Deriving a Campaign Plan for the Global Commons

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14. ABSTRACT

U.S. National Security Strategy identifies the Global Commons as shared sea, air, and space domains which exist outside of exclusive national jurisdiction. Cyberspace, as yet a nascent domain, may be evolving into a new Global Commons as it acquires the five distinguishing characteristics such domains share. The international regimes created by treaties are voluntary affairs and states accept their constraints primarily to preserve their future interests when they lack the capability to exert control or enforce a sovereignty claim. However claims to the global commons and their governing regimes are not immutable. On the contrary, technological progress, resource scarcity and most recently, climate change, are making global commons more accessible and more desirable. The result is inexorable pressure for states to expand their sovereignty. To do so, states must be able to demonstrate sustained presence and possess the capability to act within the domain. As there exists no formal process to transition international regimes to recognized sovereignty claims, states must undertake the essential activity of engagement in order to preserve their interests among the regime stakeholders and be properly positioned to affect an expansion of national sovereignty into a global commons. This paper advocates a holistic approach, advancing a campaign plan for the global commons.

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Executive Summary

U.S. National Security Strategy identifies the Global Commons as shared sea, air, and space domains which exist outside of exclusive national jurisdiction. Cyberspace, as yet a nascent domain, may be evolving into a new Global Commons as it acquires the five distinguishing characteristics such domains share: (1) each are governed by international treaties; (2) these treaties address specific permissible uses and prohibitions; (3) each treaty specifically addresses the issue of sovereignty; (4) each treaty bounds or defines areas of sovereignty and thus areas that constitute the global commons and (5) states could not realistically expect to exercise sovereignty over these areas when they established these treaties. The international regimes created by these treaties are voluntary affairs and states accept their constraints primarily to preserve their future interests when they lack the capability to exert control or enforce a sovereignty claim. Such is the present condition of the high seas (and the airspace above them), the Antarctic and outer space. However, the history of territorial seas and more recently the claims in the Arctic have shown that global commons and their governing regimes are not immutable. On the contrary, technological progress, resource scarcity and most recently, climate change, are making global commons more accessible and more desirable. The result is inexorable pressure for states to expand their sovereignty into the global commons. To do so, states must fundamentally be able to demonstrate sustained presence and possess the capability to act within the domain. In this regard the United States is well positioned in the maritime and Antarctic domains but considerably less so in the Arctic and, perhaps surprisingly, in outer space. Beyond these key enablers however, there exists no formal process to transition international regimes to recognized sovereignty claims, therefore states must undertake the essential activity of engagement in order to preserve their interests among the regime stakeholders and be properly positioned to affect an expansion of national sovereignty into a global commons. This paper advocates a holistic approach, advancing a campaign plan for the global commons with the following lines of effort:

- Engage in the maritime regime
- Support Arctic engagement organizations
- Take a holistic approach to engagement with Canada
- Realign COCOM boundaries in the North
- Step up engagement with Greenland
- Engage non-traditional partners
- Re-assign COCOM responsibilities in the South
- Lead the reshaping of the Antarctic international regime
- Shift our posture on space regimes
- Establish a national space objective that serves a broad array of strategic interests

Deriving a Campaign Plan for the Global Commons

Technological progress, resource scarcity, and climate change are converging to create a situation in which the commercial exploitation of the deep ocean, the polar regions and space is economically viable. National claims to these regions are at present non-existent or unrecognized however experience in littoral waters and current events in the Arctic suggest that a clash over claims is inevitable. There is no accepted procedure for turning such claims into sovereignty; history has shown that success results from the ability to demonstrate presence, capability and engagement. If this indeed is a zero-sum game, we can ill afford short-sighted and fractured policy-making, especially in the face of ambitious competitors. To wage a prolonged campaign of this nature requires strategic resource planning aligned to a clear vision. Our newest strategic guidance makes the strongest statement yet in this regard, "To safeguard U.S. and partner nations interests, we will be prepared to demonstrates the will and commit the resources needed to oppose any nation's actions that jeopardize access to and use of the global commons and cyberspace. . . ."[1] But this remains a reactionary posture and as such, is insufficient to enable our desires. To properly position the United States for sovereignty expansion into the remaining global commons, our strategic vision must acknowledge its likelihood and pro-actively guide our actions to peacefully reshape these international regimes.

Global Commons are distinct domains periodically challenged by sovereignty claims

The U.S. National Security Strategy identifies the shared sea, air, and space domains, "which exist outside the exclusive national jurisdiction"[2] as the global commons. Considered from the perspective of resources, global commons are domains which contain subtractable resources managed under a property regime in which a legally defined user pool cannot be efficiently excluded from the domain. Those resources may be natural, having economic or social value when extracted from their natural state, or spatial-extension resources that have value because of their location (e.g. geostationary orbits or Lagrange Points).[3] The property regime is the laws, treaties, regulations or customs that define property rights and expectations of actors in the domain. "By entering, or not, into international agreements, nations accept, or reject, constraints

[1] Michael G. Mullen, *The National Military Strategy of the United States* (Washington, DC: U.S. Department of Defense, 2011), 14.
[2] Barack Obama, *National Security Strategy* (Washington, DC: U.S. National Security Council, 2010), 49.
[3] Susan Buck, *The Global Commons: An Introduction* (Washington, DC: Island Press, 1998), 3.

on their absolute freedom of action."[4] Thus, rather than being international "white space", this suggests that distinct characteristics define what it means to be a global commons. We can identify five similarities shared by sea, air, and space commons, and by extension, the Arctic and Antarctic domains:

> First, international treaties govern each of these natural assets. The UN Convention on the Law of the Sea (Law of the Sea) entered into force in 1994, and, as of 19 December 2008, 157 countries have signed the treaty. The Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (Outer Space Treaty) entered into force in 1967, and, as of 1 January 2008, 98 states have ratified the treaty and 27 additional states have signed onto it. Finally, in 1959, 12 countries signed the Antarctic Treaty, and 47 countries are currently party to the treaty.
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> Second, each of these treaties addresses specific permissible uses and prohibitions for the natural asset. The Antarctic Treaty states, in part, that nations can only use the Antarctic for peaceful purposes, including scientific research, and specifically prohibits nations from testing nuclear weapons or disposing nuclear waste in the Antarctic. Similarly, the Outer Space Treaty states, in part, that nations can only use the moon and other celestial bodies for peaceful purposes, including scientific research, and prohibits nations from launching any nuclear weapon or other weapon of mass destruction into orbit. Finally, the Law of the Sea covers a broad range of issues ranging from a nation's transit rights, to a nation's ability to lay submarine cables and pipeline, to a nation's fishing rights on the high seas.
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> Third, each of the treaties specifically addresses the issue of sovereignty. The Antarctic Treaty states, "No new claim, or enlargement of an existing claim, to territorial sovereignty in Antarctica shall be asserted while the treaty is in force." The Outer Space Treaty 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." Finally, the Law of the Sea states, "no State may validly purport to subject any part of the high seas to its sovereignty" and "no State shall claim or exercise sovereignty or sovereign rights over any part" of the seabed and ocean floor and subsoil thereof, beyond the limits of national jurisdiction "or its resources."
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> Fourth, each treaty bounds, or defines, areas of sovereignty and thus areas that constitute the global commons. Under the Antarctic Treaty, the global commons is defined as "south of 60° South Latitude, including all ice shelves." The Law of the Sea has a myriad of provisions precisely defining areas that constitute territorial waters where a state has sovereignty as well as other areas of state interest such as an exclusive economic zone, thereby generally leaving the remaining oceans as a global commons (see Appendix A, Figure 1). Finally, under the Outer Space Treaty, the global commons essentially constitutes all of

[4] Scott Jasper and Paul Giarra, "Disruptions in the Commons," in *Securing Freedom in the Global Commons,* ed. Scott Jasper (Stanford, CA: Stanford University Press, 2010), 4.

> "outer space, including the Moon and other natural celestial bodies," although there is no specific definition of outer space provided in the Outer Space Treaty and thus no clear line between airspace and outer space.
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> Finally, states could not realistically expect to exercise sovereignty over these areas when they established these treaties. Even if a nation wanted to assert sovereignty over the entirety of the oceans, outer space, or the Antarctic, no nation realistically could exert control or enforce its sovereignty over the entirety of these natural assets[5].

This last characteristic is perhaps key to understanding why these commons persist today since, "historically, human response to vast areas of valuable resources unfettered by legal rights recognized by the dominant culture usually has been appropriation by governments and individuals, followed by exploitation as soon and as rapidly as physical force and technology would permit."[6] In a seminal article first published in 1968, Garrett Hardin addressed this reality coupled with the finite limits of our natural and concluded that this "tragedy of the commons" was fundamentally a moral dilemma that could only be managed by legislating and regulating temperance.[7] The global commons as they exist today, namely Antarctica, the high seas, the deep seabed, the atmosphere and space, "have remained exceptions only because access to them has been difficult and the value of the resources they contain has not been enough to justify the effort of acquiring them. Today however, technology has caught up with desire."[8] As a result, "the global commons are the arena in which political, economic and military competitions are going to play out against the backdrop of demographics, culture, commerce and geography."[9] The U.S. military has come to recognize this growing importance of the global commons and has identified it as an essential battlefield in which aggression must be deterred or defeated.

> Joint assured access to the global commons and cyberspace constitutes a core aspect of U.S. national security and remains an enduring mission for the Joint Force. The global commons and globally connect domains constitute the connective tissue upon which all nations' security and prosperity depend. The maritime domain enables the bulk of the joint force's forward deployment and sustainment, as well as the commerce that underpins the global economic system. The interlinked domains of air, space, and cyberspace allow for the high-speed, high-volume exchange of people, ideas, goods, information and capital that are equally critical to the global economy. These collective domains are essential and

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[5] Patrick Franzese, "Sovereignty in Cyberspace: can it exist?" *Air Force Law Review* (December 2009): 8-9.
[6] Buck, *The Global Commons,*1.
[7] Garrett Hardin, "The Tragedy of the Commons," *Science* vol. 162 (December 1968): 1244-1246.
[8] Buck, *The Global Commons,*1.
[9] Patrick M. Cronin, "Forward," in *Securing Freedom in the Global Commons*, ed. Scott Jasper (Stanford, CA: Stanford University Press, 2010), xv.

> interdependent mediums for the Joint Force's projection and sustainment of power and ability to deter and defeat aggression. [10]

Unfortunately this declaration of fundamental importance and commitment to defense fails to describe the long-term, ongoing, Phase 0 shaping activities that must be undertaken to effectively manage our position, safeguard our interests and ultimately ensure our objectives using a whole of government approach and all the tools of national power. Nominally such activities are captured in a Theater Campaign Plan, however the Global Commons transcend theaters yet require a unified national approach. Deriving a campaign plan for such domains must therefore consider them in totality within the context of the global community of nations.

International regimes are created in global commons that are currently beyond the reach of sustainable sovereignty claims

"There is no central sovereign at the international level. The United Nations is a deliberative body; its members are instructed by their national governments and must return to their national governments for approval of decisions. Enforcement is also left to the individual member states."[11] Thus international regimes are voluntary creations; constraints that states are willing to accept primarily as a means of preserving some rights when it is otherwise beyond their ability to exert control. In Hardin's construct, because freedom in the commons brings ruin to all, we mutually institute and accept "coercive devices" to escape the horror of the commons.[12] In those domains where international regimes currently apply, the guidance to U.S. military forces is quite clear. "The Joint Force will adhere to conventions, laws, and regulations our Nation supports to underpin collective security and govern conduct. We will also facilitate cooperation in the commons and cyberspace . . . as part of our theater strategies."[13] No suggestion is made however for creating a unified strategy for the global commons that would address activities to guide the transition from current status quo to desired end state for U.S. interests. The evolution of international regimes and sovereignty claims in the global commons is not a defined process. "When states and individuals started developing the technological capability to enter the domains of sea, air, and outer space, strong arguments existed for each of these domains to remain free from sovereign control. However, state interests, such as trade and national security, combined

[10] Mullen, *The National Military Strategy of the United States of America,* 9.
[11] Buck, *The Global Commons,* 24.
[12] Hardin, "The Tragedy of the Commons", 1247.
[13] Mullen, *The National Military Strategy of the United States of America,* 9.

with a state's technological capabilities, ultimately prevailed over these arguments and determined the current legal status of these domains."[14] In Roman times, the seas and the fish in it were considered common to all mankind. Following the collapse of the Roman empire and rise of city-states and merchant empires there was a practical need to exert sovereignty in order to protect commercial claims, fisheries and collect tariffs. By the 17th century, ". . . the principle that finally became accepted was that national jurisdiction extended only as far as a nation could enforce its control from shore. Beyond artillery range the high seas were open to all. This principle rested more on practical considerations than on elegant expositions of legal principles. The boundary of territorial seas eventually evolved into one marine league, or three miles. This was the distance used by the United States in 1793 when it defined its neutral coastal area during the war between Great Britain and France."[15] Three miles became the international standard as it was recognized by Great Britain, the preeminent naval power until World War II. Following the war, growing recognition of offshore oil reserves and the age-old dispute over fishing rights that led to repeated confrontation between Iceland and Great Britain prompted negotiations that ultimately produced one of the most comprehensive international regimes, the UN Convention on the Law of the Sea III (UNCLOS III).

