Internationalism in Spaceflight

Jeffrey Miyamoto

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Abstract: In the realist perspective, the international order is largely impotent. If a nation has enough relative power, it will ignore any conventions that seek to tame it. This paper argues that outer space is an exception by examining the durability of the egalitarian outer space legal regime. Even though certain nations have and have had a sustained and overwhelming technological, economic, and material preponderance, there have been no serious challenges, certainly nothing long-lived, to the treaties, conventions, and norms that govern outer space activities. Instead, nations have chosen to collaborate more often than not even though the bounties promised by an outer space domination are staggeringly appealing. The paper's argument is established through a historical exegesis followed by a reflection on the qualities that characterize spaceflight activities in the modern-day. There may yet be a substantive role for the international order and it is possible that humanity's outer space activities point the way.

Introduction

On June 7, 1494, the Holy See, keen to mend incipient fractures emerging between its leading states, mediated a concord between Spain and Portugal at the small town of Tordesillas. In the agreement, both sides generously gave to each other half of the Earth.[1] Spain was to receive the bulk of the recently discovered New World and Portugal would take most of Africa and Eurasia. Both were to have dominion over civilizations far more advanced than anything found within Christendom. Other aspirational powers in Europe had no say at this conference. The non-European world population, then numbering at around 450 million, was completely unaware of these proceedings.[2] Unsurprisingly, this order did not last and countries ignored those decisions as soon as they could.

Humanity stands on the precipice of incorporating yet another tremendous domain into the social order: outer space. Like at Tordesillas, a binary relationship between two leading states has been the force defining the contours of the arrangement. Likewise, it is reasonable to ask whether or not the arrangement decided today can last? According to the realist, the answer is, decisively, in the negative. Kenneth Waltz argued that the determination of the international regime is merely the balance of power and that states with the military strength overwhelm any attempts at opposition. Stephen Krasner's landmark paper on the emergence of the telecommunications regime discusses the reasoning behind this perspective.[3] Although there were efforts to impose an international order, those attempts came to a standstill as certain countries had the power to break out of those confines.

The discussion concerning the international regime in telecommunications sheds some light on the model that is typically envisioned by the internationalist. An international order is typically conceived of as a way to approach a more egalitarian and fairer distribution of benefits between the various actors. Those with greater aspirations would be discouraged from acting on those desires and those with less power would have an avenue to act on their ambitions more freely and cooperatively within the broader community. The reason for the breakdown is that for certain states in specific situations, there is no incentive and so Krasner contends it is folly to apply free market logic to predict or expect a distribution that approaches equilibrium.

In this paper, I propose that, in the domain of outer space, this supposition is not necessarily the prevailing one. The analysis of this paper seeks to clarify the longevity of the outer space legal foundations, which according to the realist theory, should have been already long dislodged. There are a few treaties that have received unanimous assent from every nation with spacefaring capabilities, including those that are well poised for a dramatic rise. All nations have

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[1] Stephen R. Brown, *1494: How a Family Feud in Medieval Spain Divided the World in Half* (New York: St. Martin's Press, 2012) 134-146.
[2] *ibid*
[3] Stephen D. Krasner, "Global Communications and National Power," *World Politics* 43 (1991) 336-366.

agreed upon a framework that prohibits the weaponizing of space as well as the elimination of any property privileges. The draft of this Outer Space Treaty of 1967 also adopts a decidedly humanitarian tone, declaring space to be the "province of all mankind."[4] Treaties that followed this one have assumed a similar tone. According to the United Nations, these agreements demonstrate the following commitment.

> The international legal principles in these five treaties provide for non-appropriation of outer space by any one country, arms control, the freedom of exploration, liability for damage caused by space objects, the safety and rescue of spacecraft and astronauts, the prevention of harmful interference with space activities and the environment, the notification and registration of space activities, scientific investigation and the exploitation of natural resources in outer space and the settlement of disputes. Each of the treaties lays great stress on the notion that the domain of outer space, the activities carried out therein and whatever benefits might accrue therefrom should be **devoted to enhancing the well-being of all countries and humankind**, and each includes elements elaborating the common idea of promoting international cooperation in outer space activities.

There are two puzzles at the heart of this inquiry. First, why did such a framework even emerge? In Krasner's study of telecommunications, it was posited that the only factor holding back great power states is when the situation is such that cooperation is more beneficial individually. However, this was not the case at the time of the treaty's ratification; only the United States and the Soviet Union possessed spaceflight capabilities then and other nations had neither the will nor the technology to become challengers in any capacity.

Second, what accounts for the durability of the Outer Space Treaty and the success of subsequent agreements that sought to further and consolidate the spirit of that humanist vision for outer space?[5] In the decades since the ratification of those treaties, one can infer that nations have been largely content with their persistence as there exists no serious challenge to the reign of this order. On the surface, this does not gel with the realist vision. According to Krasner, any type of lasting international regime would merely be an uneasy compromise, wobbling precariously by the flimsy chicken legs of a temporary and fleeting practicality. Nothing in that worldview can provide an account for the apparent strengthening of an international order that no one has any incentive to bow down before.

