the Article questions the use of technology at sea and examines the impact of the United Nations Convention on the Law of the Sea on patent infringement claims made under the United States Patent Code. Arguing that international custom should delineate the United States patent boundaries, the Article applies early case law to delineate the seaward patent boundaries of the United States. Next, the Article evaluates the patent boundaries of outer space and the impact the boundaries have on commercial space technology. Applying the pertinent provisions of the Outer Space Treaty to the patent boundaries of the United States, the limits of United States patent law in airspace and outer space are examined in Section III of this Article. Finally, sovereignty rights relating to United States lands are detailed in Section IV of this Article.

Technology is eroding traditional national borders. Offshore drilling is a rich source of energy and innovation. Exoplanets and other celestial bodies are in the news as commercialization of outer space approaches reality and space tourism exists. Cloud computing renders the distance between the data and the user less important than the speed with which the user can access that data. Each

United States is not one of its ‘possessions’ within the meaning of the phrase ‘from the coast of the United States, the coast of its territories, or the coast of its possessions’ as used in a treaty between the United States and Great Britain. Areas in Bermuda leased to the United States by the British Government for 99 years are neither territories nor possessions of the United States within the meaning of the Fair Labor Standards Act. Residence in the Philippine Islands was held not to be residence ‘within the United States’ for naturalization purposes.” (internal citations omitted).

13. 19 U.S.C. § 1401(h) (2012).

14. Homeland Security Act of 2002, Pub. L. No. 107-296, § 2, 116 Stat. 2140 (codified as amended at 6 U.S.C. § 101(17)(A) (2012)).

15. 8 U.S.C. § 1101(a)(38) (2012).

16. 35 U.S.C. § 100(c) (2012).

of these issues demands an answer to the question of how far the United States patent boundaries extend.

II. AT SEA

Technology, law, demand for energy, and geology have pushed innovation farther from the land-based geographic boundaries of the United States, literally sending technology out to sea. Litigation has been brought alleging patent infringement on the Outer Continental Shelf, in the EEZ, and on board ships sailing the high seas. Does drilling on the Outer Continental Shelf occur within the patent boundaries of the United States?¹⁷ Where is a patent on a shipborne computing center enforceable?¹⁸

What sovereignty does the United States exercise over the seas adjacent to the United States, and over the land beneath those seas? How far does this sovereignty extend? In order to practice technology without infringing a patent, knowledge of geography and technology is required. Knowing the metes and bounds of the patent allows innovation by encouraging competitors to design around the protected technology. Knowing the metes and bounds of the United States allows competitors to know what laws apply to the use of technology where the use occurs. If a patent does not clearly claim what is covered by the patent, then the patent is unenforceable. Similarly, a delineation of the nautical United States patent boundaries would allow competitors to know where a patent is unenforceable.

The United Nations Convention on the Law of the Sea (“UNCLOS” or “Law of the Sea”) sets forth much of the world’s understanding of the boundaries of sovereignty by nations over their adjacent seas. The United States is a signatory to UNCLOS, but Congress has never ratified the treaty, and so within the United States the treaty remains advisory in nature.¹⁹ The Law of the Sea addresses maritime boundaries, and delineates each member state’s rights with respect to its adjacent seas, setting forth a number of maritime zones. Under the Law of the Sea, the first twelve nautical miles off the coast of a member state

17. The Outer Continental Shelf is an area rich in oil, natural gas, and other resources, a site for many offshore drilling platforms, and an area booming in innovation. *See, e.g., OCS Lands Act History*, BUREAU OF OCEAN ENERGY MANAGEMENT, <http://www.boem.gov/Oil-and-Gas-Energy-Program/Leasing/Outer-Continental-Shelf/Lands-Act-History/OCSLA-History.aspx> (last visited May 15, 2015) (stating that “24 percent of [the nation’s] domestic oil production and 7 percent of its domestic natural gas production” come from “OCS oil and gas exploration and development”).

18. Google has patented a “Water-Based Data Center,” claiming shipborne computing centers using wave motion as a source of power. These mobile computing centers will be able to move anywhere in the world, bringing data and computing to regions traditionally isolated from the modern computer age. *Water-Based Data Center*, U.S. Patent No. 7,525,207 (filed Feb. 26, 2007).

19. One hundred fifty-seven other countries are signatories to the treaty. Chapter XXI Law of the Sea, United Nations Convention on the Law of the Sea, UNITED NATIONS TREATY COLLECTIONS (Mar. 5, 2015, 5:01 PM), https://treaties.un.org/Pages/ViewDetailsIII.aspx?src=TREATY&mtdsg_no=XXI-6&chapter=21&Temp=mtdsg3&lang=en#1; *see also* United Nations Convention on the Law of the Sea, *opened for signature* Dec. 10, 1982, 1833 U.N.T.S. 397 [hereinafter UNCLOS].

is known as that state's "territorial sea."²⁰ Each state has complete sovereignty over its inland waters and territorial sea.²¹ The zone contiguous to the territorial sea, extending no farther than twenty-four miles off the coast of a member state, is known as the "contiguous zone."²² In each state's contiguous zone, member states have restricted sovereignty.²³ The next zone, which can extend no more than 200 nautical miles from a country's baseline, is known as the EEZ.²⁴ Within its own EEZ, a member state has limited sovereignty.²⁵ All remaining maritime area is designated as the "high seas"—territory over which no one member state can exercise sovereignty.²⁶ In addition to these maritime rights, each member state has rights to the seabed beneath its adjacent waters—specifically to the continental shelf, which "comprises the sea-bed and subsoil of the submarine areas."²⁷ The patent sovereignty of the United States over each maritime zone and the Outer Continental Shelf (OCS) is discussed in detail below.

A. *Territorial Seas*

In 1988, President Reagan signed into law a presidential proclamation defining the territorial sea of the United States of America as the waters adjacent to the United States extending "12 nautical miles from the baselines of the United States."²⁸ These territorial waters extend to the waters surrounding the "United States of America, the Commonwealth of Puerto Rico, Guam, American Samoa, the United States Virgin Islands, the Commonwealth of the Northern Mariana Islands, and any other territory or possession over which the United States exercises sovereignty."²⁹ The United States "exercises sovereignty and jurisdiction . . . [over] the airspace over the territorial sea, as well as to its bed and subsoil."³⁰ Within twelve nautical miles of the coastline of the United States and its territories and possessions, the law is the same as it would be within the physical land boundaries of the United States.³¹ Per the United States sovereignty over its territorial seas, the Patent Act is enforceable within these boundaries, and United States law governs any patent infringement that occurs within the United States territorial seas, whether the patented invention is practiced in the water, on the seabed beneath that water, or in the air

20. *Id.* art. 3.

21. *Id.* art. 2.

22. *Id.* art. 33.

23. *Id.*

24. *Id.* art. 57.

25. *Id.* art. 56.

26. *Id.* arts. 86–87.

27. *Id.* art. 76.

28. Proclamation No. 5928, 54 Fed. Reg. 777 (Dec. 27, 1988).

29. *Id.*

30. *Id.*

31. See *WesternGeco L.L.C. v. Ion Geographical Corp. (WesternGeco I)*, 776 F. Supp. 2d 342, 365 (S.D. Tex. 2011) ("[T]he United States possesses complete sovereignty over the territorial sea—a belt of sea that extends no more than 12 miles seaward of the baseline of the coastal state.").

overhead.³² This should be codified within the Patent Code, and the definition of the United States should be further clarified, as the United Kingdom has done.³³ The territorial seas are within the United States patent boundaries.

B. *Contiguous Zone*

Extending twelve miles outward from the territorial seas of the United States is the contiguous zone. Presidential Proclamation 7219 established the contiguous zone of the United States in 1999.³⁴ The United States recognizes a contiguous zone that extends twenty-four nautical miles from the United States' coast, excluding any other nation's territorial seas that may otherwise fall within the contiguous zone of the United States.³⁵ The contiguous zone acts as a buffer between a country's territorial seas, where the country is sovereign, and the high seas, where no country is sovereign.

Within the contiguous zone the United States may regulate issues relating to "customs, fiscal, immigration, or sanitary laws and regulations."³⁶ These regulations, as they apply to the waters and the maritime rights, are mainly policy oriented in nature, with the goal of protecting the United States territorial sea, and the understanding that maritime environments move and change. Within the contiguous zone

the ships and aircraft of all countries enjoy the high seas freedoms of navigation and overflight and the laying of submarine cables and pipelines, and other internationally lawful uses of the sea related to those freedoms, such as those associated with the operation of ships, aircraft, and submarine cables and pipelines.³⁷

Patent law is not an issue related to "customs, fiscal, immigration or sanitary laws and regulations,"³⁸ nor is it a policy question with a direct impact on the

32. At least one terms and services agreement attempts to expressly codify the territorial seas as part of the United States, stating:

Notwithstanding delivery, title to Products shipped from the U.S. to a destination outside the U.S. shall pass to Buyer immediately after each item departs from the territorial land, seas and overlying airspace of the U.S. The Parties acknowledge and agree that the territorial seas of the U.S. extend to twelve nautical miles from the baseline of the country determined in accordance with the 1982 United Nations Convention of the Law of the Sea.

GENERAL ELECTRIC, STANDARD TERMS AND CONDITIONS OF SALE § 6.2 (2010), available at https://customer.gettransportation.com/public/signaling/GS_Sales_Terms.pdf.

33. In the United Kingdom, patent sovereignty over the territorial seas has been expressly codified, but not so in the United States. The Patents Act 1977, c. 37, § 132(3) (U.K.).

34. Proclamation No. 7219, 64 Fed. Reg. 48,701 (Aug. 2, 1999).

35. *Id.*

36. *Id.*; see also UNCLOS, *supra* note 19, art. 33 (stating that a coastal state may "prevent infringement of its customs, fiscal, immigration or sanitary laws and regulations," and punish infringement of those laws, in its contiguous zone); RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE U.S. § 511(b) cmt. a, k (1987) (stating that coastal states have "limited policing rights in the contiguous zone" and may "enforce specified laws" in their respective contiguous zones).

37. Proclamation No. 7219, 64 Fed. Reg. 48,701 (Aug. 2, 1999).

38. *Id.*

territorial seas, or a freedom of the high sea, excluded from a country's regulations. The contiguous zone lies outside the United States patent boundaries.

C. *Exclusive Economic Zone*

Beyond the territorial sea lies not only the contiguous zone, but also the United States EEZ. The EEZ is defined by the Law of the Sea as "an area beyond and adjacent to the territorial sea" which "shall not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured."³⁹ The United States EEZ was established by Presidential Proclamation 5030 in 1983, and includes the contiguous zone discussed above, and all other waters adjacent to the United States territorial seas extending 200 nautical miles from the territorial seas.⁴⁰

In the EEZ, the United States "possesses sovereign rights in economic exploitation of natural resources and jurisdiction over marine scientific research."⁴¹ These rights include:

- (a) sovereign rights for the purpose of exploring, exploiting, conserving and managing natural resources, both living and non-living, of the seabed and subsoil and the superjacent waters and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds;
- and (b) jurisdiction with regard to the establishment and use of artificial islands, and installations and structures having economic purposes, and the protection and preservation of the marine environment.⁴²

Transocean Offshore Deepwater Drilling, Inc. (Transocean), an Anglo-Australian company, holds several United States patents for methods and apparatus for offshore drilling. In 2006, Transocean received a permanent injunction prohibiting the use of the *GSF Development Driller I* "in the United States for the term of the Transocean patents."⁴³ Does Transocean's injunction cover the EEZ—in other words, if the oil rig is used within the EEZ, is it used within the United States?

39. UNCLOS, *supra* note 19, arts. 55, 57.

40. Proclamation No. 5030, 48 Fed. Reg. 10,605 (Mar. 10, 1983).

41. *WesternGeco I*, 776 F. Supp. 2d 342, 366 (S.D. Tex. 2011); *see also* 16 U.S.C. § 1811 (2012) (stating that the United States claims "sovereign rights" over all fish and "Continental fishery resources" within the EEZ); UNCLOS, *supra* note 19, art. 56 (stating that coastal states have "sovereign rights" as to natural resources within their EEZ); Proclamation No. 5030, 48 Fed. Reg. 10,605 (Mar. 10, 1983) (stating that the United States has "sovereign rights" relating to natural resources within the EEZ); RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE U.S. § 511(d) cmt. a (1987) (stating that coastal states exercise sovereign rights "over economic exploitation" of the EEZ).

42. Proclamation No. 5030, 48 Fed. Reg. 10,605 (Mar. 10, 1983).

43. *Transocean Offshore Deepwater Drilling, Inc. v. GlobalSantaFe Corp.*, No. H-03-2910, 2006 WL 3813778, at *1 (S.D. Tex. Dec. 27, 2006).

The EEZ must be a territory or a possession of the United States in order to come within the patent boundaries set by 35 U.S.C. § 100(c). Presidential Proclamation 5030 limits the United States' sovereignty over the EEZ, explicitly stating that the EEZ "remains an area beyond the territory and territorial sea of the United States in which all States enjoy the high seas freedoms of navigation, overflight, the laying of submarine cables and pipelines, and other internationally lawful uses of the sea."⁴⁴ The rights of a nation over its EEZ are far more limited than the rights of a nation over its territorial seas, and the Presidential Proclamation recognizes this.⁴⁵

In this day and age of an increased focus on offshore drilling, the issue of patent infringement in the EEZ is becoming increasingly important, both domestically and internationally.⁴⁶ The governments of Australia and the United Kingdom, and the judicial systems of the United Kingdom, South Africa, and the United States, have addressed patent infringement in the EEZ but have not provided a uniform determination as to whether the EEZ constitutes part of a country's territory for purposes of that country's patent code.

The Australian Patent Code states that it "extends to: (a) each external Territory; and (b) the Australian continental shelf; and (c) the waters above the Australian continental shelf; and (d) the airspace above Australia, each external Territory and the Australian continental shelf."⁴⁷ "Australia" is defined as including "each external Territory" while the "Australian continental shelf" is defined as "the continental shelf adjacent to the coast of Australia (including the coast of any island forming part of a State or Territory)."⁴⁸ If the EEZ was an external territory, and therefore automatically part of Australia, then the language extending the Patent Code to the external territories would cover the EEZ as well.⁴⁹ Under a strict construction of the Australian Patent Code, the EEZ is excluded from the definition of Australia.

In 2003, a patent infringement suit was brought alleging infringement off the coast of the United Kingdom, in the United Kingdom EEZ.⁵⁰ Patent

44. Proclamation No. 5030, 48 Fed. Reg. 10,605 (Mar. 10, 1983).

45. In fact, some countries explicitly argue that their territorial seas extend throughout the EEZ, seeking to expand their national sovereignty. The United Nations maintains a chart indicating some of the inconsistencies between national claims of sovereignty and the Law of the Sea for informational purposes only. U.N. DIVISION FOR OCEAN AFFAIRS AND THE LAW OF THE SEA, TABLE OF CLAIMS TO MARITIME JURISDICTION (2011), available at http://www.un.org/depts/los/LEGISLATIONANDTREATIES/PDFFILES/table_summary_of_claims.pdf.

46. See, e.g., *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340 (Fed. Cir. 2012) (involving a patent infringement lawsuit over an offshore drilling apparatus).

47. *Patents Act 1990* s 12 (Austl.).

48. *Id.* sch I (Austl.).

49. *WesternGeco I*, 776 F. Supp. 2d 342, 368–69 (S.D. Tex. 2011) (observing that "Australia has made a separate provision for the application of its patent law to the EEZ because the EEZ is not its territory").