> During UNCLOS III a consensus was reached in which the nations agreed on a range of territorial seas. A 12-mile limit for the right of innocent passage was set, but straits less than 24 miles wide were to be governed not as territorial waters but by a new regime of "transit passage". Beyond this 12-mile limit, coastal states had a monopoly on fish and living resources to the 200-mile limit and on energy sources and minerals to 350 miles. This enclosed 36 percent of the world's oceans, including 90 percent of commercially exploitable fish and 87 percent of projected offshore oil reserves.[16]

Driven by resources that had become economically viable both through increasing scarcity and technological progress, sovereignty into the global commons of the oceans expanded from three to 350 miles. Practically speaking, what makes such claims sustainable is the ability of a nation to exert their presence. "In effect, the nations now have very long cannons."[17] Through engagement with other nations, international regimes are created that recognize the expanded national claims, however nations must also possess the possess the capability to enforce such

[14] Franzese, "Sovereignty in Cyberspace," 14.
[15] Buck, *The Global Commons,*81.
[16] Buck, *The Global Commons,*86.
[17] Buck, *The Global Commons,* 100.

claims in order for international regimes to remain stable. "The lack of resources to obtain adequate forces, combined with national sovereignty that does not willingly cede responsibility for security within territorial waters, creates ungoverned maritime spaces that foster threats."[18] Indeed, if there is any true "white space" to speak of in the maritime domain, it is these unsecured territorial waters which spawn the principle threats to the international regime today. From the time of the Romans, until the advent of aerial machines, it has been generally accepted that a landowner has the right to use the air above his property. Thus the age of flight, which matured rapidly due to World War I both ended the common notion of private ownership of the air and highlighted the need to resolve the question of airspace sovereignty. Disparate attempts to apply maritime conventions such as territorial zones or innocent passage failed (sometimes fatally) until the issue was finally agreed upon in 1919 at the Convention of Aerial Navigation in France.

> Commonly known as the Paris Convention, this convention codified the existing customary international law of air sovereignty. Article 1 stated, in part, "The high contracting parties recognize that every Power has complete and exclusive sovereignty over the airspace above its territory." Equally as important, the Convention nominally established the idea that states had the right of innocent passage across the airspace and above the territory of other states. This fundamental concept of air sovereignty continued, specifically with the Convention on International Civil Aviation, commonly referred to as the Chicago Convention, which states first signed in 1944 and have updated eight times, most recently in 2006. Regardless of how the Convention changed over the years, Article I of the Chicago Convention has consistently stated, "[t]he contracting States recognize that every State has complete and exclusive sovereignty above its territory." However, the Chicago Convention does not recognize the right of innocent passage as set forth in the Paris Convention. Nonetheless, the Chicago Convention does address such matters as over-flight rights and aircraft nationality, and also established the International Civil Aviation Organization to govern these issues.[19]

Of significance is that no upper limit was established, thus this complete and exclusive sovereignty differs considerably from the maritime precedent. As Susan Buck points out, "perhaps if the airspace regime had developed in a more peaceful era, it might have been more international in character."[20] But as in the maritime domain, engagement in international

[18] Jeff Kline, "Maritime Security," in *Securing Freedom in the Global Commons,* ed. Scott Jasper (Stanford, CA: Stanford University Press, 2010), 77.
[19] Franzese, "Sovereignty in Cyberspace," 12.
[20] Buck, *The Global Commons,* 113.

regimes alone is not enough to sustain a sovereign claim. Nothing quite so clearly demonstrates the essentiality of presence and capability to sustain a sovereignty claim as the surface-to-air missiles that futilely fell short of U.S. U-2 aircraft flying over the USSR in the 1950's. Over the years, as technology has allowed nations to attain and control ever higher altitudes the informal notion of the bounds of sovereign airspace has expanded from the height of air-breathing engines to the lowest sustainable satellite orbit. Nor has the notion of sovereignty ended there. Despite the provisions of the Outer Space Treaty and just four years after it went into force, " . . . the World Administrative Radio Conference on Space Telecommunications formally brought geostationary orbits under ITU [International Telecommunications Union] control. . . in a dramatic departure from the old "first in time" protocol, all countries were given equal access to the use of space radio communication service frequencies and to the related geostationary orbits."[21] The obvious economic potential of geostationary orbital slots coupled with the very limited capabilities to maintain presence and exert control in the domain, compelled nations to quickly enter into an international control regime. Perhaps such equitable parsing of the key orbital landscape was also a reflection of the times given that the Common Heritage of Mankind (CHM) principle was widely advocated and in vogue at the time.

> CHM defines some resources . . . as the property of the global human population. CHM proponents then argue that since a community (albeit a large one) already holds most of the bundle the property rights to the resources, the resources cannot legally be appropriated by any one individual or state. The benefits from their exploitation should be shared by all states (and presumably distributed to the people) regardless of the state's participation in resource extraction. The CHM principle originated from two realizations in the international community. First, some valuable natural resource stocks, such as certain fisheries, are close to exhaustion. The developing countries are eager to ensure that the resources remain available for their own use, and the common heritage principle gives moral force to their arguments. Second, the developing nations were concerned that the first-come-first-served rule would be to their disadvantage in regimes such as deep seabed mining and outer space. The CHM was an assertion of their right to participate in exploitation and a moral claim to the development assistance needed for participation.[22]

On July 20, 1969, humans first set foot upon the Moon and notably, the United States did not claim territorial sovereignty. It could be regarded as validation of the CHM principle inherent in the Outer Space Treaty. Alternatively, an overt statement of sovereignty might have been

[21] Buck, *The Global Commons,*157.
[22] Buck, *The Global Commons,* 28-9.

avoided in recognition that U.S. presence was going to be fleeting and future capability to reach the moon, highly questionable. As early as January 1970, the Apollo program was being truncated with no follow-on plans to return to the moon, thus sovereignty claims would become impossible to maintain through commonly established precedents. On Earth, the CHM principle has not held up in the face of economic pressure or challenged by national interest. The seabed mineral regime was modified in 1994 to satisfy developed nations—those that could reasonably by expected to accomplish such extraction in the near future. "In the Antarctic, the consultative parties . . . have resisted any application of the CHM principle. They assert, quite logically, that numerous claims of territorial sovereignty have already been made in the resource domain. The treaty has merely set the disputes aside while scientific research continues."[23] "Finally, in the outer space domain, the inability of any state to exert any sort of control in outer space significantly contributed to The Outer Space Treaty, prohibiting the extension of sovereignty into outer space. However, as states gain the technological ability to assert control in outer space, the current outer space regime may be changed significantly, or disappear altogether."[24]

Resource scarcity, technological progress and climate change are driving the expansion of sovereignty into the commons

In September 1909, Commander Robert Peary became the first person to reach the North Pole whereupon he dispatched a message offering to place the North Pole at the disposal of the United States, which, "elicited a rather uncertain reply from President Taft—'Thanks for your interesting and generous offer. I do not know exactly what I could do with it . . .'"[25] One hundred years later, in May, the U.S. Geological Survey released some truly stunning projections of undiscovered oil and gas resources north of the Arctic Circle; 83 billion barrels of oil, which is enough to meet current global demands for three years; 44 trillion cubic meters of natural gas, or about fourteen years worth of supply.[26] This is hardly the first time natural resource discoveries have triggered sovereignty expansion. "Spurred by the discovery of huge reserves of oil and natural gas off the coast of the United States, in September 1945 President Harry Truman issued two proclamations in which the United States claimed jurisdiction over the natural resources

[23] Buck, *The Global Commons,* 65.
[24] Franzese, "Sovereignty in Cyberspace," 16.
[25] Charles Emmerson, *The Future History of the Arctic (*New York: PublicAffairs, 2010), 82.
[26] Michael Byers, *Who Owns the Arctic?: Understanding Sovereignty Disputes in the North (*Vancouver, BC: Douglas and McIntyre, 2010), 9-10.

found on the continental shelf and indicated an inclination to claim extended fishing zones on the high seas."[27] This limit remained loosely defined until the 1970's when a dispute over fishing rights between the U.S. and Ecuador led to a ruling by the International Court of Justice establishing a precedent for recognizing 200nm. This was codified by the U.S. in a Proclamation[28] issued by President Reagan in 1983 and as International Law by the UNCLOS. Driven by the quest to secure resources, the creation of the Exclusive Economic Zone (EEZ), ". . . has brought nearly one third of the high seas under some form of national administration"[29] (see Appendix A, Figure 2).

Current events in the Arctic are merely the latest scramble for sovereignty inspired by resource scarcity and enabled by technological progress and may be a preview of what lies ahead for remaining global commons (see Appendix A, Figure 3). "Arctic States share regional interdependence and recognize that economic pressure, political pressure and technological advancements will encroach on the commons. . . . Antarctic claimants would be ill-advised to ignore the possibility of increasing resources pressures in the future, and it remains to be seen how they will react to serious approaches in this regard."[30] Recent military strategy documents correctly identify the possible consequences of such competition; "heightened popular expectations and increased competition for resources, coupled with scarcity, may encourage nations to exert wider claims of sovereignty over greater expanses of ocean, waterways, and natural resources—potentially resulting in conflict ."[31] Yet, as the sovereignty drama in the Arctic has unfolded, it has become clear that economic ambition is more likely to push governments to peaceful agreements in order to hasten resource extraction. "So far, concerns about the security of drilling licenses have discouraged oil and gas exploration in areas of disputed sovereignty. But Big Oil, which is willing to deal with just about any government, is starting to push for agreed-upon boundaries. Governments, realizing that clear jurisdiction is a prerequisite for large-scale investment, are beginning to respond."[32] In May 2008, the five

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[27] Buck, *The Global Commons,* 84.
[28] Ronald Reagan, *Proclamation 5030,* (Washington, DC: The White House, March 1983),1.
[29] James Kraska, "Indistinct Legal Regimes," in *Securing Freedom in the Global Commons,* ed. Scott Jasper (Stanford, CA: Stanford University Press, 2010), 54.
[30] Julia Jabour and Melissa Weber, "Is it time to Cut the Gordian Knot of Polar Sovereignty?" *Review of European Community and International Law* 17(1) (2008): 15.
[31] Gary Roughead, James Conway, and Thad Allen, *A Cooperative Strategy for 21st Century Seapower* (Washington, DC: U.S. Department of the Navy, U.S. Coast Guard, 2007), 3.
[32] Byers, *Who Owns the Arctic?* 10.

