Transatlantic Cooperation & Outer Space Exploration[1]

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(Very rough draft! Feedback welcome)

"We are entering a new space age and I hope this will create a new unity. Space exploration has already been a great unifier, we seem able to cooperate between nations in space in a way we can only envy on Earth."[2] *Stephen Hawking, 2016*

Abstract
Drawing upon new archival research and participant observation, this paper examines transnational and international cooperation in outer space exploration from inception to today. Although the beginnings of the Space Age are usually thought to have closely coincided with the Space Race between the US and Soviet Union beginning in 1955, this paper traces the impetus behind space exploration back to the 1920s and 30s when the Spaceflight Movement took off, with an emphasis on the transatlantic context. This societal-level movement was highly transnational and collaborative in nature, and consisted of regular members of the public, scientists, and philosophers, among others. They pushed for the idea of spaceflight decades before the technology existed, and advocated for non-weaponization of space. In effect, it was the first step towards conceiving of outer space as part of the global commons. The paper traces this idea of the non-weaponization of space from the 1920s to today, culminating in an examination of the International Space Station, which is recognized as one of the most ambitious examples of international scientific collaboration. The author argues that the impetus to engage in space exploration was fundamentally "ultrasocial," a highly cooperative effort, despite the visibility and competitiveness of the Space Race.

Introduction

We are on the cusp of a new era in human spaceflight and outer space exploration. The number of spacefaring countries has grown dramatically, and the landscape of actors involved in space has become increasingly diverse: space agencies, private commercial entities, international organizations, amateur space enthusiasts, multi-national corporations, and public-private

[1] This paper is drawn from a larger book project entitled, *The Ultrasocial World: International Cooperation Against All Odds,* which engages in a comparative case study analysis of (1) the European integration project, (2) the international relations of space exploration, (3) the global nuclear weapons taboo, and (4) the transnational climate change regime. I am grateful to Justin Haner for his significant and extensive research assistance on the Space Race at the John F. Kennedy Presidential Archive.

[2] At an event to unveil Virgin Spaceship Unity in February 2016. Hawking goes on to say, "Taking more and more passengers out into space will enable them and us to look both outwards and back, but with a fresh perspective in both directions… It will help bring new meaning to our place on Earth and to our responsibilities as its stewards, and it will help us to recognize our place and our future in the cosmos — which is where I believe our ultimate destiny lies." https://www.space.com/31993-stephen-hawking-virgin-galactic-spaceshiptwo-unity.html

partnerships, among others. Experts and scientists in the field of space exploration are actively working on plans to set up a permanent human presence on the moon within a few short years and sending humans to Mars possibly within a decade. Collectively, governments now spend $42.5 billion per year on space exploration and that figure is rapidly rising.

At the same time, a militarist and competitive narrative regarding space has surfaced amongst the most established state actors. Some have even started referring to this as the awakening of a new Space Race. Trump's proposed "space force," is perhaps the most visible example of this. It is unabashedly about achieving military superiority in anticipation of the threat that other countries could pose to the US's security interests. Since the United Nations has designated outer space as part of the global commons, no country on Earth has sovereignty in this arena. However, the major spacefaring powers (United States, China, Israel, India, Brazil, Russia, Japan, and Europe among others) have still had difficulty agreeing to binding cooperative arrangements with each other – they were even unable to agree that the Moon is part of the global commons. The heightened sense of competition in space is compounded by the fact that very few international laws exist to set out the parameters of permissible behavior in space. For example in March 2019, India conducted an anti-satellite missile test which resulted in over six thousand pieces of dangerous space debris that now threaten the International Space Station, but the country faces no repercussions. While the United Nations has been leading the way in terms of international norms in space, it would seem at first glance that national self-interest has dominated the ways in which humans approach space.

Despite this often-amplified competition among the main states involved and the common assumption today that space is a future arena for military conflict, on the whole this paper suggests that humankind's relationship to space has primarily been characterized by a strong, cooperative drive. Indeed, since the 1990s the International Space Station has been "the largest civil cooperation programme in history,"[3] and it is impossible to go to the flagship conference of the International Astronautical Federation (now 70 years old) without hearing about the indispensable nature of international cooperation in every sector. I argue that this is largely because the original, transformational idea that humans should go to space – when it became technologically within reach – really resonated with *ultrasociality*, defined as a human predisposition to be other-regarding, empathic, and inclined towards seeking wide-scale cooperation, even among strangers. In this case, it was based on a shared sense of space exploration as a common *human* endeavor. In the 1920s, the early days of rocketry, this idea galvanized a societal-level spaceflight movement that was transnational and diverse. It was crucial to assigning meaning to space exploration as cooperative and peaceful. The spaceflight movement inspired others and grew to become global in scale. To the degree that competition was part of this, it was not so much conflictual as it was about helping to spur on a sense of human achievement. At times, this movement has been less visible and more of an epistemic community than a social movement, and at other times it has become larger and more influential.[4] Over the last century, the goals of the movement have become progressively more

[3] European Space Agency Manned Space Programme: Draft Programme Proposal on the European Participation in the ISSA, ES/PB-MS(94)60, Paris 22 December 1994. p. 1, ESA File 18499, EUI Historical Archives.
[4] This trajectory runs in parallel to my case study on the European federalist movement. Mai'a K. Davis Cross, "EU Institutions & Peace," *The Causes of Peace: What We Now Know,* edited by Asle Toje and Bard Nikolas Vik Steen,

ambitious. (Today, it is perhaps more accurately described as a space-*settlement* movement.) Thus, a focus only on the nationalist rhetoric coming from states, misses a large part of the story of space as an emerging area of the global commons.

The historical record also shows a clear divide between the way in which political leaders have tended to approach space (i.e. as state-based power competition) versus the way in which non-state actors or establishment outsiders[5] have approached it (i.e. as a common cooperative endeavor to peacefully benefit humankind). For example, while Trump talks about a Space Force, the NASA Administrator talks about how the only way to make progress in space exploration is for countries to cooperate. While I argue that the historical record of space exploration has continually leaned toward cooperation and peace, at times some political leaders have taken advantage of the potential for in-group vs. out-group feelings (i.e. tribalism) to stoke feelings of nationalist competition over space.[6] Thus, there is a struggle between those who want to stay true to the original transformational idea, and those who would seek to detract from this goal. Much of the time, this conflictual/competitive side of this struggle has served to inadvertently empower the ultrasocial underpinnings of space exploration, but it is certainly not a foregone conclusion that space will remain a peaceful global common. This paper seeks to shed light on this dynamic historically as a means of understanding the importance of the power of possibility at the societal level in galvanizing international cooperation.

Drawing upon archival documents,[7] participant observation at the 2018 and 2019 International Astronautical Congresses, and (upcoming) interviews of key players in spaceflight today, I show how non-state actors, including the regular public, have continually emphasized a cooperative and peaceful approach to space. In pursuing this mission, they have fundamentally shaped states' policies in space. Although they have not always been successful at getting states to prioritize peace and cooperation, these non-state actors have been more influential than not. Considering Trump's proposal to create a "Space Force," based largely on the misconception that space is a purely militarized realm for states, a fresh examination of the development of human spaceflight is necessary.

