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#### In 1967, major space powers celebrated the advent of the Outer Space Treaty and its designation of space as the global common heritage of humanity. No state could claim sovereignty over space, and all had equal right to access it, due to the seemingly natural boundary between space and sky. This principle seemed radically inclusive of the Global South, but was soon exposed as a power grab—dominant states quickly filled the skies with satellites in prized geosynchronous slots before marginalized states could even launch a rocket, expanding the imperial power gap and further excluding these states from the benefits of space.

#### Nine years later, these actors fought back. Brazil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda, and Zaire authored the Bogotá Declaration, which reframed geosynchronous orbit not as a global commons, but as a resource subject to the sovereignty of the nations whose territories corresponded with the slots above them.

#### The Declaration was defeated thanks to pushback by the US, echoed by other states of the Global North. However, the lessons of Bogotá hold relevance to the topic by exposing the political construction of space and how extra-terrestrial demarcations influence Earthly exclusions.

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When the first satellites and spacecraft entered orbit in the late 1950s, questions about outer space, law, and sovereignty began to arise. Did laws exist in outer space? Did states’ territories extend vertically into outer space? If so, how far did they go? Outer space presented a challenge that had not been encountered with most other natures: outer space in general – and orbits in particular – did not fall squarely into one or multiple territorial jurisdictions. Outer space surrounded Earth. Because of this incongruence, its legal status was unclear, and so, too, was how activities in outer space would affect political, economic, and social relations on Earth.

Fearing the extension of Cold War tensions and exacerbation of disparities in economic development at a time of formal decolonization, several states at the United Nations set forth to devise laws and regulations to govern this resource of uncertain jurisdiction. On January 27, 1967, the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies opened for signature. This treaty addressed how outer space and the benefits from activity there would be incorporated into terrestrial relations. For its time, its content was seemingly radical. Not only did the treaty declare that the exploration and use of outer space “shall be carried out for the benefit and in the interests of all countries,” and that outer space “shall be free for exploration and use by all States … on a basis of equality” (United Nations, 1966), the second article banned all forms of national appropriation, including by claims of sovereignty, of any part of outer space. This was the first multilateral legal instrument in which “centuries old state sovereignty gave way to international global commons” (Jasentuliyana, 1999, 33).

Largely because of these provisions, outer space was and continues to be celebrated as a “global commons” and “global resource” along with Antarctica, the high seas, and sea floor (Buck, 1998, Vogler, 2000). Much academic literature addressing “global commons” and “global resources” extends from historical descriptions of the issues, concerns, and politics of the negotiations (e.g. Elliot, 1998, Vaughn, 2007) to evaluating and analyzing the success and limitations of the governance regimes (e.g. Buck, 1998, Vogler, 2000). In such accounts, however, there is little concern for how resources come to be located beyond sovereign jurisdiction and why all states have legal access to them – that is, how they come to be “global”: The spatial extent or location of the resource beyond or across multiple sovereign territories is taken as given. Outer space’s supposedly given extra- or trans-territorial character is the origin of and reason for the construction of that resource as a “global commons” or “global resource.” In this sense, the legal provisions that ban sovereign claims and ensure equal access to these resources are treated as de facto outcomes of the incongruence of the spatial extent of the resource with existing territorial jurisdictions.

In this perspective, the “global” character of these spatially vast resources is often tied to the connection to Earth as a physical unit. As in other deployments, such as “global” environmental issues or threats, the adjective “global” is used to distinguish large-scale (either in Cartesian extent, degree of socionatural interconnectedness, or number of states affected) biophysical objects, phenomena, or processes from ones smaller in scale or within particular bounded territories (Dalby, 2008, Herod, Wright, 2002, Mansfield, 2008, Marston, 2000). At the same time, the term’s “invocation of the globe” suggests “a naturalism, a taken-for-granted, obvious space and political context” (Dalby, 2008, 428).

Because of this “naturalism,” however, global environmental issues, global resources, and global commons often are taken for granted as ontological givens both in popular discourse and in geopolitics and international relations literature (Bulkeley, 2005). As highlighted in recent works on various “global” environmental issues (e.g. Bumpus, Liverman, 2008, Liverman, 2009, Swyngedouw, 2010, Whatmore, 2002), the prima facie acceptance of natures as “global” masks important ways such natures are materially or discursively incorporated into political, social, and economic processes. As Bulkeley (2005, 879) explains, “This naturalization of the ‘global’ as the arena in which designated global environmental problems take place effectively serves to disembody the causes and consequences of such problems, and their construction as such, from practices and politics taking place at a multitude of sites and scales of governance.”

Drawing from such critical takes on “global” environmental issues, this paper employs a production of nature approach that attends to the role of the biophysical properties and the politics of their scalar construction to argue that “global” natures are far from ontologically given and are instead socionaturally constructed. While the vast, encompassing spatial extent of such natures is central to the way these natures are legally and politically governed, the spatial extent is also a particular site of scalar political contestation. Indeed, these scalar constructions of nature fundamentally affect how the resources are incorporated into political-economic processes. Questioning the “global” character of these natures in this way reveals the power asymmetries at the heart of such constructions.

To do this, I focus on the legal history of outer space. Outer space is central to the operation of routine political-economic processes that shape terrestrial geographies (Dickens, Ormrod, 2007, Dodge, Perkins, 2009, MacDonald, 2007, Warf, 2007). For example, orbits are used for a host of activities, including military surveillance, navigation, communication, and remote sensing, which amount to, by “the most reliable estimates,” US$150–165 billion in revenue for worldwide space-related products and services (OECD, 2011, 9–12). The benefits of these space technologies have been uneven, however. Satellites space technologies, for example, have reflected terrestrial power relations (i) through large, long-standing imbalances in the number of satellites, especially communications and reconnaissance, and in the number of earth stations between industrialized and developing countries, (ii) through imbalances again between industrialized and developing countries in participation in international satellite organizations, (iii) through re-regulation, neoliberalization and privatization of major satellite networks such as Intelsat, which are primarily based in industrialized countries, and (iv) through the commodification of satellite-based and enabled products, such as photo imagery (Warf, 2007). Moreover, they have been used to exert global military power across Earth through surveillance from orbit (MacDonald, 2007), which, for example, the US military utilized to carry out anti-terrorism operations in Afghanistan in the early 2000s (Beck, 2003) and to locate and capture of Osama bin Laden (Whitlock & Gellman, 2013). In these ways, outer space has been a means to contemporary imperial practices on Earth (Dickens & Ormrod, 2007).

This paper demonstrates how outer space was legally and scientifically constructed as a “global” resource – and not as one that could be divided into sovereign territories – and how dominant states constructed outer space and orbits as “global” natures for their own benefit. It begins with a brief overview of the production of nature approach, which, unlike most geopolitics and international relations approaches, recognizes space and nature as socially constructed and recognizes the role of the biophysical characteristics of natures in the production process. Following McCarthy’s (2005) call to examine the production of nature and scale as one process, this analysis recognizes the centrality of the politics of scale as part and parcel of the production (and definition) of these natures. The second part of this paper demonstrates how and why outer space has been constructed as a “global” nature. This empirical section first focuses on the socionatural production of outer space as a “global” nature in the drafting of the “Outer Space Treaty” in the 1960s, highlighting the role of movement of materialities in this process. It then discusses the role of materialities and the politics of science in the political contestation over the location of the border between sovereign air space and “global” outer space in the 1970s. The outcomes of this debate are central to the ways in which outer space has been incorporated into uneven political and economic processes and relations. By excavating the socionatural construction of outer space, we can open up the political-economic unevenness that the moniker “global commons” obscures.

Approaching global natures

In order to reveal the constructed and political character of “global” natures, this paper argues that the production of nature approach is a useful path of analysis. The production of nature approach derives from Lefebvre’s production of space thesis, in which space, rather than being abstract and ontologically given, or purely relative, is understood as embodying social relationships (Lefebvre, 1991, 27). Thus, rather than ontologically given and distinct from social forces, space is quintessentially social and is a fundamental part of the political, economic, social, and ecological organization of society. Seen this way, the givenness of “global” natures comes into question. For example, Dodds (2010) examines competing contemporary political constructions of the Arctic, and Dittmer, Moisio, Ingram, and Klauss (2011) show how “embodiment, the resolutely translocal, and the everyday” shape current political constructions of that region. Similarly, Steinberg (2001), in his Social Construction of the Ocean, deftly critiques the idea that oceans are and have been homogenous spaces across time. For Steinberg, constructions of ocean space are reflective of existing political–economic structures and institutions of particular time periods. Collis (2009), too, writing about outer space, employs a legal geography framework to demonstrate how the laws governing outer space socially construct outer space.

In these accounts, however, nature remains secondary and is not given the same analytical treatment as space. According to the production of nature perspective, nature is intimately and inseparably intertwined with both space and society (Smith, 2008). Like Lefebvre’s space, nature in this approach is not seen as ontologically given. It is “malleable, transformable, and potentially transgressive” (Swyngedouw, 2004a, p 96). It is produced through both material transformations and discursive and symbolic representations of it. Importantly, how nature is produced through this process affects the production of particular socio-ecological outcomes (Braun, 2000, Castree, 1995, Castree, Braun, 1998, Smith, 1996, Swyngedouw, 2004a). The term “socionature” attempts to capture this inseparable intersection between society and nature.

Demonstrating this approach, Bumpus, Liverman, 2008, Cohen, McCarthy, 2014, Demerritt, 2001, Liverman, 2009, and Swyngedouw (2010) all discuss the various ways in which climate change and carbon dioxide have been constructed as “global” natures and the various political consequences of such constructions. Similarly, Liverman, 2009, Taylor, Buttel, 1992, and Whatmore (2002) address the constructedness of biodiversity. In these analyses, the “global” natures in question and the spaces they constitute are not understood as ontological givens or as separate from political and economic concerns; they are understood as constructed and tied to social, political, and ecological contexts and interests.

In this production of nature approach, social processes do not simply act on an external nature: the biological, physical, and chemical properties, or “materialities,” of particular natures play an active role (Castree, 1995, Castree, 2002). The physical characteristics of natures and resources affect how they are exploited, managed, governed, and consumed; they affect social processes and organization. It is not just the solid, physical substrates that constitute materialities: As scholarship on oceans and seas has argued, movements, fluidity, and rhythms (including stasis) also make up very material qualities that shape society and social processes (Anderson, Peters, 2014b, Bear, Eden, 2008, Jones, 2011; Lambert, Martins, & Ogborn, 2006; see also chapters in Anderson & Peters, 2014a). Similar to conditions with outer space described later, the dynamic character of oceans and materialities within them, for example, disrupt the operation of land-based forms of fixed borders and territory at sea. Furthermore, thinking through both the physical substrates and their dynamism allows for better understanding of how power and the politics of territory operate through volumes rather than across simply horizontal or vertical surfaces (Steinberg & Peters, 2015). This interaction between materialities and social processes exemplifies how society and nature are simultaneously and mutually produced. With “global” natures, their material extent, relative location to other spaces and natures, and movement shape social processes while social processes shape them.