50. Specifically, the alleged infringing activity occurred in "the Leadon field in water depths of about 120m, and the other in the East Foinaven field in water depths of about 300-500m." Rockwater

infringement in the United Kingdom, like in the United States, must occur within the territorial boundaries of the United Kingdom.⁵¹ The patents at issue covered a pipe-laying ship, and the alleged infringement was that of a competitor's pipe-laying ship deployed in the United Kingdom EEZ to lay pipes.⁵² The first paragraph of the opinion states that the "jurisdiction under s.132(4) of the Patents Act 1977 is not in dispute."⁵³ The Patents Act 1977 applies

to acts done in an area designated by order under section 1(7) of the Continental Shelf Act 1964, or specified by Order under section 10(8) of the Petroleum Act 1998 in connection with any activity falling within section 11(2) of that Act, as it applies to acts done in the United Kingdom.⁵⁴

In addition, the United Kingdom has the power to designate areas as being covered by the Patents Act 1977. Numerous designations have subsequently been made, and sections of the EEZ and the continental shelf have been designated as coming within the purview of the Patents Act 1977.⁵⁵ This case does not render a determination as to whether the entire EEZ falls within the coverage of the Patents Act 1977, but under certain circumstances, patent infringement can be found in the EEZ of the United Kingdom.⁵⁶

In South Africa, one judicial opinion specifically found that South Africa has at least limited patent sovereignty over the South Africa EEZ.⁵⁷ In that case, the patent at issue covered "an apparatus for transferring fluid – particularly oil produced by a sub-sea deposit – between the sea and the sea surface."⁵⁸ The

Ltd. v. Coflexip S.A., [2003] EWHC (Ch) 812, [1], (Eng.). Each of these fields is in the United Kingdom EEZ.

51. G. Matthew McCloskey, Hiroshi Sheraton & Ashley Tarokh, *The Extent of Patent Coverage in Offshore Waters: A Comparison*, MCDERMOTT WILL & EMERY INT'L NEWS, Issue 1 2012, at 8, available at <http://documents.lexology.com/e3e0c58a-fd12-42d2-a01e-79392450a14a.pdf>.

52. *Rockwater Ltd.*, [2003] EWHC (Ch) at 812[1].

53. The parties in this litigation did not contest that the United Kingdom patent boundaries extended to the EEZ. There was no discussion as to whether the alleged infringing activity took place on the OCS or in the fishing waters designated for coverage under the Patents Act 1977. *Id.*

54. The Patents Act 1977, c. 37, § 132(4) (U.K.).

55. See McCloskey et al., *supra* note 51 ("Section 132(2–3) provides that the Patents Act applies to the Isle of Man and to the territorial waters of the United Kingdom respectively. Section 132(4) provides for two further extra-territorial extensions. The first is to any areas designated under Section 1(7) of the Continental Shelf Act 1964. Numerous designations have been made since 1964, primarily to encompass various oil fields and fishing grounds in close proximity to UK waters. By these designations, all provisions relating to patents apply to the extended areas. The second extension relates to areas specified under Section 10(8) of the Petroleum Act 1998. In those areas, the Patents Act applies only in connection with the exploration of the sea bed or of subsoil, or exploitation of their natural resources, although this is extended to installations concerned with exploration, exploitation, transport by pipes and provision of accommodation.").

56. *Rockwater Ltd.*, [2003] EWHC (Ch) at 812[1].

57. *Schlumberger Logelco Inc v. Coflexip S A* 2000 (3) SA 861 (SCA) at para. 1 (S. Afr.).

58. *Id.* at para. 2.

infringer installed such an apparatus in the South Africa EEZ.⁵⁹ The infringer argued that no infringement under South African patent law could be found within the South Africa EEZ.⁶⁰ The Patent Code of South Africa grants rights to the patentee “in the Republic,” a term not elsewhere defined in the Patent Code.⁶¹ Accordingly, the Supreme Court of Appeal of South Africa determined that the ordinary meaning would control, which would include in the Republic all territorial waters.⁶² Furthermore, within the EEZ, the court found that South African law delineated extensive rights over installations.⁶³ Specifically, the South African Maritimes Zone Act of 1994 states that “[a]ny law in force in the Republic [of South Africa] . . . shall also apply on and in respect of an installation”⁶⁴ where an installation is defined as being “situated within internal waters, territorial waters or the exclusive economic zone or on or above the continental shelf.”⁶⁵ The South African court determined that the South African Patents Act applied to installations in the South Africa EEZ.⁶⁶ The apparatus covered by the patent in this case was found to be an installation, and therefore covered by the South African Patents Act, despite its location in the South Africa EEZ.⁶⁷ The South African patent boundaries extend to all installations in the EEZ, but do not apply to vessels in the EEZ.⁶⁸ Mobile offshore drilling units, such as the *GSF Development Driller I*, are often classified as vessels.⁶⁹ Therefore, South African patent boundaries would not extend to a mobile oil rig if the oil rig were classified as a vessel.

The question of whether the EEZ is under the United States patent sovereignty was squarely before the United States District Court for the Southern District of Texas, which held “that the high seas, including the Chukchi Sea and the United States’ Exclusive Economic Zone (‘EEZ’), including the EEZ in the Gulf of Mexico, are not U.S. territories or possessions for purposes of the Patent Act.”⁷⁰ In a prior opinion in the same case, the court observed that if patent infringement is to be found in the EEZ, it is up to Congress to explicitly

59. *Id.* (specifically “at a Soekor Field Development Project which is situated 95 nautical miles off the South African coast (and therefore within the exclusive economic zone of the Republic) near Mossel Bay”).

60. *Id.* at paras. 3–4.

61. *Id.*

62. *Id.* at paras. 4–5.

63. *Id.* at para. 7.

64. Maritimes Zone Act 15 of 1994 § 9(1) (S. Afr.).

65. *Id.* § 1(ii).

66. *Schlumberger Logelco Inc v. Coflexip S A 2000* (3) SA 861 (SCA) at para. 8 (S. Afr.).

67. *Id.* at para. 8.

68. *Id.* at para. 11.

69. *See, e.g.,* *McLaurin v. Noble Drilling (U.S.), Inc.*, 529 F.3d 285, 287 (5th Cir. 2008) (“The vessel, a ‘mobile offshore drilling unit’”); *United States v. Transocean Deepwater Drilling Inc.*, 936 F. Supp. 2d 818, 824 (S.D. Tex. 2013) (“There is also support for the proposition that a MODU [mobile offshore drilling unit] continues to be a vessel even when it is temporarily attached to the seabed for oil drilling.”).

70. *See WesternGeco L.L.C. v. Ion Geophysical Corp. (WesternGeco III)*, 876 F. Supp. 2d 857, 907 (S.D. Tex. 2012).

extend the patent boundaries through the definition of the United States found in the Patent Code.⁷¹ Within the United States EEZ lies the Chukchi Sea, where a ship was alleged to infringe a patent assigned to WesternGeco.⁷² The alleged infringement took place on a ship located in the EEZ, not on the OCS, not drilling into the OCS like the *GSF Development Driller I* oil rig, and not attached to a pipeline or other installation.⁷³

In establishing the United States EEZ, President Reagan limited the scope of United States sovereignty over the EEZ.⁷⁴ Patent infringement does not fall within that limited sovereignty, which removes the possibility that the EEZ is either a territory or a possession of the United States.⁷⁵ Furthermore, unlike the legislatures of Australia and the United Kingdom, Congress has enacted no legislation expressly extending the patent boundaries of the United States to the EEZ. Transocean's injunction does not cover the EEZ, and the *GSF Development Driller I* can continue to operate without fear of repercussions under United States patent law, and WesternGeco has no remedy under United States patent law against a ship located within the EEZ. The Patent Code should be clarified to state that the waters of the EEZ are not within the patent boundaries of the United States.

D. Outer Continental Shelf

The United States formally recognized sovereignty over the OCS in 1953.⁷⁶ The Submerged Lands Act gave the United States jurisdiction over the "subsoil and seabed of the outer Continental Shelf and . . . all installations and other devices permanently or temporarily attached to the seabed."⁷⁷ The OCS includes the "submerged lands' beyond the extended state boundaries . . . but not the waters above those submerged lands."⁷⁸ The OCS is being addressed under the Section on seas, although it is land, since it is addressed by the Law of the Sea, and a nation's rights over its EEZ and continental shelf overlap. Sovereignty is greater over the continental shelf, despite the fact that it runs beneath the EEZ.

71. *WesternGeco v. Ion Geophysical Corp. (WesternGeco II)*, No. 4:09-cv-1827, 2011 WL 3608382, at *11 (S.D. Tex. Aug. 16, 2011) ("Though the ordinary meaning of 'possessions' would include areas within United States' control, we believe that the United States' circumscribed level of control over the EEZ is insufficient to characterize it as a 'possession' of the United States.").

72. The five patents at issue covered marine seismic data acquisition, which was performed on a boat in the EEZ. *WesternGeco I*, 776 F. Supp. 2d 342, 346-47 (S.D. Tex. 2011). The alleged infringer "applied for and received a Geological & Geophysical Permit from the U.S. Department of the Interior" to study lease holdings in the Chukchi Sea located "in the Outer Continental Shelf ("OCS"), approximately 100 miles northwest of Wainwright, Alaska, and 150 miles west of Barrow, Alaska." *Id.* at 347-48.

73. *See id.*

74. *See supra* note 42 and accompanying text for the language of Presidential Proclamation 5030.

75. *WesternGeco I*, 776 F. Supp. 2d at 368-69.

76. Submerged Lands Act, Pub. L. No. 83-31, § 3, 67 Stat. 29, 30 (1953) (codified at 43 U.S.C. § 1301-1356 (2012)).

77. 43 U.S.C. § 1333(a)(1).

78. *Pacific Operators Offshore, LLP v. Valladolid*, 132 S. Ct. 680, 685 (2012).

The awkward nature of this fit leads to an equally awkward application of the law, as discussed further below.

There is significant overlap between the continental shelf and the EEZ.⁷⁹ Under the Law of the Sea, nations may claim an EEZ of no more than 200 nautical miles beyond the coastline of a nation,⁸⁰ while the continental shelf⁸¹ can extend no more than 350 nautical miles beyond the baseline of the territorial sea.⁸² Under the Law of the Sea, these geographical limits, which are based in a historical understanding of fishing, shipping, and access of a nation to its environmental resources, are different for the EEZ and the continental shelf. As technology increases access to resources found in the continental shelf, claiming sovereignty over a greater territory has risen in importance. For instance, in 1978, the United States and Mexico established maritime boundaries in the Gulf of Mexico through the Treaty on Maritime Boundaries between the United Mexican States and the United States of America.⁸³ At the time that treaty was negotiated, the primary concern of the nations involved was fishing rights. The tension between fishing rights and any potential for oil resources led to a derailment of the treaty, and it was not ratified until nineteen years later, in 1997.⁸⁴ In 2012, when fishing rights were of less importance, and the focus of Mexico and the United States had turned to the petroleum beneath the Gulf of Mexico, a new treaty was negotiated between the two countries. This treaty, the U.S.-Mexico Transboundary Hydrocarbons Agreement, reflects the shift in focus of the nations from the maritime rights in the EEZ to the hydrocarbon rights in the OCS.⁸⁵ The boundaries negotiated in the 2012 treaty are based on the interests of each nation in its continental shelf, and these rights have a more

79. See U.S. ENERGY INFO. ADMIN., OVERVIEW OF U.S. LEGISLATION AND REGULATIONS AFFECTING OFFSHORE NATURAL GAS AND OIL ACTIVITY 6 (2005), available at http://www.eia.gov/pub/oil_gas/natural_gas/feature_articles/2005/offshore/offshore.pdf (“About 15 percent of the U.S. EEZ lies on the continental shelf in shallow waters less than 200 meters (656 feet) deep and another 10 to 15 percent lies in water depths of 200 to 2,000 meters (656 to 6,560 feet). The remaining 70 to 75 percent of the EEZ reaches water depths of up to 5,000 meters (16,404 feet). . . . In some instances . . . jurisdiction over natural resources extends beyond the 200-mile boundary to the edge of the geological continental margin based on geological factors such as sediment thickness and water depth. For this reason the boundaries associated with Alaska, parts of the East Coast and the Gulf of Mexico extend beyond 200 miles, but the Pacific coast has the standard EEZ boundary limits.”).

80. UNCLOS, *supra* note 19, arts. 55, 57.

81. The legal definition of the continental shelf is not necessarily the same as the geological definition of the continental shelf.

82. The Law of the Sea limits the continental shelf to a distance of no more than “350 nautical miles from the baselines from which the breadth of the territorial sea is measured.” UNCLOS, *supra* note 19, art. 76, ¶ 6.

83. David Applegate, *Doughnut Holes in the Gulf of Mexico*, BOUNDARY & SECURITY BULL., Autumn 1997, at 71, 71.

84. *Id.* at 71, 73.

85. Agreement Concerning Transboundary Hydrocarbon Reservoirs in the Gulf of Mexico, U.S.-Mex., Feb. 20, 2012, <http://www.state.gov/documents/organization/185467.pdf>.

extensive geographic reach than any rights that could be based on each nation's EEZ.⁸⁶

Offshore drilling in deepwater and ultra-deepwater often uses mobile offshore drilling units, such as the *GSF Development Driller I*. This cutting edge technology is a rapidly evolving area,⁸⁷ rich in patentability questions, including the question of whether United States patent law can be infringed by drilling on the OCS. Mobile offshore drilling units can move from one drilling spot to the next—as the name itself suggests—and so they are often classified as a vessel and treated as registered to the nation whose flag they carry.⁸⁸ However, when drilling, these units are necessarily attached to the seabed.⁸⁹ If that seabed is part of the OCS and the unit is attached, albeit temporarily, to the OCS, a literal reading of the Outer Continental Shelf Lands Act (OCSLA) would place the unit under limited federal jurisdiction.⁹⁰

Mobile drilling units provide an interesting hybrid of vessel and installment. Unattached to the seabed, a mobile offshore drilling unit⁹¹ is a vessel passing through the EEZ. Once attached to the seabed, the mobile offshore drilling unit is an installment for purposes of federal jurisdiction.⁹² The very question of what patent sovereignty the United States exercises over activities on a mobile oil rig turns on whether the oil rig is attached to the seabed and drilling, or mobile in the water.

86. See CURRY L. HAGERTY & JAMES C. UZEL, CONG. RESEARCH SERV., R43204, PROPOSED U.S.-MEXICO TRANSBOUNDARY HYDROCARBON AGREEMENT: BACKGROUND AND ISSUES FOR CONGRESS 7-8 (2013).

87. See, e.g., *A Brief History of Offshore Oil Drilling 1* (Nat'l Comm'n on the BP Deepwater Horizon Oil Spill and Offshore Drilling, Staff Working Paper No. 1, 2010).

88. Rebecca K. Richards, Note, *Deepwater Mobile Oil Rigs in the Exclusive Economic Zone and the Uncertainty of Coastal State Jurisdiction*, 10 J. INT'L BUS. & L. 387, 388, 407 (2011).

89. The attachment may be temporary, but in order to drill, the oil rig must have access to the seabed. Richards, *supra* note 88, at 396-97.

90. 43 U.S.C. § 1333(a) (2012) ("The Constitution and laws and civil and political jurisdiction of the United States are extended to the subsoil and seabed of the outer Continental Shelf . . .").

91. The Code of Federal Regulations defines a "mobile offshore drilling unit or MODU [as] a vessel, other than a public vessel of the United States, capable of engaging in drilling operations for exploration or exploitation of subsea resources." 33 CFR § 140.10 (2014). Once it is engaged in drilling operations, the mobile offshore drilling unit becomes an OCS facility, defined as

any artificial island, installation, or other device permanently or temporarily attached to the subsoil or seabed of the Outer Continental Shelf, erected for the purpose of exploring for, developing, or producing resources therefrom, or any such installation or other device (other than a ship or vessel) for the purpose of transporting such resources. The term includes mobile offshore drilling units when in contact with the seabed of the OCS for exploration or exploitation of subsea resources.

Id.

92. If this seems confusing, it is. In fact, this may have been an issue in the *Deepwater Horizon* disaster. The chain of command for a ship at anchor, or attached to the seabed, is different from the chain of command for a ship underway. See ANDREW MITCHELL, IN THE MATTER OF DEEPWATER HORIZON: REPORT REGARDING TRANSOCEAN'S SAFETY MANAGEMENT SYSTEM AND THE ISM CODE 7 (2011), available at <http://www.mdl2179trialdocs.com/releases/release201305171200030/TREX-040011.pdf> (stating that "[t]he Master of the *Deepwater Horizon* was incapable by virtue of the Transocean command structure and inadequate training to make the right decisions at critical times").