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[4] United Nations Office for Outer Space Affairs, “Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies,” United Nations

[5] *ibid.* Outer space has fallen under aegis of five international agreements, all of which were decided with virtual consensus. Collectively, these treaties espouse agreements and sentiments for the exclusive peaceful usage of outer space and all other heavenly objects, the abolition of space property on the Moon or other such objects, and the collective rescue and return of any stray satellites or value debris upon reentry.

This paper proposes that to unilaterally alter this regime demands certain conditions that are difficult for any lone actor to meet. For a state to challenge the Outer Space Treaty and its ilk, it would first have to bolster its domestic capabilities and then follow through with the opportunity to use those capabilities. For a variety of reasons, this is difficult. More importantly, shared institutions already established and entrenched in the international realm resist any would-be efforts to remake it unilaterally as they are, by their very nature, auto-consolidating. In other words, as time goes by, it gets progressively more difficult for each actor to implement their own designs as something else is already occupying the same place.

The dependent variable is the durability of the outer space legal regime. The independent variables are the various qualities that define the nature of outer space activities. In order, the ones discussed in this paper are the budgets and timelines typical to outer space plans, the kinds of actors involved in carrying forward spaceflight, international space projects, and the outer space culture. These variables have been selected by looking at the major themes of the history of space exploration. It is the contention of this paper that each of these factors constrain outer space jingoism.

The argument in this paper is first established through a historical exegesis of the Space Age. Certain forces moved in concert in a manner that encouraged restraint over the tendency and the desire to single-mindedly pursue national aims in outer space. Following the historical interpretation, the paper engages in an examination of several ongoing cases that continue to bind the national tendency that one might usually expect. This shows that the historical forces that have given shape to what space exploration is today are ongoing phenomena.

One of the legacies of the realist worldview is the futility of the international institution as a mediator for national disputes. All of the forces mentioned throughout this paper challenge this assumption as they can be cultivated, incubated, and reinforced through such institutions.

The History of the Space Age

For a while, space exploration proceeded along the typical vector of any technological advancement, that is rapid, if not exponential growth and development. In the similar field of aerospace, humans had, within fifty years, advanced from a very basic machine cobbled together with the odd bicycle part into an international system of gleaming jetliners ferrying tens of thousands of passengers daily across continents and oceans in a matter of hours.[6]

To the early observer, the roaring start of the Space Age brought forth similar prognostications. Just two years after the Russian accomplishment, an American postmaster general

[6] James Tobin, *To Conquer the Air: The Wright Brothers and the Great Race for Flight* (New York: Simon & Schuster, 2004). The inaugural flight lasted only twelve seconds and went only a distance of around a hundred feet, shorter than the wingspans of many modern-day jetliners.

promised intercontinental ballistic mail delivery within years. As farfetched as they seem nowadays, these were not simply the ravings of figures on the fringe. The example of rocket mail had real support in government indicating that even credible individuals at the center were preparing for this new outcome.[7] There was no reason not to from their standpoint. In the short decades following the launch of *Sputnik*, humankind had, among other things, visited the moon, sent spacecraft to all of the planets and beyond, and built a permanent human presence in the heavens.

However, what seemed like such an auspicious start came to a shuddering halt. By the end of the 2000s, many observers were ready to call for an ignominious end to the Space Age when the National Aeronautics & Space Administration (NASA) called for the retirement of the Space Shuttle without any planned successor waiting in the wings.[8] After 1969's moon landing, widely considered the apogee of human accomplishments in outer space, space programs around the world had fallen from the grace of the public and most had to settle in for a long decline into obscurity precipitated by a tremendous upsurge in apathy and pitched and protracted fights against relentless attempts to cut down financing.

This was not the matter of running up against a technological limit. In fact, even without further pushing the limits of the state of the art, the ambitions of space exploration can go much further than humanity's accomplishments to date.[9] This was, instead, a matter of choice, which arises from a situation where nations around the world began reining in the fiscal largesse once enjoyed by their space agencies.

Space exploration was never about making contributions to scientific discovery. The impetus for the huge space agency budgets was to secure victory in the Cold War. The further discussions to expand space program objectives always ran into a wall as soon as politicians lost interest in space as a proxy battlefield. From the perspective of the United States, the space race ended with the defeat of the Soviet Union and with it, the need for the generous budgets that typical of the early Space Age also departed.[10] This was not even a gradual process. In the United States, NASA had to fend off violently aggressive budget cuts as soon as the Apollo program had met Kennedy's promise

However, this is not to say that there are no other substantive benefits to a unilateral dominion in space. On the contrary, the prestige and resources one stands to derive from the domination of space are tremendous in both qualitative and quantitative terms.[11] But this never

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[7] The Eisenhower Library, "The Papers of Arthur E. Summerfield," http://eisenhower.archives.gov/Research/Finding_Aids/S.html "Before man reaches the moon your mail will be delivered within hours from New York to California, to England, to India or to Australia by guided missiles.... We stand on the threshold of rocket mail." The United States government commemorated this initiative with collectible postcards commemorating the first and only test launch of a rocket powered mail delivery system. Needless to say, this pronouncement proved wildly inaccurate.

[8] Kerry Sheridan, "Neil Armstrong Says US Space Program Embarrassing," *The Associated Press*, September 22, 2011.

[9] *ibid*

[10] Richard D. Lyon, "12.5% Slash in NASA Funding Will Force Sharp Program Cut," New York Times, February 3, 1970, New York edition. Just months after the successful conclusion of the moonshot, Congress already began putting these constraints on NASA's budget.