To back up my argument, I first lay out my ontological and theoretical approach and provide a framework for my explanation of international cooperation in space. Second, starting with the inter-war period, I examine the nature of the early spaceflight movement. Third, I focus on how WWII gave way to a flourishing in scientific cooperation that ultimately paved the way to the Space Age. This section mainly focuses on debunking the common perception that the Space Race was all about brute militaristic competition as an extension of the Cold War. The

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Lioncrest, 2019; Mai'a K. Davis Cross, *The Ultrasocial World: International Cooperation Against All Odds,* book manuscript, 2019.

[5] I am defining "establishment outsiders" as recognized leaders of social movements who may sometimes gain a formal political role, but nonetheless still act as outsiders, rather than part of the establishment.

[6] Christakis argues that humans are fundamentally "pre-wired" to show empathy and to cooperate, but they also sometimes get drawn into an us vs. them dynamic. Nicholas A. Christakis, *Blueprint: The Evolutionary Origins of a Good Society,* Little, Brown, 2019.

[7] Historical Archives of the European Union (Florence), Bibliothèque Nationale de France (Paris), the National Archives and Records Administration (Washington DC and College Park), and the John F. Kennedy Library (Boston), NASA Headquarters Archive (Washington DC, pending May 2019 trip).

paper wraps up with consideration of the International Space Station and the most recent developments in human space exploration.

Explaining Cooperation in Space

How can we understand the puzzle of international cooperation in space exploration? In the post-World War II era, international relations scholars have offered various explanations for why states cooperate, ranging from trade, to culture, to institutions. But very few have truly questioned the underlying ways in which we view human motivation and behavior in the international system, as well as how it has transformed human progress over time.[8] Indeed, within the discipline of international relations, it is challenging even to question the most basic tenets of the field because the language to do so does not exist.[9] Nearly all IR scholarship starts with one of two assumptions: either humans are materially self-interested actors who maximize power, or we are blank slates that are socialized into defining our interests in more nuanced ways.[10] It turns out that neither is true of human nature. Rather than understanding conflictual outcomes in the global commons as products of power politics (realism) or cooperative outcomes in the global commons as products of instrumental rationality (liberalism), they may actually stem from a human predisposition to be social and to work together across borders, particularly when the issue at stake taps into the power of possibility that humans – as a fundamentally social species – tend to crave.

There is a strong interdisciplinary basis for this ontological approach. While many philosophers have long contended that humans are social animals, more recently, scientists have been able to actually prove that the human brain is hard-wired, soft-wired, and pre-wired to be social.[11] A broad array of empirical findings from a diverse range of other disciplines – including neuroscience, anthropology, evolutionary biology, philosophy, and ecology, among others – strongly supports the notion that humans are *ultrasocial* beings. Ultrasociality is defined as a human predisposition to be other-regarding, empathic, and inclined towards seeking wide-scale cooperation, even among strangers. This research into the nature of human cooperation has involved lab experiments, big data analyses, neuro-imaging, and extensive field observations, all of which have supported the notion that humans are by nature remarkably other-regarding and empathic. Evolutionary biologists, for example, do not simply define cooperation

[8] One prominent exception is Ann Tickner, a pioneer of the feminist approach to understanding international relations.

[9] Indeed, IR feminists have pointed out that certain obvious questions cannot even be asked in mainstream IR because the barriers that social scientific method and epistemology have built do not allow for the language or tools to do so. As Ann Tickner writes, "Feminists have asked whether it makes a difference that most foreign policy leaders in the world are men and why women remain so fundamentally disempowered in matters of foreign and military policy. They have questioned why states' foreign policies are so often legitimated in terms of typically hegemonic masculine characteristics and why wars have been fought mostly by men. These constitutive questions have rarely been asked in IR; they are questions that probably could not be asked within the epistemological and methodological boundaries of positivist social science." Ann Tickner, "Gendering a Discipline: Some Feminist Methodological Contributions to International Relations," *Signs: Journal of Women in Culture and Society* 2005, vol. 30, no. 4. p. 2177.

[10] The former, rationalism, has long been the dominant approach of the field, while the latter, constructivism, has emerged more recently and still constitutes a minority of the field.

[11] Lieberman, *Social;* Nicholas A. Christakis, *Blueprint: The Evolutionary Origins of a Good Society,* Little, Brown, 2019.

as the lowest common denominator among actors – as many political scientists do – they actually define a cooperator as "someone who pays a cost for another to receive a benefit."[12] For them, cooperation truly entails altruism and "restraint from competition."[13] As human evolution scholar Sarah Mathew writes,

> Humans cooperate with strangers, and cooperate in groups comprising millions of genetically unrelated individuals… Even without coercion from the state, people voluntarily cooperate: they donate blood, contribute to charity, assist in disaster relief, organize community events, protest unjust laws, give up their seat on a bus for an elderly person, return items to lost-and-found locations, give directions to travelers, etc. Even politically uncentralized societies can organize cooperation at an impressively large scale.[14]

Thus, over the last couple of decades, there has emerged *consilience* across multiple disciplines – independent studies of various phenomena are all reaching the same conclusion about ultrasociality.[15] And even when humans are not engaged in this behavior, our default is still to think socially more than competitively,[16] with a kind of *empathic impulse*.[17]

At the same time, human brains are malleable, what neurobiologists call *neuroplasticity*. That is, we learn from our environment and it changes our brains in tangible ways throughout our lives. Since we are an ultrasocial species, we also teach, learn, and become socialized over time. But the existence of human nature means that we are not *fully* malleable. On some level, human nature pushes us towards certain tendencies and this is true regardless of the culture we are born into. Neuroscientists, biologists, and cognitive psychologists have identified these tendencies at a physical or biological level through studying the brain and evolution. Ethnographers and anthropologists have documented this in terms of identifying common human behaviors and ways of communicating across the world. Indeed, these characteristics are so clearly evident that scholars have compiled a list of thousands of *human universals,* defined as, *"*those features of culture, society, language, behavior, and psyche for which there are no known exception."[18]

The *human universal* of cooperation, and by extension, conflict mediation are specifically relevant to understanding international relations. *Every* human grouping around the world without exception engages in cooperation and displays empathy. On a physical level, we now