In 1987, William Riles was granted a patent for a method of installing offshore platforms for oil drilling.⁹³ The Hess Corporation was drilling on the OCS, pursuant to a lease from the United States Government, including offshore exploration projects in the “Garden Banks”⁹⁴ area of the OCS.⁹⁵ Mr. Riles sought a declaratory judgment preventing the Hess Corporation from installing the Garden Banks offshore platforms, alleging that the installations would infringe his patent.⁹⁶ Is drilling on the OCS within the United States patent boundaries? If the OCS were not within the United States, then Mr. Riles would have had no case under United States patent law for infringement.

In 2009, WesternGeco brought a lawsuit alleging infringement of five of its patents. Infringement was alleged to have occurred over one hundred miles off the coast of Alaska on board a ship in the Chukchi Sea over the OCS.⁹⁷ WesternGeco also asked the court to find infringement involving a ship sailing in the EEZ.⁹⁸ The site of the alleged infringement was found to be in the United States EEZ, not on the OCS, because the infringement in *WesternGeco* took place on a vessel traveling over the OCS.⁹⁹ Mr. Riles was concerned about actions taking place on the OCS in the EEZ, while WesternGeco was concerned about actions taking place in the EEZ, but not on the OCS.¹⁰⁰ There was jurisdiction over Mr. Riles’ claim for infringement, but not over the claim made by WesternGeco. The distinction between sailing in the EEZ and drilling on the OCS is a distinction based in international law, treaties, and United States law.¹⁰¹

The OCSLA extends a broad grant of federal subject matter jurisdiction to the OCS, giving federal courts jurisdiction over all cases and controversies arising out of “exploration, development, or production of the minerals, of the

93. *Riles v. Amerada Hess Corp.*, 999 F. Supp. 938, 938 (S.D. Tex. 1998).

94. The Garden Banks areas are “two prominent geological features on the edge of the outer continental shelf in the northwestern Gulf of Mexico, approximately 192 km southeast of Galveston, Texas.” *Flower Garden Banks*, GULFBASE.ORG, <http://www.gulfbase.org/reef/view.php?rid=fgb1> (last visited May 15, 2015).

95. *Riles*, 999 F. Supp. at 938.

96. *Id.* at 939.

97. *WesternGeco I*, 776 F. Supp. 2d 342, 347–48 (S.D. Tex. 2011).

98. *Id.* at 364, 368–70.

99. *Id.* at 370.

100. *See id.* at 364 (indicating that WesternGeco contended that the allegedly infringing activity occurred “within the Outer Continental Shelf . . . and the Exclusive Economic Zone . . . of the United States”); *Riles*, 999 F. Supp. at 938 (indicating that the defendant’s activities included offshore-exploration projects on the Outer Continental Shelf).

101. There have been allegations that this distinction is part of what led to the *Deepwater Horizon* disaster. *See* David Hammer, *Deepwater Horizon Alarm Gave No Advance Warning of Explosion, Rig Crew Member Says*, TIMES-PICAYUNE (Oct. 5, 2010, 10:15 PM), http://blog.nola.com/2010_gulf_oil_spill/print.html?entry=/2010/10/deepwater_horizon_alarm_gave_n.html (“The Transocean policy is that a rig is run by its captain when it’s making way, but the top drilling official, the offshore installation manager, is in control when the rig is latched onto a well.”); *see also* MITCHELL, *supra* note 92, at 8 (“The way that Transocean describes the command structure in the management system documentation is confusing and ambiguous, with many conflicting statements about when and whether the Master is appointed as the [person in charge] during emergency situations . . .”).

subsoil and seabed” of the OCS.¹⁰² The statute covers drilling for oil in the OCS, as long as the device is attached, either temporarily or permanently, to the OCS seabed or substrate. Within these narrow limits, the OCS falls within the United States patent boundaries. This aligns with how other countries have treated this issue. In the United Kingdom, sections of the continental shelf have been designated as under the purview of the Patents Act 1977.¹⁰³ In South Africa, the court system determined that installations on the continental shelf fell within the South African patent boundaries.¹⁰⁴ In the United States, an offshore oil rig is attached to the OCS and is, therefore, an installation, even if the attachment is only temporary, as long as the rig is drilling for oil¹⁰⁵ or otherwise physically exploring the seabed or substrate.¹⁰⁶ If a vessel is mapping the seabed, with no physical attachment to the bed, then the vessel is in the EEZ, and is not covered by the OCSLA. Once attachment to the OCS occurs, temporary or permanent, then the resulting activity is within the United States patent boundaries.¹⁰⁷

E. High Seas

The Law of the Sea defines 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 internal waters of a State, or in the archipelagic waters of an archipelagic State.”¹⁰⁸ The United States Constitution gives Congress the power to “define and punish Piracies and Felonies committed on the high Seas, and Offences

102. Outer Continental Shelf Lands Act of 1978, Pub. L. No. 95-372, § 23(b)(1), 92 Stat. 629, 658 (codified at 43 U.S.C. § 1349(b)(1) (2012)); *see also* 43 U.S.C. § 1333(a)(1) (“The Constitution and laws and civil and political jurisdiction of the United States are extended to the subsoil and seabed of the outer Continental Shelf and to all artificial islands, and all installations and other devices permanently or temporarily attached to the seabed, which may be erected thereon for the purpose of exploring for, developing, or producing resources therefrom.”).

103. *See supra* notes 51–56 and accompanying text for a discussion of how United Kingdom patent law applies to the OCS.

104. *See supra* notes 57–69 and accompanying text for a discussion of how South Africa patent law applies to the OCS.

105. This is true even if the oil rig is not anchored, but is using dynamic positioning in order to stay attached to the OCS. As long as the oil rig is drilling, it is attached to the OCS. *See* United States v. Kaluza, No. 12–265, 2013 WL 6490341, at *17 (E.D. La. Dec. 10, 2013), *aff’d in part*, 780 F.3d 647 (5th Cir. 2015) (stating that “a dynamically positioning semi-submersible rig may be an OCSLA situs under 1333(a)(1)” if it is “‘erected’ on the OCS”).

106. *See* Tom Hamburger & Kim Geiger, *Foreign Flagging of Offshore Rigs Skirts U.S. Safety Rules*, L.A. TIMES (June 14, 2010), <http://articles.latimes.com/2010/jun/14/nation/la-na-oil-inspection-20100615> (“A deepwater oil rig floats above the well, connected by thousands of feet of pipe, and is kept in position by thrusters and elaborate navigational systems.”).

107. The temporary presence exemption, set forth in 35 U.S.C. § 272, does not apply since the technology is not being used exclusively for the needs of the vessel, but is instead being used to extract oil for sale in or export from the United States. *See* J. Jonas Anderson, *Hiding Behind Nationality: The Temporary Presence Exception and Patent Infringement Avoidance*, 15 MICH. TELECOMM. & TECH. L. REV. 1, 2–4 (2008) (discussing the scope and purpose of the temporary presence exception).

108. UNCLOS, *supra* note 19, art. 86.

against the Law of Nations.”¹⁰⁹ The high seas are not territory of the United States.¹¹⁰

Willard Bascom patented a novel method of finding underwater objects.¹¹¹ He conceived of the idea of “equipping the end of a drill string in deep ocean waters (from 12,000 to 20,000 feet or more below the ocean surface) with means for viewing the ocean bottom in the vicinity of the end of the drill string” and using this to survey the ocean floor.¹¹² With this information, “a search plan could be developed for closer inspection, identification and retrieval of objects from the floor of the ocean.”¹¹³ The method can be used in any depth of water, but “particularly applicable . . . to use at depths of the order of 20,000 feet below the surface of the ocean.”¹¹⁴

Bascom sued the United States government for patent infringement, alleging that an “American-registered, U.S. Government owned and operated vessel identified as the *Glomar Explorer*” made unauthorized use of his method.¹¹⁵ If the *Glomar Explorer* was on the high seas when the method was practiced, did infringement under United States patent law occur?

Sovereignty of the United States over the high seas is strictly limited to piracies, felonies, and offenses against the Law of Nations.¹¹⁶ Patent infringement falls into none of these categories. It is not piracy, not “[r]obbery on the seas . . . an offence within the criminal jurisdiction of all nations.”¹¹⁷ A violation of United States patent law is neither a criminal act within the United States nor a felony. It is not an offense against the Law of Nations. The Law of Nations has been held to be synonymous with “customary international law.”¹¹⁸ The *Restatement (Third) of the Foreign Relations Law of the United States* defines “customary international law” as the “general and consistent practice of states followed by them from a sense of legal obligation.”¹¹⁹ In a decision from

109. U.S. CONST., art. I, § 8, cl. 10.

110. *WesternGeco I*, 776 F. Supp. 2d 342, 367 (S.D. Tex. 2011).

111. *Ocean Science & Eng'g, Inc. v. United States*, 595 F.2d 572, 573 (Ct. Cl. 1979).

112. *Id.* at 575.

113. *Id.*

114. *Id.* at 578.

115. *Id.* at 580.

116. U.S. CONST., art. I, § 8, cl. 10.

117. *United States v. Furlong*, 18 U.S. (5 Wheat.) 184, 197 (1820); see also UNCLOS, *supra* note 19, art. 101 (“Piracy consists of any of the following acts: (a) any illegal acts of violence or detention, or any act of depredation, committed for private ends by the crew or the passengers of a private ship . . . and directed: (i) on the high seas, against another ship . . . or against persons or property on board such ship . . . ; (ii) against a ship, . . . persons or property in a place outside the jurisdiction of any State; (b) any act of voluntary participation in the operation of a ship . . . with knowledge of facts making it a pirate ship . . . ; (c) any act of inciting or of intentionally facilitating an act described in subparagraph (a) or (b).”); *United States v. Smith*, 18 U.S. (5 Wheat.) 153, 153 (1820) (defining piracy as “[r]obbery, or forcible depredation, upon the sea”).

118. *United States v. Bellaizac-Hurtado*, 700 F.3d 1245, 1251 (11th Cir. 2012); *Abagninin v. AMVAC Chem. Corp.*, 545 F.3d 733, 738 (9th Cir. 2008); *Flores v. S. Peru Copper Corp.*, 414 F.3d 233, 237 n.2 (2d Cir. 2003).

119. RESTATEMENT (THIRD) OF THE FOREIGN RELATIONS LAW OF THE U.S. § 102(2) (1987).

the Eleventh Circuit looking at drug trafficking offenses on the high seas, the court wrote:

The text of the Offences Clause does not resolve the question whether it limits the power of Congress to define and punish only those violations of customary international law that were established at the Founding or whether the power granted under the Clause expands and contracts with changes in customary international law. The Supreme Court has not resolved the issue in either of the two cases in which it upheld federal statutes as a constitutional exercise of the power granted under the Offences Clause. In both cases, the Court explained that the conduct at issue had been condemned as a violation of the law of nations since the time of the Founding.¹²⁰

Patent infringement was hardly a matter of international concern in 1789. Territorial in nature, patent law and infringement varies widely from one country to another.¹²¹ It makes no sense for the Offences Clause to serve as the basis for outlawing patent infringement on the high seas. The patent boundaries must be drawn closer to the United States.

It is true that evolving technology raises the question of patent infringement on the high seas, but for now, the high seas must be outside the United States patent boundaries, as acknowledged by the court in *Ocean Science & Engineering, Inc. v. United States*.¹²²

The method used by the United States for this purpose and allegedly infringing Bascom's patent was operational only on the high seas—outside the United States, as defined in the Patent Act as “the United States of America, its territories and possessions.” Yet the Act protects only against the manufacture, use, or sale of a patented invention “within the United States.”¹²³

The court went on to state: “Perhaps the patent bar will note the possible loophole in the coverage of the U.S. patent laws and will invite the attention of Congress to it. Meanwhile, it is well to adjudicate cases on other grounds when possible, as we do this case.”¹²⁴

Absent infringement on a country's flagged ship, as addressed below, the high seas are within no country's patent boundaries.¹²⁵ The United States is not a signatory to the Law of the Sea, but customary international law holds that sovereignty over the high seas is strictly limited, and until that changes, the high seas must lie outside the United States patent boundaries.

120. *Bellaizac-Hurtado*, 700 F.3d at 1253 (citations omitted).

121. See *supra* Part II.C for a comparison of patent law in the United States, United Kingdom, Australia, and South Africa.

122. 595 F.2d 572 (Ct. Cl. 1979).

123. *Ocean Sci. & Eng'g, Inc.*, 595 F.2d at 573 (citations omitted); see also 35 U.S.C. § 271(a) (2012).

124. *Ocean Sci. & Eng'g, Inc.*, 595 F.2d at 574.

125. *WesternGeco I*, 776 F. Supp. 2d 342, 367–68 (S.D. Tex. 2011) (“U.S. patent law . . . cannot proscribe . . . direct infringement when it occurs upon the high seas.”).

F. The Law of the Flag

“A ship, which bears a nation’s flag, is to be treated as a part of the territory of that nation. A ship is a kind of floating island.”¹²⁶

Ships provide interesting qualifications to the issue of patent boundaries, as ships move from one place to another, and pass in and out of the geographic boundaries of many countries. During one voyage a ship may visit many different ports of call, each with their own patent regulations, and having some form of constancy, that the laws that apply to the ship are those of the flag the ship flies, allows for a more efficient set of decisions to be made on board the ship. To further promote this efficiency, the law of the flag states that, absent the exceptions set forth below, a ship is governed by the laws of the nation whose flag the ship bears, even in the territorial waters of another country. In other words, patent infringement may not occur, even within the territorial waters of the United States, if the infringement occurs on a foreign-flagged ship temporarily present in the United States.

Companies may choose to register vessels in countries other than the country where the company is based, or even where the ship is docked.¹²⁷ Foreign registration allows the ship to fly the flag of a nation with which the ship has only a tenuous nexus.¹²⁸ International maritime law generally endorses the law of the flag and holds that the law of the country whose flag the ship flies governs a ship.¹²⁹ These “flags of convenience” may shelter a vessel from the laws of the country where the vessel is located.¹³⁰ Ships that sail under a nation’s flag “shall be subject to its exclusive jurisdiction on the high seas.”¹³¹

126. *Patterson v. Eudora*, 190 U.S. 169, 176 (1903) (citation and internal quotation marks omitted).

127. See H. Edwin Anderson, III, *The Nationality of Ships and Flags of Convenience: Economics, Politics, and Alternatives*, 21 TUL. MAR. L.J. 139, 140 (1996) (“One of the premises of the principle of freedom of the high seas is that all states have the right to grant nationality to a vessel in accordance with national and international law. . . . [T]he flag state, the state granting nationality to a vessel, has exclusive jurisdiction over that vessel on the high seas to the extent permitted by international law.”); see also Hamburger & Geiger, *supra* note 106 (stating that companies can register vessels “in unlikely places such as the Marshall Islands, Panama and Liberia—reducing the U.S. government’s role in inspecting and enforcing safety and other standards”) (footnotes omitted).

128. See, e.g., U.S. COAST GUARD MINERALS MGMT. SERV., MARINE BOARD OF INVESTIGATION INTO THE MARINE CASUALTY, EXPLOSION, FIRE, POLLUTION, AND SINKING OF MOBILE OFFSHORE DRILLING UNIT DEEPWATER HORIZON, WITH LOSS OF LIFE IN THE GULF OF MEXICO 21–22 APRIL 2010, at 37 (2010), available at <http://www.uscg.mil/hq/cg5/cg545/dw/exhib/May%2026%20PDF.pdf> (examination of Captain Carl Smith, in which he states that a vessel he was on was “flagged out of U.K., and they were presented with a nineteen million dollar tax bill. So on December 30th of that year, they changed their flag to Singapore, and then they paid the six thousand dollar tax bill.”).

129. *United States v. Jho*, 534 F.3d 398, 405–06 (5th Cir. 2008) (“[T]he law of the flag doctrine. . . . provides that a merchant ship is part of the territory of the country whose flag she flies, and that actions aboard that ship are subject to the laws of the flag state.”).