[11] Denis Healey, "The Sputnik and Western Defence," *International Affair* 38 (1958) 145-146. Planners in the west have envisioned,

emerged nor did even the beginnings of a serious bid at space domination. For several reasons, the space programs of nations lost their budgets in full knowledge of this. Mostly, this has to do with the long time frames that typify greater space ambitions. The appeal of Cold War rhetoric lies in the easily packaged and understandable appeal of the argument. The spokespeople of the time couched the argument as one of immediacy and urgency. By contrast, further space ambitions are on a timeline that ends in the hazy future, many decades from now and there has been no appealing way of tying those efforts back to a like theme. In 1973, NASA sought to tie its quest for a budget restoration by invoking a speculative *Sputnik* but to no avail.[12]

What this implies is that the realist argument holds only when the timeframe is digestible for policy actors. If the timeline is speculative or if it is too far away into the future, the argument loses its potency and urgency. The same should be said of any of the proposed budgets. If the commitment becomes too exorbitant, countries face a situation that requires too much action performed in unison. Nations are not perfectly coordinated monoliths. If the task demands too much coordination, it can move beyond the range of what is tolerable and this has indeed happened to the classical space program.

The Continuation of the Space Age

With the retirement of the Space Shuttle and the surprising absence of a successor from NASA, many observers were ready to call an end to the Space Age. Although old -- shuttle telemetry systems were devised before the microprocessor -- the Space Shuttle was not simply outmoded technology due for retirement; at the time of the decommissioning of the very last vessel, it was the only American way to perform delivery missions for the ISS and the only human way to capture and repair satellites, a function called upon frequently during its service lifetime.[13] For these reasons, most expected that the cancellation of its erstwhile successor would lead to stay of execution. This never materialized and, instead, the United States put itself in the awkward position of having to enlist Russian help to bring astronauts to the ISS.

Although this was the symbolic nadir of the decline of the post-Cold War space agency, calling this the end of a Space Age was a premature pronouncement. For most of the several decades of space exploration, outer space accomplishments were seen as a tool in the statecraft of prestige and to a much lesser extent, in the spirit of scientific inquiry. As a result, the positive externalities could not be internalized by the private market because there was no price and so the state was the driving force behind all outer space efforts.

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feared and salivated over the possibility of an outer space weapons platform for a very long time now. The material benefits may also be tremendous. According to the startup Planetary Resources, a relatively humble asteroid could yield resources

[12] Robert A. Wright, "NASA Chief Seeks More Funds In '73," New York Times, October 3, 1971, New York edition. James C. Fletcher, head of NASA in 1973 argued that this would force the United States to scramble to "outrace another *Sputnik*."

[13] T.A. Heppenheimer, *History of the Space Shuttle* (Washington D.C.: Smithsonian Institution Press, 2002).

A group of atypical actors rose in the place of the disinterested state to become the primary momentum behind the maintenance and development of space exploration. Nowadays, private industry startups funded by adventurous maverick billionaires are promising a revolution in spacefaring. Some are rather moderate, hoping only to enter into the market for services long-dominated by established and reputable defense companies.[14] Others are trawling through the history books and resurrecting forgotten and abandoned business plans like that of space tourism.[15] Still more have ambitious goals in mind involving the capture and retrieval of an asteroid to be pillaged for mining on Earth.[16]

The consequences for the prospects of a resurgent mood in nationalism are particularly dire. Private industry types do not have the incentive to act in any particular national interest as the foremost concern is profit-making. This is not just speculative; examples abound in just a few of the years since this concept came into vogue. British magnate Richard Branson's Virgin Galactic has had absolutely no qualms about moving its space operations to America as there they have access to the most effective launch sites and the expertise of a vibrant, burgeoning aerospace industry.[17] On a similar note, private corporations will not and cannot limit the scope of their activities to the confines of a national border. Most of the business models of these industries depend on the rapid decay of price; they become untenable as soon as they are bound by a limited audience.[18]

This change is apparent not only in the grassroots found on the outside of the space agency. For decades, space agencies built their achievements on the science and labor derived from powerful defense industry contractors. In the earlier era of fiscal largesse, the profit motive of these players was coopted into the national imperative as a subset of the military-industrial complex. For example, although the Saturn V rocket was constructed by Boeing, all of the research and all of the manufacture was paid for with public funds.[19]

Nowadays, the far tighter budget constraints placed on the space agency means that defense companies are no longer mere extensions of government will. Rather, they are now partners. One of the ways the Japan Aerospace Exploration Agency (JAXA) has managed to cope with their stagnant budgets is to jointly develop new space technologies. The H-series rocket, co-developed

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[14] "SpaceX Goes to the ISS and This Time It Means Business," *The Economist*, October 13th, 2012. SpaceX, and its earlier forerunner Orbital Sciences, have long argued that they are capable of performing the mundane functions of the space agency at a price far discounted from the usual rate. Part of their plan involves better administrative structure and the use of technologies abandoned by previous research programs.