Arctic Nations issued, ". . . the Ilulissat Declaration in which all five states reaffirmed their commitment to working together within an existing framework of international law."[33] The emerging dominance of multi-national corporations to propel and influence sovereignty claims between states in the commons is a new trend. " . . . never before in world history have corporate interests unconnected with the interests of a nation-state regularly determined international structures and policy."[34] Accommodating multi-national corporations on a stage that was previously the sole domain of sovereign states adds a new dimension to international politics and complexity to the military operating environment. Further complexity is created as the line blurs between state and corporation, an emerging characteristic of the strategic environment highlighted in the new U.S. Military Strategy. "Energy-state relationships will intersect geopolitical concerns as state-run companies will control an increasing share of the world's hydrocarbon resources and the persistent challenge of resource scarcity may overlap with territorial disputes."[35]

Top leaders in the U.S., initially slow to acknowledge climate change, have now made it a key trend impacting our national security. "The danger from climate change is real, urgent, and severe."[36] It is already having a tremendous impact on the polar regions of our planet; changing the economic equation by simplifying access and renewing debates over sovereignty. "Every Arctic-specific policy imperative, whether on sovereignty, security, shipping or search-and-rescue, is driven by the need to adapt to the increasingly severe consequences of climate change."[37] As a primarily maritime environment, the sea services have taken the lead, formulating strategy to address climate change. "Climate change is gradually opening up the waters of the Arctic, not only to new resource development, but also to new shipping routes that may reshape the global transport system [see Appendix A, Figure 4]. While these developments offer opportunities for growth, they are potential sources of competition and conflict for access and natural resources."[38] Although listed as one of the top ten trends likely to impact the Join Force,[39] the services' vision of potential consequences is still not comprehensive enough. Climate change is also disrupting the food web that jeopardizes the viability of traditional Inuit

[33] Byers, *Who Owns the Arctic?* 89.
[34] Buck, *The Global Commons, 174.*
[35] Mullen, *The National Military Strategy of the United States of America,* 3.
[36] Obama, *National Security Strategy,* 47.
[37] Byers, *Who Owns the Arctic?* 128.
[38] Roughead, Conway, and Allen, *A Cooperative Strategy for 21st Century Seapower*, 3.
[39] J.N. Mattis, *The Joint Operating Environment 2010,* (Norfolk, VA: U.S. Joint Forces Command, 2010), 32.

civilization, while at the same time enhancing the economic productivity of Greenland which in turn encourages ambitions of independence. The sum of all such developments must be considered together when assessing the future security of North America and should serve as a guide for our security cooperation efforts.

Where are the simultaneous pressures of resource scarcity, technological progress and climate change likely to drive us in the future? Using the most conservative or favorable current projections of population, GDP growth, and improvements in energy efficiency, the world energy demand in 2050 will be twice what it is today. Fossil fuels will still make up 80% of the energy mix in the 2030s, with oil and gas comprising upwards of 60%. Assuming the most optimistic scenario for improved petroleum production and new discoveries, petroleum production will be hard pressed to meet the expected future demand of 118 million barrels per day in 2030.[40] Even if it is achievable, such an energy source profile will contribute substantial carbon dioxide emissions. Indeed, even if all the additional energy above today's generation capacity were from carbon neutral sources, that alone would still be insufficient to stabilize atmospheric CO_2 concentrations below 550ppmv (see Appendix A, Figure 5), the upper limit of what climate-change researchers agree would lead to a significant but hopefully not catastrophic 2°C mean global temperature rise.[41] And yet what carbon neutral sources of energy could possibly meet the projected demand? The scale of the challenge is such that it requires the building of an industry commensurate with 50 Exxon-Mobils of today and all current technologies are inadequate. Nuclear power plants are not presently being built anywhere near fast enough to supplant fossil fuel sources and politically and economically that is unlikely to change any time soon.[42] If sufficient plants did exist, it's questionable whether adequate uranium could be obtained to run them, requiring extensive use of re-processing and plutonium. Controlled fusion could solve many fuel and waste issues but it has yet to be technically achieved and will not mature in time to meet this demand. Hydroelectric sources are about tapped out and the potential that resides in wind, geothermal, tidal, and even biomass simply does not scale sufficiently to meet this power need. The Sun is the only natural energy resource that can keep up with human consumption.[43] The answer to where resource scarcity,

[40] Mattis, *The Joint Operating Environment 2010,* 24.
[41] Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report*, November 2007.
[42] National Intelligence Council, *Global Trends 2025: A Transformed World*, November 2008.
[43] Nathan Lewis, "Powering the Planet," *Engineering & Science* no 2 (2007), 13-23.

technological progress and climate change will push us, is the Sun. And nowhere is that energy more concentrated and continuously available than in Earth orbit.

Presence and capability are the keys to sustaining a sovereignty claim in the global commons

In 2007, the planting of a Russian flag on the seabed of the North Pole captured the world's imagination. Most quickly dismissed any notion that it legitimatized a sovereignty claim, and in fact Russian Foreign Ministry statements affirmed that the action had no legal force, implying in the process, that neither did an American flag on the Moon.[44] Left unspoken was the undeniable fact that this action by a Russian icebreaker and submersible was a statement of capability. Like the American landing on the moon, it was a feat no other nation could accomplish and unlike the Apollo program, they retain the ability to return any time they choose. The stunt underscored Russian presence in the Arctic, a function of their proximity, enormous arctic coastline, continuous research activity, and doggedly determined efforts to maintain a viable shipping route through the Northeast passage for the past one hundred years. "The security implications of a more accessible and more economically important Arctic will require a reconfiguration of the military and civilian resources of the Arctic states. In some countries, this reconfiguration is well underway; in others, it is only just beginning"[45] Partly in response to the orbiting of Sputnik 1957, the U.S. used its lead in nuclear submarine technology to access the Arctic Ocean, sailing the *USS Nautilus* under the pole in 1958 and surfacing the *USS Skate* through the ice a year later. In the decades since, submarines have represented the bulk of U.S. presence and capability in the Arctic, conducting exercises and research expeditions every two years in the icepack north of Alaska. Another legacy of the Cold War is the semi-autonomous North Warning System (NWS) which, ". . . remains in place roughly along 68°N and the Labrador coast. The sites were positioned to see approaching aircraft and missiles, but are in prime locations for monitoring the sea as well (see Appendix A, Figure 6). The radar upgrades installed in the early 1980s were a significant improvement over original Distant Early Warning (DEW) line equipment, but these are aging and warrant modernization and further automation."[46] Assets for conducting operations in the Arctic are also limited. Forward

[44] Emmerson, *The Future History of the Arctic,* 82.
[45] Emmerson, *The Future History of the Arctic*, 121.
[46] Tarn M. Abell, "Arctic Security in a Warming World," Strategy Research Project (Carlisle Barracks, PA: U.S. Army War College, March 23, 2010), 22.

Operating Locations (FOLs) are maintained at Inuvik, Iqaluit, Yellowknife and Rankin Inlet to accommodate Canadian and NORAD fighters, but they are seldom operationally activated. With the exception of four aging de Havilland CC-138 Twin Otters, no other search and rescue aircraft or helicopters are permanently stationed in the North by Canada. As a result, long-range sovereignty over-flights of the region have dropped to only one or two per year.[47] Also aging is the U.S. icebreaker fleet, whose capability lags behind well behind Russia, with eighteen vessels. Even China, though not an Arctic nation, recognizes the importance of icebreaking capability and maintains one capable ship. The two USCG vessels currently able to handle heavy ice are over 30 years old and "atrophying" in the words of the USCG commandant who cautioned, "[w]e run the risk of losing that national capability." [48] The U.S. National Academies of Sciences has identified the need and sea services recognize, "[i]ncreased international activity, new transoceanic shipping routes and competition for resources in the Polar Regions will require icebreakers for the foreseeable future."[49] It's worth noting that predictions for ice-free summers in the arctic beginning as early as 2013 would mean that winter ice would not be multi-year ice and thus not require heavy icebreakers to provide access. Nonetheless, such capability will remain important to guarantee presence and freedom of action in Antarctica.

Icebreakers aside, the U.S. maintains the largest stations and most sophisticated logistics networks on the Antarctic continent, supporting a continuous human presence since 1956 that, in the absence of a formal sovereignty claim, nonetheless secures our interests for the inevitable confrontation.

> The effective operation of the Antarctic Treaty is a direct result of the active and influential United States presence in Antarctica maintained through the Antarctic Program. This presence accords the United States a decisive role in the Treaty's activities based decision system and in maintaining the political and legal balance that makes the Treaty work. The Department of State believes it essential that the United States continue to maintain an active and influential presence in Antarctica, including year-round operation of South Pole Station. United States presence at the South Pole Station demonstrates United States commitment to assert its rights in Antarctica, its basis of claim, and its commitment to conduct cutting edge scientific research there. Abandonment of the Station would create a vacuum and

[47] Rob Heubert, "Renaissance in Canadian Arctic Security," *Canadian Military Journal* (Winter 2005/6), 20.
[48] Emmerson, *The Future History of the Arctic*, 123.
[49] Gary Roughead, James Conway, and Thad Allen, *Naval Operations Concept: Implementing the Maritime Strategy (*Washington, DC: U.S. Department of the Navy, U.S. Coast Guard, 2010), 91.

> likely result in a scramble to occupy the site, to the detriment of our position as well as to the stability of the Treaty system.[50]

Prior to the negotiation of the Antarctic Treaty, seven nations had made conflicting claims to portions of Antarctica (see Appendix A, Figure 8). These claims are essentially "frozen" as the Treaty neither recognizes existing claims nor allows new claims to be made. Thus nations recognize that capability and presence are the keys that will support the resolution of sovereignty that lies in the future. Demonstrations of capability and presence have been varied and creative. In 1946 Chile issued an Antarctic postage stamp and administers the territory through a provincial governor vice the foreign ministry. In 1978 Argentina declared the first child to be born in Antarctica at their Esperenza Base was an Argentine citizen, reflecting their legitimate settlement of the continent. New Zealand has long insisted on the carriage of government observers on board tourist vessels entering the Ross Sea region, ostensibly to monitor tourist behavior in World Heritage areas.[51] More recently, as sovereignty disputes in the Arctic have highlighted the important of presence and engagement, nations have scrambled to become consultative parties to the Antarctic Treaty which requires, "engaging in substantial scientific activity. Thus Antarctic research stations have proliferated (see Appendix A, Table 1) and been subjected to all manner of high visibility political visits. In just 2007-08 alone, the UN Secretary General, Prime Ministers of Brazil, New Zealand, and Norway, and the Deputy Premier of Russia all made first-time ever visits to Antarctica. A U.S. president has yet to do so.

The commonly held perception that the U.S. is a leader in space capability and presence has led to a policy in which we resist engagement in international regimes in the space domain. Our intent is to avoid commitments that might interfere from near-future expressions of sovereignty or freedom of action. The reality is that the space domain is less mature than we would like to think, and that like Antarctica of today, international regimes preserve our interests until such time as economic forces and technological capability make resolving such issues a necessity.

" . . . after all the hype about space warfare and space weapons, an examination of currently fielded forces capable of direct counter-space operations against satellites clearly shows that few countries can conduct this type of warfare. Most threats envisioned in the U.S. military's space

[50] William J. Clinton, *Presidential Decision Directive/PDD-26*, (Washington DC: The White House, March 1996), 2.

[51] Jabour and Weber, " Is it time to Cut the Gordian Knot of Polar Sovereignty?" 13.

doctrine simply do not exist in an operationally deployed form."[52] Rather than worry about the imminent militarization of space or the need to defend against the potential capability of others, we would be wiser to pursue an arms control approach for now and redirect our resources into developing basic access capability and promote cooperation.

> Ineffectual pursuit of military space dominance carries high opportunity costs. At the most basic level, the U.S. attitude has hindered efforts to develop strong international rules to minimize space debris, manage space traffic, and allocate orbital slots in GEO. The U.S. attitude has been a major obstacle to the most efficient and equitable approach to space-based navigation services—a single system operated as a global public utility with decision-making control shared among international partners. The U.S. position currently also precludes any realistic strategy for truly transformational uses of space.[53]

Commercial potential has barely been identified much less exerted its economic pressure on the marketplace. However in this regard Russian space tourist activities and U.S. commercial space station servicing contracts may be the vanguard of a new industry. We must be careful not to undercut fledging commercial ventures such as SpaceX with duplicative government financed initiatives. Doing so will neither spur private investment nor achieve lowered costs as was painfully demonstrated by the Evolved Expendable Launch Vehicle program which pressed forward with the simultaneous development of the Atlas V and Delta IV launch vehicles to the economic detriment of both. Properly nurtured, a commercial space industry could create a tremendous engine for economic growth that bringing great competitive advantage over strictly state sponsored space programs. Renowned futurist George Friedman has postulated that a commercial space power industry will bring a fundamental paradigm in geopolitical realities.

> Since the start of the industrial revolution, industry has guzzled energy, which was accidentally and haphazardly distributed around the world. The Arabian Peninsula, which otherwise had little importance, became crucially important because of its oil fields. With the shift to space-based systems, industry will produce energy instead of simply consuming it. Space travel will be the result of industrialization, and an industrialized nation will produce energy at the same time as it fuels its industry. Space will become more important than Saudi Arabia ever was . . . .[54]

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[52] Scott A. Weston, "Examining Space Warfare: Scenarios, Risks, and U.S. Policy Implications," *Air and Space Power Journal* (Spring 2009): 5.
[53] Nancy Gallagher and John D. Steinbruner, *Reconsidering the Rules for Space Security* (Cambridge, MA: American Academy of the Arts and Sciences, 2008), 73.
[54] George Friedman, *The Next 100 Years* (New York: Anchor Books, 2009), 220.