Recognizing the importance of materialities also requires accounting for the ways in which humans understand the material natures that they seek to transform and incorporate into production processes. This includes the discursive and representational practices (of which “science” is a part) that are “constitutive of the very ways that nature is made available to forms of economic and political calculation and the ways in which our interventions in nature are socially organized” (Castree & Braun, 1998, 16). For “global” natures, this may very well include determining the nature’s spatial extent and other physical characteristics, as it does for outer space. Moreover, sociology of scientific knowledge approaches situates the scientific production of knowledge within larger, power-laden social and institutional contexts, but simultaneously do not neglect the importance of materialities of natures in the production of that knowledge (Castree & Braun, 1998, 26). For example, in his work on the role of geological mapping in constituting political rationality in British Columbia, Braun shows how “nature’s ordering in and through modern forms of knowledge is related to, and in part constitutive of, the ways in which nature is integrated into forms of economic and political rationality” (Braun, 2000, 13–14). Science, then, is by no means apolitical, despite what politicians (and physical scientists) may claim. Rather, scientific understandings and framings of particular materialities shape political contests over how natures should be incorporated into political–economic processes and discourses (Cohen, 2012, Cohen, McCarthy, 2014, Demerritt, 2001; Liverman, 2009, Swyngedouw, 1999, Swyngedouw, 2004a, Swyngedouw, 2004b, Whatmore, 2002, Whitehead, 2009, Whitehead et al, 2007). As this paper shows, competing scientific understandings of orbital materialities configured debates over the spatial extents of the outer space legal regime. Recognizing the politics inherent in scientific framings of natures is central to unlocking the contested character of “global” natures and their coproduction as socionatures.

The framing of natures also includes the construction of a resource’s scalar dimension (McCarthy, 2005, Neumann, 2009, Sayre, 2005, Smith, 2008, Swyngedouw, Heynen, 2003). Like with space and nature, scale is produced through multiple social processes and strategies. “Local,” “regional,” “national,” and “global” scales are not pre-existing or given: they are created as part of the socio-spatial organization of political–economic development, and thus are always subject to change (Brenner, 1998, Herod, Wright, 2002, Marston, 2000, Smith, 2008). The production of scale involves both the ecological or material extent of the resource (Sayre, 2005, Sneddon, 2003) and discursive practices (MacKinnon, 2011, Marston, 2000, Moore, 2008), including those that define the material extent. Scale can thus be seen as socially produced, as discursively deployed, and as a political tool (MacKinnon, 2011). Several authors writing about hydropolitics have been particularly adept at demonstrating how the scaling of water and watercourses are inseparable from political–economic processes and projects (e.g. Bakker, 2004, Cohen, 2012, Cohen, Bakker, 2014, Harris, Alatout, 2010, Sneddon, 2003, Sneddon, Fox, 2006, Swyngedouw, 1999, Swyngedouw, 2004a, Swyngedouw, 2004b). Adding to this, Sneddon and Fox (2006) and Harris and Alatout (2010), for example, both show how actors employ and perform discursive scalar politics to define biophysical materialities and achieve particular projects. “Global” natures are not inherently “global” natures: they are made so and performed as such to engender particular social outcomes.

The section that follows demonstrates how this production of nature approach destabilizes prevalent conceptions of “global” natures as fixed and pre-given apolitical objects that humans politically confront, exploit, or manage. Destabilizing and politicizing global natures in this way entails seeing space, nature, and scale as socially and simultaneously constructed rather than fixed, pre-given, and separate. It entails recognizing the ways in which biophysical materialities are entangled in politics, including in the deployment and performance of scalar discourses. Analyzing global natures as socionaturally constructed rather than as inherently “global” illuminates the contested politics present in the construction and invocation of certain natures as “global” and how the construction of “global” socionatures effectively perpetuates political–economic disparities.

Two vignettes from the history of the production of outer space illustrate this destabilization of “global” natures. The first provides some background to the United Nations governance of outer space and highlights the role of astrophysical materialities, including the movement of Earth, in shaping the scalar politics and the construction of nature in the Outer Space Treaty of 1967. The second vignette concentrates on a declaration made by Equatorial countries in 1976 to contest the location of the border between outer space and Earth. In accounts of the legal regime mentioned above, this declaration receives little more than passing attention. Yet, this contestation involved scalar politics and the construction of nature at its core. Excavating this declaration and the debates surrounding it through the statements of country representatives at United Nations meetings shows how the construction of outer space as a “global” socionature reproduced uneven political–economic hierarchies.

Constructing outer space as “global resource”

Regulating outer space

By the late 1950s, many governments saw the need to formally regulate how outer space should be used, by whom, and for what purposes. Some governments were concerned with the application of the new space technologies; others, by the prospect of the extension of the arms race into space and the threat to safety and peace on Earth. Still others were wary of the ability of only two countries to employ these new technologies to their advantage and to the benefit of few others. International regulation of outer space was seen as the best way to ensure that outer space would not become an extension of the problems on Earth. For much of the 1960s, UN delegates worked toward developing a treaty that would address these concerns. That meant codifying a particular construction of outer space.

In 1958, United Nations General Assembly (GA) Resolution 1348 (XIII) established an 18-member Ad-Hoc committee to determine the UN’s ability to regulate and support activities in space and investigate the legal questions that may arise from the exploration of space (United Nations. General Assembly, 1958). Soon after, the GA formally established the Committee on the Peaceful Uses of Outer Space (COPUOS). The committee was (and still is) divided into two subcommittees, the Legal Subcommittee, which formulates and debates laws and regulations, and the Scientific and Technical Subcommittee, which addresses the more “scientific” aspects of the coordination of space exploration and application of space technologies.

At its inception, COPUOS consisted of 24 member states, dominated in representation by those states with the ability to reach space, as the US and Soviet Union had agreed (United States Government. Department of State, 1959). Indeed, for the laws to be successful, those most affected (the “dominant parties”) needed to support the international regulations (Cheng, 1997, Lyall, Larsen, 2009). The committee was hardly “global” in its representation. It included twelve countries from Europe (not counting the Soviet Union) and none from Africa, but was expanded in 1961 to include Chad, Mongolia, Morocco, and Sierra Leone, to account for more geographical representation. It remained that way until 1973. Built into the structure of this governance body, then, was a technological, economic, and geographical unevenness of representation that, from the start, calls into question how “global” in inclusivity this commons has been.

Astrophysical materialities and the outer space treaty

Shortly after the first space flights in the late 1950s, UN delegates, including the US, had begun to generate principles to govern outer space and contemplate what space flight meant for the extension of sovereignty. Turning to precedent, as is common in international law, many delegates recalled the international response to the flights of Sputnik and other satellites. As the delegate of Peru (and others at different points) observed, during the early satellite flights, no states complained about the flight of the satellites over their territories, which demonstrated that states did not recognize those flights as violations of their sovereignty and thus, that sovereignty did not apply there (United Nations. General Assembly. First Committee [“GA First Committee”], 1959a). Although some states questioned this logic (Christol, 1982), this precedent provided strong grounds for banning sovereign claims in outer space and was an argument commonly used to justify that outer space was free for any state to use and, hence, that it was “global” in character.

Legal scholarship at the time also pointed out another argument – one based on the material rotation of Earth and Earth’s movement through outer space – that provided a seemingly apolitical, “natural” basis. Lawyer C. Wilfred Jenks provided a subsequently often-cited explanation for the prohibition on sovereignty in space. As he wrote, there were fundamental difficulties with simply extending borders vertically into outer space:

The first is that any projection of territorial sovereignty into space beyond the atmosphere would be inconsistent with the basic astronomical facts. The revolution of the earth on its own axis, the rotation around the sun, and the motions of the sun and the planets through the galaxy all require that the relationship of particular sovereignties on the surface of the earth to space beyond the atmosphere is never constant for the smallest conceivable fraction of time. Such a projection into space of sovereignties based on particular areas of the earth’s surface would give us a series of adjacent irregularly shaped cones with a constantly changing content. Celestial bodies would move in and out of these cones all the time… By reason of basic astronomical facts, space beyond the atmosphere of the earth is and must always be a res extra commercium incapable of appropriation by the projection into such space of any particular sovereignty based on a fraction of the earth’s surface. (Jenks, 1958, 389–90)

Until that point historically, the extension of political boundaries and political control had occurred through simple geometric extension of borders – horizontally across the surface of Earth or vertically into air or ground. As Jenks points out here, simply extending borders infinitely into space was incongruent with the physical movement of Earth; the spinning of Earth and the revolution around the sun, though regular in rhythm, were out of synch with static and rigid political borders. This necessitated a different legal status. Delegates in the General Assembly cited this and other lawyers’ similar arguments as reason why there could and should not be sovereign claims in outer space (see, e.g. GA First Committee, 1959a). In essence, the material movement of Earth was used as a basis for distinguishing the space of outer space from terrestrial space. This demarcation early in the development of the regime set the stage for the negotiations that would further distinguish the legal character of outer space and legally construct the space, nature, and scale of outer space.

By 1961, there was already wide agreement in the General Assembly and COPUOS that sovereignty in outer space should be prohibited. Forbidding all sovereign claims in space (including claims over non-contiguous spaces) was a way of ensuring that space would not become the domain of just the US and USSR and would also help prevent the extension of Cold War hostilities to space. The UN General Assembly codified this prohibition through Resolution 1721 A, which laid the foundation for the “Outer Space Treaty” (“OST”). This resolution demonstrated a “common expectation” among states of how outer space should be used (McDougal, 1964, 120; see also Lachs, 2010, 127–8) and could be considered customary international law (Jasentuliyana, 1992, 27), reflecting a concurrence of the independent legal opinions of affected (i.e. dominant) states (Cheng, 1997). Several years later, the prohibition appeared in its final version in Article II of the OST: “Outer space, including the Moon and other celestial bodies, is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means” (United Nations, 1966). This article instantiated the non-appropriation of outer space in treaty law (only binding on states party to the treaty) and confirmed it as part of general (customary) international law (applicable to all states) (Cheng, 1997).

Tied to this rejection of sovereign claims in space was the idea that outer space, in contradistinction to airspace, was to be free for use by all countries. For many of the new and less economically developed countries at the UN, the fear was that the US and USSR (and to a lesser extent, other economically developed countries) would be the states that would most greatly benefit militarily and economically from the use of space, which would only serve to increase the disparities between the groups of states. Even before many space activities went into operation, several members of the UN called for activities in space to be used for the benefit of all countries (United Nations. General Assembly. First Committee, 1959a, United Nations. General Assembly. First Committee, 1959b). In late 1961, the General Assembly formally recognized the need to share thebenefits of space in the preamble of Resolution 1721 A, although the recognition was not legally declaratory or binding (Cheng, 1997). In the initial US outline of points to include in the OST, Article I referred only to the freedom of states to conduct activities in space (United States Government. Department of State, 1966). The first article in the Soviet draft treaty was based upon the two preambulatory clauses in Resolution 1721 A, which referred to the “common interest of mankind,” the need for international cooperation, and the belief that “mankind” and all states should benefit from space activities (United Nations. General Assembly. Committee on the Peaceful Uses of Outer Space. Legal Subcommittee [“Legal Subcommittee”], 1966a, 3). The non-space powers pushed for greater emphasis of the ideas from 1721 A, arguing, for example, that Article I should focus on cooperation, regardless of level of development (Legal Subcommittee, 1966b, 8) and that the “common interest of mankind” should be stated in that article as well. Indeed, following its further negotiation in a working group, Article I appeared largely in its final form (Legal Subcommittee, 1966c, 8), which reads: “The exploration and use of outer space, including the Moon and other celestial bodies, shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific development, and shall be the province of all mankind” (United Nations, 1966). Although some space lawyers point out that the terms “benefit” and “mankind” have unclear and uncertain meanings (Adams, 1968, Bueckling, 1979, Christol, 1991, Gorove, 1971, Markoff, 1976), this article constructed outer space as a space in which activities were to be carried out and as a nature that was to be used for the benefit of all countries – very unlike activities conducted and natures exploited within sovereign airspace.