[15] "Virgin Galactic: Flame On," *The Economist*, April 29th, 2013. The idea for space tourism has been around for a very long time. Even in the 19th century, science fiction authors imagined pleasure cruises taken to the stars. This was even floated during the heyday of NASA among some circles. However, only in the last decade or so has the idea received any lasting traction and the impetus for this change comes almost exclusively from new, privately held enterprises like Virgin Galactic.

[16] "Fool's Platinum?" *The Economist*, March 9th, 2013.

[17] "Virgin Galactic: Flame On."

[18] *ibid.*

[19] "Companies Also Accused With NASA of Waste in Lunar Program," *New York Times*, October 4, 1963, New York edition. NASA's relationship with these corporations was so close that many in Congress accused those in the aerospace industry of forming an alliance as a conspiracy to secure and inflate finances. Although besieged by accusations of such gravity, NASA's argument for procurement was largely persuasive and successful. During the peak of the Apollo development, the NASA budget had become nearly five percent of annual American expenditure, representing the single greatest peacetime commitment in American history.

with Mitsubishi Heavy Industries (MHI), is emblematic of this change in the distribution of procurement.[20]

Without a doubt, this is a smarter use of funds as it allows the space agency to do more with the same amount of money. However, this represents yet another limitation that checks national ambitions. Private companies like MHI do not enter these partnerships out of a sense of altruism. Rather, they do so because space agencies are offering opportunities for profitability. For its industrial knowhow, MHI receives licenses and patents and the ability to deploy that technology in other business arenas. In 2012, Mitsubishi performed its first international commercial satellite launch with the H-rocket and has tapped it as a key component in this as a part of its future growth strategy.[21] The way these resources are now being allocated represents a new constraint on the nationalistic space agency. The private industry embraces only projects that are likely to bring profit and it also demands the freer usage and access to what would have been the jealously guarded state secrets of yesteryear.

In summary, outer space may soon be looking far more like the market driven regimes that we see in other sectors. The regulations demanded by a landscape of privateers cannot be constructed in a manner that overly skews everything in the favor of an exclusive party. First, competition is the only way to decay pricing. Second, the actors are already crossing borders and so the argument for protecting domestic interests does not hold the same sway. Finally, and most importantly, having access to a global consumer base is only going to happen if the field tends to be more equitable than exclusive.

Case Study: The International Space Station

Today, the International Space Station is a remarkable feat of engineering technology. It was built through the efforts of over thirty different countries. It is likely the single most expensive project ever undertaken by humankind. It has played host to the longest sustained human presence in outer space, a duration of nearly thirteen years at the time of writing this paper.[22] It is also functions as a restraint on nationalism in space.

The ISS began as an exercise in realism as it finds its roots in the Cold War milieu. Originally, it was called Space Station Freedom, a Reagan era proposal meant to counter Soviet space station technologies. The tenor of the project was incredibly combative; it was unveiled as a

[20] "Japan to Rely More on Private Sector to Develop Cheaper Rocket," *Asahi Shimbun*, May 29, 2013. This would represent a complete change from the typical developmental structure seen in the development of the components for the moon program.
[21] Chris Cooper and Kiyotaka Matsuda, "Mitsubishi Heavy Makes Japan's First Commercial Satellite Launch," Bloomberg, May 18, 2012. In 2012, Japan carried into space a satellite for the Korea Aerospace Research Institute. This was not just a onetime affair. Mitsubishi and JAXA both plan on having many more commercial satellite launches as the global market is rapidly growing and currently, dominated by only a few players that Japan is more than capable of competing with.
[22] "International Space Station," NASA, http://www.nasa.gov/mission_pages/station/main/index.html#.Ueec1awvmXA.

part of the Reagan Administration's ill-fated "Star Wars" plan to weaponize space.[23] That it developed into the premier and enduring symbol of international cooperation in space activities is a testament to the power of the forces in outer space exploration that drive nations together.

The first national partner drawn into the orbit of Space Station Freedom's designs was Japan.[24] In Japan, the United States saw another competitor in outer space and to include it in these plans was seen as a way to check its national ambitions. In the report compiled to discuss America's new role in the changing world order, scientists sounded the alarm against falling behind once more.

> The Soviets are now the sole long-term inhabitants of low-Earth orbit. The first, and only, U.S. space station, Skylab, was visited by three crews of astronauts before it was vacated in 1974; the U.S. has had no space station since. The Soviets have had eight space stations in orbit since the mid-1970s. The latest, Mir, was launched in 1986 and could accommodate cosmonauts and scientific experiments for nearly a decade before the U.S. Space Station can accommodate astronauts in 1995. The United States has clearly lost leadership in these two areas, and is in danger of being surpassed in many others during the next several years.

But the reason the United States and Japan agreed to such a plan was obviously not a desire to place limits on themselves. Rather, the project costs of such an enterprise were far too exorbitant for either government to bear on its lonesome. In the same report sounding the alarm against a decline in American leadership was also a rather startling concession considering the all-or-nothing attitude of the previous climate. Said the authors of the report, "leadership does not require that the U.S. be preeminent in all areas and disciplines of space enterprise. In fact, the broad spectrum of space activities and the increasing number of spacefaring nations make it virtually impossible for any nation to dominate in this way."