For now, it is important to acknowledge our limits; U.S. ability to send humans into space is tenacious and restricted to low earth orbit, and our human presence on the International Space Station will count for little in future sovereignty assertions. It is our commercial enterprises, the dominance of our navigation and communication satellite networks and the nascent private launch initiatives that embody presence and capability in the global commons of space.

Engagement preserves a nation's interest in international regimes and is the essential activity to expand sovereignty claims into the global commons

Engagement as defined by the National Security Strategy (NSS) is, "the active participation of the United States in relationships beyond our borders."[55] Guidance on the nature and importance of such engagement to secure our interests in the global commons is characterized in successive strategic documents. The NSS makes clear that engagement begins with our closest friends and allies and depends upon the effective use and integration of different elements of American power to underpin a just and sustainable international order.[56] The National Defense Strategy identifies engagement as a force multiplier since our partners may be able to provide resources, knowledge, skills, and capabilities that we cannot duplicate.[57] Within the Maritime Strategy we find the key tenant for leveraging engagement; that although our forces can surge when necessary, trust and cooperation cannot be surged, rather they must be built over time so that strategic interests of the participants are continuously considered while mutual understanding and respect are promoted.[58] "Today, the United States and its partners find themselves competing for global influence in an era in which they are unlikely to be fully at war or fully at peace."[59] This state of affairs can only be managed through perpetual engagement. In the range of military operations, such engagement corresponds to security cooperation and the manner in which strategic guidance is translated into action is through campaign plans. What follows then is a high level outline presenting the significant lines of effort of a campaign plan to ensure our long-term interests in the global commons.

Engage in the Maritime Regime. UNCLOS has proven to be one of the most widespread and enduring international regimes that has been expanded so that it applies in some way to all

[55] Obama, *National Security Strategy*, 11.
[56] Obama, *National Security Strategy*, 11-12
[57] Robert M. Gates, *National Defense Strategy* (Washington, DC: U.S. Department of Defense, 2008), 20.
[58] Roughead, Conway, and Allen, *A Cooperative Strategy for 21st Century Seapower*, 8.
[59] Roughead, Conway, and Allen, *A Cooperative Strategy for 21st Century Seapower*, 1.

terrestrial global commons. From resource extraction to pollution to maritime security, it is the principle means by which the nations of the world engage in the commons of the seas. It has also become the tool and the venue by which sovereignty in the Arctic is being determined and will likely serve a similar role when the question arises in Antarctica. For now, uncontested control of the sea by the U.S. Navy affords us the luxury of not entering into the constraints of this international regime. Understandably we treasure our complete freedom of action that unchallenged presence and capability in the maritime domain allows. It remains to be seen how long we can sustain this status quo. However, even under present circumstances, this notion of complete freedom is an illusion because we have accepted UNCLOS as international law, thus concluding on some practical level that greater national interests must be served by doing so. Thus, the ratification of this treaty has become the one specific engagement directive explicitly stated in the National Security Strategy. As pointed out in U.S. Arctic Policy, "Joining will serve the national security interests of the United States, including the maritime mobility of our Armed Forces worldwide. It will secure U.S. sovereign rights over extensive marine areas, including the valuable natural resources they contain. Accession will promote U.S. interests in the environmental health of the oceans. And it will give the United States a seat at the table when the rights that are vital to our interests are debated and interpreted."[60]

Support Arctic engagement organizations. Actively promote the Arctic Council which, " . . . provides a mechanism and platform for international cooperation on key issues concerning the Arctic."[61] Although not a regulatory or decision-making authority, the Council nonetheless provides an important venue for cooperation and achieving consensus between Arctic nations and with the indigenous populations; stated objectives of U.S. Arctic Policy. Domestically, the U.S. Navy has created Task Force Climate Change, charged with the task of creating the Arctic Roadmap and the Navy Arctic Strategic Plan. Based upon a comprehensive assessment, this will lay out acquisition and training recommendations to improve U.S. presence and capability in the Arctic. The U.S. must act upon the output of this Task Force and be mindful that the pace of climate change disregards the timeline of bureaucratic action. For example, any recommendation for the construction of a heavy-ice capable icebreaker must consider the lead time

[60] George W. Bush, National Security Policy Directive/NSPD-66 (Washington, DC: The White House, January 2009), 3.
[61] Jabour and Weber, "Is it time to Cut the Gordian Knot of Polar Sovereignty?" 7.

required to amend the 30-year shipbuilding plan and the government planning, programming, and budgeting cycle, not to mention the time required for construction. Current predictions suggest the Arctic could experience ice-free summers within ten years, meaning that even winter ice would not be the heavy, multi-year ice that requires this class of icebreaker. In light of these realities, Arctic planning should be open to alternatives, perhaps leasing such ships, that fit the timeline imposed by both bureaucratic processes and developments in the environment.

Take a holistic approach to engagement with Canada. To sustain claims on the global commons in the face of competition, the U.S. and Canada are stronger together. We share common interests and viewpoints on a wide variety of issues but allow a few outliers to prevent forming a truly united front. Rather than individually negotiating these divisors, the U.S. should take a holistic approach with the end state of forming a cohesive, unshakable, North American "block". With more than 80 treaty-level defense agreements and over 250 defense MOUs in effect there is a solid foundation to build on. The 2006 expansion of NORAD's mission statement to include maritime domain awareness and defense in the Arctic and the simultaneous stand-up of Canada Command are a good start. However, these organizations must be brought together and more importantly must fuse their data to create a truly integrated North American surveillance, command, and response capability. Transforming USNORTHCOM's Joint Intelligence Operation Center (JIOC) into a Combined JIOC, is a good place to start.[62] Improving fundamental maritime surveillance capabilities must also be addressed. The 2007 launch of Canada's second RADARSAT satellite into polar orbit provides all-weather, 1m resolution, monitoring of the Canadian Arctic on a 12-day ground track however the U.S. and Canada have been at odds over shutter control and the data access policy. Efforts to improve ground based capability should explore the feasibility of re-purposing Cold War early warning defense radars in Canada's far north into a maritime surveillance network. The U.S. and Canada must address remaining boundary issues in the Arctic and on the Alaskan border collectively, so as to present a joint submission on claims to the UN Commission on the Limits of the Continental Shelf. Such an uncontested submission is

[62] Brad W. Gladman, "Strengthening the Relationship: NORAD Expansion and Canada Command," *Journal of Military and Strategic Studies* Vol 9 issue 2 (Winter 2006/7), 1-20.

far more likely to receive their approval and thus more quickly secure sovereign rights for both nations. We can decidedly shift the negotiation in favor of U.S interests if we are willing to make some concession on what is perhaps the most significant issue to our northern neighbors, sovereignty of the Northwest Passage. Our current Arctic policy recognizes that the U.S. has, ". . . fundamental homeland security interests in preventing terrorist attacks and mitigating those criminal or hostile acts that could increase the United States vulnerability to terrorism in the Arctic region." Yet we continue to insist that, "[t]he Northwest Passage is a strait used for international navigation, and the Northern Sea Route includes straits used for international navigation; the regime of transit passage applies to passage through those straits."[63] This is a somewhat contrary and unnecessary position. The fact is that unlike the NW Passage, most international straits are long established, heavily used and well recognized by international regimes, important factors under UNCLOS. The precedent set by declaring the NW Passage to be historical inland waters is unlikely to significantly upset other waterways, especially given current U.S. capability and presence in the maritime domain and the current minimal utility of the NW Passage. Supporting a sovereignty claim will be a much more difficult proposition the longer we wait, and as pointed out by none less than the former U.S. ambassador to Canada, "It is in the security interest of the United States that it be under the control of Canada."[64]

> Having the Northwest Passage recognized as Canadian internal waters would help to prevent the illegal entry of people and goods into North America. Within internal waters, the full force of the coastal state's immigration, customs and criminal laws apply, and foreign vessels, crews, passengers and cargo can be closely scrutinized. Cargo manifests and crew and passenger lists can be required in advance, as can visas, in the same manner as on land. In contrast, the right of transit passage has almost absolute precedence in an international strait. Under the UNCLOS, the coastal state may adopt laws concerning "the loading or unloading of any commodity, currency or person in contravention of its customs, fiscal, immigration or sanitary laws and regulations." But even these laws "shall not . . . have the practical effect of denying, hampering or impairing the right of transit passage.[65]

[63] Bush, *NSPD-66*, 2-3.
[64] Byers, *Who Owns the Arctic?* 80.
[65] Byers, *Who Owns the Arctic?* 61.

Recognizing that despite its presence, Canada has limited capability to monitor and control the passage, our two nations should enter into a joint jurisdiction agreement, as part of the negotiation to recognize sovereignty. The logical arrangement would be for the U.S. to assume responsibility for the western approaches to the NW Passage and for the two countries to share law enforcement responsibilities within the passage. One proposal, put forward by the Canadian Defense and Foreign Affairs Institute, is the creation of a cooperative, treaty-based North West Passage Authority (NWPA) that will allow Canada and the U.S. to manage the NWP jointly and negotiate resolutions to conflicting claims, just as they did in the Great Lakes and St. Lawrence Seaway in the past.[66] A combined command structure aligned with a single COCOM AOR would simplify execution.

Realign COCOM boundaries in the North. The opening of the NW Passage will herald a rare shift in the world's major sea lanes of communication. The Arctic will go from a natural barrier between nations to an important conduit connecting them, and in the current U.S. unified command construct, this passage will transit three COCOM AORs. The Arctic Ocean being presently divided such that the Barents and Kara Seas lie within EUCOM's AOR, while the East Siberian and Laptev Seas are the responsibility of PACOM who shares responsibility for Alaska with NORTHCOM as a special case. From the perspective of unity of command, such a complex seam will become unmanageable. The logical choice is to redraw the map and assign full responsibility for the Arctic Ocean to NORTHCOM, coincident with the responsibilities of NORAD. "In the Cold War, Arctic security policy was bound up with the single overwhelming threat of nuclear confrontation between the Soviet Union . . . and the United States . . . . In the twenty-first century, that threat has largely gone. Instead, Arctic security policy in the future will be about a more fragmented set of challenges-many of them civilian-arising from the Arctic's growing economic importance and, partly as a result of climate change, its increased accessibility."[67] With shipping traffic poised to become the dominant concern, the new AOR should include the approaches to the Arctic to include the Bering Strait. It should also include the entirety of Greenland, anticipating the transformation that climate change is likely to bring to that land.

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[66] Brian Flemming, "Canada-U.S. Relations in the Arctic: A Neighborly Proposal," (Calgary, Alberta: Canadian Defence and Foreign Affairs Institute, December 2008), 2.
[67] Emmerson, *The Future History of the Arctic,* 120.

Step up engagement with Greenland. Rich in natural resources and with an ice-sheet in full retreat, Greenland is experiencing increasing productivity, income, and ambition. In June 2009 Greenland voted for extended self-government, just short of independence from Denmark. Although Denmark still provides an annual subsidy to Greenland, that amount will fall as income from mineral extraction rises. When the subsidy reaches zero, many in Greenland expect a referendum on independence.[68] Undoubtedly, there will remain strong incentives to preserve ties with Denmark and the European Union has already identified the strategic goal to enhance Arctic-related cooperation with Greenland, stating,"[a]dditional efforts should be envisaged to make the EU an even more important partner for Greenland in managing its fragile environment and the challenges confronting its population."[69] Similarly, the U.S. should begin actively courting Greenland's favor, as we have interests ranging from mineral and fish resources to security concerns over approaches to the NW Passage and maintenance of our airbase in Thule. Arguably, the Inuit population forms the basis for closer cultural ties to North America than Europe and the physical proximity of the island suggests shared perspectives on the environment and a potential lucrative trading partner. Extending the notion of a holistic approach, the U.S. should seek to incorporate Greenland into a greater North American economic and security block.