On December 19, 1966, the UN General Assembly passed the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies. The Treaty was opened for signature on January 27, 1967 and entered into force almost nine months later on October 10, 1967 with both the Soviet Union and the United States (among others) having ratified it. The foundation for the outer space legal regime, this treaty formalized in treaty law the conditions under which human use and exploration of outer space would proceed; it confirmed “in treaty language the principles and rules already adopted and accepted as law” (Lachs, 2010, 128). By limiting and permitting certain activities that could occur there, the treaty simultaneously defined outer space itself. Outer space was constructed as a space defined by, among other things, a prohibition on claiming sovereign territory, the legal ability for all states to use outer space, and a requirement that activities there be conducted for the use and benefit of all countries. There was thus a very stark difference between the laws that governed outer space and those that governed terrestrial sovereign territories. The stark difference in legal regimes has meant stark differences in the ways in which the natures of outer space and Earth would be incorporated into various social processes.

The scalar politics of delimiting earth and space

While it was clear that outer space was legally distinct from air space, what was not clear was where the border between these spatial legal regimes was located in practice. Even though in the early years of space flight many scholars advocated for a legal boundary between these zones, no mention of such a boundary appeared in the OST (Kopal, 1980, Lachs, 2010). To at least one prominent jurist, the “territorial character” of Articles I and II required a “precise delimitation of the two legally distinct spaces” in order to be correctly interpreted and applied (Kopal, 1980, 161). Indeed, the border separates natures under state sovereignty (terrestrial space) from natures that are to be used for the benefit of humanity and accessible to all states (outer space). This topic, perhaps better than any other in the governance history of outer space, demonstrates how the construction of nature and scalar politics are implicated in the construction of outer space as a “global” nature. It distinguishes, and simultaneously constructs, “national” resources from “global” or international resources, the implications of which are considerable.

In the late 1960s and 1970s, debate over a border shaped the use of space in subsequent decades. The importance of a border to the application of the treaty was clear to many delegations, and the lack of a legally agreed upon definition or demarcation of outer space concerned them (see, e.g., United Nations. General Assembly. Committee on the Peaceful Uses of Outer Space. Legal Subcommittee, 1967, United Nations. General Assembly. Committee on the Peaceful Uses of Outer Space. Legal Subcommittee, 1969b). Other states, such as the US and France, questioned the need for a definition both in general and at that point in time specifically (Legal Subcommittee, 1967, 13–14, 17). For the time being, they and other delegations preferred instead to request guidance from the Science and Technical Subcommittee on the matter (Legal Subcommittee, 1967, 4, 13, 17). The draft resolution, submitted by the French delegation, invited that committee to “provide basic information on a purely scientific and technical level, while the Legal Subcommittee retained full freedom to make what use it chose of the list of criteria it received” (Legal Subcommittee, 1967, 17 [emphasis added]). Such a “scientific” definition would supposedly help to avoid any contentious decisions as to where the boundary would lie and whatever implications it would have on the use of space. This desire for a scientific definition was an attempt to “naturalize” and thus “depoliticize” the always-political construction of nature. Several months later in 1968, the Chairman of the Legal Subcommittee reported that the Scientific and Technical Subcommittee “replied that it thought it impossible at the present time to identify scientific or technical criteria which would permit a precise and lasting definition of outer space” (Legal Subcommittee, 1968a, 1).

At the same time, several other states offered other ways of defining space. The Austrian delegate suggested that any potential border should be based upon the principle of “effective control,” (Legal Subcommittee, 1967, 43). The delegate from Poland recommended just determining a conventional border at 100 km (Legal Subcommittee, 1969a, a24). Problems existed with both of these options, too (Lachs, 2010). Both the Austrian and Canadian delegates felt that instead of a spatial definition, the purpose of a flight would be the best factor in defining outer space (United Nations. General Assembly. Committee on the Peaceful Uses of Outer Space. Legal Subcommittee, 1968b, United Nations. General Assembly. Committee on the Peaceful Uses of Outer Space. Legal Subcommittee, 1968c).

In 1970, the Secretariat of the Legal Committee prepared a background paper on the definition and delimitation of outer space to aid the committee’s deliberation. The paper explained the two main approaches in defining or delimiting outer space, the “spatial” and the “functional.” These approaches offered competing means of constructing space and nature. The spatial sought to define space geometrically through a boundary at a more-or-less fixed altitude; the functional sought to define space through the intended purpose of certain activities and technologies. Within each approach, especially the spatial approach, there were further competing suggestions over what should determine the dimensions of outer space. In the case of the spatial approach, these suggestions were suggestions for where sovereign territory would end and “global” sovereignty-free space would begin. I highlight the “spatial” approach here to show the degree to which scientific knowledge was employed to determine where the boundary between air space and outer space should be and, ironically as it would turn out, to argue that such a geometric boundary should not be legally established. In this sense, this is a key instance in which various physical materialities of Earth’s atmosphere and outer space and knowledge of those physical characteristics influenced the construction of outer space. The disagreement over what the natures of outer space and Earth were was at the heart of the debate over the definition of space and the geostationary orbit.

The spatial approach centered on the belief that outer space should be defined by the geometric division of one space (outer space) from another (air space). The difficulty of this approach lied in determining where that division would be located. The Secretariat’s report describes a host of possible scientific divisions based on scientific knowledge of the materialities of Earth and its atmosphere. The first potential criterion for division suggested in the report was the scientific boundary between the atmosphere and outer space, so that national sovereignty would be confined to the height of the atmosphere. As the report explains, this criterion did “not seem realistic primarily since the atmosphere of the earth does not end abruptly but gradually transforms into outer space. Consequently, there is no agreement among scientists as to the altitude at which air space ceases. According to some estimates, it extends far beyond the parameters of an orbit of an artificial earth satellite which is generally considered to be in outer space” (Legal Subcommittee, 1970, 37). As it turned out, determining a border based on scientific materialities was not so simple. Another suggestion was to base the border on the division of the atmosphere into layers. Possible ways of doing this included dividing the atmosphere by density (heights depended upon various possible criteria for determining layers, and at 150 km above sea level, the density of the atmosphere reached 1 × 10−12 g/cm3), by the height at which the atmosphere seemed to stop showing tendencies to rotate with Earth (20,000–30,000 km from the center of Earth), or by the composition of chemicals (anywhere from 60–3000 km above sea level, depending on the chemicals prioritized). It was suggested that the upper boundary of the atmosphere could also be determined by the duration of twilight (itself based upon the scattering of the sunlight in high altitudes – 600 km above sea level at a latitude of 54 degrees), by the height at which meteors become luminous (about 300 km, or by the observation of the rays of the aurora borealis (about 1100 km). Yet another suggestion was based upon the maximum altitude of aircraft flight (various heights, depending on definition of “aircraft”). Another was based upon the “aerodynamic characteristics of flight instrumentalities” – the altitude (about 275,000 ft [84 km]) at which aerodynamic lift yields to centrifugal force, also known as the “von Karman line.” Another suggestion was the lowest perigee of an orbiting satellite (approximately 140–160 km), and another was based upon Earth’s gravitational effects (various heights) (Legal Subcommittee, 1970, 37–49). Overall, the spatial approach included numerous possible ways of using scientific knowledge of various physical materialities to identify an apolitical “natural” border between air space (Earth) and outer space to delimit sovereign air space from sovereignty-free outer space. The multiplicity of potential physical boundaries complicated any agreement over any one potential border. The ambiguity and unevenness of material distinctions in upper levels of Earth’s atmosphere led to continued uncertainty about where a boundary between Earth and outer space would be located – or if indeed there were any boundary at all. Neither science nor the physical materialities it read provided a definite, clear-cut answer.

The main other approach, the “functional approach,” also met with complications. Simply put, this approach argued that laws should not regulate the space of outer space as such, but rather should regulate “outer space” activities (Legal Subcommittee, 1970, 58). What “outer space” activities were was to be determined by the aim of the activity (i.e. a “space activity”) and the means used (i.e. a “space vehicle”). As the Secretariat’s report describes, critics of this approach cited the inability to always distinguish between space activities and other activities, the complications brought on by scientific and technical advances in air- and spacecraft technologies, and the potential conflicts with sovereignty in air space, in the sense that state sovereignty would not apply to “space activities” at low altitudes (Legal Subcommittee, 1970, 65). In addition, as legal scholar Bin Cheng points out, the functional classification of activities follows, rather than proceeds, spatial delimitation in that states’ power to exercise their legal authorities under international law follows a hierarchy in which territorial legal authority (spatial political borders) overrides quasi-territorial legal authority (e.g. a state’s jurisdiction over a ship) (Cheng, 1997, 437–439). Nonetheless, as the spatial approach failed to provide a definition, the functional approach, despite its weaknesses and problems, became more popular, especially among the industrialized states.

The report concluded that “neither the two basic approaches nor any combination of the criteria seem to have gained general support” and that “[v]arious proposals for an arbitrary delimitation of air space and outer space have also failed to achieve that purpose” (Legal Subcommittee, 1970, 66). The desire to find a clear, scientific definition and demarcation of outer space ran up against the various physical characteristics of Earth and atmosphere that demonstrated the unavoidable role of politics in the decision. The incongruity of these physical characteristics with land-based forms of territory challenged and (re)shaped how power could and would be projected through this volumetric space.

In the years that followed, delegations’ positions became entrenched. Discussion of this issue stagnated as other issues grew in importance. Even though the Scientific and Technical Committee report identified some “scientific” definitions that could have placed the boundary above some orbits, several states in the Legal Subcommittee generally and informally accepted the idea that all orbits were part of outer space and were thus free for use by all states, as per Article I of the OST. Orbits were “global” natures, not able to be claimed by any state, but able to be used by all states. Such a construction provided space-faring states with an Apollonian gaze (Cosgrove, 2001) and strategic political and economic position over the entire globe that those states and their domestic industries could, through satellites, use for the accrual of information and capital. Alternative socionatural constructions of outer space and orbits may have limited this ability.

Disputing borders, disputing science

In December 1976, Equatorial countries offered such a construction. They signed a declaration that both demonstrated that the absence of a definition and boundary was problematic and emphasized the continued disparities in light of these new and increased space activities. This declaration was a central challenge to the way that outer space had been constructed until that point and how it would be constructed in the future; it was a contestation over the construction of space, nature, and scale.