This very same force drove other states together as well. By the finalization of its approval in the 1990s, the ISS involved thirty different countries, including every nation with significant spacefaring capabilities at the time.[25] The realist motive was probably also a concern in the calculus of each and every ISS member but inarguably, dominating the drive to the expansion of this project was the intimidating sticker price coupled with the prestige and scientific value of having a space

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[23] David E. Sanger, "Many Experts Doubt 'Star Wars' Could Be Effective by the mid 90's," *New York Times*, February 11, 1987, New York edition. The plan failed as a result of the technological requirement that would have been demanded by the entire program. This is a particularly apt example of the budget, coordination, and timeline issue discussed already earlier in the paper.

[24] The NASA History Foundation, "NASA Leadership and America's Future in Space," The National Aeronautics and Space Administration, http://history.nasa.gov/riderep/begin.htm.

[25] "International Space Station," NASA. The Russian contribution was a particularly powerful sweetener for American politicians as some saw it as one of the last and most symbolic triumphs over the Soviet Union. The Russian part of the International Space Station was the incomplete planned sequel to the *Mir* space station.

station.

But the lasting contribution of the ISS in the field of international politics is not that it is one of the technological and engineering wonders of the modern age. Rather, its legacy may still be obscured and not fully revealed for years to come. The ISS has yielded scientific strides and prestige for every one of the participants and this has happened by dividing costs between project contributors and in doing so, it has cultivated a new normal in what governments expect to be able to accomplish through a limited budget.

Nowadays, one can scarcely find the willpower to furnish an ambitious space program with the required fiscal support. The situation becomes even direr when the nationalist argument is removed from the equation. This is not just speculation. NASA, the agency with the most capability and the one in the world with, by far, the easiest argument for its own expansion, is finding it very difficult to see through a growth in size because of this new climate of internationalism in space agency budget planning. The type of budgeting demanded by American congressional committees envisions a much broader role for collaborative finance.

In 2004, the Bush Administration announced Constellation, a wildly ambitious plan to bring NASA into, what was intended to essentially be, a second golden age. Within six years, it was scrapped. Many observers state that its cancellation ought to be blamed on its gross budget overruns but this explanation does not hold up upon closer examination as space programs are no strangers to budget overruns and Constellation was not significantly deviant from the typical. Although there were many factors at play, the documents at the time point to another answer. Part of the reasons cited by the Obama Administration was the failure of the plan to incorporate enough of the fiscal advantages of internationalism. By this point, the House of Representatives had already conducted several studies on the feasibility of a smarter budgetary allocation by drawing in global expertise.[26]

To challenge the laws that dominate space is going to be a project that requires the development of indigenous space capabilities. Collaboration is not going to lead to such an outcome as the diversity of the stakeholders and their opposing interests holds back any individual actor from breaking free with impunity. Even though NASA is the far more powerful agency in any partnerships formed with the ESA, it willingly gives up prominent roles to deepen and make more extensive partnerships. In the Cassini mission to Saturn, the *Huygens* was a space probe designed exclusively in European laboratories; this was a conscious concession to their complaints of being relegated to ancillary, unimportant positions.[27]

But not only does collaboration contribute nothing to individual space capabilities, it even counts as a net negative to any aspirants of space conquest. What the ISS demonstrates is that cooperation, once begun, becomes a self-multiplying force that automatically grows in power by

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[26] Kenneth Chang, "For a Moon Colony, Technology Is the Easy Part," *New York Times*, January 27, 2012.
[27] Ralph Lorenz and Jacqueline Mitton, *Lifting Titan's Veil: Exploring the Giant Moon of Saturn* (Cambridge: Cambridge University Press, 2000).

virtue of its own existence. It sorely weakens the reasoning for the handling of space objectives unilaterally and it introduces and expands a new conceptual approach to the planning of outer space budgets that has proven far too enticing for any mature spacefaring state to ignore. And the more this grows and the more success it sees, the range for going through with, and even conceptualizing, a return to a unilateral space program driven exclusively by the concerns of one nation becomes ever more distant.

The International Space Station is but the most prominent of many trends in space science, and indeed science in general, that comprise a seismic groundswell of technological collaboration. The largest telescopes and observatories today are being built through the efforts of multinational consortiums.[28] Likewise, attempts at creating the first nuclear fusion power plant involve many countries with considerable expertise in the fields of engineering and science.[29] It seems that we are in an age where the average science project is far beyond the means of any lone nation. Even the most powerful of states find it difficult to bring any of these projects into complete fruition. The Superconducting Super Collider, intended to be the largest particle accelerator in the world, was canceled because American politicians saw that it was preferable to enter into the concord behind what would become the Large Hadron Collider.[30]

One can say with some authority that this fiscal barrier is only going to harden as we go further into the future. The engineering challenges behind some of the greatest of human ambitions for outer space go far beyond anything seen today. By the conservative estimations of NASA, a manned mission to Mars is going to cost $300 billion dollars.[31] To retrieve an asteroid back to Earth for the purposes of mining is going to demand a $100 billion dollar investment upfront.[32] Not only is the long-coveted space elevator is going to involve a Herculean engineering effort, its realization will require a tremendous research investment in the creation of high strength polymers that are yet unknown to humanity.[33]

It is not just the cost that presents an obstacle. The nature of science is that it draws upon the communal contributions of the entire professional community. To overcome the many hurdles that stand in the way of innovations like the life systems that would make a Mars mission feasible or the synthetics required for the construction of a space elevator is going to require, more than ever,

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[28] "Thirty Meter Telescope," http://www.tmt.org/about-tmt. Slated to be the largest telescope ever built, the 30 Meter Telescope involves institutions from America, India, Japan, China, and Canada. The Very Large Telescope array in Chile was constructed in the same manner but between European member nations. The recent activity European Southern Observatory attests to the power of collaboration in furthering the research of science. After integration, European nations have taken the lead in developing the largest telescopes and are even considering the construction of a behemoth with a 100 meter aperture!