Engage non-traditional partners. Development of sovereignty into the global commons will create the need or opportunity to engage non-traditional partners, like Greenland. This is particularly true with respect to Antarctica. The U.S. can leverage some because they are already strong partners elsewhere (e.g. South Korea) and only now are beginning to engage in Antarctica. While with others we may be able to use Antarctica to enhance partnerships that may prove useful to us elsewhere as well. South American nations with strong Antarctic ambitions such as Argentina, Brazil and Chile are perhaps obvious candidates, but nations such as India should not be overlooked. "In all the major areas considered to be global commons sea, air, space, and cyber domains India's capabilities are significantly rising and are poised to influence the outcomes in the not too distant future."[70] Unlike the seven nations which currently claim portions of the Antarctic Continent, though those claims are unrecognized, or peer competitor nations like Russia and China, which are committed to developing presence and capability in

[68] Emmerson, *The Future History of the Arctic,* 264.
[69] Commission of the European Communities, *The European Union and the Arctic Region*, Communication to the European Parliament and the Council (Brussels, 2008), 13.
[70] Raja Mohan, "Rising India, Partner in Shaping the Global Commons," *The Washington Quarterly* (July 2010): 6.

Antarctic but don't share many U.S. worldviews, India represents a new, non-claimant nation in the Antarctic and one with which Antarctic cooperation could enhance global partnership between two nations that are similarly aligned.

> Beyond the question of political values, the two countries share a number of other traditions that are likely to draw them together on global commons in the future. These include their adherence to the common law tradition that offers predictability and prevents large-scale legal misadventures by the state. The respect for property rights is another feature that will come in handy for cooperative thinking about global commons. The growing interpenetration of the two economies in the knowledge and information technology sectors makes them natural partners in devising a regime for the cyber commons, on which a large and growing part of the two economies rely. More broadly, as India becomes a major power, its worldview could become increasingly similar to the Anglo-American traditions on openness and rule of law in the global commons. India either has or is acquiring the major attributes of the successful Anglo-Saxon model entrepreneurial capitalism, liberal democracy, and a maritime orientation.[71]

The recently released National Military Strategy provides an opportunity to capitalize on this partnership potential with India by stating, "[w]e seek expanded military cooperation with India on . . .safeguarding the global commons. . . . "[72]

Reassign COCOM responsibilities in the South. Despite the potential of India to become a significant U.S. partner, future development in Antarctica will necessitate extensive engagement with the seven claimant nations. South American nations have been among the most aggressive in asserting their claims, some of which may be able to employ precedent set in the Arctic to claim landmass continuity with the Antarctic peninsula. Additionally, their proximity to the continent facilitates their presence and one of the two major logistic routes supporting the U.S. Antarctic Program (USAP) runs through Punta Arenas, Chile. These considerations make USSOUTHCOM a logical choice for assuming responsibility in Antarctica. This shift would also contribute to our goal of, " . . . progress on bilateral, hemispheric and global issues with South America."[73] An argument can be made that Australia and New Zealand, both proximal, claimant nations with stronger ties to the U.S. and the major USAP logistic route, justifies the current command arrangement. However a shift in COCOM would ensure that U.S. engagement in Antarctica does not suffer as the result of security demands in East Asia commanding priority of USPACOM attention. In redrawing the COCOM map SOUTHCOM should be given

[71] Mohan, "Rising India," 13.
[72] Mullen, *The National Military Strategy of the United States,* 14.
[73] Mullen, *The National Military Strategy of the United States,* 11.

responsibility for all latitudes south of 60° South. Such a designation acknowledges the unity of the Southern Ocean and Antarctica as an ecosystem and a political domain, and is consistent with the international regime created by the Antarctic Treaty.

Lead the reshaping of the Antarctic international regime. South of the Antarctic Convergence (i.e. 60° South), the agreements of UNCLOS give way to the Antarctic Treaty. "In exchange that the treaty powers would discuss Antarctic resources after UNCLOS III, the Group of 77, a coalition of developing nations, agreed to exclude Antarctic resources from the LOS discussions."[74] The Antarctic Treaty did not resolve sovereignty claims but rather shelved them as unrecognized. "Until recently the inaccessibility of the Antarctic made any territorial claims on its land 'largely symbolic'. The conundrum of sovereignty in the Antarctic was not resolved by the Antarctic Treaty; indeed it remains unsolved today."[75] Current policy states that the U.S. benefits more than any other nation from the Antarctic Treaty and that, "The potential for international discord and conflict over Antarctica that would exist absent the Treaty is, if anything, greater now than when it was negotiated."[76] Unquestionably, the complete dissolution of an international regime would leave an undesired vacuum of governance and sovereignty in a global commons. However, we need not default to an unthinking and endless endorsement of a status quo which is likely to be unsustainable, rather, a modification of the existing regime is something that might very well be in U.S. interests. Currently, the Madrid Protocol, enacted in 1998, prohibits mineral extraction activities, other than for scientific purposes for 50 years. Given the pace at which events in the Arctic have unfolded and the increasing press of resource demand and climate change, it is likely that this agreement will be challenged before it expires. There are three reasons the U.S. is better served by addressing regime modification sooner rather than later; (1) at a time when national research bases in Antarctica are proliferating, the U.S. is by far the dominate actor in terms of presence and capability, this affords greater influence and puts the U.S. closer than others in terms of desire and ability to accomplish extraction; (2) nations are quickly realizing the need to secure an interest in the Antarctic and are rapidly joining the Treaty System which requires consensus for change or action, making such consensus more difficult and unlikely to attain, and thus the treaty less effective as governing regime; (3) the present regime relies largely on self-enforcement which is not contentious when there are few

[74] Buck, *The Global Commons,* 62.
[75] Buck, *The Global Commons,* 51.
[76] Clinton, *PDD-26*, 2.

infractions, however in time, questionable violations will raise tensions and complicate negotiations. Making even incremental revisions in the regime structure will be a protracted process of engaging new partners, and shaping, sharing, selling, and securing a new world-view. Trying to expedite this process can be counterproductive so our effort must start soon. We should not underestimate the maturity of this domain. In Antarctica the ice is melting and the future will be here sooner than we expect.

Shift our posture on space regimes. Unlike Antarctica, we have overestimated the maturity of the space domain and our ability to exert sovereignty in that commons. It has led us to assume a posture that rejects international governance regimes and instead advocates U.S. dominance to achieve space superiority.

> The United States was the principal sponsor of the original rules but has become the principal obstacle to their legal elaboration. In order to protect efforts to develop ballistic missile defense, the United States has refused since the 1980s to consider explicit rules prohibiting deliberate attack on space objects and the deployment of weapons in space. It has assertively blocked formal attempts to organize negotiations on those topics and has stood virtually alone against the rest of the world in doing so.[77]

A realistic assessment of our capabilities and presence in space, though unmatched except by a few space-faring nations, suggests this position should be reversed. The development of international regimes and treaties can effectively govern the uses of space for peaceful purposes, while preventing weaponization, especially during those formative years when capability and presence is limited. Therefore the United States should take the lead in promoting such agreements versus maintaining the belief that international treaties and regimes not backed by incentives, disincentives, and sanctions are not likely to be enforceable.[78] Whatever lead we enjoy among nations in space can be constructively used to assume leadership and exert influence over a process to craft more a more expansive international regime.

> If the constructive use of space does unavoidably require international accommodation, as originally presumed, and if the pursuit of assertive national dominance is recognized as both unrealistic and provocative, then a major reformulation of current U.S. policy will be necessary and will require serious consideration of enhanced legal protection built upon the principles and legal obligations of the OST. If defeating belligerent reactions to an assertive policy of dominance is not feasible, then preventing such reactions by conveying credible

[77] Gallagher and Steinbruner, *Reconsidering the Rules for Space Security*, V.
[78] Robert L. Pfaltzgraff, *Space and U.S. Security: A Net Assessment,* (Cambridge, MA: Institute for Foreign Policy Analysis, 2009), 5.

> reassurance, which almost certainly would require legally binding commitments, becomes vital. . . . If dominance is not possible, enhanced legal protection is not merely a necessary concession to other countries but rather the predominant interest of the United States itself.[79]

In our newest strategic document, there is a tantalizing suggestion that the military may be slowly acknowledging the need to shift our space posture. Previous discussions of dominance and freedom of action have given way to an endorsement of, " . . . whole-of-nation approaches to establishing and promoting norms, enhancing space situational awareness, and fostering greater transparency and information sharing."[80] It is an important start but falls short of embracing international regime participation and developing commercial space enterprise.

Establish a national space objective that serves a broad array of strategic interests. There are some who advocate that deflecting asteroids from impacting Earth is an essential capability to ensure the safety of the human race; unquestionably this is a low risk but high consequence event. There are others who advocate that the robotic search for life in the universe is one of the few essential questions to be answered; unquestionably discovering whether life exists elsewhere, or not, would profoundly change our perception of what it means to be human. Then there are those who advocate for leaving Earth's cradle and establishing a colony on Mars as the stepping stone to ensure the continuity of our species; unquestionably such ambition nourishes the human spirit and lifts our civilization. But I will advocate an alternative goal. It is predicated on the assumption that our next endeavor in the space domain must meet a wide array of requirements in order to receive the support it will need over the time that will be required. These are:

- It should require a level of funding, time to complete, and maturity of technology that is comparable to the International Space Station adjusted to today's frame of reference
- It should build on the skills and technology developed for the ISS and maximize the use of that existing infrastructure investment
- It should spur the commercial space marketplace with sufficient launches, over a sustained timeline such that payload delivery rates can realistically be driven down and a viable business model emerge
- It should create a new source of revenue for the U.S. beyond the commercial space delivery needed to create and support it
- It should offer overwhelming benefit to both civilian and military sectors to ensure widest possible support for and commitment to the program

[79] Gallagher and Steinbruner, *Reconsidering the Rules for Space Security*, 75.
[80] Mullen, *The National Military Strategy of the United States of America,* 9.

- It should support the highest level strategic goals of the U.S. and once accomplished, should continue to provide measurable national competitive advantage

The national space objective that can accomplish all of these things, is construction of a space based solar power industry. Consider that, ". . . more solar energy hits the earth in one hour than all the energy the world consumes in a year"[81], or looked at another way, "[a] single one kilometer band of geosynchronous earth orbit experiences enough solar flux in one year to nearly equal the amount of energy contained within all known recoverable conventional oil reserves on Earth today."[82] That presents an exploitable natural resource in an unclaimed commons that will become increasingly difficult to ignore. The basic idea is very straightforward: place very large solar arrays into continuously and intensely sunlit Earth orbit (1,366 watts/m2) in order to collect gigawatts of electrical energy which is electromagnetically beamed to Earth and received on the surface for use either as baseload power via direct connection to the existing electrical grid, conversion into manufactured synthetic hydrocarbon fuels, or as low-intensity broadcast power beamed directly to consumers (see Appendix A, Figure 7).[83] Some will say that space based solar power is science fiction, but no more so than the ISS was twenty years ago, or the space shuttle was forty years ago or a moon landing was sixty years ago. A stretch goal to be sure but not a fantasy and carries with it the benefit of, " . . . energy security, economic development, improved environmental stewardship, advancement of general space faring, and overall national security for those nations who construct and possess a SBSP capability."[84] This represents a space objective worthy of our nation's collective effort and a very logical step technically, financially, and strategically from where we are today. Our government should encourage and fund a collaborative effort between the military and civilian communities to take the next prudent step via an incremental research and development program that culminates with a space-borne proof-of-concept demonstration in the next decade.

Cyberspace domain is poised to be the next global commons

The creation of cyberspace invented a new domain. Though it is often referred to as, and assumed to be, a global commons, it does not meet the criteria established for commons. As yet,

[81] Lewis, "Powering the Planet," 22.
[82] Joseph D. Rouge, *Space Based Solar Power as an Opportunity for Strategic Security*, (Washington, DC: National Security Space Office, October 2007), 1.
[83] Rouge, *Space Based Solar Power,*1.
[84] Rouge, *Space Based Solar Power*, 1.

it is an ungoverned space, one in which some regulation has been inconsistently applied and haphazardly enforced but where no agreed upon international regime has formed. It is the high seas in the days of sail, the polar regions before the arrival of intrepid Victorian era explorers and the vast sanctity of space before the trespass of Sputnik. It remains to be seen whether that domain is a global commons that will become subject to an international management regime and ultimately, to expressions of sovereignty.