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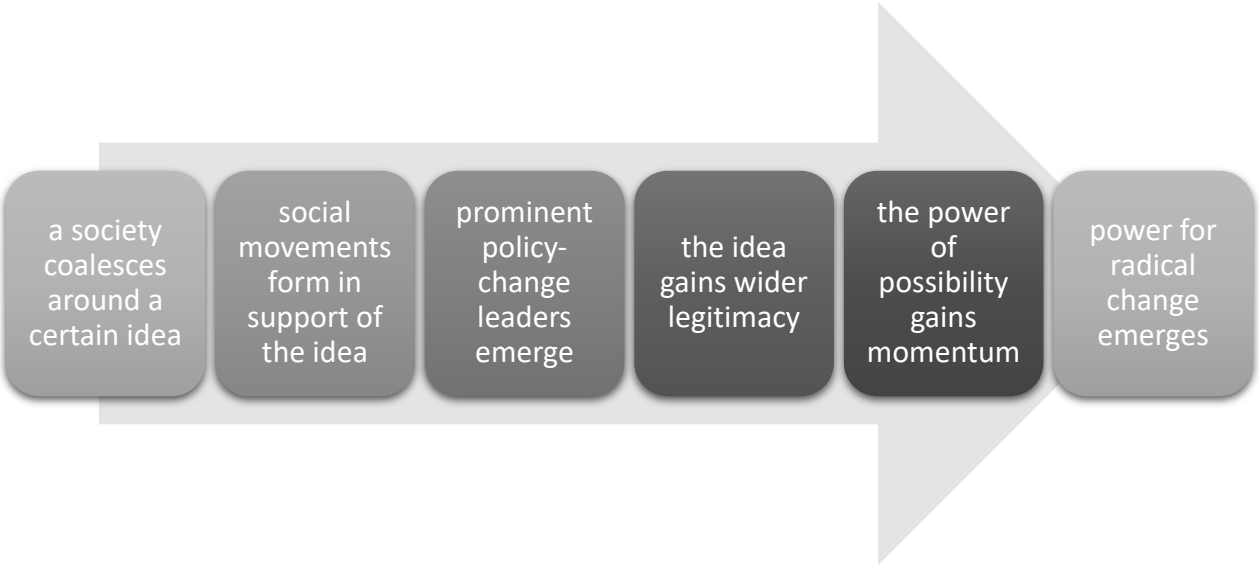
[12] Martin A. Nowak. "Five rules for the evolution of cooperation. *Science*, 314(5805), 1560-1563. p. 1560.
[13] Robert Axelrod and William D. Hamilton, "The Evolution of Cooperation," *Science,* 211(4489): 1390-1396.
[14] Sarah Mathew, "Evolution of Human Cooperation," In: James D. Wright (editor-in-chief), *International Encyclopedia of the Social & Behavioral Sciences*, 2nd edition, Vol 11. Oxford: Elsevier, 2015. pp. 259–266.
[15] E. O. Wilson, *Consilience: The Unity of Knowledge.*
[16] I do not claim that human nature somehow *determines* human behavior, preferences, and actions. To the contrary, no scientist anywhere believes in "biological determinism," and there is no evidence that any aspect of human biology fully determines human behavior (Pinker, *Blank Slate,* p. 112-113, 122). At the same time, science does tell us that not *everything* is socialized; human beings are not completely malleable (on this point, I find Pinker, *Blank Slate*, convincing). The argument at the other extreme from biological determinism – that we are born completely "blank slates" – has serious flaws too, and has been thoroughly disproven (Pinker, *Blank Slate*.)
[17] Rifkin, *The Empathic Civilization.*
[18] Donald E. Brown's list of human universals. (1991). *Human Universals*. New York City: McGraw Hill.

know that the brain's default mode is to think socially, whether we intend it to or not. On a psychological level, individual humans fail to thrive if they do not have social interaction, the absence of which leads to documented illness and even death in infants. It has been established that the need to be social is a stronger requirement for human flourishment than even food and water.[19]

This opens up the analysis in the field of international relations to investigate why such a fundamental quality of humankind – ultrasociality - translates into influence and how this might have an impact on international cooperation. Most IR accounts start with the material self-interest of states, but this overlooks the rise and spread of transformational cooperative ideas at the societal level as a prerequisite for cooperation among states. To operationalize this further, I identify a pattern by which a transformational idea galvanizes a transnational social movement, facilitates the emergence of new leaders, and eventually enables international cooperation to replace conflict or fill in new domains of human activity. Whether it is eradicating national sovereignty, exploring space for peaceful purposes, getting rid of the most powerful weapons on earth, or eliminating carbon emissions, transformational ideas tap into the power of possibility that humans crave.[20] Through analyzing the growth of social movements, narratives, and decision-making about and challenges to cooperation, I show why the human inclination to act with empathy and a sense of shared humanity mattered enough to resist those who would detract from these goals.



The next section engages in historical process-tracing of the case of space exploration. The 1960s Space Race is probably the most recognizable symbol of power competition in space, however, even in this period, and especially in the lead-up to it, actors from within the US and the Soviet Union cooperated significantly and in many ways. Indeed, archival evidence shows that they not only cooperated, but *competed to be seen as the most cooperative*. Each felt that

[19] Lieberman, *Social,* p. 43.
[20] My book manuscript delves into the biological, neurological, psychological, and evolutionary underpinnings of this. Mai'a K. Davis Cross, *The Ultrasocial World: International Cooperation Against All Odds,* book manuscript in progress.

there was an advantage to being the first to offer cooperation with the other. This approach really stands out in contrast to other areas of the Cold War, which featured far more ruthless power competition. To explain this, I draw out the difference between state and non-state actors, and go further back in time to the 1920s, when the early idea of human space exploration was starting to emerge in a more serious and tangible way. I argue that the societal-level spaceflight movement was crucial in assigning meaning to space exploration as a cooperative and peaceful endeavor in the early days of rocketry. I also suggest that space in particular has an inherent quality to it that tends to trigger a sense of common human identity. To the degree that competition was part of this, it was not so much conflictual as it was about helping to spur on a sense of human achievement.

The Interwar Period

For tens of thousands of years humans have looked upward to the stars, using them for navigation, inspiration, and wonder. 19th century science fiction (Jules Verne, H.G. Wells) played an important role in putting spaceflight into people's imaginations and dreams. In 1909, Robert Hutchings Goddard began working on rockets in the US with the intention of being able to eventually launch a rocket to the moon. After facing strong ridicule in the media for suggesting that a rocket could work in space, on March 16 1926, he was finally able to launch the first ever liquid-fueled rocket near his hometown of Worcester, Massachusetts where he was a professor at Clark College.[21] A year later, on the other side of the Atlantic, the Society for Space Navigation was formed and Hermann Oberth became a key figure in Germany working with groups of scientists to develop a liquid-fueled rocket, which they successfully launched in 1931. Space enthusiasts in Germany formed organizations like the Society for Space Navigation. The Russians were also making advancements in rocketry around this time, and were greatly impressed by both Goddard's and Oberth's work. They formed their own rocket group, Groups for the Study of Reactive Motion, known as GIRD. In particular, Konstantin Tsiolkovsky – a Russian schoolteacher and engineer, later known as the father of astronautics in Russia – had been doing parallel work on space rockets.

Thus, the interwar period featured the establishment of several amateur spaceflight organizations, which began to shape the terms of how humans conceived of space long before it was possible to actually go there. Organizations and space societies such as GIRD, the Society for the Study of Interplanetary Communications and the All-Inventors' Vegetarian Club of Interplanetary Cosmopolitans gained thousands of members, regular people who had become space enthusiasts. In this period of the1920s and 30s, the spaceflight movement had already emerged. It was comprised of a diverse network of individuals interested in philosophy, technology, and rockets.[22] These societal-level spaceflight organizations gained membership, became increasingly transnational, and did a lot of public outreach in an effort to stoke popular interest in space exploration (and even colonization). This public outreach worked. Regular people became fascinated with the possibility of space exploration. As Stroikos argues, it "was largely a social and cultural phenomenon evinced in a wide range of activities, including books,

[21] *The New York Times* finally published a retraction 49 years later of a 1920 commentary that ridiculed Goddard's efforts. Apollo 11 had landed on the moon. Douglas Brinkley, *Moonshot,* pp. 8-9.