[29] "The International Thermonuclear Experimental Reactor," http://www.iter.org/proj/iterhistory. The ITER project is a very serious attempt at proving the feasibility of nuclear fusion and its consortium involves nations encompassing over half of the world population.

[30] Jeffrey Mervis and Charles Seife, "Lots of Reasons, but Few Lessons," *Science* 302-5642 (2003): 38-40.

[31] Kenneth Chang, "For a Moon Colony, Technology Is the Easy Part," *New York Times*.

[32] "Fool's Platinum," *The Economist*.

[33] Tim Hornyak, "Japan Plans Snail-Paced Space Elevator for 2050," *CNET* February 23, 2012, http://news.cnet.com/8301-17938_105-57383872-1/japan-plans-snail-paced-space-elevator-for-2050/ If this ever works, this is going to require the construction of carbon nanotubes on a scale never before seen in engineering.

global expertise.

The Challenges on the Horizon

If there is any nation that poses a challenge for the vision of space presented in this paper thus far, it is China. With its booming economy and revanchist attitude to historical relations -- many in China view its newly acquired modernity as a triumphant return to a position of primacy after centuries of what it sees as imperialistic humiliation -- it is reasonable that China has both the fiscal fitness and the popular will to initiate the second phase of a competitive Space Age.

Recent developments in Chinese space exploration indicate that this is indeed a nation that can buck the trends that have coagulated the interests of its spacefaring colleagues. It has announced a tremendously aggressive time schedule for its National Space Administration; by 2020, it wishes to have a person on the moon as a prelude to the construction of a permanent moon base, by 2040, China plans on having an astronaut on Mars and what makes this all so remarkable is that it claims to intend to do all of this on its own.[34]

While the jury is still out on the likelihood and feasibility of their planning, we do already have some hints that offer some predictive force. As of the time of the writing of this paper, China has already fallen behind on their own timeline.[35] While the secretive nature of their program makes a true assessment difficult, it is obvious that they have already toned down the aggressively optimistic propaganda that colored their voice at the time of this program's announcement.

Interestingly, China is also already on the lookout for partnership agreements, indicating that the expenses of so much homegrown spaceflight are just proving too costly. On their own space station, China has already borrowed scientific expertise from Germany and other ESA states.[36] Moreover, it appears that China wants an active role in the ISS and has only been rebuffed due to security concerns voiced by the United States.[37]

Nevertheless, the issue posed by the government does not stop outer space collaboration from being an attractive force. Whether China can overturn the contours of this new arrangement is yet to be determined but current events already cast doubt on such an outcome. Furthermore, even if it manages to do so, it would simply be a unique exception to a very evident and solid trend and this would not cast any doubt on the power of these forces. The history suggests that it is nationalistic forces that are ephemeral. Just three years following *Apollo 11*, President Richard Nixon and the

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[34] "China's Space Activities in 2006," China National Space Administration, http://www.cnsa.gov.cn/n615709/n620681/index.html

[35] "China's Space Program Tries to Catch Up," http://www.forbes.com/sites/stratfor/2013/06/27/chinas-space-program-tries-to-catch-up/

[36] Christian Schwägerl, "Challenging America: Europe Seeks Space Cooperation With China," *Der Spiegel*.

[37] Marc Kaufman and Dafna Linzer, "China Missile Destroys Satellite; Test Raises Fear of Arms Race in Space," Chicago Tribune, January 19, 2007, Final edition. Without warning to the rest of the world, the Chinese used a missile to destroy one of its satellites as a test for its space warfare technologies, perhaps creating over 300,000 pieces of orbital debris. Observers questioned in the article saw this disregard as an early development that may lead to an arms race in space again.

Soviet Premier Alexei Kosygin planned for a linkup between an Apollo command module and a *Soyuz* spacecraft. This became the Apollo-Soyuz Test Project (ASTP). On July 17, 1975, an American astronaut and a Russian cosmonaut shared the very first international handshake in space. The default stance in space exploration is not to remain a tool for other national ambitions. Cooperation triumphs because it is easier.

Internationalism is not simply a way of rescuing a program in peril. In some cases, it also allows for far greater ambitions. In 1986, a NASA/ESA joint project to intercept Halley's Comet was scrapped as a result of the Challenger disaster but it was resurrected with even broader goals by including Russia and Japan as partners.[38] In short, a China with tremendous ambitions might find its needs better sated through cooperation rather than blunt individualism.

The Culture of Space

Because outer space is not yet fully incorporated by any political regime, it may seem counterintuitive that space already carries with it a cultural identity of sorts. However, this would be an accurate characterization. The gestures made at humanity in space exploration may seem hollow as they were verbalized during the most heated times of the Cold War but the record indicates that there may be a substance to it at the core. The first steps on the moon were made in the name of humankind, not America. The Voyager and Pioneer deep space probes bear plaques carrying greetings in the languages of the world. The absence of jingoism in space is not just a random act of benevolence; rather, it can best be understood as the most accessible of outer space conceptions.