> The development of sovereignty in the sea, air, and outer space domains were all distinct, yet shared significant similarities. These similarities, in turn, provide significant insights into how sovereignty can develop in the cyberspace domain as well. First, the development of sovereignty in cyberspace requires an international regime. Second, states must critically assess their interests in cyberspace, because those interests will eventually trump the desires of those actors who want cyberspace to remain free from state sovereignty. Third, current state practice regarding the concept of sovereignty in cyberspace, as well as how a state responds to violations of its sovereignty in cyberspace, will influence how, and if, an international regime governing sovereignty in cyberspace ultimately develops. Fourth, the capability to identify specific actors in cyberspace will become an important requirement. Finally, a state must be able to exert control of cyberspace and respond to those actors who violate its sovereignty in cyberspace.[85]

China appears to be the first state attempting to exert formal control of cyberspace. In June 2010 the Chinese government released a statement guaranteeing, " . . . freedom of speech on the Internet as well as the public's right to know, to participate, to be heard and to oversee [the government] in accordance with the law." But it also stipulated that, "within Chinese territory, the Internet is under the jurisdiction of Chinese sovereignty," thus legitimizing national firewalls and filters.[86] For now, the U.S. has set the modest goal to, ". . . push for the recognition of norms of behavior in cyberspace, and otherwise work with global partners to ensure the protection of the free flow of information and our continued access."[87] The cyber attacks on Estonia in 2007 and Georgia in 2008 demonstrate the vulnerabilities posed by unregulated cyberspace while the popular revolutions in Tunisia and Egypt in 2011 displayed the power and value of a social media not secured by government. Despite the real threat of cyber attack and the pervasive, yet difficult-to-prosecute nature of cyber crime, it can be argued that an ungoverned cyber domain better serves U.S. interests by allowing free expression and permeation of Western thought in closed, oppressive societies. Whether this remains the case, or

[85] Franzese, "Sovereignty in Cyberspace," 16.
[86] Ian Bremmer, "Democracy in Cyberspace," *Foreign Affairs* vol 89 no 6 (November/December 2010), 89.
[87] Obama, *National Security Strategy*, 50.

cyberspace follows the example set by other global commons remains to be seen. According to a BBC poll taken in August 2010, four out of five people around the world believe that access to the Internet is a fundamental human right, although greater differences emerge over the degree to which it should be regulated.[88] A further step in that direction was taken in June 2011 when a United Nations report declared that, "facilitating access to the Internet for all individuals, with as little restriction to online content as possible, should be a priority for all States."[89] In acknowledging the criminal opportunities available in cyberspace, the report laid out a framework for states to safeguard the Internet while instituting checks against using such pretenses to suppress freedom of expression. Such guidelines and recommendations may be the beginnings of an international regulatory regime which would advance cyberspace on the path toward becoming a true Global Commons.

Conclusion

Contrary to the popular conception that global commons are simply ungoverned spaces beyond the borders of state sovereignty, the air, sea, polar, and space domains share particular characteristics that create a specific entity known as a Global Common. These characteristics define the physical boundaries of the commons and place some constraints on the expression of sovereignty within those boundaries so as to be able to institute an international regime that will restrict the actions and guarantee the rights of all participants collectively. States agree to such constraints when they are unable to exert control or enforce sovereign claims. History has shown that global commons and their governing regimes are not immutable. On the contrary, technological progress, resource scarcity and most recently, climate change, are making global commons more accessible and more desirable. The result is inexorable pressure for states to expand their sovereignty into the global commons. To do so, states must fundamentally be able to demonstrate sustained presence and possess the capability to act within the domain. In addition, since no formal process exists to transition international regimes to recognized sovereignty claims, states must undertake the essential activity of engagement in order to preserve their interests among the regime stakeholders and be properly positioned to affect an expansion of national sovereignty into a global commons. Within the range of military

[88] BBC World News, 8 March 2010.
[89] Frank La Rue, *Report of the Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression,* (United Nations Human Rights Council, 17/27, 16 May 2011), 4.

operations, engagement consists of security cooperation activities which are guided by strategic vision and translated into action through cohesive campaign plans. Typically these plans are geographically organized and country-specific in implementation due to their bi-lateral nature. Such an approach is inappropriate and too shortsighted to address the global commons. This paper advocates a holistic approach in which our various national interests which converge in the commons are considered in totality. A recent essay in Joint Forces Quarterly magazine advocated the need for, "a Global Commons Operational Concept construct properly detailing the effective employment of military power to ensure commons access would serve not only military interests, but also broader national priorities within the diplomatic, economic, and informational realms as well."[90] Indeed, such an operational concept is needed but it must be derived from an equally cohesive commons strategy. If the various domains that make up the global commons can be thought of as their own theater of operations, then this document serves to articulate a strategic campaign plan at the theater level. To an even greater extent than traditional theaters of operation, "[t]he global commons will be shaped in the future, as they have in the past, by forces other than raw military power, including the less tangible factors of national will, individual perception, and leadership decisions concerning the nature of cooperation or conflict within the commons."[91] Despite our strength, unilateral action will become increasingly more difficult and less effective.

> As new centers or poles of power emerge in the international arena, they will demand a greater say in how the seas, cyberspace, and outer space are used and governed. Competing views about the use and governance of exclusive maritime economic zones, for example, led to a series of naval encounters between U.S. and Chinese vessels in the South China Sea in 2009. The Indian Navy, cutting through the legalistic restraints on piracy interdiction observed by the Western powers, sank a pirate vessel off the coast of Somalia 2008, upholding a more ancient standard of naval governance in the process.[92]

We must hone our practice of engagement; an occasionally indirect tool that requires patience and a sustained clear vision. Securing our interests in the global commons is unlikely if our efforts are re-directed every four years and our strategy consists of compromises on acquisition decisions. We must come to recognize that, "[p]lanning today to protect the global commons of

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[90] Mark E. Redden and Michael P. Hughes, "Defense Planning Paradigms and the Global Common," *Joint Forces Quarterly* issue 60 (1st Quarter, 2010), 65.
[91] Jeffrey Becker, "Strategic Trends and Drivers," in *Securing Freedom in the Global Commons,* ed. Scott Jasper (Stanford, CA: Stanford University Press, 2010), 19.
[92] Becker, "Strategic Trends and Drivers," 30.

tomorrow, to safeguard our property, territory, and economic interests, is the paramount work of government."[93] We must recognize the value and purpose of international regimes and engage them with greater effectiveness from within. With a clear vision we can work years in advance to gradually reshape those regimes and place us in a better position to secure our interests. In crafting a grand North American alliance we must consider all issues collectively in balance. For better or for worse, our COCOM structure dictates how we view and interact with the world and we must be willing to modify that structure in response to unavoidable changes in the polar environments. We must be as quick to recognize new partnership opportunities as the changing climate and demographics of the world present them. Finally, by acknowledging our true limitations in space we can change our posture and embrace the commercial enterprises that will bring true capability and presence in that domain. Ultimately enabling the achievement of a national space objective that will provide the United States with a decisive competitive advantage in the century ahead.

[93] Dick Bedford, "The Changing Security Environment," in *Securing Freedom in the Global Commons,* ed. Scott Jasper (Stanford, CA: Stanford University Press, 2010), 43.

APPENDIX A: Figures

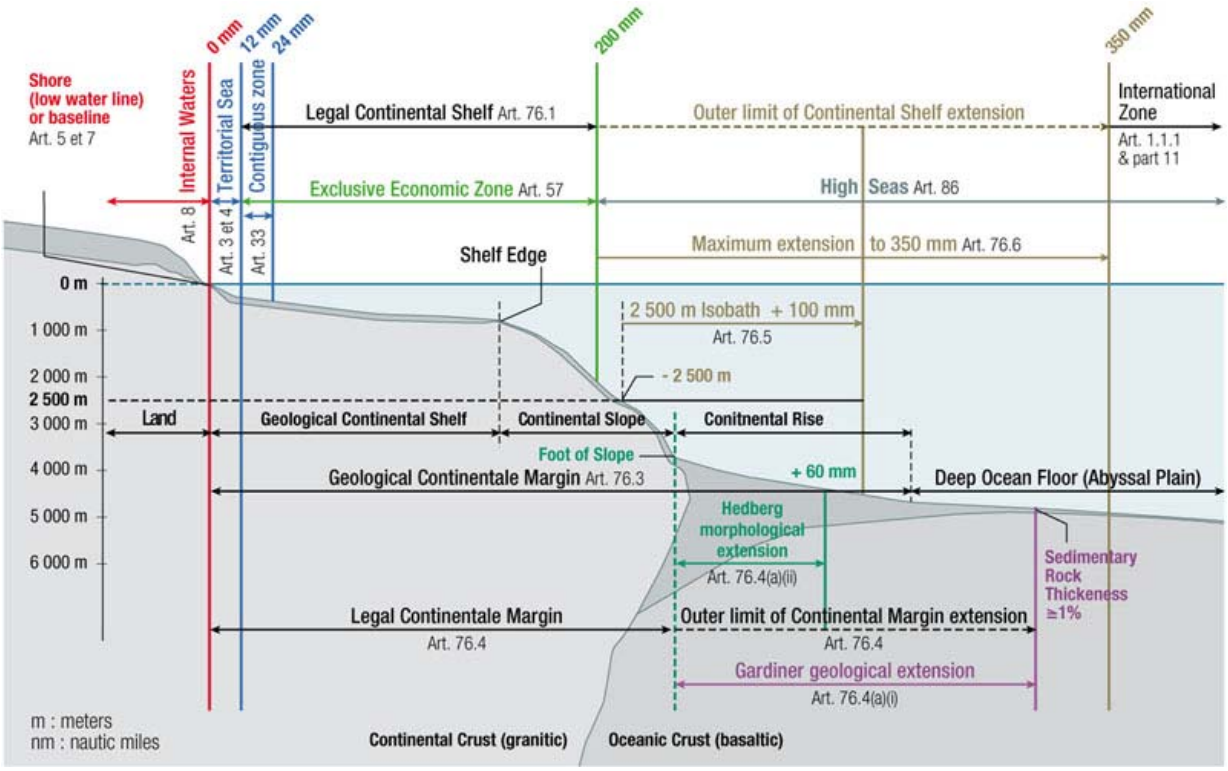


Figure 1: Basis for Claims in the Maritime Domain[94]

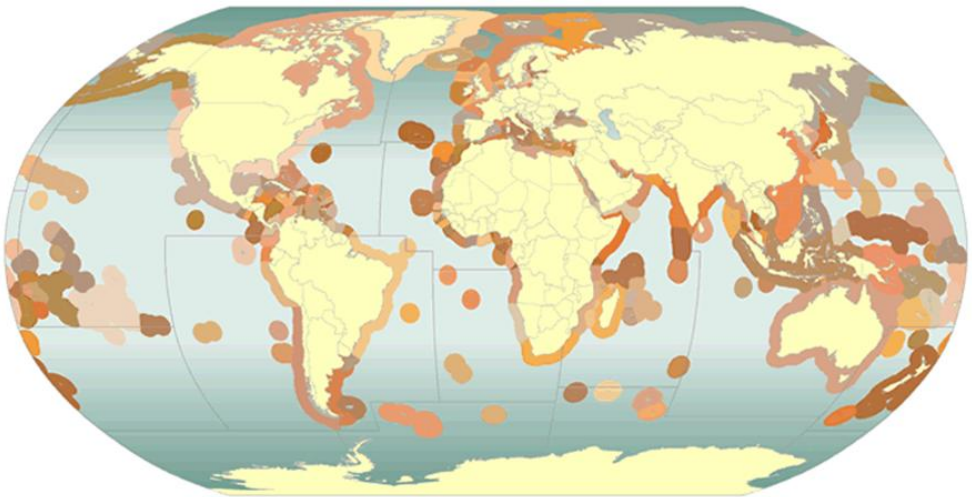


Figure 2: World wide Exclusive Economic Zones[95]

[94] Image produced by the International Boundaries Research unit available at http://www.dur.ac.uk/ibru/
[95] Image produce by The Sea Around Us Project available at http://www.seaaroundus.org/eez/