At stake in this debate was legal control over satellite orbits, which by the mid-1970s were being used for a host of military and civilian scientific and economic purposes, particularly communication (Schauer, 1977). There are three main types of orbits that satellites follow. The first, located approximately 150–2000 km above sea level, is the “low-earth orbit” (LEO). This orbit is the orbit in which most space activity takes place: the International Space Station, remote sensing satellites and many communication satellite networks can be found here. The second, at approximately 2000–36,000 km above sea level, is the “medium-earth orbit” (MEO). Most satellites in this orbit are used for navigation purposes, such as the Global Positioning System (US owned) and Galileo (European Union and European Space Agency owned) global navigation satellite systems. Often seen as the most valuable, however, is the geo-synchronous orbit. This orbit is located above the Equator at an altitude of approximately 36,000 km. Taking advantage of these physical conditions, satellites in the geostationary orbit offer several advantages over satellites in other orbits. Although the cost of placing the satellites into the GSO is higher (larger rockets and more fuel are needed to reach 36,000 km), costs of keeping a satellite in orbit is low (some propulsion capability is required, but far less than for satellites in other orbits) because the satellite stays fixed in place relative to the surface of Earth. That is, as Earth spins, satellites stay in position above an area on Earth’s surface. The relatively “fixed” position at this height enables one satellite to provide constant coverage for a particular area and three satellites to provide constant coverage for the entire surface of the Earth, except the poles; therefore, fewer satellites are required to provide coverage than in other orbits (Maini & Agarwal, 2010, 66–8).

By the mid-1970s the use of and benefit from this orbit was highly uneven. At that time, the International Telecommunication Union (ITU), the body that allocates orbital slots and frequencies, allocated slots when they were requested by any state that requested them. Non-space powers viewed this negatively as a “first come, first served” process, in which those states with the technical capacity to do so would dominate the geostationary orbit before those without the capacity gained the ability to have their own satellite in that orbit. The number of satellites in the GSO justified this fear. By 1977, the number of satellites in that orbit had reached 100, with 15–20 more planned to be launched per year from 1978 to 1981 (United Nations. General Assembly. Committee on the Peaceful Uses of Outer Space [“COPUOS”], 1977). Of the 81 satellites scheduled to be launched through 1982, 71 were from the US (33 satellites), USSR. (16), European Space Agency (12), Canada (3), Japan (3), Belgium (1), Scandinavian countries (1), or joint US–ESA–Canada ventures (2). The other ten satellites were from Brazil (3), China (2), Columbia (2), India (2) and ASTO (Arabsat) (1) (COPUOS, 1977, 13–14). These numbers indicate that the economically and technologically developed countries used the GSO to a much greater extent than economically developing countries.

On December 3, 1976, in protest of the construction of orbits as “global” natures, representatives of Brazil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda, and Zaire, meeting outside of the United Nations, adopted the “Bogota Declaration.” The equatorial countries declared:

the geostationary synchronous orbit is a physical fact linked to the reality of our planet because its existence depends exclusively on its relation to gravitational phenomena generated by the earth, and that is why it must not be considered part of the outer space. Therefore, the segments of geostationary synchronous orbit are part of the territory over which Equatorial states exercise their national sovereignty. The geostationary orbit is a scarce natural resource, whose importance and value increase rapidly together with the development of space technology and with the growing need for communication; therefore, the Equatorial countries meeting in Bogota have decided to proclaim and defend on behalf of their peoples, the existence of their sovereignty over this natural resource. (Declaration of the First Meeting of Equatorial Countries [“Bogota Declaration”], 1976).

In one paragraph, these states claimed that the material gravitational forces of Earth made Earth orbits possible; therefore, the GSO was part of Earth – not part of outer space – and, as such, was subject to states’ claims of territorial sovereignty. Moreover, the Equatorial states reiterated their opposition to the customary construction, asserting, “There is no valid or satisfactory definition of outer space which may be advanced to support the argument that the geostationary orbit is included in outer space” (Bogota Declaration, 1976).

The Equatorial states also claimed that the negotiations of the OST were unjust. The OST could not be considered the final solution to the problems of activities in and use of space, particularly when “the international community is questioning all the terms of international law which were elaborated when the developing countries could not count on adequate scientific advice and were thus not able to observe and evaluate the omission, contradictions and consequences of the proposals which were prepared with great ability by the industrialized powers for their own benefit” (Bogota Declaration, 1976). To these states, the uneven outcomes of the use of the GSO could be traced back to the negotiation of the OST.

For the Equatorial states, alleviating disparities in the use of the GSO would be made possible by the construction of the GSO as a resource subject to states’ claims instead of a “global” resource free for any state to use. The segments of the orbit above the oceans would remain “global.” They maintained that even though they would hold sovereign control over their segments of the GSO, they would use the orbit for their benefit and for other countries’ benefit as well, which they did not feel the space powers had been doing or the UN or ITU had been achieving. States, especially the space powers, would no longer have free access to the valuable orbital locations above Equatorial states in this alternate construction.

Unsurprisingly, this construction met resistance in the Legal Subcommittee meetings three months later. The delegate from the United States issued a strong criticism of the Bogota Declaration and the alternate construction of outer space. The US delegate contended:

While the geostationary orbit was a natural phenomenon of particular importance with respect to communications and other applications, there was no scientific or legal basis for a unilateral claim to exclusive national sovereignty over that orbit. Geostationary and other orbits of artificial earth satellites lay in outer space, and [according to the OST] were ‘not subject to national appropriation by claim of sovereignty …’ … [The] characteristics of the orbit were dependent to a substantial degree not only on the gravitational field of the earth but also on the velocity, altitude and azimuth of insertion of the satellite. The gravitational field around the earth was derived from the total mass of the earth, and except for small effects, was independent of the detailed characteristics of the earth’s surface. It was utterly unaffected by political boundaries.

He continued this argument with reference to scientific knowledge of materialities:

In geostationary and other orbits, a satellite’s path through space was determined not by any single factor [as argued in the Bogota Declaration], but by a combination of factors, including the energy imparted by the launching vehicle, the mass and altitude of the space craft, the forces of gravity of the earth, the moon and the sun, and the radiation pressure of the sun … There was no causal relationship between orbital mechanics and the earth’s current rotational velocity on the one hand and locations on the earth’s surface on the other: the geostationary orbit depended on properties of the earth as a whole.

With respect to this matter, he concluded: “it could not reasonably be argued that the geostationary orbit did not lie in outer space” (Legal Subcommittee, 1977, 2–3). Other states, such as Canada, Australia, the Soviet Union, Sweden, Japan, and the Federal Republic of Germany, all echoed these arguments, and some other countries, such as Argentina, expressed their respect for some of the US delegate’s argument.

What these arguments attempted to do was to challenge the science of the Bogota Declaration that the GSO was related to the gravity of Earth by asserting that the science of the GSO involved more material (and techno-social) components than the effect of gravity alone, and therefore, that the GSO was not just related to Earth’s gravitational forces, but to gravitational forces of Earth and other celestial bodies and to technological specificities of the satellite as well. The declaration’s alternative construction of outer space was widely rejected and not recognized by most countries, especially by those that had the most to lose from its adoption. Simultaneously, the existing construction in which all orbits were considered part of “outer space” and available for use by all countries was reproduced through its continued performance. Through the construction of outer space as a “global” nature, economically and technologically developed countries could continue the uneven access in practice and the uneven benefits that resulted. Despite the lack of a formal legal (or agreed-upon scientific) boundary ensconced in a treaty, the informal (possibly “customary”) boundary was reproduced: outer space, beginning at an altitude around 100 km, included orbits. The general rejection of the Bogota Declaration and the establishment of any line demarcation by the space powers remains today, largely because space powers have not wanted to restrict any future activities with a legal boundary, and at the same time, the non-space powers have not been in any position to exercise pressure (Lyall, Larsen, 2009, Su, 2013). States also have performed this “global” scalar construction over the past several decades by continuing to regulate outer space and orbits through inter-state organizations.

The Bogota Declaration was successful in one particular way, however: it highlighted the continued disparities in the use of and benefit from the GSO (Gorove, 1979, 455). In the years that followed, concern over these disparities and the ITU’s “first-come, first-served” orbital allocation system increased. These disparities and concerns led to the development, during the ITU’s World Administrative Radio Conferences of the 1980s, of a new orbital allocation system that ostensibly took into account the needs of developing countries.

Conclusion: “global” space

The question of the definition and delimitation of outer space was a question of the socionatural construction of outer space and Earth. It was a debate over the scientific knowledge of astro/geophysical properties and scale of nature. Any potential definition or delimitation would distinguish between “outer space” and “air space.” The general rejection of the Bogota Declaration and its construction of outer space and Earth further entrenched the existing construction of orbits as part of outer space, which has possibly become part of general international law, even without a legal definition enshrined in a treaty.

Examining the physical materialities and scalar politics through a production of nature approach has revealed how political and economic disparities shaped the production of a “global” socionature. Outer space in general and orbits in particular are not inherently “global” natures; they were and have been made so through negotiations rife with structural and social power imbalances that favored economically developed space-faring states. Economically and technologically advanced states have extended their power through the volumetric outer space by navigating various mobile and static physical materialities of Earth and outer space that challenge planar conceptions of borders and territory and by constructing outer space in such a way so as to allow all states, as equals, to use and benefit from it. This construction allows uneven use and uneven benefit to persist through continued access to distant, “global” natures that might otherwise be constructed as sovereign, “national” natures. As such, economically and technologically advanced states have secured a construction of outer space favorable to their continued political and economic interests and to the structures that support those interests. This outcome directly challenges the notion that the construction of nature as “global” is entirely progressive or cosmopolitan.

Recognizing this tension between the discursive and performative constructions has important implications for further research on outer space. Research into the political-economic operation of specific existing space-based technologies, such as communications, remote sensing, weather forecasting, and satellite-based navigation, should bear in mind the legal constructions and the power dynamics that made those activities possible. Further analyzing outer space as a dynamic, heterogeneous volume, as Steinberg and Peters (2015) propose for oceans and seas, may also deepen our understanding of territory and how “power is simultaneously projected on, through, in, and about [geographic] space” (Steinberg & Peters, 2015, 261). Moreover, the political-economic outcomes of future space activities come into question as well. Speculators are already anticipating the mining of the Moon, asteroids and other celestial bodies; some geoengineers are scheming ways to use mirrors to reflect sunlight to cool the Earth while others are scheming ways to capture sunlight to power activities on Earth; and space enthusiasts are pushing for the colonization of Mars to escape the terrestrial climate change the geoengineers are trying to stop. In whose interest all of these activities will be conducted runs up against how the nature of outer space is and has been defined and constructed.

#### The marginalization of equatorial actors for the benefit of established space powers directly enables imperial violence and dispossession. The lessons of Bogotá are imperative for resisting imperial consolidation in space.

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Spaceflight almost invariably involves activities that directly subjugate marginalized peoples. Space provides a strategic military position from which to continue postcolonial violence on Earth, exacerbating inequalities between spacefaring countries and the so-called “Third World.” Space is critical for surveilling and enacting violence upon communities throughout the Third World, from Moroccan spy satellites over occupied Western Sahara, to remote sensing of Afghanistan and other strategic regions, to monitoring of the US-Mexico border: The United States spends $10 billion per year on publicly known space projects, but $15 billion on classified military activities.

Moreover, drones and most other military technologies that harm and surveil marginalized communities depend on global positioning technology and space-based communications. Significant advances in space technology developed in the context of US intervention in the Middle East and Latin America: Remote sensing and GPS developed in the Gulf War, and, decades earlier, the first US telecommunications satellites were used to communicate with troops in Saigon. More recently, consider the US Air Force’s aforementioned Space Fence or Boeing’s Space Based Space Surveillance satellite constellation and X-37B orbital drone, which has orbited Earth several times over the past decade.

These claims over territory, resources, and populations highlight the enormous accumulation of capital necessary to access space. The US government and its corporate entities can afford the cost of spaceflight because it is but a fraction of their annual budgets. But for developing countries and marginalized communities, that cost is prohibitive: Spending on space is contingent on accumulated wealth.