130. See *Spector v. Norwegian Cruise Line, Ltd.*, 545 U.S. 119, 126 (2005) (“Despite the fact that the cruises are operated by a company based in the United States, serve predominantly United States residents, and are in most other respects United States-centered ventures, almost all of [Norwegian Cruise Line’s] cruise ships are registered in other countries, flying so-called flags of

As stated above, the law of the flag is the general rule. There are exceptions. In 1920, the Eighteenth Amendment to the United States Constitution took effect. Prohibiting the transportation of alcohol within the United States, this Amendment would carry extraterritorial impact if applied to ships sailing between the United States and ports outside the United States.¹³² Relying on the fact that alcohol had long been present on ships and in naval history, several merchant ships sued the United States to enjoin application of the National Prohibition Act to foreign-flagged vessels.¹³³ The merchant ships learned that foreign-flagged ships traveling in United States waters may be subject to United States law, if Congress expressly extends United States law to foreign-flagged ships, or if the United States law exists to protect the “peace of the port.”¹³⁴ The Supreme Court held:

A merchant ship of one country voluntarily entering the territorial limits of another subjects herself to the jurisdiction of the latter. The jurisdiction attaches in virtue of her presence, just as with other objects within those limits. During her stay she is entitled to the protection of the laws of that place and correlatively is bound to yield obedience to them. Of course, the local sovereign may out of considerations of public policy choose to forego the exertion of its jurisdiction or to exert the same in only a limited way, but this is a matter resting solely in its discretion.¹³⁵

Alcohol was prohibited on any ships that wished to enter the United States. In 2005, the Supreme Court upheld this rule, and found:

The general rule that United States statutes apply to foreign-flag ships in United States territory is subject only to a narrow exception. Absent a clear statement of congressional intent, general statutes may not apply to foreign-flag vessels insofar as they regulate matters that involve only the internal order and discipline of the vessel, rather than the peace of the port.¹³⁶

This exception differentiates between regulation of the internal affairs of the vessel and the peace of the port. In other words, the law of Panama would regulate internal affairs on the *GSF Development Driller I*, including the qualifications of the captain, and the law of the United States would regulate the peace of the port, including criminal conduct on board. The next question is whether patent law is an internal affair of a ship, or part of the peace of the port. In other words, do the United States patent boundaries extend to foreign-flagged

convenience.”); Anderson, *supra* note 127, at 162–67 (addressing some of the environmental, safety, and labor problems associated with flags of convenience).

131. UNCLOS, *supra* note 19, art. 92.

132. In fact, during prohibition, “several U.S. vessels, including two cruise liners, the M/V RELIANCE and the M/V RESOLUTE, were reflagged in Panama to avoid the U.S. law banning the sale of alcohol aboard U.S. ships.” Anderson, *supra* note 127, at 156.

133. *Cunard S.S. Co. v. Mellon*, 262 U.S. 100, 119 (1923); *see also* National Prohibition Act, Pub. L. No. 66–66, 41 Stat. 305 (1919) (repealed 1935).

134. *Spector*, 545 U.S. at 130.

135. *Cunard*, 262 U.S. at 124.

136. *Spector*, 545 U.S. at 130.

vessels in United States waters, or are those vessels subject only to the patent law of their flagged nations? The question is one of very narrowly drawn lines, indeed. In cases involving labor relations, the National Labor Relations Act has been held to apply to relationships between foreign-flagged ships and American longshoremen, but not to relationships between the foreign-flagged ships and their foreign crew.¹³⁷ The narrowness of this distinction arises from the presumption that

Congress intends no interference with matters that are primarily of concern only to the ship and the foreign state in which it is registered. It is also reasonable, however, to presume Congress does intend its statutes to apply to entities in United States territory that serve, employ, or otherwise affect American citizens, or that affect the peace and tranquility of the United States, even if those entities happen to be foreign-flag ships.¹³⁸

The Supreme Court weighed in on this issue in 1856. In *Brown v. Duchesne*,¹³⁹ the patent at issue covered “a new and useful improvement in constructing the gaff of sailing vessels.”¹⁴⁰ The alleged infringement was used “in the gaffs of a French schooner, . . . built in France, and owned and manned by French subjects . . . [while] upon a lawful voyage, under the flag of France, from . . . one of the colonies of France, to Boston, and thence back” to the French colony.¹⁴¹ The patentee, a United States citizen, claimed infringement when the *Alcyon*, the French vessel, was “lawfully in a port of the United States.”¹⁴² To further complicate matters, the improvement on board the *Alcyon* had been done in a foreign port “and was authorized by the laws” of France.¹⁴³ Chief Justice Taney held that the patent act is “domestic in its character, and necessarily confined within the limits of the United States. It confers no power on Congress to regulate commerce, or the vehicles of commerce, which belong to a foreign nation, and occasionally visit our ports in commercial pursuits.”¹⁴⁴ The policy behind patent law is the promotion of science and the useful arts, not the “right to interfere in foreign intercourse, or with foreign ships visiting our ports.”¹⁴⁵ The Supreme Court held that on board a foreign-flagged ship in United States waters, the patent law of the country whose flag the ship flies apply.¹⁴⁶

Patent laws, with their strongly territorial nature, are primarily of concern to the country of origin. It would be very difficult to say that patent law affects the peace and tranquility of the United States, or its ports. Patent law has more

137. *Id.* at 131–32.

138. *Id.*

139. 60 U.S. 183 (1856).

140. *Brown*, 60 U.S. at 193.

141. *Id.*

142. *Id.* at 194.

143. *Id.*

144. *Id.*

145. *Id.* at 198.

146. *Id.* at 198–99.

to do with the internal affairs of the vessel itself. United States patent boundaries do not extend to foreign-flagged vessels—even when such vessels are present in the United States.¹⁴⁷ Any claims of patent infringement on board *GSF Development Driller I* would have to be brought under the patent law of Panama—that is, if the *GSF Development Driller I* was a vessel afloat in the waters off the United States, as opposed to an installation attached to the OCS.¹⁴⁸ This represents the primary problem with drawing patent boundaries based on the flags borne by a ship. The ship may be viewed as a “floating island,” an extension of the nation whose flag it flies. However, often times that flag is selected for reasons other than the connection between the vessel and the nation. Often referred to as “flags of convenience” for this very reason, a ship may fly a flag for tax purposes, or register in a particular nation to take advantage of its favorable labor laws, or for environmental shelters.¹⁴⁹

The result of extending a nation’s patent boundaries, which is the correct result, may lead to a poor fit between the patent law of a country and the technology on board the ship. The Marshall Islands, for instance, are a popular country in which to register ships and oil rigs, many of which cost millions of dollars to build and encapsulate a wide range of technological innovations.¹⁵⁰ In the Marshall Islands, “[t]he only intellectual property–related legislation relates to locally produced music recordings.”¹⁵¹ There is no patent law in the Marshall Islands. The Marshall Islands may, therefore, provide a patent shelter for a mobile offshore drilling rig seeking to avoid charges of patent infringement, or for a shipborne mobile computing center modeled on the disclosure found in Google’s patent for a “water-based data center.”¹⁵²

The law of the flag does protect United States–flagged ships, which have long represented an extension of the sovereignty of the United States to the high seas. A United States–flagged ship, regardless of its berth, port, or location on the high seas, is under the territorial sovereignty of the United States and within the United States patent boundaries. This supports the above limit on foreign-flagged vessels, because if foreign-flagged vessels are subject to foreign laws, even in the United States, the converse should also hold true, and United States–

147. *WesternGeco I*, 776 F. Supp. 2d 342, 367 (S.D. Tex. 2011) (stating that although United States patent law may cover infringement “occurring upon a U.S. flag vessel on the high seas, . . . no court has extended this holding to foreign flag vessels on the high seas”) (citation omitted).

148. See *supra* notes 105–07 and accompany text for an explanation of the significance of this distinction under United States patent law.

149. See Anderson, *supra* note 127, at 162–67 (detailing environmental and labor concerns raised by flags of convenience).

150. See Hamburger & Geiger, *supra* note 106 (noting that companies can register vessels “in unlikely places such as the Marshall Islands, Panama and Liberia—reducing the U.S. government’s role in inspecting and enforcing safety and other standards”).

151. BUREAU OF ECON. & BUS. AFFAIRS, U.S. DEP’T OF STATE, 2012 INVESTMENT CLIMATE STATEMENT - MARSHALL ISLANDS (2012), available at <http://www.state.gov/e/eb/rls/othr/ics/2012/191946.htm>.

152. Water-Based Data Ctr., U.S. Patent No. 7,525,207 (filed Feb. 26, 2007).

flagged vessels should be subject to United States laws, even when on the high seas or elsewhere.

In 1865, a challenge was brought alleging infringement of an “improvement in the sails of vessels.”¹⁵³ The alleged infringer “applied the patented improvement to one of the sails of [his] vessel, on [the vessel’s] passage from Liverpool to New York.”¹⁵⁴ The ship was an American vessel, and the improvement was made to the sail on the high seas.¹⁵⁵ The court held that “[t]he patent laws of the United States afford no protection to inventions beyond or outside of the jurisdiction of the United States; but this jurisdiction extends to the decks of American vessels on the high seas, as much as it does to all the territory of the country.”¹⁵⁶ Since 1865, it has become clear that there is no simple answer to the question of jurisdiction over these “floating islands” of territory. The exception to United States sovereignty for foreign-flagged ships in American waters would suggest that an extension be made to United States-flagged ships in non-American waters. The Supreme Court has upheld that extension, but as the Court of Claims points out, Congress has not clearly extended the scope of the Patent Act to include American ships on non-American waters. Looking to international law for guidance provides no greater clarity. The law of the flag has a vast following, and is perhaps the easiest source to look to for purposes of efficiency and clarity, even as it varies based on the character of the jurisdiction and laws being applied. Under the law of the flag, it must be that American patent boundaries extend to American ships in non-American waters. Therefore, if a United States-flagged vessel obeys United States patent law, it should not be charged with patent infringement for docking in another country. Conversely, if a United States-flagged vessel wishes to benefit from that ruling, the same vessel must be willing to submit to United States patent law, no matter where the ship may be found. Once again, the United States patent boundaries are not strictly geographical—they are limited by the purpose of patent law as well as by the geography of the United States.

III. IN THE AIR

In 2004, test pilot Mike Melvill flew the rocket plane *SpaceShipOne* more than 100 kilometers above California, achieving weightlessness and earning the first pair of commercial astronaut’s wings from the Federal Aviation Administration.¹⁵⁷ If Mr. Melvill used a camera to take pictures from *SpaceShipOne* and in doing so infringed a patent, would it matter at what height above the United States he took those pictures? In other words, could he infringe a patent in United States airspace, and not infringe in outer space? What is the demarcation between the two?

153. *Gardiner v. Howe*, 9 F. Cas. 1157, 1157 (C.C.D. Mass. 1865) (No. 5,219).

154. *Id.*

155. *Id.*

156. *Id.* at 1158.

157. Michael Coren, *Private Craft Soars into Space, History*, CNN.COM (July 14, 2004, 4:14 AM), <http://www.cnn.com/2004/TECH/space/06/21/suborbital.test/>.

Virgin Galactic is selling tickets to fly into space.¹⁵⁸ Drones are on the evening news, being used by traffic reporters, home aviation enthusiasts, and the federal government.¹⁵⁹ A new commercial Mid-Atlantic Regional Spaceport (MARS) has been built in Virginia.¹⁶⁰ As the technology advances, so changes the question of what constitutes patent infringement. Patent infringement must occur within the United States. How high does the United States reach? The discussion below sets forth the airspace of United States patent boundaries.

A. Airspace

In 2010, Raytheon filed for a patent titled “Systems & Methods for Collision Avoidance in Unmanned Aerial Vehicles.”¹⁶¹ The claims cover a collision-avoidance system contained on board an unmanned aerial vehicle, i.e., a drone. Raytheon’s drones can autonomously avoid collisions.¹⁶² The method takes place in air, never touching ground. Can this patent be infringed by an unauthorized operation of this device in the United States?

Air is not the same thing as airspace.¹⁶³ Air, as in the oxygen, nitrogen, argon, and carbon dioxide that constitute the atmosphere, is a common good, belonging to no one and no party. There are no property rights associated with air. Airspace on the other hand, does carry with it property rights. The landowner owns the airspace above land.¹⁶⁴

158. *Booking*, VIRGIN GALACTIC, <http://staging.virgingalactic.com/booking/> (last visited May 15, 2015) (“All seats to fly to space are US \$250,000 and deposits are refundable.”); see also Timothy Stenovec, *Space Tourism Expected to be \$1 Billion Industry over Next 10 Years, Says FAA*, HUFFPOST, (Mar. 22, 2012, 9:43 AM), http://www.huffingtonpost.com/2012/03/22/space-tourism-1-billion-industry_n_1371354.html (“Ashton Kutcher was the 500th person to sign up for a \$200,000 ride aboard Virgin Galactic’s Space Ship Two.”).

159. See Leslie Kaufman & Ravi Somaiya, *Drones Offer Journalists a Wider View*, N.Y. TIMES, Nov. 25, 2013, at B1 (explaining that drones have mostly been used by the military, but “are increasingly being used for civilian purposes”).

160. E.g., Melanie D.G. Kaplan, *Walloped by a Rocket Launch on Virginia’s Wallops Island*, WASH. POST (Jan. 23, 2014), http://www.washingtonpost.com/lifestyle/travel/walloped-by-a-rocket-launch-on-virginias-wallops-island/2014/01/23/cd0e245a-82de-11e3-8099-9181471f7aaf_story.html.

161. *Systems & Methods for Collision Avoidance in Unmanned Aerial Vehicles*, U.S. Patent No. 8,378,881 (filed Oct. 18, 2010).

162. *Id.* The Federal Aviation Administration (FAA) has announced plans to allow drones to enter the national airspace. Timothy T. Takahashi, *Drones in the National Airspace*, 77 J. AIR L. & COM. 489, 492 (2012). Drones were previously banned from national airspace out of a concern for midair collisions between drones and airplanes. *Id.* at 494. Numerous companies, including Raytheon, are working on autonomous collision-avoidance systems, increasing drone safety, and supporting the FAA’s plans to allow drones into our national airspace. Craig Whitlock, *Near-Collisions Between Drones, Airlines Surge, New FAA Reports Show*, WASH. POST (Nov. 26, 2014), http://www.washingtonpost.com/world/national-security/near-collisions-between-drones-airliners-surge-new-faa-reports-show/2014/11/26/9a8c1716-758c-11e4-bd1b-03009bd3e984_story.html.

163. See, e.g., John Cobb Cooper, *Roman Law and the Maxim Cujus Est Solum in International Air Law*, 1 MCGILL L.J. 23, 36 (1952) (“The distinction between ‘air’ and ‘airspace’ was as clear in Roman law as it is today. The legal status of the air (or atmosphere) which men breathed was not the same as that of the space through which the air circulated.”).

164. See 2 WILLIAM BLACKSTONE, COMMENTARIES *18 (William Draper Lewis ed., 1902) (“Land hath also, in its legal signification, an indefinite extent, upwards as well as downwards.”); 1

Ownership of airspace first became an issue when advances in transportation raised the question of who had the rights to fly where.¹⁶⁵ Fliers claimed the right to fly everywhere, and landowners claimed the right to exclude aircraft from the airspace over their land.¹⁶⁶ The 1919 Paris Convention for Regulation of Aerial Navigation “recognized the ‘complete and exclusive sovereignty’ of the subjacent State over the airspace above its territory,” and with that came the right to exclude aircraft from that airspace.¹⁶⁷ The United States was not a party to this treaty, but in 1938 Congress enacted the Civil Aeronautics Act, stating:

The United States of America is hereby declared to possess and exercise complete and exclusive national sovereignty in the air space above the United States, including the air space above all inland waters and the air space above those portions of the adjacent marginal high seas, bays, and lakes, over which by international law or treaty or convention the United States exercises national jurisdiction.¹⁶⁸

Today, that colorful description has been reduced to simpler language, and the current statute states: “The United States Government has exclusive sovereignty of airspace of the United States.”¹⁶⁹ Subsequently, in *United States v. Causby*,¹⁷⁰ the Supreme Court held:

The air is a public highway, as Congress has declared. Were that not true, every transcontinental flight would subject the operator to countless trespass suits. Common sense revolts at the idea. To recognize such private claims to the airspace would clog these highways, seriously interfere with their control and development in the public interest, and transfer into private ownership that to which only the public has a just claim.¹⁷¹

Looking back at the definition of the United States, under 35 U.S.C. § 100(c),¹⁷² the United States possesses the airspace of the United States, and therefore, Raytheon can bring suit for infringement of its autonomous drones, should such an occasion arise. The patent boundaries of the United States extend

EDWARD COKE, *INSTITUTES OF THE LAW OF ENGLAND* ch. 1, sec. 1, 4.a. (Francis Hargrave & Charles Butler eds., 19th ed. 1853) (“For as the heavens are the habitation of Almighty God, so the earth hath he appointed as the suburbs of heaven to be the habitation of man . . . the earth hath he given to the children of men.”); 3 JAMES KENT, *COMMENTARIES ON AMERICAN LAW* *401 (John M. Gould ed., 14th ed. 1896) (explaining that land “has an indefinite extent, upwards as well as downwards, so as to include everything terrestrial, under or over it”).