Although these points may seem trivial, culture is a very important part to the appearance of the final contours of a domain. Nation building happens by incorporating a region within not only the physical superstructure, but also by drawing it into the mental orbit.[39] If we conceive of the nation as an imagined community, it is necessary to implement a kind of simultaneity and consistency between all of its parts. Otherwise, citizens do not understand the immediacy or the urgency of such a community and will find no reason to defend it.

For the country contiguous with a continent, this is not such a tall order. However, the challenge grows dramatically if space enters into the equation. A typical fixture of the conception of space is the organic growth of territory. However, this does not work as there is no way to draw a neat border in space and so there is no way to grow it outward like the growing of the appendage of

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[38] John Noble Wilford, "Halley's Comet: Scientists Prepare the Welcoming Party," *New York Times*, October 26, 1982, New York edition. All four agencies together sent an armada of satellites to provide telemetry readings so the satellite built to approach it would have the most accurate data possible. It should be noted that the ESA was the leader of this mission as it provided the majority of the funding and contributed the *Giotto* satellite designed to approach Halley's comet up close. The mission was a stunning success, providing scientists with the closest and clearest images of a comet nucleus up until then. It also served as an introduction for Japan to bigger aspirations in space explorations as its satellite was a national first in interplanetary studies. Japan also became the first nation to send a man-made object out of Earth orbit, after the Soviet Union and the United States.

[39] Ana María Alonso, "The Politics of Space, Time and Substance: State Formation, Nationalism and Ethnicity," *Annual Review of Anthropology* 23, (1994), pp. 379-405

the organic land. The fact that there is no space population isolates even further any attempt to nationalize the heavens; because this is the situation, a would-be space nationalist does not have access to the arguments of cultural or historical preservation. An effort dominating space would run into the same problems as any attempt to dominate the skies or the seas, two other domains that are indeed under collective administration. There have been challenges. However, while in the present-day we may be perturbed by the flare ups of various small island disputes, contextualized in history, they are simply not of the same scale or resonance as that of the disputes in the past because they do not have access to the usual arguments and fixtures that stir up emotions.[40]

While unlikely, this does not preclude the possibility that the ambitious state might one day pen a nationalistic language that successfully incorporates space into an aggressive, territorial worldview. However, the possibility for that further diminishes as the nation may have already been beaten in defining outer space. Despite overwhelming advantages in spaceflight technology, military power, and material resources, both the Soviet Union and the United States checked their own tendency to be nationalistic in this domain. Although *Sputnik* sparked fears in some American quarters of a communist nuclear menace in space, it was a rather benign piece of technology, sporting only a rudimentary radio transmitter. More significantly, the meaning of its name was only "traveling companion"[41] to Earth, evoking images of an amorphous humanity sharing a planet, not of a representative of an exclusive Russian fiefdom.

The symbolism behind *Sputnik* is not unique and represents just the beginning of a longstanding tradition in the typical nomenclature of the space agency. Overall, even throughout the tensest periods of the Space Age, humanist or neutral spacecraft names far outnumber those that are nationalistic which is a very unusual convention compared to the kinds of names found in aerospace or military vessels.[42]

This is not just a coincidence. Space agencies were engaged in a dialogue with a grassroots community that held influence over the naming schemes. For example, in naming the very first Space Shuttle, NASA held a contest and decided to name it *Enterprise* after the starship of the same namesake in the television series *Star Trek*.[43] The community organized around this media

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[40] *ibid*

[41] Matt Bille, *The First Space Race: Launching the World's First Satellites* (College Station: Texas A&M University Press, 2004). On July, 29 1958, NASA was established after the enactment of the National Aeronautics and Space Act. In many ways, its very formation was also steeped in the charged political climate of the time; it absorbed its antecedent, the National Advisory Committee for Aeronautics (NACA) in part because the government felt that NACA lacked the agility necessary for a response to the Soviet Union and had done a poor job of keeping America afoot in aerospace developments in light of *Sputnik* and the several failed American rocket launches immediately after.

[42] Harve Bennett, *Star Trek V: The Final Frontier*. DVD. Directed by William Shatner. Hollywood, CA: Paramount Pictures, 1989. Pioneer *10* was blown up by a Klingon cruiser in the movie *Star Trek V: The Undiscovered Country*. Human representatives in a *Star Trek* book introduced a copy of one of the plaques to nearby alien races who told the envoys that their civilizations never were able to decode the message. See: Judith Reeves-Stevens, *Star Trek:*
Federation (New York City: Simon and Schuster, 1995) The fictional *Voyager 6*, shaped just like the two real *Voyagers* also made an appearance in the first *Star Trek* film as a probe turned into a powerful artificially intelligent being after drifting for centuries in space. See: Gene Roddenberry, *Star Trek: The Motion Picture*. DVD. Directed by Robert Wise. Hollywood, CA: Paramount Pictures, 1979.