As with access to the sea or air, access to outer space, then, is not solely about obtaining resources, services, and other benefits in areas that exist outside of what are perceived as “conventional” borders. It is also about drawing on resources—capital, labor, raw materials, territory, intellectual property, expertise—from “back home,” Earth, that make those activities possible in the first place.

In this way, the history of spaceflight is the story of powerful nations consolidating power against marginalized communities within their borders and throughout the Third World.

In 2017, the Department of Defense announced that it would no longer treat space as a “sanctuary,” supplementing uses of force on the ground via surveillance, communications, and global positioning. Instead, DoD would treat space as a “warfighting domain,” in which states exercise force in space itself. This shift signals that a significant number of US officials believe in the need to secure the American economy’s most recent dependency: its space infrastructure.

Then, last June, Donald Trump proposed the Space Force, a sixth military branch, to a room of government contractors, legislators, and policy-makers. In response, some argued that the Space Force would violate the Outer Space Treaty of 1967; it probably does not. Others dismissed it as ludicrous: The Trump administration, entertaining a fantasy of battling other countries, or even extraterrestrials—in space! This is also probably incorrect. If there is violence in space, it will be a fight about who dominates the infrastructure that asserts violence, surveillance, and economic control over activities on Earth itself.

Some thinkers on the left, on their part, regard the Space Force as woefully out of touch with fundamental questions of justice. They argue that the government should spend resources in more meaningful directions: What about Flint, Puerto Rico, climate change, police brutality? This response echoes critiques of many space ventures since the 1960s. Consider Gil Scott-Heron’s Whitey on the Moon, Andrew Russell and Lee Vinsel’s contemporary update, “Whitey on Mars,” or environmentalist critiques of space futures like Interstellar’s. Even Garrett Hardin, a decade before he popularized the phrase “tragedy of the commons” in 1968, cast doubt on the idea of solving problems of population growth and limited resources by leaving Earth behind (although his racist legacy should moderate how his claims are read).

This line of thinking must go further and acknowledge that the Space Force is not just a matter of “exploration” but the most recent instance of spaceflight’s postcolonial legacies that facilitate surveillance, military strikes, media, communication, resource surveying, disaster relief, and climate science.

As most space advocates will rebut, spacecraft are essential to the infrastructure of modern life. A 2012 World Economic Forum panel concluded that “a day without satellites” would instigate a global economic catastrophe by taking out communications and media, GPS, disaster relief, meteorological observations, and monitoring of key resources like crops and water. Scientists’ understanding of climate change relies on data collected by weather satellites, and satellite observations of agriculture have aided sustainable development projects across the world, from the American Corn Belt to Morocco and elsewhere throughout Africa. Likewise, exploring other planets and stars can help scientists better understand Earth. And space activities produce trickle-down effects, such as novel, even life-saving technologies like heart pumps and prosthetics on Earth. To that point, Danielle Wood’s Space Enabled research group at the MIT Media Lab collaborates with marginalized communities to create space technologies that serve their interests. Consider also Erika Nesvold and Lucianne Walkowicz’s JustSpace Alliance.

In this sense, the Space Force is not a superficial proposal. It matters for reasons of national security and political economy—hence the DoD’s new position on space as a “warfighting domain.” While military activities in space are not new, this explicit position signals that such activities might soon take unprecedented forms. Viewed against the histories of spaceflight, the Space Force is an attempt to secure American empire, to defend the high-tech infrastructure of the “haves” against the “have-nots.”

In 1975, Indalecio Liévano Aguirre, the Colombian Minister of Foreign Affairs, declared to the UN General Assembly in New York City that the UN must pursue

a new and more satisfactory balance between the affluent and the impoverished worlds, between the rich peoples and the vast pauperized masses of the planet, on whose discontent one cannot build a lasting international order. Let us hope that no one will yield to the temptation of thinking that power and force constitute effective instruments for the perpetuation of old policies of privilege.

These words concluded a speech in which Liévano made legal claims over geostationary orbit. Arthur C. Clarke had famously proposed the concept of geostationary satellites in 1945: If a satellite were placed above the equator at an altitude of about 35,786 km, it would orbit at the same rate as Earth’s rotation, such that the satellite hovered above a specific point on the ground. Because of this convenient physics, segments in this orbit were more valuable than others for remote sensing and, most importantly, for the nascent telecommunications satellite industry.

Based on this physics, Liévano argued that international law must divide sovereignty in geostationary orbit according to the equatorial territory below. In other words, equatorial countries’ sovereignty included geostationary orbital segments above their territories.

A year later, Liévano’s country gathered leaders from seven other equatorial nations—Congo, Ecuador, Indonesia, Kenya, Uganda, and Zaire, with Brazil as observer—to sign the Bogotá Declaration of 1976. These countries not only claimed sovereignty over geostationary orbital segments above their territories but argued that segments hovering above the “high seas” were the “common heritage of mankind” and ought therefore to be collectively governed by all nations. Access to those segments would have to be distributed equitably among the “universal community” by keeping in mind developing countries’ interests.

The signatories also proclaimed that American and Soviet dominance of space amounted to de facto claims of sovereignty—a “technological partition” of orbit. Today, the Colombian Constitution still contains a provision claiming sovereignty over the orbital segment above the country’s territory.

The Bogotà Declaration is one piece of a bigger story. Historically, Third World lawyers and diplomats have long sought to reshape international law to equitably reorder barriers to access in extraterritorial or transnational domains like space, the sea, and the electromagnetic spectrum (for telecommunications). They articulated these claims by portraying US and Soviet or Russian extraterritorial activity as a unique form of empire. They saw global inequality as a perpetuation of older, more formal colonial orders, and they argued that the “Great Powers” exploited such inequality as they shaped the laws that governed extraterritorial domains.

It is often forgotten that the Outer Space Treaty of 1967—the first and, to this day, most influential treaty governing spaceflight—arrived on the heels of decolonization. Article II of the Space Treaty, which famously proscribes “national appropriation by claim of sovereignty, by means of use or occupation, or by any other means” in space, is frequently interpreted by US, Soviet, and European lawyers as an artifact of a Cold War compromise between the United States and USSR. But during its drafting, developing countries had recently declared independence or were continuously staving off foreign intervention. In light of this historical context, the treaty’s ban on claims of sovereignty has probably meant something different to the majority of the 107 state parties to the treaty which might be considered developing countries. Meanwhile, the treaty came to ban only weapons of mass destruction in space, not militarization as a whole.

While the treaty, like the moon landing’s “one giant leap for mankind,” famously opened by declaring space “the province of mankind,” lawyers disagreed about what that principle meant. When the Brazilian delegation added language to this phrase clarifying that spaceflight must benefit all countries “irrespective of their degree of economic or scientific development,” the US and Soviet delegations ensured that this would not amount to strong collective property rights. Instead, US lawyers argued that this much-lauded provision was not, legally speaking, a strong one. It was a general statement of the “spirit” of the text, not a formal, legal demand for equitable distribution of resources and access to space, particularly for developing countries.

These claims were part of a broader mid-20th century movement to decolonize international law. From the 1950s to ’70s, Third World leaders initiated transnational projects like the Non-Aligned Movement and the New International Economic Order, aiming to redistribute markets and natural resources to repay developing countries for their economic strife in the aftermath of imperialism. In international laws on the sea, space, and intellectual property, Non-Aligned countries proposed concepts like “common interest” or the “common heritage of mankind.” By these theories, all states would collectively govern extraterritorial domains, such that property rights over scientific information in those domains, technologies used to access them, and economic benefits derived from them would be equitably shared with developing countries. These countries were concerned that American and Soviet technology, made possible with postcolonial violence and inequitable accumulations of capital and expertise, would deplete valuable extraterrestrial resources before the rest of the world could “catch up.”

Anti-imperial notions of collective sovereignty were preceded by Latin American and Caribbean lawyers’ positions on space law. Even before the Space Treaty of 1967, lawyers in the Inter-American Bar Association signed the “Magna Carta of Space” at Bogotá in 1961 and at San Juan, Puerto Rico in 1965. In part, the document aimed to establish space as res communis—in other words, collectively owned by the international community.

Decades later, in the Moon Agreement of 1984, several developing countries declared lunar resources to be the common heritage of mankind, attempting to establish a system for equitably distributing property rights for lunar mining.

But subsequent efforts to get the international community to consider spaceflight itself as a resource that ought to be redistributed—and, in the process, restructure global inequality—mostly failed. Spacefaring countries have refused anti-imperial legal moves via explicit official statements or simply through technological practice. If outer space is a “global commons” or res communis at all—those terms’ legal meanings are controversially ambiguous—it is only insofar as space provides a domain not for collective sovereignty or property ownership but, rather, the free and uninhibited exercise of commercial and military might.

Outer space governance thus represents a unique kind of postcolonial order. Space law encodes an empire that is not about colonizing peoples, as in the relations between spaceflight and postcolonial violence, territorial claims, and resource extraction on Earth. Rather, spacefaring states have shaped space law, or at least its effect, by exploiting global inequality. They have taken advantage of their political weight around when negotiating international law, or merely exercised superior technological capabilities without regard for consensus.

Last year in the UN General Assembly, delegates from several developing nations, self-identified as Non-Aligned countries, responded to the Trump Administration’s proposed Space Force. They advocated for the total demilitarization of space, reasoning that militarization would increase the probability of producing more space debris. This would pose barriers to access, which was anathema to the legal status of space as, in their view, the “common heritage of mankind” and “a common asset for humanity.”

Decades earlier, the signatories of the Bogotá Declaration had made similar arguments about debris, access, and collective governance with respect to the commercial exploitation of geostationary orbit.

While the history of anti-imperial legal claims in space is largely a history of failure, they have affected subsequent legal developments by destabilizing the appearance of consensus among the so-called “international community.” For instance, the Bogotá Declaration may have “failed,” but it also influenced the ensuing decade of debates at the UN. Such perspectives have also shaped national legislation in industrialized countries. Even if these changes are minimal, understanding the history of these claims helps complicate the reasons “failures” are considered as such. Understanding the historical construction of dominant readings of space law might open the door for alternative, redistributive interpretations to take hold.

In the meantime, activism might fill those gaps. As French Guiana showed us, spaceflight might seem distant, but it becomes “local” where it requires territory and mineral resources on Earth. Organized protest movements might exploit these vulnerabilities. In the case of Brazil, protests about the conditions of the Alcântara Launch Center might force Brazilian officials—not to mention their friends in the Trump administration—to grapple with the conflicts between their views on international law (which have more recently turned neoliberal) and the conditions of the quilombolas in Alcântara.

The history of spaceflight is the story of technological and legal counterrevolutions against calls for global redistribution. We now know spaceflight is essential to the accomplishment of worthy ends—environmental justice, water and agriculture management, humanitarian relief, freedom of information—and to their undoing—resource extraction, surveillance, military strikes, displacement, corporate media. And it is this entanglement of technology, law, and inequality to which the left should direct its critical efforts.

#### Independently, orbital dominance is the linchpin of US empire’s new frontier. Orbital surveillance capabilities enable targeted genocidal violence against any perceived threats across the globe.