[22] Stroikos, Dimitrios. "Engineering world society? Scientists, internationalism, and the advent of the Space Age." *International Politics* 55.1 (2018): 73-90. P. 77.

pamphlets, films, experimental research, and exhibitions."[23] Importantly, these amateur groups were highly transnational and diverse, by no means confined to just a few countries. These various groups eventually formed a strong transnational network with regular communication and exchange about everything from how to build spaceships to how to live on other planets. The deep ties across these groups were so significant that in 1931 there was discussion of possibly forming a common, supranational umbrella organization to bring them all together. [24]

Of the many rocket clubs that formed in the 1930s, only two of the original societies continued to exist in the 1970s: the American and British Interplanetary Societies.[25] This is partly because of the disruption of World War II, and partly because the goals of the movement had become much more mainstream and other organizations had taken their place. Bainbridge writes, "As important parts of the Spaceflight Movement, they show the typical evolutionary pattern of successful social movements: born in obscurity as deviant outsider organizations, they grow and mature until they finally gain the status of conventional institutions – more or less parts of the Establishment."[26]

There are various ways to understand why people came together to form such a movement devoted to spaceflight. Humans have long had a pioneering spirit of discovery, and the story of human history has often involved expanding boundaries. Alternatively, as Stroikos argues, "the idea of science and technology as a unifier of humankind couched in the language of scientific cosmopolitanism and universalism" is what spurred on the movement.[27] Others focus on the time period of the 1920s and the emergence of "scientific internationalism," a kind of supranational imagined community, led by both state and non-state actors.[28] While there were no doubt multiple motivations, they all have in common a fundamentally *social* underpinning. That is, those in the spaceflight movement saw humankind as a common civilization and space exploration as an intrinsically shared endeavor for the betterment of all mankind.

From World War II to the Space Race

World War II marked a turning point. During the war, many of the spaceflight groups went on hiatus, and governments started to pay more attention to the potential of space technology, especially rockets, to give them a military advantage in the war. Key spaceflight advocates, especially Wernher Von Braun in Germany, used the war as an opportunity to get more funding and support for the research that they knew would eventually lead to spaceflight. But as soon as the war ended, spaceflight enthusiasts resumed their activities in earnest. Members of the spaceflight movement had always shared the common goal of internationalizing their efforts, and they were able to achieve this in a far more formal way after the war. On September 30, 1950 the first meeting of the *International Astronautical Congress* took place in Paris. At the gathering, around 40 delegates from ten countries founded the *International Astronautical Federation*, bringing together 14 rocket societies. While it is true that military

[23] Stroikos, p. 81.
[24] Stroikos, p. 82.
[25] William Sims Bainbridge, *The Spaceflight Revolution: A Sociological Study,* Malabar, Florida: Krieger Publishing Company, 1983. Chapter 5.
[26] Bainbridge, The Spaceflight Revolution, p. 125.
[27] Stroikos, p. 87.
[28] Stroikos, Dimitrios. "Engineering world society? Scientists, internationalism, and the advent of the Space Age." *International Politics* 55.1 (2018): 73-90. P. 79.

efforts to develop missiles had significantly advanced rocketry technology, as in the past, their goals were to achieve peaceful spaceflight, international cooperation in space, and to build enthusiasm from the public. Before WWII, they had been often been seen as a kind of fringe movement of crackpots, but all of this changed after the war. In particular, plans started to emerge to formalize sharing of science, including most prominently space science, among dozens of countries across the globe, in what became the International Geophysical Year. This eventually triggered international plans to actually put the first satellite into orbit. While the standard historical narrative is that the Soviets worked on their own and surprised the world with the launch of Sputnik, the goal of achieving this milestone was actually born out of the International Geophysical Year. In other words, it was fundamentally a part of international sharing and cooperation, and it was openly known that a satellite would be launched during this period.

International Geophysical Year July 1957-December 1958

The idea for the IGY was born in 1950 amongst a group of Western European and American scientists.[29] The idea was floated among US universities, then smaller international groups of scientists, until finally in 1952 it arrived at the International Council of Scientific Unions (now known as the International Science Council) as a full-fledged agenda to include all major areas of scientific research.[30] At first only 26 countries were involved in planning the IGY, but that quickly grew. The Soviet Union came on board in 1955, especially in reaction to the news that the American plans included launching artificial satellites into orbit. Indeed, the Soviet Union became so involved after that that it offered a number of major initiatives and resources in nearly all areas of IGY planning, including 15 of the 48 ships for the oceanography section of the IGY.[31] The IGY quickly became the Soviet Union's highest priority in terms of allocating money, personnel, and resources, possibly even a higher priority than the US gave it.[32]

The timing of the IGY was designed to capitalize on a period of maximum solar activity,[33] as well as recent advancements in rocketry and computing. In October 1954, the Council passed a resolution specifically calling for the launch of satellites during the upcoming IGY. The IGY is often described as "the largest and most complex international scientific undertaking ever attempted" and beyond that, it is praised for "the contributions made by the IGY in overcoming ideological differences as a means of building bridges between science and diplomacy."[34] Indeed, the IGY could be a case study of ultrasociality in its own right given that sixty-seven countries, around 60 thousand scientists, and regular members of the public

[29] Korsmo, "The Genesis of the International Geophysical Year," p. 40.
[30] Harold Bullis, The Political Legacy of the International Geophysical Year, Washington: U.S. Government Printing Office, 1973; Krige, John, et al. NASA in the world: Fifty years of international collaboration in space. Palgrave, 2013. This was not entirely the first event of its kind as an International Polar Year was held 1882-1883 and 1932-33
[31] Korsmo, p. 41.
[32] Sullivan, *Assault on the Unknown,* p. 29
[33] "Sputnik and the Dawn of the Space Age," *NASA*. https://www.history.nasa.gov/sputnik/index.html Accessed January 6, 2019.
[34] Clement J. Zablocki, "Forward" in Harold Bullis, *The Political Legacy of the International Geophysical Year,* Washington: U.S. Government Printing Office, 1973.

(teachers, students, volunteers) participated and they spanned across the countries whose governments were on opposite sides of the Cold War.

The period from 1957 to 1958 represented an enormous flourishing of international scientific cooperation in a way that managed to overcome the barriers of the Cold War.[35] Literally thousands of stations set up around the world, filled with scientists, worked to advance knowledge in a multitude of areas. It was not limited to just the scientific elite of the world. There was a concerted effort to get the public involved, and it was such a significant issue for the world that *The New York Times* assigned a reporter to cover the IGY full-time.[36] Not only did it bring *humans* together, it also affirmed both that science could only advance through "experiments in concert," as Francis Bacon put it in the 17th century, and that natural events on the planet itself were all interconnected.[37] In this world, they believed, national boundaries are meaningless. Scientists have known this since ancient times, but in the context of the Cold War, the IGY was a good reminder.