165. STUART BANNER, *WHO OWNS THE SKY? THE STRUGGLE TO CONTROL AIRSPACE FROM THE WRIGHT BROTHERS ON 15* (2008).

166. *Id.*

167. Robert L. Bridge, *International Law and Military Activities in Outer Space*, 13 AKRON L. REV. 649, 650 (1980).

168. Civil Aeronautics Act of 1938, Pub. L. No. 75-706, § 1107(i)(3), 52 Stat. 973, 1028, (repealed by the Federal Aviation Act of 1958).

169. 49 U.S.C. § 40103(a)(1) (2012).

170. 328 U.S. 256 (1946).

171. *Causby*, 328 U.S. at 261.

172. See 35 U.S.C. § 100(c) (2012) (defining the United States as, “The United States of America, its territories and possessions”).

to the air above the United States. This includes the territorial limits set forth in the Section on land boundaries below, and the airspace over the United States territorial seas.¹⁷³ The question is how far up does the airspace go. The United States has limits over the reach of its sovereignty, and the sky may be the limit.¹⁷⁴

B. Outer Space

In 1967, the United Nations adopted the Outer Space Treaty, which states: “Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”¹⁷⁵ The United States does not own the space above it extending out to infinity, but the airspace above the United States is under national sovereignty. This begs the question: where is the line between airspace and outer space?

The question is far from a new one—over forty years ago, one author commented:

What is the definition of outer space? Or, more specifically, what is the difference between national air space and outer space? . . . How is one to be distinguished from the other? The question has received much attention in recent years, and many proposals on how it might be resolved have been put forward. A great deal has also been written on the subject, and several publications of the United Nations have discussed it at some length. As yet, no consensus has emerged. However, the progress of technology may make some solution more urgent in coming years. An arbitrary decision may be the only feasible answer.¹⁷⁶

Unlike the Law of the Sea, there is no international treaty that sets forth limits, nor is there clear international demarcation precedent. In fact, there is not even international agreement that it is yet necessary to “define or delimit airspace and outer space” since the absence of such definitions has not yet been an impediment to space activities.¹⁷⁷ Australia is the only country to codify a demarcation, having determined that national sovereignty ends 100 kilometers

173. Sovereignty over the EEZ is recognized internationally as being limited and, as discussed above, the patent boundaries extend neither to the EEZ, nor to the airspace above it.

174. See *Grace v. MacArthur*, 170 F. Supp. 442, 447 (E.D. Ark. 1959) (“[A] time may come, and may not be far distant, when commercial aircraft will fly at altitudes so high that it would be unrealistic to consider them as being within the territorial limits of the United States or of any particular State while flying at such altitudes.”).

175. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies art. II, *opened for signature* Jan. 27, 1967, 18 U.S.T. 2410, 610 U.N.T.S. 2015 [hereinafter *Outer Space Treaty*].

176. Raymond J. Barrett, *Outer Space and Air Space: The Difficulties in Definition*, AIR UNIV. REV., May–June 1973, available at <http://www.au.af.mil/au/afri/aspj/airchronicles/aureview/1973/May-Jun/barrett.html>.

177. U.N. Secretariat, Comm. on the Peaceful Uses of Outer Space, *Questions on the Definition and Delimitation of Outer Space: Replies from Member States*, 4, U.N. Doc. A/AC.105/889/Add. 10 (Feb. 21, 2012) (Norway Response).

above Australia.¹⁷⁸ The United States has expressly stated that it “is firmly of the view that there is no need to seek a legal definition or delimitation for outer space.”¹⁷⁹ Russia believes a definition needs to be set forth in an international treaty that will be legally binding on the signing parties, but has not yet codified such a definition domestically.¹⁸⁰

The ambiguity in the demarcation between airspace and outer space is based on the natural lack of a boundary between the two.¹⁸¹ In both space and at sea, there are natural demarcations ranging from the currents to the layers of the atmospheres, to the continental shelf, to the effect of gravity, but there are no tactile boundaries. As discussed above, however, boundaries in the seas are set forth in UNCLOS. Ships transverse the seas to ferry goods and people between countries.¹⁸² No convention exists defining outer space.¹⁸³ Goods and people are not routinely ferried through outer space. In order to cross the airspace of another country, permission of that nation must be granted, since sovereignty extends over a country’s airspace.¹⁸⁴ At one point in history, Russia claimed that sovereignty had no national height limits. When *Sputnik* launched and orbited over many nations, Russia quietly dropped that argument.¹⁸⁵ If permission had to be granted every time a satellite orbited over a nation, the cost and expense would be tremendous.

In recognition of this cost, and despite the Outer Space Treaty, there have been attempts to claim outer space sovereignty and, therefore, to profit off of satellite orbits. In 1976, the Bogota Declaration, signed by eight equatorial countries,¹⁸⁶ laid claim to “the segments of the synchronous geostationary orbit [which] are an integral part of the territory over which the equatorial States exercise their national sovereignty.”¹⁸⁷ Geostationary synchronous orbit, also

178. Jenifer K. Lamie, *Who Cares About the Demarcation Line Between Airspace and Outer Space?*, A.B.A. SciTECH LAW., Summer 2012, at 18, 18 n.4.

179. Statement by Mark Simonoff, United States Representative to the Legal Subcommittee of the United Nations Committee on the Peaceful Uses of Outer Space, Regarding the Definition and Delimitation of Outer Space and the Character and Utilization of the Geostationary Orbit, April 2006, available at <http://www.state.gov/s/1/2006/98774.htm>.

180. U.N. Secretariat, Comm. on the Peaceful Uses of Outer Space, *supra* note 177, at 5–6.

181. See Michael Listner, *Could Commercial Space Help Define and Delimitate the Boundaries of Outer Space?*, SPACE REV. (Oct. 29, 2012), <http://www.thespacereview.com/article/2180/1>.

182. This is one of the reasons so many countries have signed the Law of the Sea. Negotiating the rights of passage between nations is easier when the rules are set forth in international treaties. Again, this has not been a concern in outer space, as no significant challenge has been raised regarding the overflight of satellites.

183. Dean N. Reinhardt, *The Vertical Limit of State Sovereignty*, 72 J. AIR L. & COM. 65, 66 (2007).

184. In 1996, North Korea agreed to allow international airlift through its airspace for the first time. Previously, aircraft had to fly around North Korea. *North Korea to Open Its Airspace to Others*, N.Y. TIMES, Aug. 3, 1996, <http://www.nytimes.com/1996/08/03/world/north-korea-to-open-its-airspace-to-others.html>.

185. Bridge, *supra* note 167, at 651.

186. Specifically the countries included Brazil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda, and Zaire. The Bogota Declaration, 6 J. SPACE L. 193, 196 (1978).

187. *Id.* at 193.

known as geosynchronous orbit, is a section of space found at a specific height over the equator.¹⁸⁸ There are a limited number of such orbits, and communications satellites benefit from maintaining a geostationary orbit, rendering these orbits valuable. The signatory countries declared:

[T]he synchronous geostationary orbit is a physical fact arising from the nature of our planet, because its existence depends exclusively on its relation to gravitational phenomena caused by the Earth, and that for that reason it must not be considered part of outer space. Therefore, the segments of synchronous geostationary orbit are an integral part of the territory over which equatorial States exercise their national sovereignty.¹⁸⁹

As another observer has written, the “logic of such a statement is obscure, but bears a similarity to the ‘sector’ claims of Chile and Argentina to parts of Antarctica.”¹⁹⁰ The Bogota Declaration remains extant, but has no effect.¹⁹¹ This is because it is in conflict with the Outer Space Treaty, which proscribes any claim to sovereignty over outer space, including geostationary orbit.¹⁹² Instead, the International Telecommunications Union (ITU), an agency of the United Nations, regulates the geosynchronous orbit landscape.¹⁹³ The ITU has subdivided the geosynchronous orbit into longitudinal slots, and each country has first rights to those longitudinal slots above their airspace.¹⁹⁴ There are

188. Lawrence D. Roberts, *A Lost Connection: Geostationary Satellite Networks and the International Telecommunication Union*, 15 BERKELEY TECH. L.J. 1095, 1099 (2000) (“For example, the International Space Station typically orbits at 250 miles above the surface and makes one complete orbit approximately every ninety minutes. In contrast, a satellite placed in an orbit 22,300 miles above the Earth will take precisely one day to complete a single circuit. Such an object is considered to be geosynchronous. If a spacecraft is placed in this 22,300 mile orbit directly above the Earth’s equator, the satellite’s orbit is not merely synchronized with the Earth’s rotation but will appear from the surface to be stationary. For this reason, this specific orbit is commonly known as the ‘geostationary orbit.’”) (footnotes omitted).

189. The Bogota Declaration, *supra* note 186, at 193.

190. FRANCIS LYALL & PAUL B. LARSEN, *SPACE LAW: A TREATISE* 253 (2009).

191. *Id.* at 255 (“No space-competent state has accepted its validity or complied with its requirements for permission to place a satellite in a geostationary orbital slot claimed by an equatorial state to be under its jurisdiction.”).

192. Outer Space Treaty, *supra* note 175, art. II; *see also* Kyle A. Jacobsen, Comment, *From Interstate to Interstellar Commerce: Incorporating the Private Sector into International Aerospace Law*, 87 TEMP. L. REV. 159, 159–62 (2014) (proposing amendments to the Outer Space Treaty that will accommodate the growing space tourism industry while accommodating the needs of nonpacefaring countries).

193. *About ITU*, ITU, <http://www.itu.int/en/about/Pages/default.aspx> (last visited May 15, 2015).

194. This is not without controversy. The United States has officially stated that it cannot agree with those that argue that the GSO is or can be subjected to the sovereignty of States or that States may have preferential rights to the use of such orbits. We remain committed to the position that because this orbit, at approximately 36,000 kilometers above the earth, is in outer space, its use is governed by the 1967 Outer Space Treaty. . . . Thus, a signatory to this Treaty cannot appropriate a position in the GSO either by claim of sovereignty or by means of use, or even repeated use, of such an orbital position.

Agenda Item 6: Definition and Delimitation of Outer Space and the Character and Utilization of the Geostationary Orbit, U.S. DEP’T OF STATE (2001), <http://www.state.gov/s/l/22718.htm>.

currently estimated to be 465 satellites in geosynchronous orbit, each occupying a longitudinal slot.¹⁹⁵ Thirty-six percent of all active satellites are estimated to be in this orbit, with another fifty-two percent in low earth orbit, an orbit between geostationary orbit and Earth.¹⁹⁶ If sovereignty can be declared over these two orbits, then nearly ninety percent of all satellites could be under national governance.¹⁹⁷ It is, thus, important to understand the demarcation between outer space, and the absence of sovereignty, and airspace, subject to national sovereignty.

As with the Law of the Sea, any such demarcation may well be arbitrary.¹⁹⁸ The United States, despite not recognizing an official delineation, has codified a definition of “launch” in its National and Commercial Space Launch Activities bill, known as the Commercial Space Launch Act.¹⁹⁹ Under the Act,

“launch” means to place or try to place a launch vehicle or reentry vehicle and any payload, crew, or space flight participant from Earth—

- (A) in a suborbital trajectory;
- (B) in Earth orbit in outer space; or
- (C) otherwise in outer space.²⁰⁰

Contrast this definition with Australia’s definition set forth in its Space Activities Act of 1998: “*launch* a space object means launch the object into an area beyond the distance of 100 km above mean sea level, or attempt to do so.”²⁰¹ To avoid codifying a definition is to avoid answering the important and fundamental questions of what laws apply and what rights exist in the atmosphere.

There are two primary schools of thought on how to draw the line between airspace and outer space. The functional approach asks what is the function of the vessel in question. If it is an aircraft, then the law of the air should govern it. If it is a spacecraft, then the law of outer space should govern it. This functionality is recognized in the language of “space flight” used in the Commercial Space Launch Act.²⁰² It is more formally recognized in Australia’s use of the 100 kilometers demarcation, which is based on the “von Karman line.” The “von Karman line” is “the altitude, approximately 100 kilometers, where the atmosphere is too thin for an airplane’s wings to generate the aerodynamic lift

195. *UCS Satellite Database*, UNION OF CONCERNED SCIENTISTS, http://www.ucsusa.org/nuclear_weapons_and_global_security/space_weapons/technical_issues/ucs-satellite-database.html (last visited May 15, 2015).

196. *See id.* (estimating that of the 1,265 operating satellites, 465 are operating in geosynchronous orbit, and 669 are operating in low earth orbit).

197. *Id.*

198. *See* Lamie, *supra* note 178, at 18 n.4 (indicating that Australia has codified demarcation at 100 kilometers).

199. Commercial Space Launch Act, Pub. L. No. 98-575, § 4(2), 98 Stat. 3055, 3056 (1984) (codified as amended at 51 U.S.C. § 50902(4) (2012)).

200. 51 U.S.C. § 50902(4) (2012).

201. *Space Activities Act 1998* pt 2 s 8 (Austl.).

202. Commercial Space Launch Act, 51 U.S.C. §§ 50901–50923. While “space flight” is not defined in the Act, other definitions in the Act distinguish between suborbital flights and launches into “outer space.” *See id.* § 50902(4)(A)–(B).

necessary to sustain flight.”²⁰³ This has been recognized as the delineating line between airspace and outer space by the Federation Aeronautique Internationale, “a non-governmental and non-profit making international organisation with the basic aim of furthering aeronautical and astronautical activities worldwide, ratifying world and continental records and coordinating the organisation of international competitions.”²⁰⁴ The von Karman line allows for a determination of the function of the vessel. Essentially, like the Law of the Sea, nations could draw a boundary, and determine the limits of their sovereignty based on the function of the craft in question, and the distance from the ground the craft operates.

The second school of thought, the spatial approach, focuses on the policy behind the Outer Space Treaty, and seeks to protect the freedom of all countries to explore and exploit outer space. There is also a school of thought that says a combination of these approaches may make the most sense. This lack of agreement is reflected in the variety of approaches taken by countries in either defining or declining to define outer space. In the United Kingdom,

[d]uring an October 1999 session of the U.K. House of Lords . . . the Minister of State, Department of the Environment, Transport, and the Regions[] said that “the UK does not have a working definition of the upper limit of UK airspace, but for practical purposes the limit is considered to be *at least as high* as any aircraft can fly.”²⁰⁵

Germany’s Law Concerning Air Navigation defines “aircraft” as including spacecraft and rockets.²⁰⁶ South Africa has restricted airspace to “the maximum height at which aircraft can ‘derive support from the atmosphere.’”²⁰⁷ “Outer space” is defined by South Africa as “the space above the surface of the earth from a height at which it is in practice possible to operate an object in an orbit around the earth.”²⁰⁸ Basing the definition of outer space on technology defies any concept of geographic boundaries, and brings extra challenges to any judicial determination of the patent boundaries of South Africa. Should airspace be defined as of the date of invention, as of the date of infringement, or as of the date of the lawsuit? With evolving technology, aircraft can derive support from the atmosphere at greater heights than ever before. *SpaceShipOne*, for example, blurs the lines between spacecraft and aircraft.²⁰⁹

There is no convention defining outer space, but despite this lack of a formal definition, informally at least, the von Karman line appears to be the

203. Lamie, *supra* note 178, at 18.

204. *About FAI*, FAI (July 20, 2014 10:24 PM), <http://www.fai.org/about-fai>.

205. Reinhardt, *supra* note 183, at 83–84.

206. *Id.* at 82.

207. *Id.* at 83.