Shaw, 16—Senior Lecturer in the School of Geographical and Earth Sciences at the University of Glasgow (Ian, “Full Spectrum Global Dominance,” *Predator Empire*, Chapter 3, pg 146-154, dml) [ableist language modifications denoted by brackets]

From soil to sea to outer space, the final frontier of the Predator Empire lies beyond the breathable atmosphere of human existence in the extraterrestrial orbits where only machines survive. Outer space, like the ocean, is part of the same full spectrum dominance strategy pursued by the U.S. military. We must, therefore, explore the satellites, missiles, and strategies that have foregrounded the growing entrenchment of a space war in the corridors of the Pentagon. The Global Positioning System (GPS) of satellite navigation is central to nearly everything the modern military does and has revolutionized drone warfare by enabling precision reconnaissance and targeting— remote split operations. Orbital space infrastructures, in short, enable the U.S. military to see and communicate across the planet.

The Cold War saw a protracted period of research into space technology by Soviet and American scientists. Sputnik, the Soviet satellite launched in 1957, was the first artificial Earth-orbiting satellite and propelled the Cold War space race. Sputnik was carried into space by the R-7 launch vehicle, the world’s first intercontinental ballistic missile (ICBM). Over a decade prior to that, however, RAND (then part of the Douglas Aircraft Company) was investigating the launch of satellites in an important 1946 paper titled “Preliminary Design of an Experimental World Circling Spaceship.”157 Indeed, in many ways the roots of the looming space war actually date back to the V-2 rocket used by the Nazis, which influenced early missile designs in the United States and the USSR. The first American ICBM was the SM-65 Atlas missile, which began unsuccessful test flights in 1957.

As well as offensive capabilities, both the United States and the USSR began to construct defensive systems. This included antiballistic missiles (ABMs), together with ABM complexes that monitored incoming missiles. The development of these kinds of ABMs was restricted by the 1972 Anti-Ballistic Missile Treaty signed by President Nixon and Soviet general secretary Brezhnev. The agreement prohibited a nationwide missile defense system. It did, however, allow the United States to build the Safeguard ABM Complex in Grand Forks, North Dakota. In 1976—a year after the Safeguard site was constructed—the entire program was shutdown.158 As it turned out, the system could be easily blinded if its radars were destroyed (a problem that hasn’t really gone away).

The aerial bombardment of Serbia from March 24 to June 10, 1999, was one of the first major space-enabled wars, due to heavy reliance on satellites. For NATO this period was officially known as Operation Allied Force, and for the U.S. military, Operation Noble Anvil. While the Serbian military was ultimately subdued by precision U.S. airpower, Operation Noble Anvil revealed a paradox that still haunts the U.S. military today. As the Pentagon has become ever more reliant on space-based technologies, it has also become more vulnerable. Without the eyes and ears [monitoring] the satellites now provide, the military’s high-tech systems would be blind and deaf [useless]. In spite of, or perhaps because of, this unwelcome paradox, the determination to militarize outer space has accelerated over the past two decades. As Johnson writes, “The United States now argues that it must totally dominate space to protect its new, casualty-free warfighting technologies.”159

On March 23, 1983, President Ronald Reagan delivered a national address that energized the antiballistic missile race and shattered the restraints of the previous administration. Reagan, who had campaigned to develop an ABM system, urged the United States to redouble its efforts. As he resolved, “I am directing a comprehensive and intensive effort to define a long-term research and development program to begin to achieve our ultimate goal of eliminating the threat posed by strategic nuclear missiles.”160 This ambitious project would become the Strategic Defense Initiative (SDI), overseen by the Strategic Defense Initiative Organization (SDIO). SDI was built on the idea of a planetary-wide defense shield that could intercept incoming Soviet ICBMs with ground-based missiles and orbital lasers. The proposal would be mocked as an unrealistic “Star Wars” fantasy and eventually collapsed. But this ostensible failure misses two important points. First, SDI paved the way for billions of dollars in defense spending and research. Second, it was the first step in militarizing space and enclosing the planet.

During the 1990s the conceits of cosmic power continued. In 1993 the SDIO was renamed the Ballistic Missile Defense Organization. Rather than engineering a global shield, the Clinton administration shifted its ABM strategy to focus on regional threats and rogue nations. Of course, the collapse of the Cold War should have ended the project, but there were too many vested interests. The Republicancontrolled Congress accelerated antiballistic spending despite the enormous costs. Conservative defense hawks were convinced that the collapse of the USSR had everything to do with U.S. technological power and that throwing more money at missile technology “was a sure way to achieve perpetual domination of the world.”161 Missile lobbying came from the powerful right-wing think tank Center for Security Policy, which was funded by major weapons contractors and served as “the de facto center of the Star Wars lobby.”162 Frank Gaffney Jr. was the founder of this group and an important figure in the weaponization of the atmosphere during the 1990s. So too was Republican Curt Weldon, a board member of the Center for Security Policy. He obtained a resolution to create a congressional committee to assess the ballistic threat posed to the United States.163 It was time to scare American lawmakers.

The Commission to Assess the Ballistic Missile Threat to the United States was chaired by Donald Rumsfeld.164 Their 1998 report was heavily influenced by the military–industrial complex. Controversially, the Rumsfeld Commission, as it was known, contradicted a 1995 National Intelligence Estimate that a rogue nation would need ten to fifteen years to build a ballistic missile. The report warned rogue nations could acquire these capabilities within five years. “In essence, the Rumsfeld panel gave Star Wars boosters in Congress the quasi-official endorsement they needed to push the program forward.”165 By this point in time, the United States had already sunk $50 billion into antiballistic systems, none of which having proved workable.166 The report’s findings were leapt upon by proponents of a national missile defense shield, leading to the passage of the National Missile Defense Act of 1999. This called for the United States to “deploy as soon as is technologically possible an effective National Missile Defense system capable of defending the territory of the United States against limited ballistic missile attack.”167 President Clinton, however, deferred the deployment of the National Missile Defense (NMD) system. His reticence was unsurprising: an ICBM is incredibly difficult to stop effectively, given that the interceptor missile, or “exoatmospheric kill vehicle,” is easily fooled.

After Bush came into office with Rumsfeld as his secretary of defense, Star Wars was back on the table. In December 2001 the administration announced it was withdrawing from the 1972 Anti-Ballistic Missile Treaty. On December 16, 2002, Bush signed National Security Presidential Directive 23, which instructed the Department of Defense to “deploy a set of initial missile defense capabilities beginning in 2004.” The directive stated the missile shield must be global in scope: capable of defending the U.S. homeland, international forces, and even foreign allies, thereby eliminating “the artificial distinction between ‘national’ and ‘theater’ missile defense.”168 Reagan’s planetary vision from 1983 was back. Bigger and better than before, the system would go by the name Ground-Based Midcourse Defense (GMD). Since testing began in 1999, ground-based ICBM defenses in the United States have been unreliable. The GMD, which cost billions of dollars, is no exception.

In January 2001 Rumsfeld chaired the Commission to Assess United States National Security Space Management and Organization.169 Unsurprisingly, the commission was influenced by the missile defense lobby. While the report acknowledged it was in the U.S. national interest to use space for peaceful purposes, it also recommended the construction of space defense systems. These would provide the president with “revolutionary methods” for space-based intelligence. Moreover, orbital defenses could protect the United States from a possible “Space Pearl Harbor.” This incendiary phrase was repeatedly used to warn lawmakers that the military’s heavy reliance on space technologies had rendered it vulnerable to enemy attacks. There are, after all, now approximately 1,200 satellites in space, of which over 500 belong to the United States. Of these, an unknown number serve as spy satellites for intercepting foreign communications and photographing the planet.

Space war is now, after two decades of lobbying, a strategic concern. No other country has antisatellite weapons in space, yet for U.S. galactic warriors the enclosure of space is viewed as an inevitable future for the military. Outer space presents the U.S. military with the same kind of opportunity as the seas—an environment devoid of direct sovereign control. There are no foreign governments to negotiate with and no need to adhere to legally binding SOFAs. “Best of all,” writes Johnson, “the weaponizing of space enables [the United States] to project power anywhere in the world from secure bases of operation. It is, by definition, the global high ground.”170 One of the first documents laying out the U.S. military’s ambition was Vision for 2020, published in 1997.171 The booklet argues space is becoming the “fourth medium of warfare,” after land, sea, and sky. As a consequence space must be controlled and, if necessary, denied to foreign governments.

The United States Strategic Command (USSTRATCOM) has overall responsibility for space operations. It was established in 1992 as the successor to the Cold War–era Strategic Air Command. Within STRATCOM there are two important organizations for coordinating activity in space. First is the Air Force Space Command (AFSC), which employs forty thousand personnel and operates over thirty-one military satellites. Within the AFSC lies the main hub for space-based operations, the Joint Functional Component Command for Space (JFCC Space). Known as Guardians of the High Frontier, JFCC Space operatives support U.S. ground forces across the planet. Perhaps unsurprising, the low Earth orbit (LEO) is congested with space junk—from spent rocket boosters to globs of frozen sewage. By its own estimates, the Air Force Space Surveillance Network (part of JFCC Space) tracks around twenty-three thousand objects every day (with hundreds of thousands of smaller pieces too small to track).172 Given space debris travels at tremendous speeds, even minute fragments can severely damage and destroy satellites. This makes space war a disastrous proposition.

The U.S. 2010 National Space Policy affirmed its commitment to peaceful access to outer space, but it maintained that such “peaceful purposes” included using space for “national and homeland security activities.” As the report states, “The United States will employ a variety of measures to help assure the use of space for all responsible parties, and, consistent with the inherent right of self-defense, deter others from interference and attack, defend our space systems and contribute to the defense of allied space systems, and, if deterrence fails, defeat efforts to attack them.”173

In other words, the world’s premier spacefaring nation affirms its status as the unilateral guardian of space, a galactic shepherd to the other nations that dwell in the upper and outer atmospheres. Similarly, the 2011 National Security Space Strategy argues, “Our military and intelligence capabilities must be prepared to ‘fight through’ a degraded environment and defeat attacks targeted at our space systems and supporting infrastructure. We must deny and defeat an adversary’s ability to achieve its objectives.”174 Beginning in 2008, the United States established the multimillion-dollar Space Protection Program to coordinate the defense of U.S. space assets. This counterspace program includes funding for satellite-jamming technologies to disrupt adversary communications, although this is rarely vocalized in public.

The National Reconnaissance Office (NRO) is the U.S. intelligence community’s eyes and ears [monitoring] in outer space (and, as chapter 2 details, was instrumental in the dronification of the Vietnam War). The NRO was formed by the Department of Defense in September 1961.175 For much of its history, it was a classified agency, until its existence was publicly revealed in 1991. Around three thousand NRO personnel—drawn from the armed services, CIA, and civilian population—operate the U.S. fleet of spy satellites and deliver SIGINT and imagery intelligence (IMINT) to the other branches of the intelligence community. The NRO’s black budget in 2013 was at least $10.3 billion, forming part of what Barton Gellman and Greg Miller call an “espionage empire.”176 Publicly, the NRO states it provides “innovative overhead reconnaissance” for U.S. national security. But as internal documents show, the NRO programs go beyond reconnaissance to collect and intercept global communications. As it states, “Space collection provides unique access to otherwise denied areas to provide persistent and responsive collection; and it does so without risk to human collectors or infringing upon the territorial sovereignty of other nations.”177 In short, this is another reworking of the high seas doctrine.