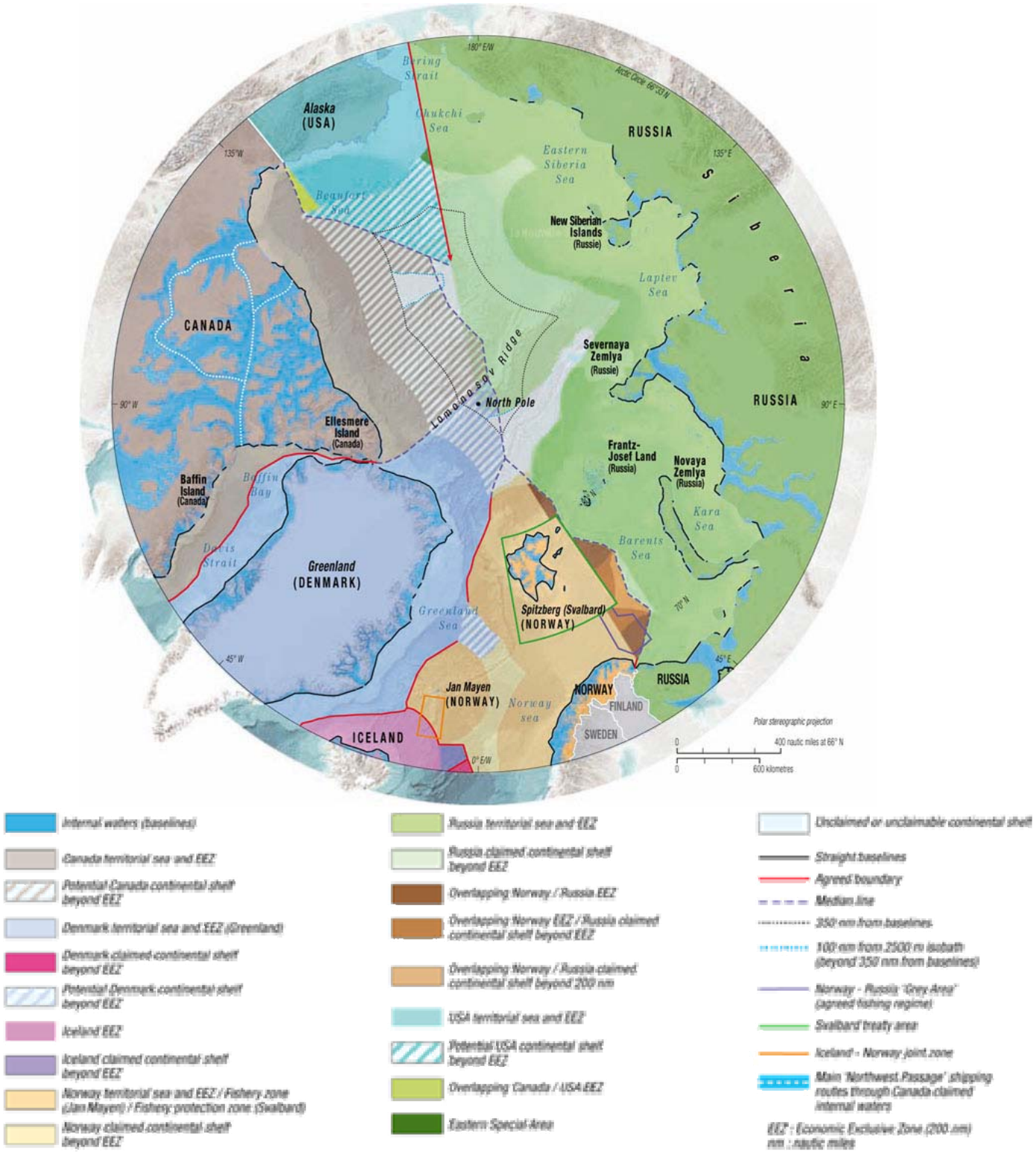


Figure 3: Sovereignty Claims in the Arctic Domain[96]

[96] Image produced by the International Boundaries Research unit available at http://www.dur.ac.uk/ibru/

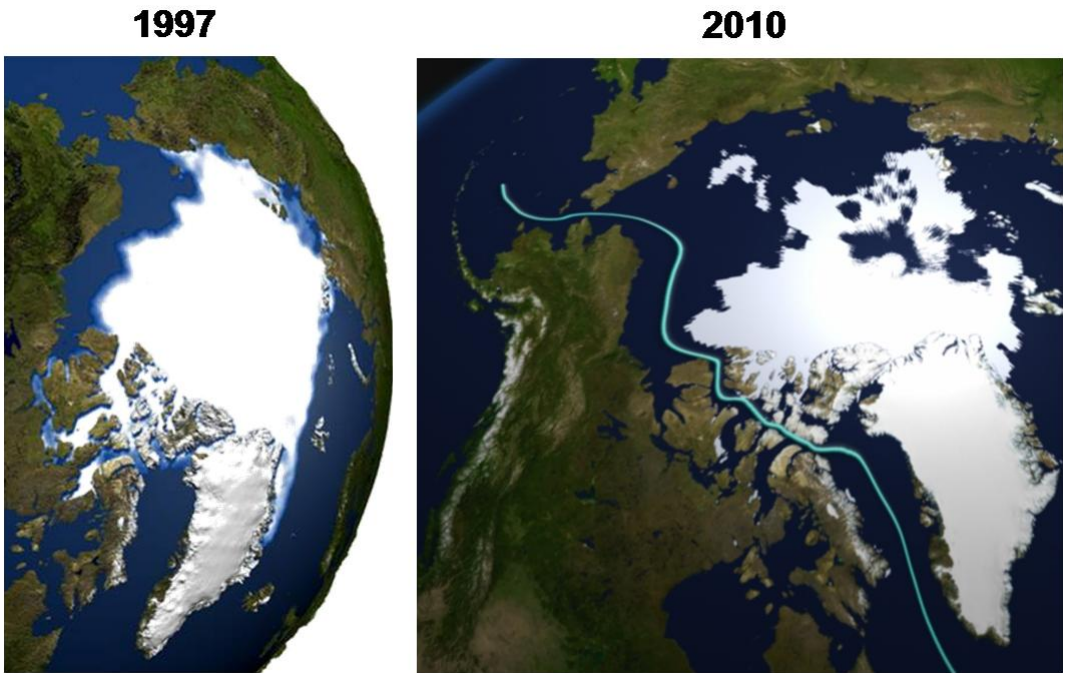
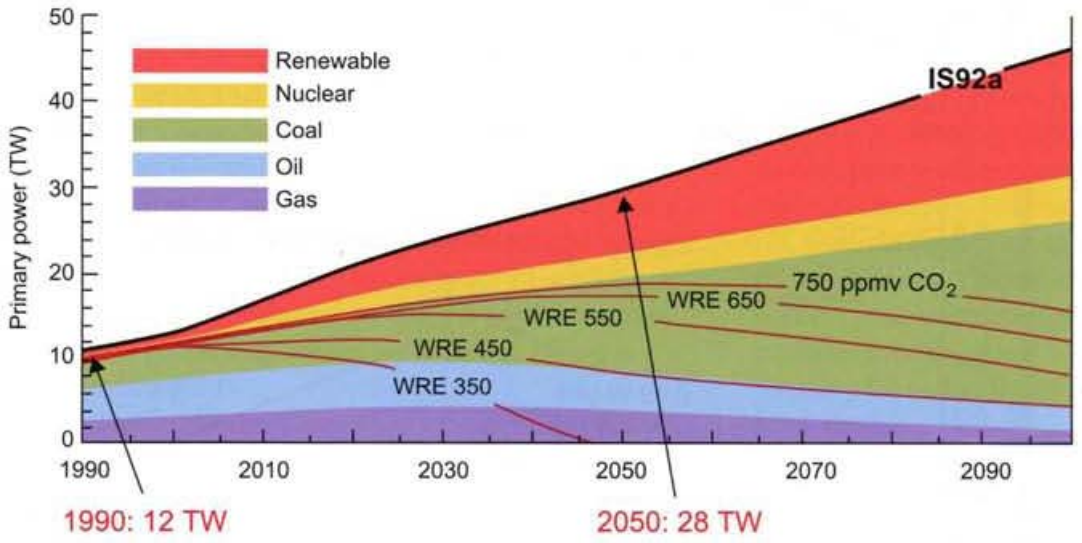


Figure 4: Climate Change opens the Northwest Passage[97]



The heavy black line shows humanity's primary power consumption in the "business as usual" scenario. The red lines show the carbon-based power consumption reductions needed to stabilize atmospheric CO_2 at various levels.

Figure 5: Projected World Energy Consumption Compared to CO_2 Concentrations[98]

[97] Image produced by NOAA available at http://www.nnvl.noaa.gov/MediaDetail.php?MediaID=521&MediaTypeID=2&MediaFileID=109

[98] Nathan Lewis, "Powering the Planet," Engineering & Science no 2 (2007): 16.

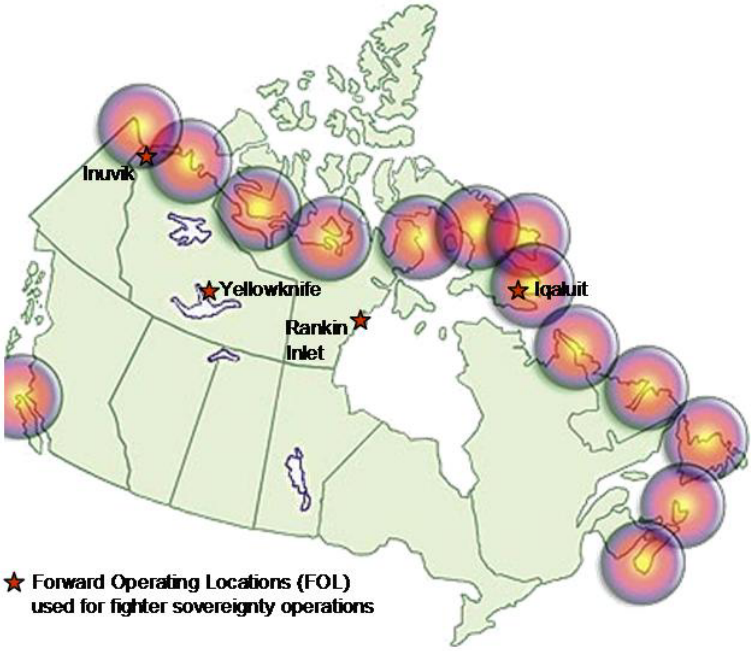


Figure 6: North Warning System and Forward Operating Locations[99]

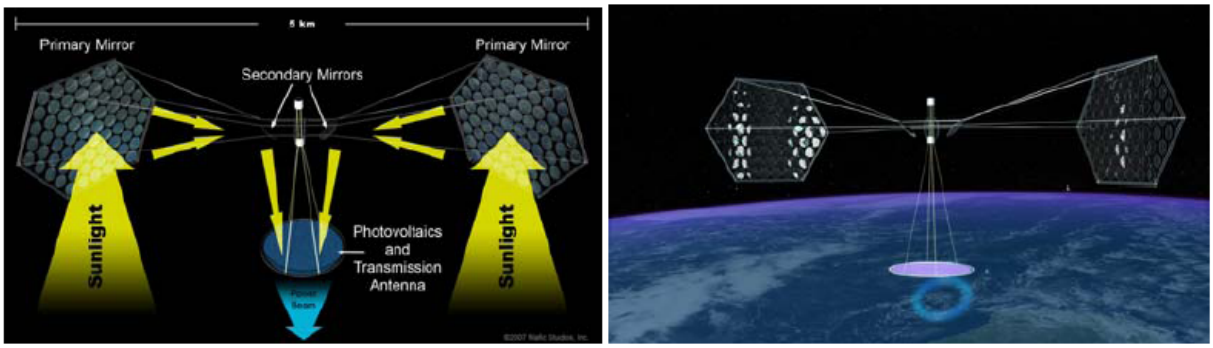


Figure 7: Notional Space Based Solar Power System[100]

[99] Image available at http://www.journal.forces.gc.ca/vo6/no4/north-nord-eng.asp
[100] Rouge, *Space Based Solar Power*, 8.