208. *Id.*

209. *SpaceShipOne* is a “three-place, high-altitude research rocket, designed for sub-orbital flights to 100 km altitude.” Robert Valdes, *How SpaceShipOne Works*, HOWSTUFFWORKS (June 20, 2004), <http://science.howstuffworks.com/spaceshipone2.htm>. It “transforms into three different configurations during the course of its flight. These configurations put SpaceShipOne in the ideal shape for boost, entry and landing.” *Id.*

default for a demarcation between the territorial airspace over which a nation can exercise sovereignty and outer space which remains free for all nations. The von Karman line, at least, provides guidance for where the demarcation should be, even if the 100-kilometer mark is somewhat arbitrary.²¹⁰ The functional approach aligns with congressional delineations in areas outside of patent law. Under 18 U.S.C. § 7, Congress distinguishes its territorial claims between “[a]ny aircraft belonging in whole or in part to the United States, or any citizen thereof, or to any corporation created by or under the laws of the United States, or any State, Territory, district, or possession thereof” and “[a]ny vehicle used or designed for flight or navigation in space.”²¹¹

The airspace above the United States is under national sovereignty. Outer space is not within the United States. Until Congress holds otherwise, any interpretation of the patent boundaries should be informed by international standards.²¹² If unauthorized use of Raytheon’s drone occurred in outer space, no charge of infringement could be brought.²¹³

C. *Space Objects*

Congress has extended United States patent law “to applicable activities conducted in outer space.”²¹⁴ Inventions in outer space are expressly “within the United States” if the invention is “made, used or sold in outer space on a space object or component thereof under the jurisdiction or control of the United States” unless the “space object . . . is specifically identified and otherwise provided for by an international agreement” or the space object is registered to a foreign state.²¹⁵ The statute is intentionally broad in its coverage, using the term “space object” rather than “space vehicle” to avoid narrowing any interpretation of the scope of the statute.²¹⁶ This statute extends the United States patent boundaries to include space objects registered to the United States—but not the outer space surrounding those objects. The law has yet to be relied on in a judicial decision.

210. Dan Kois, *Where Does Space Begin?*, SLATE (Sept. 30, 2004, 1:31 PM), http://www.slate.com/articles/news_and_politics/explainer/2004/09/where_does_space_begin.html; see also Jeff Foust, *SpaceShipOne Makes History – Barely*, SPACE REV. (June 24, 2004), <http://www.thespacereview.com/article/167/2> (“There is nothing that significant about 100 km; conditions there are little different than at 95 or 105 km. Indeed, it is not the only definition for space: the Air Force (and now the FAA) award astronaut wings for those who exceed an altitude of 50 miles (80.5 km). However, thanks in large part to the X Prize, 100 km is now perceived by the media and the public as the boundary of space, an imaginary line where the final frontier begins.”).

211. 18 U.S.C. § 7(5)–(6) (2012).

212. See Reinhardt, *supra* note 183, at 86 (“In various sections of the U.S. Code, the term ‘outer space’ is used in the definition of other terms but is not itself specifically defined.”).

213. See *supra* notes 161–62 for a discussion of Raytheon’s drone.

214. JOSEPH BIDEN, INVENTIONS IN OUTER SPACE, S. REP. NO. 101-266, at 6 (1990).

215. 35 U.S.C. § 105(a) (2012).

216. S. REP. NO. 101-266, at 6–7 (stating that the term space object is used rather than space vehicle “to avoid the possibility that the term ‘vehicle’ may be interpreted more restrictively than the term ‘object’”).

The only definition of a “space object” given in the United Nations Convention on Registration of Objects Launched into Outer Space is a circular one defining “space object” in terms of itself. “The term ‘space object’ includes component parts of a space object as well as its launch vehicle and parts thereof”²¹⁷ Like the term outer space, the term space object is in need of further interpretive guidance. A broad definition should be used until such time as Congress or the judicial system provides a narrower one, given the legislative history of section 105 of the Patent Act. A space object should be any object in space—debris, spacecraft, satellites—and all such objects fall within the United States patent boundaries if registered to the United States.

The question of patent boundaries in outer space remains a hypothetical question for now, not having yet been challenged in court—however, it is a question ever increasing in relevance and importance.²¹⁸ In 2009, the Commander of the Joint Functional Component Command for Space told the Subcommittee on Space and Aeronautics, of the House Committee on Science and Technology:

In 1980 only 10 countries were operating satellites in space. Today, nine countries operate spaceports, more than 50 countries own or have partial ownership in satellites and citizens of 39 nations have traveled in space. In 1980 we were tracking approximately 4,700 objects in space; 280 of those objects were active payloads/spacecraft, while another 2,600 were debris. Today we are tracking approximately 19,000 objects; 1,300 active payloads and 7,500 pieces of debris. In 29 years, space traffic has quadrupled.

It’s challenging to accurately predict the growth of active payload space traffic and debris. In addition to the growth of national security and commercial satellites from existing and new space-faring nations, we believe the global diffusion of space technologies, especially the availability of small spacecraft technologies and providers, will lead to a larger and more diverse population of active spacecraft.

Based on the last 10 years of launch activity, we conservatively project the number of active satellites to grow from 1,300 to 1,500 over the next 10 years. We also estimate the overall number of tracked objects could increase from 19,000 to as much as 100,000.²¹⁹

In 2013, over two hundred space objects were launched into outer space.²²⁰ Of these, only 154 objects were registered with the United Nations Secretariat, in

217. Convention on Registration of Objects Launched into Outer Space, Sept. 15, 1976, 28 U.S.T. 695, T.I.A.S. 8480; 1023 U.N.T.S. 15.

218. See generally Dan L. Burk, *Application of United States Patent Law to Commercial Activity in Outer Space*, 6 SANTA CLARA COMPUTER & HIGH TECH. L.J. 295 (1991) (providing an earlier discussion of how patent law might apply in outer space).

219. *Keeping the Space Environment Safe for Civil and Commercial Users: Hearing Before the Subcomm. on Space and Aeronautics, H. Comm. on Sci. & Tech.*, 111th Cong. 22 (2009) (statement of Lt. Gen. Larry D. James, Commander, Joint Functional Component Command for Space).

220. See *Online Index of Objects Launched into Outer Space*, UNITED NATIONS OFFICE FOR OUTER SPACE AFFAIRS, <http://www.unoosa.org/oosa/search.do> (last visited on May 15, 2015). These new launches add to the more “than 500,000 pieces of debris, or ‘space junk,’ . . . tracked as they orbit

accordance with the United Nations Registration Convention.²²¹ For the 154 registered objects, the domestic law of the registering country covers them.²²² This allows flags of convenience for space objects. In other words, if a space object is registered to Azerbaijan,²²³ use of a microchip that could potentially infringe a United States patent would be sheltered from infringement on the Azerbaijan space object, presuming no patent issued in Azerbaijan.²²⁴ This is true even if a United States company is the one that launched the space object and registered it in Azerbaijan.²²⁵ Ships are already choosing national registration based on factors other than the location of corporate headquarters. Will space objects be the new frontier, creating patent shelters in outer space? Furthermore, fifty-five objects were launched unregistered in 2013 and perhaps are subject to no country's domestic laws. An analogy can be made between unregistered space objects and ships that sail the earth's oceans absent a flag or registration, "stateless ships." This analogy, however, does not clarify the application of law to the space object, as it remains unclear what laws apply to

the Earth. They all travel at speeds up to 17,500 mph, fast enough for a relatively small piece of orbital debris to damage a satellite or a spacecraft." *Space Debris and Human Spacecraft*, NASA (Sept. 27, 2013), http://www.nasa.gov/mission_pages/station/news/orbital_debris.html#Uu-2Cnm4mII. At this point, there are so many objects in outer space that the Japanese Space Agency, JAXA, plans to launch a garbage collector into outer space with the aim of capturing debris before satellites become endangered. JAXA's "garbage truck" is a giant net that will orbit Earth, gather debris and space objects through an electromagnetic charge. After the net is full, it will be slowed down and fall back to Earth where the net, the debris, and the spacecraft will burn up in Earth's atmosphere. See Aviva Hope Rutkin, *Gone Junk Fishing*, NEW SCIENTIST, Jan. 22, 2014, at 19; Michael Listner, *A Brief Look at the Legal and Political Implications of Japan's Space Debris Removal Plans*, SPACE REV. (Jan. 27, 2014), <http://www.thespacereview.com/article/2441/1>.

221. The Convention on Registration of Objects Launched into Outer Space was adopted in 1974 by the United Nations. See Frans G. von der Dunk, *The Registration Convention: Background and Historical Context*, PROCEEDINGS OF THE FORTY-SIXTH COLLOQUIUM ON THE LAW OF OUTER SPACE, 2003, at 450, available at <http://digitalcommons.unl.edu/spacelaw/32>.

222. See Edmond Boullé, *Do We Have a Problem? IP Protection in Outer Space*, WORLD INTELL. PROP. REV. (Jan. 9, 2013), <http://www.worldipreview.com/article/do-we-have-a-problem-ip-protection-in-outer-space>.

223. See *Online Index of Objects Launched into Outer Space*, *supra* note 220 (indicating that Azerbaijan has one registered space object in geosynchronous orbit).

224. In 2012, 3,946 applications were filed in the Eurasian American Patent Office, of which 801 named a United States inventor. EURASIAN PATENT ORGANIZATION 2012 ANNUAL REPORT 3 (2012), available at http://www.eapo.org/pdf/home/report/eapo_2012.pdf. Two hundred ninety-two patents were granted to United States applicants in 2012. *Id.* at 22. Azerbaijan is a party to the Eurasian Patent Convention. *Azerbaijan Republic*, EURASIAN PATENT ORGANIZATION, <http://www.eapo.org/en/az.html> (last visited May 15, 2015).

225. See Boullé, *supra* note 222 ("This might seem like an extravagance but paper registration in a state with minimal regulatory oversight of space objects held on its registry could have distinct benefits for a commercial entity which procured the space object's launch. . . . Among the 25 states to register space objects so far this year are North Korea, South Korea, Mexico, India, Brazil, Thailand and Azerbaijan. For private sector innovators in the space industry it is becoming hopelessly expensive and unpredictable to obtain meaningful protection for intellectual creations intended for use in outer space.").

stateless ships.²²⁶ The United States has passed legislation stating that stateless ships can be viewed as “vessels subject to the jurisdiction of the United States” for purposes of prosecuting drug smugglers.²²⁷ There is a presumption that a flagless ship is doing something illegal. There is no such presumption for an unregistered space object, nor should there be, given the large number of unregistered space objects.

A space object, even one under the control of the United States, is not the territory of the United States for purposes of 35 U.S.C. § 105 if the object is “specifically identified and otherwise provided for by an international agreement to which the United States is a party.”²²⁸ The report accompanying the statute highlights “[t]he flexibility provided by this exception [because it] is considered important in negotiating international agreements relating to cooperative activities in outer space.”²²⁹ The accompanying Senate Report makes it clear that such international agreements “could include, in addition to intergovernmental agreements, international agreements between a Federal agency of the U.S. Government and their foreign counterparts, including foreign governmental agencies or international organizations.”²³⁰ In other words, if the European Space Agency (ESA) and the National Aeronautics and Space Administration (NASA) reach an agreement to cooperate in space, then it can be binding in the United States. If Orbital, a United States company, launches a rocket from Wallops Island, Virginia, carrying a payload for the ESA, a treaty may operate to remove that payload from United States patent jurisdiction, even if that payload is physically within the United States. Section 105 further clarifies the point that any invention-related activities are outside the United States patent boundaries if occurring on a space object carried on the registry of a foreign state, even if such space object may otherwise be considered under either the “jurisdiction” or the “control” of the United States.²³¹ In other words, if Orbital’s fictional foreign-flagged rocket carries a payload laboratory in which an invention is made in outer space, then the invention is not under United States jurisdiction, even if Orbital is a United States corporation and the rocket was launched from the United States.

A space object is not within the United States patent boundaries if the space object is “carried on the registry of a foreign state in accordance with the Convention on Registration of Objects Launched into Outer Space” unless the United States and the foreign country have reached an agreement granting the

226. See Allyson Bennett, Note, *That Sinking Feeling: Stateless Ships, Universal Jurisdiction, and the Drug Trafficking Vessel Interdiction Act*, 37 YALE J. INT’L. L. 433, 436 (2012) (discussing how States can only exercise prescriptive jurisdiction over stateless ships if they satisfy the requirements of one of five accepted international legal doctrines).

227. *Id.* at 441 (quoting Marijuana on the High Seas Act, Pub. L. No. 96-350, § 1, 94 Stat. 1159 (1980)).

228. 35 U.S.C. § 105(a) (2012).

229. JOSEPH BIDEN, INVENTIONS IN OUTER SPACE, S. REP. NO. 101-266, at 6 (1990).

230. *Id.* at 7.

231. 35 U.S.C. § 105(a); S. REP. NO. 101-266, at 6.

United States rights over the object.²³² This exception allows private enterprises to essentially opt out of United States patent law by choosing where to register objects for launch into outer space. Orbital could launch from another country, and wait to register the space object until completing a patent search.²³³ After completing the patent search, Orbital could then choose to register the space object in the country with the most favorable patent laws. There are less than two dozen launch sites worldwide that operate on a regular basis,²³⁴ but choosing to register in China, or French Guinea, or even to build a new launch site in the Caribbean,²³⁵ may allow rockets—like cruise ships—to carry flags of convenience, rather than carry the flag associated with corporate headquarters. Space objects registered in the United States, and subject to no other treaties, fall within the United States patent boundaries.²³⁶ All other space objects may fall outside the patent boundaries of the United States, even if launched from within the United States.

D. *International Space Station*

The International Space Station, the largest spacecraft ever built, orbits the earth at an altitude of 250 miles.²³⁷ Fifteen nations have contributed to the construction of the International Space Station. It is the subject of the International Space Station Intergovernmental Agreement (IGA), signed on January 29 1998, to which the United States is a signatory.²³⁸ The International Space Station hosts a number of research facilities, and, in 2005, “the NASA

232. 35 U.S.C. § 105(b).

233. See Boullé, *supra* note 222.

234. *Space Launch Report Orbital Space Launch Site Listing*, SPACE LAUNCH REPORT (Feb. 10, 2014), <http://www.spacelaunchreport.com/padsites.html>.

235. It becomes more complicated than even this scenario suggests. As one author points out: The term “launching state” is given a very broad definition in the UN treaties on outer space to include a state whose governmental or non-governmental entities launch or procure the launch of a space object or a state from whose facility (as opposed to territory) a space object is launched. Though infrequent in practice, there could be as many as four separate states each regarded as ‘launching states’ for the purposes of a single launch into orbit. When this happens, those states must jointly determine which one of them will be nominated as the sole state of registry.

Boullé, *supra* note 222.

236. Celestial bodies, naturally occurring space objects, are “the common heritage of mankind” subject to no “national appropriation by any claim of sovereignty, by means of use or occupation, or by any other means.” Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, art. 11(1)–(2), *opened for signature* Dec. 18, 1979, 1363 U.N.T.S. 3. This treaty provides valuable insight into the international views on sovereignty of celestial bodies, but the United States is not a signatory, and so the language is only persuasive and not binding.

237. *PlanetSpace, Inc. v. United States*, 92 Fed. Cl. 520, 525 (2010).

238. “The station is a venture of international cooperation among NASA, the Russian Federal Space Agency, Canadian Space Agency, Japan Aerospace Exploration Agency, or JAXA, and 11 members of the European Space Agency, or ESA: Belgium, Denmark, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, Switzerland and the United Kingdom.” *International Space Station: Nations Around the World Mark 10th Anniversary of International Space Station*, NASA (Nov. 17, 2008), http://www.nasa.gov/mission_pages/station/main/10th_anniversary.html.