The NRO’s first signals intelligence satellite was the 1960 GRAB, and its successor was POPPY, which intercepted Soviet radar communication until 1977. The first image intelligence satellite was the CORONA satellite, a system built in the late 1950s. Launched on August 18, 1960, CORONA’s first successful mission photographed 1.65 million square miles of Soviet territory. Interestingly, in the days before imagery could be remotely transmitted, film had to be stored in capsules and dropped back down to the planet. Three thousand feet of film were captured in this way.178 Indeed, CORONA was so successful it was used until 1972. For much of the Cold War, satellite intelligence from the NRO was used to record and estimate the number of missiles, planes, and submarines in the Soviet inventory. After the Cold War the NRO supported the 1991 Operation Desert Storm in Iraq. Since then, the NRO has played a pivotal role in the U.S. war on terror and continues to launch spy satellites.

The radio transmissions contemporary NRO spy satellites intercept must be downloaded back on the ground. Two of the biggest downlink facilities are located in the United Kingdom and Australia, part of the worldwide surveillance network called ECHELON, or Five Eyes. Menwith Hill, in the English countryside, is the largest electronic surveillance station in the world and is a cornerstone of the U.S. Ballistic Missile Defense program. Despite technically being an RAF base, the site is run by the National Security Agency (NSA). Around two thousand intelligence personnel and cryptanalysts, together with billion-dollar supercomputers, analyze the interpreted satellite data and transmit it to the NSA’s headquarters at Fort Meade in Maryland.179

Pine Gap is the second-largest satellite downlink facility in the world. Built upon ancient Aboriginal land in Australia, the purpose of this remote base is to track the geolocation of radio signals and mobiles, pinpointing the whereabouts of enemy combatants in the Eastern Hemisphere. The facility, instrumental to the war on terror, was established by a 1966 Australia–U.S. treaty. Around one thousand personnel, mainly CIA, NSA, and NRO agents, control a set of geostationary satellites positioned above the Indian Ocean and Indonesia. The satellites are able to pinpoint the origin of a radio signal to within approximately ten meters. “Initially Pine Gap was collecting information—it was, if you like, listening in. It’s now targeting weapons systems. It’s also very much involved in the targeting of drones,” explained former Australian prime minister Malcolm Fraser in 2014.180

From the launch of the first satellites, space has been a militarized domain, providing the eyes and ears [monitoring] for the U.S. military and intelligence community. The future points to not only more intense forms of militarization but also, potentially, more overt forms of weaponization—that is, the placement of orbital weapons in outer space. This has yet to happen, although both the United States and China have antisatellite capabilities. Some speculate the U.S. military’s secretive X-37B unmanned orbital spacecraft is a space weapon of some sort, although its real purpose remains unclear.181 The U.S. Congress has approved a big increase in space defense for 2016, totaling $5 billion over the next five years. Of course, the majority of UN states are against any form of space weaponization. To a large extent, UN legislation already prohibits space weapons, stemming from the foundational 1967 Outer Space Treaty. A big question mark therefore hangs over whether this kind of legislation will be able to hold back the emerging weaponization of space.

Summary: The Enclosure of the Planet

By the end of the nineteenth century, the United States had been violently settled. Railroads stretched from east to west, and a tidal wave of homesteaders, ranchers, gold miners, and families had migrated in one of the largest movements in human history. The frontier, the elusive beyond of American society, had been effectively closed. In the span of decades, not only had the Great Plains been settled, but so had the Pacific Coast. Of course, the closing of the frontier was really just another kind of mass enclosure, one that began centuries earlier in England. While the idea of the western frontier died with the enclosure of the American continent, numerous other frontiers have sprung up in the past decade, from Libya to Syria. To surveil these disparate areas and dangerous individuals, a globalizing infrastructure of air policing is being installed in the atmosphere. The enclosure of humanity’s life-giving bubble with orbital weapons represents the most totalizing and daring imprisonment ever attempted.

From spy satellites circling the earth to Predators roaming over Mali to undersea drones swimming in coastal estuaries, the synergy between land, sea, air, and outer space is crucial to the full spectrum dominance of the planet. Alfred McCoy argues the war on terror has created a “robotic regime” preoccupied with dominating space. He writes the U.S. military is attempting to install a three-tiered “space shield” that envelops the earth within a totalizing surveillance network.182 From satellites in the exosphere to space-based aircraft in the upper stratosphere to drones swarming in the lower stratosphere, the weaponization of the atmosphere is crucial to the future of the Predator Empire. As McCoy concludes, this regime “seeks to build a network of aerospace robotics, advanced cyberwarfare, and pervasive biometrics to envelop the earth in an electronic grid— allowing elimination of entire enemy battlefield formations through ‘network-centric warfare’ or incineration of a single insurgent with a drone-fired missile.”183 Such a pervasive space shield is the electronic battlefield of the twenty-first century—an atmospheric totalitarianism that poses innumerable threats to the human condition.

#### Thus, the plan: The United States federal government should establish a national space policy substantially increasing its international space cooperation with the People’s Republic of China over space traffic management of geosynchronous orbital slots that at least includes ratification by the United States of the 1976 Declaration Of The First Meeting Of Equatorial Countries.

#### The aff turns Westphalian sovereignty against itself to undo colonial power relations between emerging and established space powers. China says yes.

Nayebi, 11—J.D. candidate, University of California Hastings College of the Law (Nima, “The Geosynchronous Orbit and the Outer Limits of Westphalian Sovereignty,” 3 Hastings Sci. & Tech. L.J. 471 (2011), dml) [inserted the word “blank” as a substitute for “\_” in “Bogotá \_” for readability’s sake; insertion denoted by brackets]

The GSO is the orbit around the Earth's equator at an altitude of approximately 35,785 km (22,236 miles); the orbit takes twenty-four hours to complete." From this position, an orbiting satellite can "see" about one third of the planet's surface at a time." According to NASA, this altitude allows for a "broad view" that, when combined with "the ability to hover over a single equatorial location," has made the GSO very popular for communications relay and weather monitoring spacecraft." Satellites in the GSO that appear to remain stationary in the sky when viewed from the ground are called "geostationary."" This is an especially desirable position for telecommunications satellites since they can maintain a constant link with their contact point on the Earth from these parking spots."89 Satellite communications is an immensely profitable enterprise. There is a long queue for access to the GSO, comprised of "companies proposing new services (such as direct-to-home broadcast television and mobile communications for trucking or airline fleets) and representing newcomers, particularly developing countries, now entering the market for satellite services."" This queue is administered by the Space Services Department of the International Telecommunication Union (ITU) under the auspices of the UN. 91

It is no surprise, then, that the "commodification" of these vantage points in space and their relative allocation among the various countries is a point of international dispute.' Even the drawing of a boundary between the air and outer space has been controversial because the classification could potentially push the GSO into the province of air law rather than space law. Imposition of an internationally recognized, definitive boundary between air and space could cause a shift in the treaties applicable to the GSO.3 You will recall that the basic premise of space law is to promote the exploration and exploitation of outer space for the benefit of humankind, free from the normative notion of sovereignty.4 This proposition is rather different from that of air law, which (like the law of the sea) is based on the Westphalian model of sovereign nation-states. The Paris Convention of 1919 on international air law was premised on the idea that "[p]arties recognize that every Power has complete and exclusive sovereignty over the airspace above its territory."5 Exclusive sovereignty over airspace is now the norm, and has been codified by many countries: in 1920, for example, the United Kingdom Parliament declared, "[t]he full and absolute sovereignty and rightful jurisdiction of His Majesty extends, and has always extended, over the air."96 Similarly, in 1957 the US Congress declared that "[t]he United States Government has exclusive sovereignty of the airspace of the United States."" For our purposes, we will think of the GSO as part of space rather than the air," but some countries have already (and may again) challenge this definition and attempt to assert sovereignty over the GSO as their "territorial outer space" under international air law.9

A. The Bogotá 8

Controversy over ownership rights and sovereignty over this finite space resource has not been entirely lacking. Up to now, the United States, Russia, and a few other developed countries have enjoyed the most "space" in the GSO."0 The U.S. has about 339 satellites in the GSO,' six of which, for example, served DirecTV satellite television company as of 2004.'0 During the decolonization wave of the 1970s, developing countries became cognizant that their former colonizers' use of the GSO for telecommunications could hinder their ability to access this resource in the future. 103 Lawrence D. Roberts writes that, "[o]f even greater concern to the developing states were the uses to which communication technologies were being put. Distribution of news and other information to developing populations was perceived as former colonial powers foisting inappropriate and dangerous perceptions and values on the citizens of developing states."" In other words, the former colonies were foreshadowing the threat to their sovereignty by Western cultural imperialism, which has now ironically become an established byproduct of globalization.o10

By 1976, a group of eight equatorial countries led by Colombia (the "Bogotá 8") sought to secure the rights to the geostationary positions directly over their territories'0 by extending their sovereignty to "outerspace."0' The 1976 Bogotá Declaration encapsulated their aspirations, though it was difficult for the equatorial group to make their claim of sovereignty given the Outer Space Treaty's express abrogation of national sovereignty over outer space.t os A further problem was that since none of the Bogotá 8 countries were space-capable at the time, a legal violation of the Outer Space Treaty on their part would have probably prompted the space-faring countries to take advantage of the opportunity and assert their own claims of sovereign rights over other parts of space.1ta To elude this possibility, the group of eight argued for a special exception for the GSO:

Reasoning that the orbital arcs above each declaring nation were fixed, the declarants argued that those arcs should not be considered a part of outer space at all, but rather should be considered a natural resource arising directly out of terrestrial gravitational phenomena. Since each nation has a right of control over its own natural resources, they argued, the portions of geostationary arc should be controlled by those nations having territory directly underneath."o

As discussed earlier, commentators have long pointed to a loophole in the Outer Space Treaty caused by the lack of a clear line of demarcation between airspace and outer space. The Bogotá 8's argument that the GSO arises directly from the Earth's gravity implied that everything that lies in Earth's gravitational field is airspace and hence should not be governed by space law but rather by air law."' This reasoning allowed the Bogota 8 to make claims of sovereignty without contravening international law, and without prompting space-capable countries to follow suit. In the Bogota Declaration of 1976, the equatorial countries asserted that the placement of satellites in their respective portions of the GSO required "express authorization on the part of the concerned State." 1 2 The Bogota 8 restated their claims to geostationary sovereignty at the 1977 World Radio Conference held in Geneva, Switzerland, and later that same year at the UN Outer Space Legal Subcommittee.'13 In a statement by the Colombian delegate E. Gaviria, the group maintained that their proclamation of sovereignty over their respective segments of the GSO was not in conflict with the Outer Space Treaty and that this Treaty "did not take account of the interests of developing countries.", 4 During the meeting, Kenyan delegate J. Simani pointed to the need for a definition of the boundary between the air and space that was sensitive to "the special position of equatorial countries with respect to the GSO forming part of their natural resources."" Essentially, Mr. Simani argued that the GSO should be considered a part of airspace, and hence, immune from the Outer Space Treaty regime.

Not surprisingly, the equatorial countries' arguments did not go over well at the Outer Space Legal Subcommittee. The Soviet delegate, Mr. B.G. Maiorski, argued that the GSO was part of outer space and that the coincidental location of the equatorial countries did not create any rights in the orbit."'6 In the end, the overwhelming consensus at the Subcommittee was that claims of sovereignty over the GSO or any other part of outer space are incompatible with the express and implied spirit of the Outer Space Treaty and should be dismissed."7 However, to deflate the situation and bring temporary resolution to the issue, the ITU agreed to set aside certain GSO "parking spaces" for future use by non-space-faring countries."