When the IGY was over, the number of advancements and discoveries that had occurred as a result of such widespread scientific cooperation are too numerous to count. It made its mark in everything from atoms to human health to earth sciences to Antarctica to space. It has been described as "the single most significant peaceful activity of mankind since the Renaissance and the Copernican Revolution."[38] While the effort was clearly highly cooperative, the Cold War and the recent advent of nuclear weapons was certainly part of the context of the period. Governments saw the military implications in much of this even while civilian groups of scientists did not necessarily want to see it that way.

The cornerstone of the IGY was the "free movement of data."[39] In 1955, all participants in the IGY agreed to a resolution that all data resulting from the science over the Year would be freely and readily available to all. This was such a major part of the point of the IGY that many countries, including the US and Soviet Union, offered to support data centers to compile all of the discoveries in one place. Eventually, three World Data Centers were established for this purpose.[40] Eisenhower said, "the most important result of the International Geophysical Year is the demonstration of the ability of all nations to work together harmoniously for the common good."[41]

Notably, Russian government leaders were initially quiet about plans involving space, and the US goal of launching an IGY satellite. Khrushchev had not endorsed the idea of sharing its satellite program with the international scientific community, but after some efforts behind the

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[35] Fae L. Korsmo, "The Genesis of the International Geophysical Year," *Physics Today,* 60(7): 38- 43. July 2007.
[36] Walter Sullivan, *Assault on the Unknown: The International Geophysical Year,* New York: McGraw Hill Book Company, 1961. Acknowledgements.
[37] Sullivan, *Assault on the Unknown,* p. 4-5.
[38] Hugh Odishaw, organizer of US IGY contributions, as quoted in Sullivan, *Assault on the Unknown,* p. 4.
[39] Sullivan, *Assault on the Unknown,* pp. 34-35.
[40] World Data Center A was located in the United States, World Data Center B was in the Soviet Union (Moscow and Novosibirsk, Siberia), and World Data Center C was divided among Western Europe, Australia, and Japan. Each housed complete IGY scientific records so that nothing would be lost in the event that something happened to one of them. Sullivan, *Assault on the Unknown,* p. 35.
[41] As cited in Stroikos p. 86.

scenes, the Soviet Union joined this endeavor too in 1956. Scientists were able to convince the governments of the US and Soviet Union to make their satellites compatible in terms of radio frequencies. At the same time, cooperation was not totally open. The two governments shared a lot with the world as they made steps towards this goal, but were more tight-lipped when it came to failures along the way. As Korsmo writes, "The satellite launches of the IGY were among the most visible results of the participating countries' decisions to partially demilitarize science and participate in an open, civilian science program…the satellite programs were a huge step towards sharing scientific and technical information for peaceful purposes."[42] To be sure, there were state-level tensions that made for a few uncomfortable meetings of the IGY – the final IGY meeting in Moscow resulted in US-Soviet disagreement on precisely what satellite data to share – but for the most part the parties involved wanted to continue the cooperation they had launched even after the Year was over. Both Soviet and US delegates found ways to convince their governments to extend cooperative programs, and a number of major international committees continued to exist, including the Committee on Space Research.

Space Race

The start of the Space Race is usually thought of as when the Soviet Union launched *Sputnik* (the Russian word for satellite) 1 and 2 in the fall of 1957, and the United States launched Explorer 1 in 1958. However, there are at least four reasons why the Space Race was actually very cooperative, instead of just conflictual. Competition among the two super powers actually spurred on cooperation. **First**, the satellite launch occurred *during* the International Geophysical Year, meaning that the goal itself was a shared, international endeavor and the science needed to achieve it was being widely shared across countries. **Second**, as already mentioned, the Soviet Union and United States were collaborators on the satellite goals during the Year. There were differences in approach in this regard. For their part, Russian scientists were open about saying that they would not announce when their attempted first launch would take place. They took the approach that it was inappropriate to brag about experimental breakthroughs unless they were actually successful.[43] By contrast, Americans were very open about each phase of their satellite plans. Thus, when the announcement was made that the Russians had been first to get a satellite into orbit, many scientists were surprised.[44] But the two countries were still collaborating on many aspects of this, continually sharing scientific discoveries, along with all of the other countries involved in the IGY.

This leads to the **third** reason why "Space Race" does not really fully capture the sentiment of this time period. Sputnik had actually inspired the people. At the time, Space became, as one US general described it, "a glamorous and spectacular frontier" that had "generated worldwide public excitement."[45] Sputnik had put the issue of space squarely in the public eye. Indeed, it was so prominent that space had a central place in JFK's 1960 presidential campaign, long before his famous Moon Speech in 1962 (i.e. "We choose to go to the moon in this decade…").

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[42] Korsmo, p. 42.
[43] Sullivan, *Assault on the Unknown,* p. 66.
[44] Walter Sullivan, *Assault on the Unknown: The International Geophysical Year,* New York: McGraw Hill Book Company, 1961. Acknowledgements.
[45] Senate Committee on Aeronautical and Space Sciences, "Excerpts from General Schriver's Testimony before the Subcommittee on Governmental Organization for Space Activities," 23 April 1959. JFK Presidential Archives, Pre-Presidential Papers #2, Box 568, Folder 3.

Thus, there is a standard understanding of the Space Race, which is actually wrong. The usual story is that the launch of Sputnik 1 had an immediate and significant impact on American public opinion, sparking fear of a Soviet ballistic missile attack, and the loss of US power in the world. This in turn gave the government the ability to increase spending on space exploration. One of the most significant outcomes was the creation of NASA in 1958, which explicitly aimed to explore space for "peaceful purposes for the benefit of all mankind." NASA's existence meant that the use of rocketry technology for missiles and other military purposes could be clearly divided. The Department of Defense could pursue the use of these technologies for their own ends, while NASA could focus on science. However, the story was actually not so straightforward. Instead of a reaction of fear and desire to immediately compete with the Soviet Union, American citizens were excited about the development. As Roger Launius writes:

> Most Americans seemed to recognize that the satellite did not pose a threat to the United States and instead congratulations ensued and many people seemed excited by the Soviet success…it seems a generation of Americans embraced the dawn of the space age as a symbol of progress and a better future both on Earth and beyond. Raised on visions of human colonies on the Moon and Mars, great starships plying galactic oceans, and prospects of a bright, limitless future…"[46]

Five days after Sputnik 1 made it into orbit, President Eisenhower said:

> Every scientist that I have talked to since this occurred…has spoken in most congratulatory terms about the capabilities of the Russian scientists in putting this thing in the air. They expressed themselves as pleased, rather than chagrined, because at least the Soviets have proved the first part of it – that this thing will successfully orbit.[47]

Social anthropologists Margaret Mead and Rhoda Metraux conducted a survey of Americans three days after the satellite launch. They discovered that the vast majority of people were not surprised by the launch, and neither were they alarmed that somehow the US had lost something by not being first. A government survey found that only 13% "believed that we had fallen behind dangerously."[48]

Rather than immediate alarm over Sputnik, as Launius argues, Senator Lyndon Baines Johnson (LBJ) and other leaders from the Democratic Party used the event as political strategy. LBJ gave several speeches painting the satellite launch as a dangerous development for US security, seeking to turn this into a crisis. They essentially constructed an alarmist narrative surrounding Sputnik where none had existed before. Republican President Eisenhower for his part, did not do much to address the issue, or respond to the growing sense that the US was behind. With this leadership vacuum from the top, an epistemic coalition of a sort came together, comprised of "political opponents, scientists, military space advocates, space exploration enthusiasts, and leaders in the aerospace industry"[49] – many of whom were members

[46] Launius, "An unintended consequence of the IGY," pp. 257-8.
[47] As quoted in Sullivan, *Assault on the Unknown*, p. 77.
[48] As quoted in Launius, "An unintended consequence of the IGY," p. 258.
[49] Launius, "An unintended consequence of the IGY," p. 260.

of the spaceflight movement – to craft the US response. It was their initiative and lobbying that ultimately pressured the US Congress and Eisenhower to eventually and reluctantly create NASA. The agency ended up being much smaller than the epistemic coalition wanted - it ultimately reflected Eisenhower's political preferences for small government – but nonetheless they had managed to use Sputnik as an opportunity to form NASA, which actually takes a peaceful approach to space.