Authorization Act recognized the U.S. orbital segment as the first national laboratory beyond Earth.”²³⁹ Truly an international vehicle, there are modules and laboratories that include contributions from the United States, Russia, Japan, Canada, and the European partnership.²⁴⁰ The partner states have national jurisdiction over the International Space Station, and “retain jurisdiction and control over the elements it registers . . . and over personnel in or on the Space Station who are . . . nationals” of each partner state.²⁴¹

Article 21 of the IGA addresses patent law, stating: “[F]or 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.”²⁴² The IGA goes on to discuss issues with secrecy, invention, enforcement in one European partner state only, even if infringement occurs in more than one state, and to explicitly state:

The temporary presence in the territory of a Partner State of any articles, including the components of a flight element, in transit between any place on Earth and any flight element of the Space Station registered by another Partner State or ESA shall not in itself form the basis for any proceedings in the first Partner State for patent infringement.²⁴³

This means that United States patent law expressly applies to the United States flight elements on the Space Station.²⁴⁴ United States law allows for further treaties governing patent rights on the Space Station, but no further agreements have been reached.²⁴⁵ The odd aspect of this is that a piece of equipment brought on board the Space Station could be used by a Russian astronaut in a Russian laboratory with no infringement, while the same equipment used by an American astronaut in an American laboratory, on the same Space Station, would infringe.²⁴⁶ Considering that over “one hundred sixty-seven individuals representing 15 countries have visited the complex” this is a real issue.²⁴⁷

239. *Id.*

240. *International Space Station: International Cooperation*, NASA, http://www.nasa.gov/mission_pages/station/cooperation/#.Uu_LPXm4mII (last updated Apr. 30, 2015).

241. 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, art. 5, Jan. 29, 1998 T.I.A.S. 12927.

242. *Id.* art. 21(2).

243. *Id.* art. 21(6).

244. *Id.*

245. *Patents and Space-Related Inventions*, EUR. SPACE AGENCY (Nov. 22, 2012), http://www.esa.int/About_Us/Industry/Intellectual_Property_Rights/Patents_and_space-related_inventions (noting that the IGA is the most recent international agreement to address patent rights on the Space Station).

246. G.F., *The Economist Explains: How Does Copyright Work in Space?*, ECONOMIST (May 22, 2013, 11:50 PM), <http://www.economist.com/blogs/economist-explains/2013/05/economist-explains-12>.

247. *International Space Station: Nations Around the World Mark 10th Anniversary of International Space Station*, *supra* note 238. One example of the potential issues arose in 2001, when multinational intellectual property concerns caused complications. The Space Shuttle *Atlantis* brought

The territoriality of the patent rights relies on the module in which the patent is used on the International Space Station. Patent infringement can occur in one module, and not another. Infringement of a method patent may, therefore, be avoided by simply making sure that at least one element of the claim occurs in a different module from the remaining elements and by a citizen of another country. The patent boundaries of the International Space Station represent an interesting exception to the patent boundaries on other space objects and in outer space. Even when regulated by treaty, patent boundaries remain territorial in nature, and the natural delineation of outer space patent boundaries follows the boundaries set for other legal issues.

IV. ON LAND

In order to infringe a patent the invention must be practiced within “the United States, its territories and possessions.”²⁴⁸ Congress does not further delineate the physical aspects of the geographic boundaries of the United States, its territories and possessions. Uncertainty about the scope and status of these boundaries illustrates a basic point reiterated throughout this Article. Patent boundaries are legally significant, yet those boundaries are not delineated. This geographic ambiguity affects the application of the Patent Code, and the rights of patent holders. What are the landlocked patent boundaries of the United States, its territories and possessions?

A. *Territories and Possessions*

Neither is it plausible that . . . anyone . . . would commonly refer to U.S. territories as the United States. In addition to the U.S. Virgin Islands, U.S. territories include the Northern Mariana Islands, Guam, Puerto Rico, Midway Islands, and American Samoa. The Northern Mariana Islands consist of 14 islands situated in the western Pacific just east of the Philippines and are as far away from the west coast of the United States as Cairo, Egypt, is from Washington, D.C. Guam is south of the Northern Mariana Islands and just east of the Philippines. It is west of the International Dateline and is therefore one day ahead of the United States. Midway Islands are more than 1,000 miles from the Hawaiian Islands. American Samoa is located in the South Pacific roughly in the middle of a triangle drawn between the Hawaiian Islands, New Zealand and Tahiti. I doubt that anyone would consider

DVDs to the International Space Station. Imposed on DVDs are regional limitations, meaning that the DVD players in the United States may only play Region 1 DVDs, while DVD players in Russia may play Region 5 DVDs. To alleviate any concerns about sharing DVDs on the Space Station, NASA supplied the Space Station with specially modified DVD players that could play DVDs from all regions. See Peter K. Yu, *Region Codes and the Territorial Mess*, 30 CARDOZO ARTS & ENT. L.J. 187, 218 (2012); see also Lucy Sherriff, *Sony and the DVD Player Phantom Space Launch*, REGISTER (Feb. 19, 2001, 3:39 PM), http://www.theregister.co.uk/2001/02/19/sony_and_the_dvd_player/.

248. See 35 U.S.C. § 100(c) (2012) (defining the United States); *id.* § 271(a) (requiring that infringement occur “within the United States”).

traveling to these U.S. territories to be travel “inside the United States.”²⁴⁹

The definition of the United States itself is a complicated one, defined differently in dictionaries, statutes, and case law.²⁵⁰ The main challenge in defining the United States is determining which territories and possessions fall within which definition of the United States, which is not a problem with patent law, inclusive as it is in its reference to all “territories and possessions.” This inclusive approach to the definition aligns with the broad powers granted Congress by the Constitution to promote the progress of science and useful arts.²⁵¹

Title 48 of the United States Code defines the territories and possessions of the United States. These include Puerto Rico,²⁵² the United States Virgin Islands,²⁵³ Guam,²⁵⁴ American Samoa,²⁵⁵ and the Commonwealth of the Northern Mariana Islands.²⁵⁶ In the Virgin Islands, the Code expressly finds United States patent law applicable, while in Guam, copyright law is expressly made applicable but patent law is not mentioned.²⁵⁷ However, title 28 of the United States Code states:

The district courts shall have original jurisdiction of any civil action arising under any Act of Congress relating to patents, plant variety

249. *United States v. Courtney*, 240 F. Supp. 2d 1038, 1048–49 (W.D. Mo. 2002).

250. *See, e.g., Hooven & Allison Co. v. Evatt*, 324 U.S. 652, 671–72 (1945) (“The term ‘United States’ may be used in any one of several senses.”).

251. U.S. CONST. art. 1, § 8, cl. 8.

252. 48 U.S.C. § 734 (2012) (“The statutory laws of the United States . . . shall have the same force and effect in Puerto Rico as in the United States.”).

253. *Id.* § 1405q (“The laws of the United States relating to patents, trade marks, and copyrights, and to the enforcement of rights arising thereunder, shall have the same force and effect in the Virgin Islands as in the continental United States, and the District Court of the Virgin Islands shall have the same jurisdiction in causes arising under such laws as is exercised by United States district courts.”).

254. *Id.* § 1421q (“The laws of the United States which are made applicable to the Northern Mariana Islands . . . shall be made applicable to Guam on the same terms and conditions as such laws are applied to the Northern Mariana Islands.”). Interestingly enough, federal copyright laws are expressly made applicable to Guam. *Id.* § 1421n (“The laws of the United States relating to copyrights, and to the enforcement of rights arising thereunder, shall have the same force and effect in Guam as in the continental United States.”).

255. *Id.* § 1661(b); *see also United States v. Lee*, 159 F. Supp. 2d 1241, 1247 (D. Haw. 2001) (“Lee is presumably not arguing that the term ‘all’ should be read as containing no restrictions. Otherwise, Lee would have to contend that American Samoa’s courts would, in some instances, have broader powers than federal district or circuit courts. A district court, for example, cannot try matters that are reserved for the Court of Federal Claims. If ‘all’ contains no limitation, American Samoa’s courts could address such matters. Similarly, the Ninth Circuit may not hear appeals from patent infringement decisions by this court. Such appeals are heard by the Federal Circuit. Reading ‘all’ as having no limitation would presumably have the High Court of American Samoa hearing patent appeals that the Ninth Circuit could not hear. There is no reason for this court to conclude that Congress intended to confer such unlimited jurisdiction on American Samoa’s courts. If ‘all’ powers are indeed limited, then the limitation of § 3231 must apply.”).

256. 48 U.S.C. § 1822(a) (“The District Court for the Northern Mariana Islands shall have the jurisdiction of a District Court of the United States . . .”).

257. *See supra* notes 253–54.

protection, copyrights and trademarks. No State court shall have jurisdiction over any claim for relief arising under any Act of Congress relating to patents, plant variety protection, or copyrights. For purposes of this subsection, the term “State” includes any State of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the United States Virgin Islands, American Samoa, Guam, and the Northern Mariana Islands.²⁵⁸

This language extends the patent boundaries of the United States to each of these territories and authorizes “the federal district courts to exercise original jurisdiction in ‘all civil actions arising under the Constitution, laws, or treaties of the United States,’ . . . and, more particularly, over ‘any civil action arising under any Act of Congress relating to patents.’”²⁵⁹

There is no explanation given for the inclusion of the word “possessions” in the definition of the United States, nor is the term “possessions” defined.²⁶⁰ Title 48 of the United States Code refers to “Territories and Insular Possessions” and appears to refer to possessions as analogous to territories, but separate from them. However, the insular possessions language arises from a “series of opinions later known as the Insular Cases” where the Supreme Court “addressed whether the Constitution, by its own force, applies in any territory that is not a State.”²⁶¹ Such possessions may include guano islands, or former guano islands like the Kingman Reef, a National Wildlife Refuge located approximately one thousand miles southwest of Honolulu, Hawaii.²⁶² Such possessions are not territories—the “triangular reef has a land area of only 0.01 square miles. . . [and] is wet or awash most of the time.”²⁶³ If a

258. 28 U.S.C. § 1338(a) (2012).

259. *Gunn v. Minton*, 133 S. Ct. 1059, 1064 (2013) (quoting 28 U.S.C. §§ 1331, 1338(a)); *see also* *Christianson v. Colt Indus. Operating Corp.*, 486 U.S. 800, 808 (1988) (comparing § 1331 with § 1338).

260. *WesternGeco II*, No. 4:09-cv-1827, 2011 WL 3608382, at *9 (S.D. Tex. Aug. 16, 2011) (“All we can gather from the legislative history is that the term ‘possessions’ was an affirmative addition to the statutory language. As such, it must be given a definition separate and distinct from that of ‘territory.’”).

261. *Boumediene v. Bush*, 553 U.S. 723, 756 (2008); *see also* *Dorr v. United States*, 195 U.S. 138, 149 (1904) (finding that the Constitution, without legislation, does not require the ceded territory of the Philippine Islands to enact laws granting citizens the right to trial by jury); *Hawaii v. Mankichi*, 190 U.S. 197, 221 (1903) (holding that, after annexation, Hawaiian laws, “not inconsistent with . . . nor contrary to the Constitution . . . nor any existing treaty of the United States, shall remain in force” until Congress indicates otherwise); *Downes v. Bidwell*, 182 U.S. 244, 287 (1901) (plurality opinion) (holding that the Foraker Act was constitutional to the extent it imposed duties upon imports from Puerto Rico since as a territory, Puerto Rico was not a part of the United States within the Revenue Clause of the Constitution); *Armstrong v. United States*, 182 U.S. 243, 244 (1901) (indicating that based on the holding in *Dooley v. United States*, tariffs imposed after Puerto Rico became a territory were recoverable); *Dooley v. United States*, 182 U.S. 222, 236 (1901) (holding that tariffs should not be imposed on goods imported to Puerto Rico because Puerto Rico was a United States territory and longer a foreign country); *De Lima v. Bidwell*, 182 U.S. 1, 200 (1901) (concluding that Puerto Rico “was not a foreign country within the meaning of the tariff laws but a territory of the United States”).

262. For a detailed history of the Kingman Reef, see *Kingman Reef Atoll Investments, L.L.C. v. United States*, 103 Fed. Cl. 660, 665–85 (2012).

263. *Overview: Kingman Reef National Wildlife Refuge*, U.S. FISH & WILDLIFE SERV., <http://www.fws.gov/refuges/profiles/index.cfm?id=12534> (last visited May 15, 2015).

citizen of the United States discovers a deposit of guano on any island, rock, or key, not within the lawful jurisdiction of any other government, and not occupied by the citizens of any other government, and takes peaceable possession thereof, and occupies the same, such island, rock, or key may, at the discretion of the President, be considered as appertaining to the United States.²⁶⁴

There is no discussion of the extension of civil jurisdiction to these guano islands. Offenses committed on these guano islands are “deemed committed on the high seas, on board a merchant ship or vessel belonging to the United States” for purposes of criminal jurisdiction.²⁶⁵ These islands should fall within the United States patent boundaries, analogous to the inclusion of ships bearing a United States flag on the high seas within the United States patent boundaries.²⁶⁶

Per the definitions set forth in 35 U.S.C. § 100(c) and 28 U.S.C. § 1338(a), the United States patent boundaries extend to all United States possessions, guano islands that may yet be discovered, and territories, including “the Commonwealth of Puerto Rico, the United States Virgin Islands, American Samoa, Guam, and the Northern Mariana Islands.”²⁶⁷

B. Arctic Region

The Arctic region is “all of the Earth north of the Arctic Circle.”²⁶⁸ It consists of “the frozen seas surrounding the pole and the land mass that is the perimeter of those seas—a land mass that is interrelated to the sea by continuous ice in many places.”²⁶⁹ The Arctic Ocean, central to the Arctic region, is surrounded by the United States, Canada, Greenland, and Russia and includes the Svalbard archipelago—the northernmost part of Norway.²⁷⁰ The Arctic

264. 48 U.S.C. § 1411 (2012).

265. *Id.*; 48 U.S.C. § 1417.

266. See *supra* Part II.E for a discussion of patent boundaries on the high seas.

267. 28 U.S.C. § 1338(a) (2012); see 35 U.S.C. § 100(c) (2012);

268. *Frequently Asked Questions About the Arctic*, NAT'L OCEANIC & ATMOSPHERIC ADMIN., <http://www.arctic.noaa.gov/faq.html> (last visited May 15, 2015) (“In the strictest sense, the Arctic is all of the Earth north of the Arctic Circle, which is located at 66 degrees, 32 minutes North Latitude. However, there are other definitions to suit specific scientific or political interests. For instance, the U.S. Congress has decreed that all of the Bering Sea, which extends southward to about 53 degrees North Latitude, is part of the Arctic for internal U.S. planning and budgeting purposes. Others make use of . . . such markers as the southernmost extent of winter sea ice for oceanic boundaries of the Arctic, or the treeline for terrestrial boundaries.”).

269. Elliot L. Richardson et al., *Legal Regimes of the Arctic*, 82 AM. SOC'Y. INT'L L. PROC. 315, 315 (1988).

270. *Frequently Asked Questions About the Arctic*, *supra* note 268 (“The Arctic region, defined as the Arctic Ocean and surrounding land, including all of Greenland and Spitsbergen, and the northern parts of Alaska, Canada, Norway, and Russia, is 14.5 million square kilometers (5.5 million square miles.)”; see also Clive Schofield, Tavis Potts & Ian Townsend-Gault, *Boundaries, Biodiversity, Resources, and Increasing Maritime Activities: Emerging Oceans Governance Challenges for Canada in the Arctic Ocean*, 34 VT. L. REV. 35, 44 n.66 (2009) (describing an arctic boundary claim by Denmark, on behalf of Greenland, that exceeds the normal size of boundary claims by other countries).

region is at the center of numerous boundary disputes.²⁷¹ The Arctic region was largely historically inaccessible, and so many of these disputes were merely theoretical in nature, with little incentive to settle them. However, the Arctic region is becoming more accessible, and with its potential for vast mineral wealth, it is also becoming more desirable.²⁷² Recognizing the potential issues arising in the Arctic region, the Ottawa Declaration of 1996 established the Arctic Council as “a means for promoting cooperation, coordination and interaction among the Arctic States.”²⁷³ There are eight Arctic States: Canada, Denmark, Finland, Iceland, Norway, the Russian Federation, Sweden, and the United States of America.²⁷⁴ Canada, Greenland, Russia, Norway, and the United States have each claimed part of the Arctic region under the Law of the Sea as its EEZ, or its equivalent.²⁷⁵ There is no dispute that each state that borders the Arctic Ocean has a right to claim an EEZ under the Law of the Sea.²⁷⁶ Seaward of the maximum recognized EEZ claims of each of the five coastal states lies the high seas of the Arctic Ocean.²⁷⁷

The seabed beneath the Arctic Ocean is separate from the EEZ. Under the Law of the Sea, each “coastal state can define and establish its rights to the outer edge of its continental shelf areas beyond the 200 [nautical mile] limit.”²⁷⁸ Even though the United States is not a signatory to the Law of the Sea, this aspect is international custom recognized by the United States government.²⁷⁹ It is these claims to the continental shelf that present many of the more complicated issues governing rights in the Arctic region.²⁸⁰ On a mission to prove “the Arctic is

271. See IBRU, DURHAM UNIV., MARITIME JURISDICTION AND BOUNDARIES IN THE ARCTIC REGION 2 (2014), available at https://www.dur.ac.uk/resources/ibru/resources/ibru_arctic_map_27-02-15.pdf.