Figure 8: Antarctic Sovereignty Claims and Research Stations[101]

[101] Image accessed on 29 January 2011 at http://www.lib.utexas.edu/maps/islands_oceans_poles/antarctic_region_pol_2005.pdf

Table 1: Antarctic Research Stations[102]

Operator(s)	Facility Name	Latitude	Longitude	Elevation	Airfield Suitability if any (5)	First opened	Facility Type (7)	2009 Current Status (8)
Argentina	Orcadas	60°44.33'S	044°44.28'W	4 m		1904	Station	Year-round
Chile	Arturo Prat	62°28.75'S	059°39.833'W	5 m		1947	Station	Year-round
Argentina	Melchior	64°20'S	62°59'W			1947	Station	Seasonal
United Kingdom	Signy	60°43'S	045°36'W	5 m		1947	Station	Seasonal
Chile	Bernardo O'Higgins	63°19.25'S	057°54.02'W	12 m	ski	1948	Station	Year-round
Argentina	Decepcíon	62°59'S	60°42'W	7 m		1948	Station	Seasonal
Argentina	Brown	64°53'S	62°53'W	10 m		1951	Station	Seasonal
Chile	Gabriel González Videla	64°49.42'S	62°51.50'W	5 m		1951	Station	Seasonal
Argentina	San Martín	68°07.78'S	067°06.20'W	5 m		1951	Station	Year-round
Chile	Bahía Yankee	62°32' S	59°47' W	5 m		1952	Refuge	Seasonal
Argentina	Esperanza	63°23.70'S	056°59.77'W	25 m		1952	Station	Year-round
Argentina	Cámara	62°36'S	59°56'W	22 m		1953	Station	Seasonal
Australia	Mawson	67°36.28'S	062°52.25'E	5 m	ski	1954	Station	Year-round
Argentina	Belgrano II (1)	77°52.48'S	034°37.62'W	250 m		1955	Station	Year-round
USA	McMurdo	77°50.88'S	166°40.10'E	~ 10 m	ski	1955	Station	Year-round
USA	Amundsen-Scott	89°59.85'S	139°16.37'E	2 830 m	ski	1956	Station	Year-round
France	Dumont d'Urville	66°39.77'S	140°00.08'E	42 m		1956	Station	Year-round
United Kingdom	Halley	75°34.90'S	026°32.47'W	37 m	ski	1956	Station	Year-round
Russia	Mirny	66°33.12'S	093°00.88'E	40 m		1956	Station	Year-round
Australia	Davis	68°34.63'S	077°58.35'E	15 m	ski	1957	Station	Year-round
Chile	Luis Risopatron	62°22.92'S	59°39.833'W	10 m		1957	Station	Closed
New Zealand	Scott Base	77°51.00'S	166°45.77'E	10 m		1957	Station	Year-round
Japan	Syowa	69°00.37'S	039°35.40'E	29 m	ski	1957	Station	Year-round
Russia	Vostok	78°28.00'S	106°48.00'E	3500 m	ski	1957	Station	Year-round
United Kingdom	Fossil Bluff	71°19.76'S	068°16.02'W	92 m	ski	1961	Refuge	Seasonal
Argentina	Matienzo	64°58'S	60°03'W	32 m		1961	Station	Seasonal
Russia	Novolazarevskaya	70°46.43'S	011°51.90'E	102 m		1961	Station	Year-round
Chile	Federico Guesalaga	67°46.50' S	68°54' W	50 m		1962	Refuge	Seasonal
Russia	Molodezhnaya	67°40.30'S	045°23.00'E	42 m		1962	Station	Closed
South Africa	SANAE IV (3)	71°40.42'S	002°49.73'W	850 m	ski	1962	Station	Year-round
Chile	Yelcho	64°62'S	63°35'W	5 m		1962	Station	Closed
USA	Palmer	64°46.50'S	064°03.07'W	~ 10 m		1965	Station	Year-round
Argentina	Sobral	81°05'S	40°39'W	1000 m		1965	Station	Seasonal
Argentina	Petrel	63°28'S	56°13'W	18 m		1967	Station	Seasonal
Russia	Bellingshausen	62°11.78'S	058°57.65'W	16 m		1968	Station	Year-round
Australia	Casey	66°17.00'S	110°31.18'E	30 m	ski	1969	Station	Year-round
Chile	Eduardo Frei	62°12.00'S	058°57.75'W	10 m		1969	Station	Year-round
Argentina	Marambio	64°14.70'S	056°39.42'W	200 m	wheel	1969	Station	Year-round
Chile	Rodolfo Marsh	62°11.37'S	058°58.87'W	45 m	wheel	1969	Camp	Year-round
Japan	Mizuho	70°41.88'S	44°19.90'E	2230 m		1970	Station	Seasonal
Russia	Lenindgradskaya	69°30'S	159°23'E			1971	Station	Closed
Chile	Spring or G. Mann)	64°17.80' S	61°04' W	30 m		1972	Refuge	Seasonal
United Kingdom	Rothera	67°34.17'S	068°07.20'W	16 m	wheel	1975	Station	Year-round
United Kingdom	Rothera Skiway	67°32'S	68°11'W	250 m	ski	1975	Camp	Seasonal
Poland	Arctowski	62°09.57'S	058°28.25'W	2 m		1977	Station	Year-round
Argentina	Primavera	64°09'S	60°57'W	50 m		1977	Station	Seasonal
Russia	Russkaya	74°45'S	136°40'W			1980	Station	Closed
Germany	Neumayer	70°38.00'S	008°15.80'W	40 m	ski	1981	Station	Year-round
Argentina	Jubany	62°14.27'S	058°39.87'W	10 m		1982	Station	Year-round
Russia	Soyuz	70°35'S	68°47'E	336 m		1982	Station	Closed
India	Dakshin Gangotri	70°05'S	12°00'E			1983	Station	Seasonal
Germany	Gondwana	74°38'S	164°13'E			1983	Station	Seasonal

[102] Table accessed on 2 February 2011 at https://www.comnap.aq/facilities

Table 1: Antarctic Research Stations (continued)

Uruguay	Artigas	62°11.07'S	058°54.15'W	17 m		1984	Station	Year-round
Japan	Asuka	71°31.57'S	024°08.28'E	930 m		1984	Station	Seasonal
Brazil	Comandante Ferraz	62°05.00'S	058°23.47'W	8 m		1984	Station	Year-round
China	Great Wall	62°12.98'S	058°57.73'W	10 m		1985	Station	Year-round
Chile	Luis Carvajal	67°45'S	68°54'W	10 m	ski	1985	Station	Seasonal
Norway	Tor	71°53'S	005°09'E	1625 m		1985	Station	Seasonal
Chile	Julio Ripamonti	62°12.07'S	58°53.13'W	50 m		1986	Station	Seasonal
Italy	Mario Zucchelli	74°41'S	164°07'E	15 m	ski	1986	Station	Seasonal
Russia	Druzhnaya 4	69°44'S	073°42'E	20 m		1987	Station	Seasonal
Chile	Antártica	62º 12.4' S	58º57.45' W	5 m		1987	Station	Year-round
România	Law – Racovita	69°23'S	076°23'E	65 m		1987	Station	Seasonal
Korea	King Sejong	62°13.40'S	058°47.35'W	10 m		1988	Station	Year-round
Bulgaria	Ohridiski	62°38.48'S	060°21.88'W	~ 13 m		1988	Station	Seasonal
Finland	Aboa	73°03'S	013°25'W	400 m		1989	Station	Seasonal
Spain	Juan Carlos I	62°39'S	060°23'W	12 m		1989	Station	Seasonal
Peru	Macchu Picchu	62°05.49'S	058°28.27'W	10 m		1989	Station	Seasonal
India	Maitri	70°45.95'S	011°44.15'E	130 m		1989	Station	Year-round
Russia	Progress 2	69°23'S	076°23'E	15 m		1989	Station	Year-round
Sweden	Wasa	73°03'S	013°25'W	~ 400m		1989	Station	Seasonal
China	Zhongshan	69°22.27'S	076°22.23'E	~ 10 m		1989	Station	Year-round
Spain	Gabriel de Castilla	62°59'S	060°41'W	15 m		1990	Station	Seasonal
Ecuador	Maldonado	62°26.96'S	059°44.54'W	~ 10 m		1990	Station	Seasonal
Ecuador	Refugio Ecuador (6)	62°08'S	058°22'W	~ 10 m		1990	Refuge	Seasonal
Norway	Troll (4)	72°00.12'S	002°32.03'E	1300 m	wheel	1990	Station	Year-round
Chile	Shirreff)	62°28.1' S	60°46.1' W	10 m		1991	Station	Seasonal
Germany	Dallman	62°14'S	58°40'W			1994	Station	Seasonal
Italy	Edmonson Point	74°20'S	165°07'E		ski	1994	Camp	Seasonal
Chile	Julio Escudero	62°12.08'S	058°57.77'W	10 m		1994	Station	Year-round
Japan	Dome Fuji	77°19.00'S	039°42.20'E	3810 m	ski	1995	Station	Seasonal
Ukraine	Vernadsky	65°14.72'S	064°15.40'W	7 m		1996	Station	Year-round
Chile	Antonio Huneeus	80°08' S	81°16' W	880 m		1997	Camp	Seasonal
Italy	Browning Pass	74°37.37'S	163°54.82'E	170 m	ski	1997	Refuge	Seasonal
France & Italy	Concordia (2)	75°06.12'S	123°23.72'E	3220 m	ski	1997	Station	Year-round
Chile	Boonen)	63°32.263' S	57°24.257' W	10 m		1997	Refuge	Seasonal
Uruguay	Elichiribehety	63°24.13'S	056°58.38'W	~ 50m		1997	Station	Seasonal
Italy	Mid Point	75°32.44'S	145°49.12'E	2520 m	ski	1998	Depot	Seasonal
Chile	Arturo Parodi	80°19.10'S	081°18.48'W	880 m	ski	1999	Station	Seasonal
Italy	Sitry Point	71°39.32'S	148°39.15'E	1600 m	ski	2000	Depot	Seasonal
Germany	Kohnen	75°00'S	000°04'E	2900 m	ski	2001	Station	Seasonal
Chile	11 de septiembre	63°36.318' W	57°35.528' W			2002	Refuge	Seasonal
Chile	Abrazo de Maipú	63°23.278'S	57°34.96' W	400 m		2003	Refuge	Seasonal
Italy	Talos Dome	72°46'	159°02'E	2300 m	ski	2004	Camp	Seasonal
Italy	Enigma Lake	74°42.81'S	164°02.49'E	170 m	ski	2005	Depot	Seasonal
Japan	S17	69°01.58'S	040°04.37'E	620 m	ski	2005	Camp	Seasonal
Chile	Collins	62°09.667' S	58°50.967' W	5 m		2006	Refuge	Seasonal
Czech Republic	Gregor Mendel	63°48.04'S	057°52.95'W	~ 10 m		2006	Station	Seasonal
China	Kunlun	80°25.02'S	077°06.97'E	4087 m		2009	Station	Seasonal
Belgium	Princess Elisabeth	71°57'S	23°20'E	1397 m		2009	Station	Seasonal
France	D10 skiway	66°40.08'S	139°49.18'E	~ 100 m	ski		Camp	Seasonal
France	D85 skiway	70°25.50'S	134°08.75'E	2850 m	ski		Camp	Seasonal
Australia	Edgeworth-David	66°15'S	100°36'E	15 m			Camp	Seasonal
USA	Marble Point Heliport	77°24.82'S	163°40.75'E				Camp	Seasonal
Russia	Molodezhnaya Airfield	67°40.97'S	046°08.08'E	225 m	ski		Camp	Seasonal
Russia	Airfield	70°49.52'S	11°37.68'E	550 m	ski		Camp	Seasonal
USA	Odell Glacier	76°39'S	159°58'E	1600 m	wheel		Camp	Seasonal
France	Prud'homme	66°41.22'S	139°54.42'E	~ 10 m			Camp	Seasonal
USA	Siple Dome	81°39'S	149°04'W		ski		Camp	Seasonal
United Kingdom	Sky Blu	74°51.38'S	071°34.16'W	1372 m	wheel		Camp	Seasonal
Australia	Wilkins Runway	66°41.45'S	111°31.73'E	740 m	wheel		Camp	Seasonal

APPENDIX B: Agreements Creating International Regimes[103]

1954 International Convention for the Prevention of Pollution of the Sea by Oil (London). In force 26 July 1958. Amended 1962, 1969.

1958 Convention on the High Seas (Geneva). In force 30 September 1962.

1958 Convention on the Continental Shelf (Geneva). In force 10 June 1964.

1958 Convention on the Territorial Sea and the Contiguous Zone (territorial Seas Convention) (Geneva). In force 10 September 1964.

1958 Convention on Fishing and Conservation of the Living Resources of the High Seas (Conservation Convention) (Geneva). In force 20 March 1966.

1959 Antarctic Treaty (Washington). In force 23 June 1961.

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