A **fourth** reason why the notion of "Space Race" is misrepresentative is also the fact that leaders – influenced by members of the spaceflight movement – emphasized space exploration as a *cooperative* endeavor, especially John F. Kennedy who clearly acted as an establishment outsider during his short time as president. On April 12, 1961, shortly after the Russians sent the first man into space, JFK sent a telegram to Khrushchev stating:

> "The people of the United States share with the people of the Soviet Union their satisfaction for the safe flight of the astronaut in man's first venture into space. We congratulate you and the Soviet scientists and engineers who made this feat possible. It is my sincere desire that in the continuing quest for knowledge of outer space our nations work together to obtain the greatest benefit to mankind."[50]

A short while later, summarizing the climate after two early meetings on space at the UN, a telegram from Geneva to the Secretary of State in Washington DC was also clear about the human, as opposed to national, potential of going into space in 1962:

> "It was now generally realized that international cooperation in the exploration and utilization of outer space would benefit all the nations of the world, irrespective of their size, political structure or industrial potential…one goal would undoubtedly be achieved: the nations of the world would come closer together and understand more clearly that they were members of one family – mankind."[51]

On June 18, 1963 a secret paper, addressed to McGeorge Bundy, Special Assistant to the President for National Security Affairs, and written by the US Department of State's Policy Planning Council, was discussed in a special planning group on the "Implications of Outer Space in the 1970s."[52] In this comprehensive paper, the emphasis was clearly on using space exploration for the acquisition of new knowledge through international cooperation. Its conclusions state that, "The nature of outer space activities themselves, and of the international context in which they develop, will necessarily lead to increased international interdependence in this field. International cooperation in space and space-related activities should be sought from the points of view both of the foreign support which the US program will need, and of the foreign policy objectives which can be served."[53]

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[50] The White House, Office of the White House Press Secretary, April 12, 1961, Box 308 National Security Files, JFK Presidential Archives.
[51] "Incoming Telegram from Geneva to Secretary State, Outer Space," Depatment of State, May 31, 1962. Box 308 National Security Files, JFK Presidential Archives.
[52] "National Security Policy Planning Paper: Implications of Outer Space in the 1970's," May 31, 1963, Box 308 National Security Files, JFK Presidential Archives.
[53] "National Security Policy Planning Paper: Implications of Outer Space in the 1970's," May 31, 1963, Box 308 National Security Files, JFK Presidential Archives.

While the competition with the Soviet Union and security implications were also clearly noted in the behind-the-scenes discussions, there was also much uncertainty surrounding this. There was an expressed feeling that the Russians were possibly not "racing" with the US to get to the moon at all. The secret paper stated explicitly that, "It should be acknowledged that the USSR has not, so far as we know, committed itself to a race for a manned lunar landing, and may not in fact have set other space goals. In the impression of most people, however, there is a 'race,' even if it is unacknowledged by the Soviets."[54] At the same time, it was in the US interest to be seen as *wanting* to cooperate with the Soviets in getting to the moon, and especially to being the *first* to initiate cooperation: "It would be better if we made the offer first. If we made such an offer and it were rejected, and we then won the race, we would gain doubly."[55] Despite all of the conflict in so many different sectors of the Cold War, somehow space was viewed as categorically different.

On October 26, 1963, Khrushchev made a statement stipulating clearly that the Soviet Union had no intention of participating in a "race to the moon," did not have a program to do so, and did not wish to embark upon a plan to achieve this. Kennedy administration officials believed this to be a sincere and truthful statement. As stated in a Department of State memo:

> We do not consider Khrushchev's statement to be play or deception. We believe it to be an authoritative statement of the present Soviet position…With respect to the prospect of cooperation with the Soviets in the space projects, our policy remains as restated by the President at the current session of the UN General Assembly. We are prepared to consider and possibilities for meaningful and workable cooperation with the Soviets in manned as well as unmanned space flight.[56]

As evidence of this, there was actually *a joint US/USSR Lunar mission* that JFK proposed to the United Nations. As Joseph B. Weisner, the Chair of the Science Advisory Committee in the Kennedy administration put it in 1963:

> I believe that Premier Khrushchev's statement on October 26 that the USSR does not plan to land a man on the moon gives us a unique opportunity to follow through on your UN proposal for a joint US-USSR program in a way that will not only be in accord with U.S. objectives for peaceful cooperation if accepted by the USSR, but will also decisively dispel the doubts that have existed in the Congress and the press about the sincerity and feasibility of the proposal itself. Specifically, I would propose a joint program in which the USSR provides unmanned exploratory and logistic support for the U.S. Apollo manned landing. I believe such a program would utilize the combined resources of US

[54] "National Security Policy Planning Paper: Implications of Outer Space in the 1970's," May 31, 1963, Box 308 National Security Files, p. vii, JFK Presidential Archives.
[55] p. vii
[56] Memorandum to P/PG – Mr. Herron from SCI – Robert F. Packard, "Khrushchev's October 26 Statement on the Race to the Moon," October 28, 1963, JFK Presidential Archives, National Security Files, Box 308, Space Activities.

> and USSR in a technically practical manner, and might, in view of Premier Khrushchev's statement be politically attractive to him.[57]

In reaction to this proposal Khrushchev accepted a joint moon landing in principle.[58] However, Khruschev was also vague about his concrete view on the matter. An internal US State Department intelligence memo put it this way:

> "He appears to regard the President's suggestion as a vague one, to which he can appropriately respond in vaguely approving terms without undertaking negotiations or obligations. We believe that he would be more positive and definite in response to a more specific proposal for cooperation on some particular aspect of a joint program which could be undertaken at an early time. We doubt, however, that he would be ready, for the sake of such a program, to make far-reaching commitments of Soviet resources or permit release of Soviet rocket technology at this time."[59]

Ultimately, for this reason and JFK's inability to convince Congress to fund a joint lunar landing, the plan did not move forward, but the tone and tenor of the discussions between the two was very much about conveying a desire to cooperate, and to explore space in a peaceful way, without weaponization.

While the four reasons identified above clearly show the cooperative underpinnings of the Space Race, it is also true that to some degree the militaries of the two main superpowers were making different calculations. The fact that the Russians launched a satellite into space meant that they had heavy-rocket propulsion capacity and were that much closer to having intercontinental ballistic missile technology than the US.[60] In this sense, the Space Race clearly also helped to feed a competitive, militaristic drive in some sectors of government.