272. See, e.g., U.S. GEOLOGICAL SURVEY, DEP’T OF THE INTERIOR, FACT SHEET NO. 2008-3049, CIRCUM-ARCTIC RESOURCE APPRAISAL: ESTIMATES OF UNDISCOVERED OIL AND GAS NORTH OF THE ARCTIC CIRCLE 1 (Peter H. Stauffer ed., 2008) (“90 billion barrels of oil, 1,669 trillion cubic feet of natural gas, and 44 billion barrels of natural gas liquids may remain to be found in the Arctic.”).

273. Declaration on the Establishment of the Arctic Council § 1(a), Sept. 19, 1996, 35 I.L.M. 1387 (1996).

274. *Id.* § 2.

275. Schofield et al., *supra* note 270, at 44 n.66 (“The exception to this rule is Denmark which, on behalf of Greenland, claims a 200 nm fishing zone rather than a 200 nm EEZ.”).

276. There are, however, numerous disputes as to where the 200 nautical miles should be measured from, and there are boundary disputes between the various states concerning EEZ claims. For instance, there is a dispute between the United States and Canada over whether the Northwest Passage is international waters or part of Canada’s EEZ. *Id.* at 41–44; Molly Watson, Comment, *An Arctic Treaty: A Solution to the International Dispute over the Polar Region*, 14 OCEAN & COASTAL L.J. 307, 321 (2009).

277. Schofield et al., *supra* note 270, at 47.

278. *Id.* at 48; see also UNCLOS, *supra* note 19, arts. 55, 57, 76 (defining the EEZ and continental shelf).

279. Schofield et al., *supra* note 270, at 44 (observing that the United States regards the Law of the Sea “as being reflective of customary international law and pursues its oceans policy accordingly”).

280. *Id.* at 47 (“[T]here are large portions of the seabed underlying this high seas ‘pocket’ . . . that do not, necessarily form part of the international seabed—that portion of the seabed beyond national jurisdiction . . .”).

Russian,” in 2007 an expedition ventured to the North Pole where Russia “symbolically staked its claim” to the Arctic Ocean by planting “a one metre-high titanium Russian flag on the underwater Lomonosov ridge, which Moscow claims is directly connected to its continental shelf.”²⁸¹

Forty-three companies are currently engaged in research and development “and or sale of products derived from or based on the genetic resources of the Arctic,” and “[m]ore than half of these companies are based in North America (i.e. the USA and Canada).”²⁸² One example, ExxonMobile Upstream Research Company, received a patent for a “Mooring System for Floating Arctic Vessel” on October 29, 2013.²⁸³ The patent relates to a “floating marine drilling unit that employs a riser and mooring system suitable for use in icy arctic waters.”²⁸⁴ Bioprospecting in the Arctic region has also formed the basis for numerous patents around the world.²⁸⁵

The Arctic region deserves no special treatment, despite the fact that a delineation of boundaries on the Arctic region seabed has yet to be made. Any regions eventually determined to lie on the United States Outer Continental Shelf will fall under the patent boundaries of the United States only to the extent discussed above.²⁸⁶ The United States EEZ is not within the United States patent boundaries, and neither is the EEZ of any other country.²⁸⁷ The high seas of the Arctic Ocean clearly lie outside the United States patent boundaries.²⁸⁸

281. Tom Parfitt, *Russia Plants Flag on North Pole Seabed*, GUARDIAN (Aug. 2, 2007, 1:01 PM), <http://www.theguardian.com/world/2007/aug/02/russia.arctic>.

282. DAVID LEARY, UNU-IAS REPORT: BIOPROSPECTING IN THE ARCTIC 21 (2008), available at http://archive.ias.unu.edu/resource_centre/Bioprospecting%20in%20the%20Arctic.pdf.

283. Mooring Sys. for Floating Arctic Vessel, U.S. Patent No. 8,568,063 (filed Feb. 2, 2010).

284. *Id.*

285. LEARY, *supra* note 282, at 22 (“A desk top search of the European and US patent databases has identified thirty one patents and or patent applications in relation to inventions based on or derived from the genetic resources of the Arctic.”) (footnotes omitted).

286. The Law of the Sea states:

The continental shelf of a coastal State comprises the seabed and subsoil of the submarine areas that extend beyond its territorial sea throughout the natural prolongation of its land territory to the outer edge of the continental margin, or to a distance of 200 nautical miles from the baselines from which the breadth of the territorial sea is measured where the outer edge of the continental margin does not extend up to that distance.

UNCLOS, *supra* note 19, art. 76(1). “To make a claim that the continental shelf extends beyond 200 nautical miles, a party must submit information on the end of the continental shelf to the Commission on the Limits of the Continental Shelf.” Cinnamon P. Carlarne, *Arctic Dreams and Geoengineering Wishes: The Collateral Damage of Climate Change*, 49 COLUM. J. TRANSNAT’L L. 602, 619 (2011). The United States is mapping its continental shelf, but, even so, the exact boundaries remain unclear. Since the United States is not a party to the Law of the Sea, no claim need be submitted to the Commission on behalf of the United States.

287. See *supra* Part II.C for a discussion of the patent boundaries of the EEZ.

288. See *supra* Part II.E for a discussion of the patent boundaries of the high seas.

C. *Antarctic Region*

The Antarctic region, a cold and remote continent that abuts no other state and has no native human population, was nonetheless the subject of tremendous territorial dispute.²⁸⁹ Seven countries claimed rights over the region, and the issue of territorial sovereignty was set aside by adoption of the Antarctic Treaty in 1961.²⁹⁰ The treaty resolved to protect “the interest of all mankind that Antarctica shall continue forever to be used exclusively for peaceful purposes and shall not become the scene or object of international discord.”²⁹¹ One of the fundamental tenants of the Antarctica Treaty was to promote and protect “international cooperation in scientific investigation in Antarctica.”²⁹² The treaty applies to “to the area south of 60° South Latitude, including all ice shelves, but [not] . . . the high seas within that area.”²⁹³ As in the Arctic region, the boundaries within the Antarctic remain unclear. However, in the Antarctic, the treaty suspends all claims to territorial sovereignty as long as the treaty is in force.²⁹⁴

The exploitation of resources is very different in the Arctic region and the Antarctic region.

In the Arctic, extraction of oil, gas and minerals, at sea and on land, is an important reality; in the Antarctic, it is only a conjecture. The living resources of the Antarctic Ocean are abundant, and significant international exploitation occurs. In the Arctic, large-scale fishing is important only in North Atlantic areas and the Barents Sea, although whaling is still a source of food for indigenous peoples and an expression of their traditional culture. While the Arctic has plentiful caribou, reindeer, polar bears and other land-based mammals, the Antarctic has none, and only shoreline colonies of penguins and seals require protection. Even when the problems are directly comparable—such as the risks posed by marine pollution and the need to control navigation in ice-filled waters—the radically different legal status of both regions may necessitate different solutions.²⁹⁵

The Arctic and Antarctic regions are very different, but in each region the climate and the resources available have led to innovation, which ought to be protectable by patent law.²⁹⁶

289. Morten Walløe Tvedt, *Patent Law and Bioprospecting in Antarctica*, 47 POLAR REC. 46, 46 (2010).

290. The Antarctic Treaty had twelve original signatories: Argentina, Australia, Belgium, Chile, France, Japan, New Zealand, Norway, the Russian Federation (then the Soviet Union), South Africa, the United Kingdom, and the United States. *Antarctic Treaties: Parties*, SECRETARIAT OF THE ANTARCTIC TREATY, http://ats.aq/devAS/ats_parties.aspx?lang=e (last visited May 15, 2015). As of February 15, 2015, fifty-one nations have ratified the treaty. *Id.*

291. Antarctic Treaty preamble, Dec. 1, 1959, 12 U.S.T. 794, 402 U.N.T.S. 71.

292. *Id.*

293. *Id.* art. VI.

294. *Id.* art. IV(2).

295. Richardson et al., *supra* note 269, at 324.

296. See Tvedt, *supra* note 289, at 46 (“The number of patents that include biological material of Antarctic origin is growing rapidly.”).

The Antarctic Treaty does not address patent law specifically. It states that authorized personnel in the Antarctic “shall be subject only to the jurisdiction of the Contracting Party of which they are nationals.”²⁹⁷ Therefore, United States patent boundaries extend to United States nationals in Antarctic, but not to nationals of other countries. Like in outer space, two scientists of different nationalities can work together at the same lab bench, sharing data and research, and one can be found to infringe a United States patent while the other, doing exactly the same thing, is not infringing.²⁹⁸ Again, as in outer space, the patent boundaries of the Antarctic region are personnel-based and not territorial-based.²⁹⁹

D. Embassies

Imagine a scenario where an American employee at the American embassy in Azerbaijan purchases an electric razor from a local store. The employee uses the razor at home in Baku, Azerbaijan.³⁰⁰ One morning, running late, the employee brings the razor to work and hastily shaves at the office. If that razor contains technology that could infringe a United States patent, the employee, by shaving at the office, has opened himself up to a suit for patent infringement.

In the early twentieth century, the United States purchased and used radio receivers from Marconi Wireless Telephone Company of America. The receivers were covered by a number of patents, and during the term of the patent, the United States manufactured and built its own radio receivers.³⁰¹ Ten such receivers were assembled and used at the “United States Naval Radio Station at the American Legation in Peking. The station was located within the legation grounds.”³⁰² Marconi sued the United States for infringement, raising the novel question: “Does manufacture and use in such a location violate the monopoly

297. Antarctic Treaty, *supra* note 291, art. VIII.

298. The treaty also states “scientific observations and results from Antarctica shall be exchanged and made freely available.” *Id.* art. III. As others have pointed out—can the Patent Act’s grant of a right to exclude others from practicing an invention coexist with the requirement that results be made freely available? See Tvedt, *supra* note 289, at 52–53 (“The underlying difficult question is whether there is conflict between establishing an exclusive right covering, for example, using and making the Antarctic based invention and the accessibility of scientific observations and results. This is a question concerning the availability of research results and use by others of the modified/isolated/found biological material and derived products.”).

299. See, e.g., *Smith v. United States*, 507 U.S. 197, 212–13 (1993) (Stevens, J., dissenting) (“As was well settled at English common law before our Republic was founded, a nation’s personal sovereignty over its own citizens may support the exercise of civil jurisdiction in transitory actions arising in places not subject to any sovereign.”).

300. See *supra* notes 223–25 and accompanying text for a discussion of the dearth of Azerbaijani patents issued to American inventors.

301. The patent infringement suit specifically addresses the time period from “March 8, 1913, when plaintiff first gave notice of infringement to the defendant, to August 16, 1915, when the patent expired.” *Marconi Wireless Tel. Co. of Am. v. United States*, 99 Ct. Cl. 1, 5 (1942), *vacated in part on other grounds, aff’d in part*, 320 U.S. 1 (1943).

302. *Id.* at 38.

created by the patent and which extends ‘throughout the United States, and the Territories thereof,’ as expressed by Section 4884 of the Revised Statutes?”³⁰³

Evaluating *Brown v. Duchesne*,³⁰⁴ and *Gardiner v. Howe*,³⁰⁵ the court held that if foreign ships are outside of United States patent boundaries, even in American waters, and if American ships are inside United States patent boundaries, even on the high seas, then the United States patent boundaries must extend to the American Legation at Peking.³⁰⁶ Infringement was thus found under United States patent law, despite the use being in the American Legation at Peking.

Marconi was decided in 1942, when section 4884 of the Revised Statutes simply said that the patent grant extended “throughout the United States, and the Territories thereof” with no further definition.³⁰⁷ In 1952, the Patent Act was amended to include the following definition of the United States: “the United States of America, its territories and possessions.”³⁰⁸ This amendment was made both to broaden and delineate more clearly the patent boundaries of the United States.³⁰⁹

In 1942, the Court of Claims found that the United States patent boundaries extended to legations providing precedent for a determination that, today, the United States patent boundaries should include all United States legations, consulates, and embassies, while excluding all foreign legations, consulates, and embassies, even those on United States soil.³¹⁰ The American embassy worker,

303. *Id.* at 67. Section 4884 of the Revised Statutes read: “Every patent shall contain a short title or description of the invention or discovery, correctly indicating its nature and design, and a grant to the patentee, his heirs or assigns, for the term of seventeen years, of the exclusive right to make, use, and vend the invention or discovery . . . throughout the United States, and the Territories thereof, referring to the specification for the particulars thereof. A copy of the specification and drawings shall be annexed to the patent, and be a part thereof.” 35 U.S.C. § 4884 (repealed 1952).

304. 60 U.S. 183 (1856). See *supra* notes 139–46 for a brief overview of *Brown v. Duchesne*.

305. 9 F. Cas. 1157 (C.C.D. Mass. 1865). See *supra* notes 153–56 for a brief overview of *Gardiner v. Howe*.

306. *Marconi Wireless Tel. Co. of Am.*, 99 Ct. Cl. at 67–68.

307. 35 U.S.C. § 4884 (repealed 1952).

308. Patent Act of 1952, Pub. L. No. 82-593, ch. 950, § 100, 66 Stat. 797 (codified at 35 U.S.C. § 100(c) (2012)).

309. Federico, *supra* note 11, at 201.

310. An interesting parallel that has yet to be decided by the courts is the question of whether United States patent law extends to overseas military bases. The United States exercises at least partial sovereignty over military bases, so there is some basis for extraterritoriality, however, the extent of the sovereignty varies from base to base and country to country depending on the Status of Forces Agreement in place between the host country and the United States. These bilateral treaties, which are in place virtually everywhere the United States has an overseas military base, differ from country to country. There has been no case law or legislation extending the United States patent boundaries to overseas military bases, and no suggestion of patent sovereignty. From a policy perspective, foreign governments are unlikely to impose patent liability on overseas military installations, and United States patent law, therefore, provides a remedy for the patentee, that the patentee may otherwise be unable to collect. However, the uniqueness of the Status of Forces Agreement treaties means that each base must be analyzed on a case-by-case basis to determine whether that base is a possession of the United States or not and, therefore, whether each base is under United States patent sovereignty.

therefore, must comply with United States patent law while at the embassy, even when living in Azerbaijan.

V. CONCLUSION

Patent infringement must take place “within the United States, its territories and possessions.”³¹¹ This carries with it a presumption against extraterritoriality, bolstered by the “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.’”³¹²

The territorial nature of patent law has long been known. In defining the United States, Congress could have expressly delineated its jurisdiction, as they have in other statutes, such as 18 U.S.C. § 7, which expressly sets forth a detailed definition of “special maritime and territorial jurisdiction of the United States.” Congress has not done so, and therefore the presumption must hold that Congress did not intend to create an overly expansive definition of the United States.

That being said, 35 U.S.C. § 100(c) fails in its cursory definition of the United States, its territories and possessions, raising more questions than it answers. Technology has spread to every corner of the earth, bringing once hostile territory under the spell of deepwater oil drilling, satellite communication systems, and mobile phone technology. These technologies present challenges to our current understanding of patent law. The patent boundaries of the United States extend from the International Space Station to the Outer Continental Shelf.

It is time for Congress to take action and codify the United States patent boundaries. Defining the limits of United States patent sovereignty is a necessary course of action. As litigation at the limits of technology and geography increases, judicial efficiency will be maximized by a clear codification of the patent boundaries of the United States.

311. See 35 U.S.C. § 271 (2012) (stating that patent infringement must take place “within the United States”); *id.* § 100(c) (defining “United States” as the “United States of America, its territories and possessions”).

312. *Smith v. United States*, 507 U.S. 197, 204 (1993) (quoting *EEOC v. Arabian Oil Co.*, 499 U.S. 244, 248 (1991)).