[43] "Space Shuttle Shown Amid Palmdale Fanfare," *Los Angeles Times*, September 17, 1976, Los Angeles edition.

subculture sees space in a very distinct manner, as a place that is destined to be shared among humanity. The communication was not just one way; the writers of *Star Trek* shared a dialogue with NASA and, for example, saw fit to integrate the ISS as a symbolic forerunner to the egalitarian United Federation of Planets in an episode of *Deep Space Nine*.[44]

These are not just seldom and incidental events nor is it something that emerges from the fertile imagination of a few renegade idealists imagining the post-Cold War future. On the contrary, they emerge from a practice, culture, and tradition that finds its roots in the preceding centuries. For example, the names of most of the objects within the Solar System come from the Roman mythology. Occasionally, there are attempts to redraw the neutral zone. William Herschel, discover of Uranus in 1781, sought to name the seventh planet *Georgium Sidus*[45] but that never caught on as the rest of the astronomical world pushed back against such a nationally aggrandizing name.[46] Nowadays, naming newly discovered heavenly bodies is something conducted through the International Astronomical Union (IAU) a broad, multinational forum that regulates such matters.[47]

There is reason to believe that this cultural atmosphere has influence over even agenda-setting. The Search for Extraterrestrial Intelligence (SETI) owes its existence to the amateur and professional scientific community that has chosen to consider space through this nation-agnostic framework. Its high profile operations are quintessentially humanistic, like the sending of global messages on the behalf of humanity to distant star systems in the hopes of reaching another civilization.[48] This is a project that yields absolutely zero benefit for the proponent and the host[49] and yet hundreds of millions of dollars have been devoted to it. This means that the culture is not just holding back aggressive tendencies but that they also steer the ship in a direction that tends to be more pacifistic and egalitarian.

What holds back nations from making aggressive gestures at and in space is not altruism nor can this tendency be characterized as mere coincidence. Rather, a more complete interpretation lies in the insight that the traditional tools of cultural nation-building do not work so well in outer space and on top of that, space is not a vacuum, at least conceptually. Science fiction and other scientific conventions have defined outer space already, as a shared space the "province of all humankind."[50]

Conclusions

Outer space is a domain ripe for collaboration. For various reasons, ranging from fiscal to

[44] *Star Trek: Deep Space Nine*. *Star Trek*. CBS Television Distribution. January 3, 1993 – June 2, 1999.
[45] Meaning "George's Star"
[46] Mark Littmann, *Planets Beyond: Discovering the Outer Solar System*. (New York: Courier Dover Publications, 2004) 10–11.
[47] "About IAU," International Astronomical Union, http://www.iau.org/about/
[48] Morris Jones, "Deep Pockets of Investors Needed to Realize Space Dreams," *Sydney Morning Herald*, July 3, 2012.
[49] It is hard to claim even a general soft benefit from these operations as they frequently come under media ridicule!
[50] Quoted from the preamble in the Outer Space Treaty of 1967.

cultural to practical, nations are willing to hold back the animal spirits of competition unilaterally and to instead, work with fellow states. Emblematic of this spirit in space is the longstanding Outer Space Treaty of 1967. This is worth a remark because, historically, only a few nations have had the willpower and any interest in being regular spacefarers; this means that outer space is not a particularly crowded place. This was especially true in the year of its first round of ratifications. Potentially, space is a bountiful place to the victor with enough technological and material capability would go some very economically and strategically lucrative spoils. That nations wrote that order in 1967 and that they willingly accede to that order to this day begs for an explanation.

A simple, arbitrary delineation of power levels by examining cases from nation to nation is an inadequate analysis as it does not offer any explanation for the particularities of this context. The sum accumulation of power is only the first and most basic of considerations to examine when a nation chooses to pursue its aims. Whether or not it can execute its will to the fullest extent also depends on the indigenous ability to mobilize its resources. This paper has argued that, for various reasons, the task of mobilization is especially trying in the realm of outer space.

This is not the only consequence of this paper. The realist argument is one that undermines the value of the international institution in mediating disputes as nations with enough power can adjust the landscape into their own favor overwhelmingly. Any hint of an international order is illusory and the domain is anarchic or so the argument goes. However, it is clear that this is not necessarily the case. Even if there is no powerful order, the forces discussed in the paper all count as constraints on the nation's ability to mobilize its resources and all of them can be cultivated and strengthened through international organizations. The cases of the International Space Station and the International Astronomical Union are demonstrative of this.

While Pareto optimality or even something approaching it is, in all likelihood, beyond possibility, a collaborative organization can act as an incubator that holds back a distributive outcome that would be even less optimal. In addition to this function of incubation, gains made through these groups naturally consolidate over time. When one interpretation dominates the conceptual framework, it becomes progressively more difficult to dislodge.

For further study, one should examine whether this process exists and how it works in other types and areas of activities. The argument in this paper has already touched upon this by looking at science in the broader context in projects like the Large Hadron Collider. A deeper inquiry can be had by delving further into other collaborative projects. It could be instructive to determine whether or not there is a quality about space or about science that distinguishes it from other areas. Is it simply the scale of these projects that drives nations into the each other's arms? If so, is it possible to cultivate higher expectations and ambitions? Is there a greater force that undergirds these efforts? If there is, the argument here may be applicable in similar cases like Antarctica, another wide swath of territory on the verge of mainstream incorporation. Whatever the case, even if international

institutions are not a panacea for conflict, it seems that they can have a substantive role to play in these negotiations.