The Chinese government tried to compete too, but the Cultural Revolution set them back as did its split with the Soviet Union. Eventually, China became the fifth spacefaring power in 1970 with the launch of its satellite *Dong Fang Hong* (DFH-1), translating to "The East is Red". After the Soviet Union and US, France and Japan in 1965 and 1970 respectively had also launched satellites with their own rockets into space. (China has since been an outlier in terms of international cooperation in space, although even Chinese scientists and space enthusiasts have participated in many cooperative ventures, especially with Europe, as long as they do not involve the US directly.)

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[57] Jerome B. Wesiner, "Memorandum for the President: The US Proposal for a Joint US-USSR Lunar Program," October 29, 1963, JFK Presidential Archives, National Security Files, Box 308, Space Activities.
[58] "Memorandum for Mr. McGeorge Bundy from the White House," November 7, 1963, JFK Presidential Archives, National Security Files, Box 308, Space Activities.
[59] "Intelligence Note: Khrushchev's obscure and noncommittal statements about moon shots," The Director of Intelligence and Research, Department of State, To the Secretary From INR- Thomas L. Hughes, November 5, 1963. Box 308, National Security Files, JFK Presidential Archives.
[60] Hannah Kohler, 2015, "The Eagle and the Hare: U.S.-Chinese Relations, the Wolf Amendment, and the Future of International Cooperation in Space," *The Georgetown Law Journal,* Vol. 103(5):1135-1162**.** p. 1138.

Once the first satellite was launched into space, the United Nations got involved, and set up an ad hoc committee for space in 1958.[61] A year later, this became a permanent committee, *The UN Committee on the Peaceful Uses of Outer Space*, or COPUOS, and had two subcommittees designed to oversee international cooperation in space. By 1966, the International Astronautical Federation had grown, representing 32 countries and 50 societies.[62] The big difference was that after WWII, the spaceflight movement was no longer comprised mainly of amateur enthusiasts. But as spaceflight became a reality, many of the most prominent founders of the transnational spaceflight movement turned themselves into legitimate experts. And they also gained the following of many new members as well as actual scientific experts. Their success was somewhat of a double-edge sword because the more they got people to believe in their mission, the more governments took over the cause. By the time the European Space Agency was founded, the original leaders of the movement were sidelined.[63]

Thus, the Space Race was not as simple as a geopolitical competition between two big superpowers. The advancements in space technology that occurred during this period were the result of unprecedented international cooperation on space exploration (the International Geophysical Year and the spaceflight movement, in particular), and was embedded in a global atmosphere of intense scientific collaboration. Subsequently, the UN formalized many aspects of international cooperation in space.[64] Most prominent are the 1963 UN *Declaration of Legal Principles Governing the Activities of States in the Exploration and Use of Outer Space* and the *1967 UN Outer Space Treaty*.[65]

When Apollo 11 landed on the moon in 1969, the spirit of the moment was not tribal, or nationalistic, even though it was an American mission. Indeed, the plaque commemorating the event, which still sits on the moon, reads, "Here men from the planet Earth first set foot upon the Moon, July 1969, A.D. We came in peace for all mankind."[66] This moment ended the main urgency of the Space Race as the goal of landing a man on the moon had been achieved.

International Space Station (still rough)

In the early 1970s, even before the end of the Cold War, the Soviet Union and United States were able to continue to put aside differences and cooperate in space exploration.[67] In 1972, they launched formal cooperation through Apollo-Soyez Test Project.[68] And once the Soviet Union began to fall apart a few years later, cooperation intensified in the 90s, and the two countries worked together to launch the first stage of the International Space Station in 1998.

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[61] Yun Zhao, "The Role of bilateral and multilateral agreements in international space cooperation," *Space Policy,* 36(2016): 12-18; UNGA Res. 1348 (XIII) (December 13, 1958), "Question of the Peaceful Use of Outer Space".
[62] Geppert, "Space *Personae,"* p. 282.
[63] Geppert, "Space *Personae."*
[64] Yun Zhao, "The Role of bilateral and multilateral agreements in international space cooperation," *Space Policy,* 36(2016): 12-18
[65] Its full name is, "Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies."
[66] As cited in Alexander C. T. Geppert (2008) "Space *Personae*: Cosmopolitan Networks of Peripheral Knowledge, 1927-1957," *Journal of Modern European History,* 6(2): 262-286. p. 262.
[67] Kohler, "The Eagle and the Hare," p. 1148.
[68] Nicolas Berniquez-Villemaire, "The United States and Russia cooperation paradox in human spaceflights: the role of the outer space international governance regime," International Studies Association Conference paper, 2019.

Since its launch, astronauts have continuously inhabited it with no gaps. Each team of 3-6 astronauts has been multi-national in composition although they consistently identify as from "planet Earth" rather than from any particular country. The activities, achievements, and operations of the International Space Station would not have been possible without sharing of technology and resources.[69] It is in many ways the pinnacle of what is possible in international cooperation. The explicit aims of international cooperation in this are:

> merging of different cultures and techniques reinforcing human communication capabilities across borders and language barriers, Reinforcement of young generation's motivation for space activities through this large scale, worldwide programme allowing continuous human activities in space.[70]

As Astronaut Alexander Gerst put it in a 2018 video call from the ISS to the International Astronautical Congress:

> I'm in the European module, but that is docked to an American module. Behind that is the Japanese module. Then there's another US module, and then there's a Russia module, and so on. We live in this amazing machine that was built by around 100,000 people. So far, we have conducted around 3,000 experiments in the lifetime of the ISS, and experimenters from more than 100 different countries participated in scientific experiments up here. That means that more than 100 nations have benefitted from the ISS. And it is obvious that this is a machine – some say it's the most complex machine that humanity has ever built – no single nation could have done that alone. It would be next to impossible to do that. By putting our international sometimes discrepancies aside and focusing on what unites us, our common visions, putting that together, enabled us to put together this machine. And if you think about it, those modules that we stuck together in space they were never stuck together on earth. They were never stuck together on earth….Some said it was not possible. Well, here we are, and that is a sign of what international cooperation can do…International cooperation will be the key for getting further out into space.[71]

The International Space Station is now over 20 years old, and reaching the end of its longevity. Plans are not yet solidified on how to replace it, and that will be a big test for a cooperative approach to space. If it is retired without a replacement, it would be the first time in decades that humans have not had a presence in space. The Chinese do have plans to build a space station, and are willing to allow other nations to use it, but they so far view it as a purely national project. At IAC conferences, these Chinese plans are met with consternation. Literally every plenary on space at this flagship annual conference emphasizes the importance of international cooperation.

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[69] Hannah Kohler, 2015, "The Eagle and the Hare: U.S.-Chinese Relations, the Wolf Amendment, and the Future of International Cooperation in Space," *The Georgetown Law Journal,* Vol. 103(5):1135-1162**.**

[70] European Space Agency Manned Space Programme: Draft Programme Proposal on the European Participation in the ISSA, ES/PB-MS(94)60, Paris 22 December 1994. p. 2, ESA File 18499, EUI Historical Archives.

[71] Participant observation, International Astronautical Congress, Bremen, Germany, October 2018.

For example, Sylvian Laporte, Canadian Space Agency President, said at one of these plenaries, "we all know how important it is to collaborate internationally in order to have success in space." NASA Administrator, Jim Bridenstine said, "we can't do what we do without the support of our international partners...There are more space agencies on the planet today than ever before…that means we have been able to do more today that we have ever before…We want to do more than we've ever done before and collaboration and cooperation is the way to get it done." The Indian Space Agency representative said, "Unless everyone comes together, won't be possible." Germany: "in the past we had the money and gave it to industry…in the future we will be working with industry" "we are trying to put together agencies, industries, and universities to provide them with a platform"

Similarly, Evgeny Mikrin, General Designer of RSC Energia, said,

> ISS was the first to have an integrated system as soon as two major segments were on the ISS. Life support, guidance & navigation, mission control system, and the crew are all integrated. Within this integration we have reached and taken all the best that each of us have had. We were completely different engineering cultures before we joined and worked together. Being integrated, we have achieved a very synergistic effect. None of our partners would have been able to have this achievement by themselves. This nice experience cannot be lost. We have to move together working together. We consider and take into account the problems that arise when we work together. When we discuss future progress of deep space missions, we have already dealt with problems that have been solved on the ISS.

Private companies are no exception to international cooperation. Mark Mulqueen of Boeing said at the IAC, "International cooperation of space goes back thousands of years…Today, there's actually 103 nations that have put science, hardware, people, or payloads into the ISS." He then emphasized that as we look to the future, the Moon and Mars, international cooperation will continue to be really important. Aspects of this are helping directly on earth – osteoporosis, MS, cancer, growing of crops – drugs and crop efficiency have been studied in space that have led to improvements on earth.

(More to be added from participant observation in October 2019)

Space Today (still incomplete)

The UN Committee on the Peaceful Uses of Outer Space now has 87 member states, and a growing number of NGOs and IGOs as official observers, making it one of the biggest UN committees in existence. Over 60 countries or governmental organizations as well as many private and scientific actors have satellites in space.[72] 17 countries have official space programs. This amounts to around 1,700 active satellites in addition to tens of thousands of other man-made objects orbiting Earth. The commercial side of space exploration is now crucial. In 2016, 76%

[72] Frank A. Rose, "Safeguarding the Heavens: The United States and the Future of Norms of Behavior in Outer Space," *Brookings Policy Brief,* June 2018.

of the world's space economy was the result of commercial entities operating in space.[73] Lockheed, Boeing, SpaceX, Blue Origins, and Virgin Galactic are prominent among them. Several of these non-state entities are working rapidly on developing the technology to travel regularly to Mars, with the aim of allowing people to be settled there for some period of time. One of the key challenges for these non-state entities, and one they are determined to overcome, is the issue of cost. While putting people on Mars for the long term seemed extremely far-fetched just a few years ago, it is rapidly become within reach. Perhaps most prominently, in 2016, Elon Musk, the head of SpaceX, gave a speech at the annual International Astronautical Congress mapping out the precise steps required to make regular travel to Mars a reality. His solution to the cost problem was the creation of a reusable launch system, which he successfully created and used for the first time in March 2017, representing one of the biggest advancements in spaceflight in recent years. Leading experts in space have long argued that settling in Mars will only be possible with long-term international cooperation.

Still notably absent from international space cooperation is China. This has been largely self-imposed. The country has engaged in space espionage, has been caught on multiple occasions stealing information from NASA, and was also responsible for the creation of significant space debris when it used anti-satellite technology to blow up one of its own satellites in 2007. The US and China under Obama made big advancements in communicating and promising to cooperate more in space, but this has unraveled under Trump. However, China's behavior in particular is the exception rather than the rule, and the country is clearly regarded as in violation of widely shared international norms. Both Russia and China are developing anti-satellite weapons technology, which is largely frowned upon, but Russia is far more cooperative than China, contributing in major ways to the ISS. China claims it will soon launch its on space station, and that it is willing to cooperate with the UN on it. The Chinese space program says that any UN member state, particularly developing countries, and non-state actors (universities, research institutes, private companies) can apply to conduct experiments through the future Chinese Space Station.

While the UN is still the main venue for state-level agreements on space cooperation. There are four main treaties in this regard: the Outer Space Treaty, the Rescue Agreement, the Liability Convention, and the Registration Convention. The Moon Agreement to designate the moon as part of mankind's common heritage, was attempted, but is significantly weaker given that the main spacefaring nations did not sign on to it.

(more to be added)

Conclusion

The case of space as part of the global commons shows that at the level of society, the idea of exploring and understanding space has always been fundamentally a human, rather than nationalist, endeavor. To the extent that there was an impetus in the early years to explore space, it came from space enthusiasts, rocket societies, scientists, and the public. This emerging space

[73] The Space Foundation, "Space Foundation Report Reveals Global Space Economy at $329 Billion in 2016," press release, August 3, 2017, www.spacefoundation.org/news/space-foundation-report-reveals-global-space-economy-329-billion-2016. As cited in Rose, "Safeguarding the Heavens."

community was not confined to the United States, but was actually transnational and international in nature, and its members had a keen understanding that to succeed at their goals, they needed to cooperate across borders. As leaders emerged from this spaceflight movement and scientific breakthroughs were made, umbrella organizations, such as the International Astronautical Federation, brought people together. They started to be regarded less as a fringe movement, and more of a mainstream group that governments could not afford to ignore.

As governments took an interest in space, they did bring a militaristic and competitive drive to it. In the shadow of the Cold War, alongside the development of powerful rockets, this was perhaps inevitable. However, I argue that even during the most competitive period, nearly every aspect of the activities leading to space exploration were cooperative in nature, even between the two big superpowers. It is little recognized that Sputnik was born out of the biggest international scientific sharing of knowledge that had ever happened to that point – the International Geophysical Year – and that the moon landing was actually at one point conceived of as a cooperative mission shared between the US and USSR, among other things. The archival record shows clearly that the two biggest superpowers were reluctant to come across as seeming to be unwilling to cooperate with the other when it came to space. At the societal level, as always, public enthusiasm for the adventure of space, and celebration of any milestone as a human accomplishment was very clear.

After the Space Race era, the cooperative nature of space exploration becomes even easier to see. The International Space Station is unabashedly cooperative, and plans for the future continue along these lines, even involving private companies in ways that require international cooperation and a sense of discovery.

Political scientists tend to gravitate towards theories of competition and conflict, and as a result, if space exploration is addressed at all, it is assumed to be simply an offshoot of the Cold War. As such, the common perception of the "Space Race" is not questioned. However, if we really want to understand space as part of the global commons, it is necessary to peel back the veneer of competition and understand how the actors involved actually approached it, and how they continue to see it today. By using the lens of human ultrasociality, this paper seeks to emphasize a different starting point for the analysis of international cooperation. In this light, there are reasons to be optimistic about space as part of the global commons. Space may indeed be an easy case for a productive approach because more than in other areas, it is inherently about the common identity of humans from planet Earth.