Nonetheless, the question of whether the GSO is part of outer space or the air remains unanswered. Professor Andrej Gorbiel, who was the Polish delegate at the Outer Space Legal Subcommittee in 1977, has written that the main objective of the Outer Space Treaty was to promulgate rules to govern the activities of countries in their outer space adventures." 9 He argues:

[t]his use encompasses objects launched into outer space and in particular artificial earth satellites placed in orbit around the earth. Therefore, the implementation of the [Outer Space Treaty] is possible on the assumption that its provisions concern those regions of space in which the . . . satellites are placed.12

Gorbiel concludes that to argue otherwise would deprive the Outer Space Treaty of the reason for its existence.121 In 2001, at its 44th session, UNCOPUOS agreed that "[t]he GSO, characterized by its special properties, is part of outer space."12 2 In line with our assumption that space law governs the GSO, it would seem that, thus far at least, the orbit is immunized from dissection by equatorial sovereigns.

B. The Bogotá \_?123

You may question the relevance of the events of 1976 in today's rapidly changing world, but the issue of the ownership of the GSO is not likely to fade away anytime soon. While from a Western perspective the failure of the Bogotá 8 to garner support for their Declaration may appear to be in the best interest of humanity, the current system lacks an element of fairness for the developing world. In this sense, the Bogotá Declaration may be thought of as not only a demand for sovereignty over portions of the GSO, but as a symbolic disapproval of the current "first come, first served" 24 arrangement in space, where wealthy countries disproportionately enjoy the benefits of new space technologies.125

At present, developing countries are more reliant on telecommunications satellites than the developed world because they have limited telephone networks and less infrastructure. 6 Wealthier countries, on the other hand, have an abundance of networks that serve their robust mobile telephone and broadband Internet markets. These services are delivered mainly via less expensive low Earth orbit satellites and terrestrial networks rather than geostationary sources.127

As demand for information services increases in developing countries, the spirit of the Bogotá Declaration is likely to linger.

In 1991, Colombia, the principal actor of the Bogotá 8, promulgated its new constitution. In defiance of international law, article 101 sets out the regions over which Colombia enjoys sovereignty. Paragraph 4 of the article reads:

Also part of Colombia is the subsoil, the territorial sea, the contiguous zone, the continental shelf, the exclusive econ-omic zone, the airspace, the segment of the GSO, the electromagnetic spectrum and the space in which it operates, in accordance with international law or the laws of Colombia in the absence of international regulations.28

This constitutional declaration illustrates that Colombia still disputes the existence of international regulations applicable to the GSO or, that the GSO falls within the ambit of the Outer Space Treaty. This assertion enables Colombia to claim that its declaration of sovereignty over the GSO is "in accordance with international law. ,129

Arguably, it is not just developing countries that wish to acquire territorial rights in the space above their land. Despite having ratified the Outer Space Treaty in 1983,130 an "increasing number of publications by influential Chinese authors (are) advancing the principle that China's sovereignty extends through outer space," reasoning that there is still no legal line of demarcation that would prevent such an extension. 13 1 With the continuing classification of the GSO as res extra commercium and the resulting advantage to wealthy space-faring countries, it is likely that the Bogotá 8 will grow and make a comeback as the Bogotá \_ [blank]. Thomas Gangale argues that many "entities have contracted with [satellite] launching States to place their own satellites in the [GSO], and this number will only grow as more States develop the need for positions in the [orbit]." 32 However, if countries must rely on a contractual relationship to benefit from satellite technology, this may exacerbate access and sovereignty issues in relation to the GSO, and may be viewed as a form of space neocolonialism. To avoid this scenario, it is necessary to find an alternative classification for the GSO.

#### Creating a conflicting treaty regime based on Bogotá disrupts imperial technocracy. We can use global claims to rupture the “global” itself.

Durrani, 18—JD/PhD candidate at Columbia Law School and Princeton University (Haris, “THE BOGOTÁ DECLARATION: A GLOBAL UPRISING?,” <http://blogs.law.columbia.edu/uprising1313/haris-a-durrani-the-bogota-declaration-a-global-uprising/>, dml)

Arendt’s speculative ruminations about the authoritative limitations of the laws governing outer space vaguely anticipated fundamental dilemmas in space law today. Just as Arendt worried about the unfettered free use of territory and property in space, several contemporary controversies in space law concern limitations on territoriality and property rights in space. These disagreements tend to fall along fault-lines between global north and south nations, between colonial or imperial states and their former subjects.

Historically, such disagreements arose out of national liberation movements and postcolonial unrest in the mid to late twentieth century. This has led to an ongoing history that continues as one of postcolonial struggle. Prominently, due to the unique relationship between equatorial territories and geostationary orbit, such territories are particularly useful for rocket launches. Thus, since the mid twentieth century, global north nations have exploited these territories for this purpose, resulting in various ongoing environmental and labor concerns. For example, only last April, protestors blockaded the European space industry at the Guiana Space Center, formed in the 1960s after French colonization, as Peter Redfield describes in Space in the Tropics.

A Global Uprising?

The Bogotá Declaration is an intriguing example of an anti-imperial struggle about outer space that appears more intrinsically global than the revolutions discussed in 3/13. This is by virtue of its attempt to reconstruct state authority in outer space by employing limitations on territory, much as Arendt might have envisioned.

In the Declaration, a coalition of equatorial states (Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda, Zaire, and Brazil) attempted to resist the OST’s non-appropriation principle—which prevents claims of sovereignty in outer space—by asserting that each of their national territories extends to geostationary orbital slots overhead. The Declaration claims these slots as natural resources connected to the equatorial status of the territories below, thus allowing these states to “call on the jus cogens principle that States have absolute control over their natural resources to exercise sovereignty over the geostationary orbit.”[10] Because such orbits were and remain valuable for telecommunications satellites, the postcolonial nations that signed the Declaration were concerned that global north states would occupy these slots before the developing world could achieve the technological and economic means to do so.

Although the Declaration has failed because no spacefaring nation signed it, remnants of this legal uprising continue into the present day. The Constitution of Colombia still contains a provision reiterating the country’s sovereignty over geostationary orbit above Colombian territory.[11] Colombia and the Republic of Congo have signed but not ratified the OST. And, although the International Telecommunication Union (ITU) regulates orbital slots, out of 427 satellites in geostationary orbit, “only a few belong to technologically developing States.”[12]

The Declaration’s global character is distinct from those discussed in 3/13. Although the Arab Spring and OWS uprisings were responses to the neoliberal, capitalist, imperial order that has emerged from the global north, they manifested in practice as struggles resisting particular domestic circumstances, no doubt influenced by those broader grievances and influences. By contrast, the Declaration is a fascinating case in which the struggle is inherently over the constitution of “the global.” Various states did not merely share broad concerns about the global north’s abuses of force and capital, but came together to specifically respond to these concerns in a single, concerted action: a claim about the physical connection between their equatorial territories and geostationary orbital slots above them. Their legal uprising was a reimagining of the fundamental scientific, natural, and legal relationship between space, Earth, and the state.

Restated in Arendtian terms, the Declaration was a claim about fundamental authority rooted in a conception of nature and the globe—the relation between outer space and equatorial territory—at odds with the conception formulated by global north states in the OST. In this conception, the Declaration proclaims, “geostationary orbit is a physical fact linked to the reality of our planet because its existence depends exclusively on its relation to gravitational phenomena generated by the earth.” Perhaps this attempt to limit orbits as extensions of territory on Earth is an attempt to impose Arendt’s “geocentric” limitations onto territoriality in space.

Or, an Uprising Against the Global?

Although the Declaration’s legal uprising is about the global, perhaps it is not necessarily global itself. There is a sense in which the Declaration is not inherently about the global at all but is an attempt to rupture the global as a concept that arose in the global north’s space regime and to ground questions about legal sovereignty back onto national territoriality, rather than de facto power, in domains with ambiguous arrangements of sovereignty like that under the OST’s non-appropriation principle.

Indeed, the Declaration complicates the truly “global” character of international law. It is one of several legal conflicts about space governance that fall along fault lines between how states in the global north and south conceive of limitations on territory that are either “geocentric” (linked to earth) or “anthropocentric” (commonly owned by humankind). Even if the Declaration has no legal effect, its mere existence is one of resistance: It lodges a crack in the legitimacy of dominant regimes that use their purportedly global character to produce the semblance of authority. These fault lines generate alternative internationalisms, or, more bluntly, conflicting international orders: the OST as one interpretation of the space regime shared by many nations and enforced by the global north, against regimes like the Declaration as legal orders shared by alternative coalitions of nations. In fact, discussing the Declaration and the complex history of negotiations over the governance of the deep seabed, Surabhi Ranganathan has gone so far as to argue that a coalition of states can resist dominant international order by forming conflicting treaty regimes.[13]

The Declaration’s rupturing of the global would match with the history in which the concept of Earth as the “Blue Marble” (alternatively, “World Picture,” “Whole Earth,” “Gaia,” or “Rocketship Earth”) emerged as a “political and cultural object.”[14] There is a significant body of historical, sociological, philosophical, and anthropological scholarship pointing toward Blue Marble as exhibiting a cybernetic, colonial worldview about control over people and nature.[15] Notably, Heidegger and Arendt, against philosophers like Hans Blumenburg or Frank White, viewed the image of Earth from space as alienating.[16] More recently, Sara Pritchard describes “Black Marble”—the image of city lights on Earth at night—as a phenomenon emerging from Blue Marble. She argues that, rather than exposing global economic inequality by displaying the absence of lights in the developing world, Black Marble revives age-old imperialist perspectives of Africa as the “dark continent.”[17] This history is particularly important to our discussion of legal uprisings in space because the Blue Marble concept has blatantly influenced legal conceptions of space as related to a borderless, non-appropriable, or commonly-inhabited globe rather than one defined by national territories.[18]

In this context, the Declaration’s intervention into the OST’s legal prescription of space as a non-appropriable global domain—a regime without borders—appears all the more radical.

#### Symbolic challenges to imperial control over GEO slots can energize resistance by using the lessons of Bogotá to reimagine the spatial production of orbits.

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While industrialized nation-states have dominated orbit for decades,2 developing countries have challenged this hegemony on multiple occasions. The first section of this essay provides a contextual discussion that explores the legal definition of outer (and orbital) space as a space of equal access and mutual benefits, and highlights historical moments when orbit became a contested domain. Drawing on international treaties and critical scholarship, I suggest that orbit should be thought of as a "vertical public space" that extends from the earth's surface to the outer limits of orbit, a space that has historically been struggled over by multiple competing interests. In a world dominated by global capitalism and militarism, a vertical space cannot remain "public" without a struggle to define and maintain it as such. In the second section of the essay, I suggest that the mapping and visualization of orbit are vital to the process of claiming it as public. Since physical occupations of orbit are impossible for most, struggles over this domain must take place within the symbolic economy. To draw attention to this terrain, I critically examine a series of orbital maps and develop four categories of orbital mapping:

• otherworldly perspectives;

• satellite-centric views;

• orbital projections;

• conceptual maps.

Using examples, I demonstrate the kind of knowledge and critical questions that such visualizations can generate, while also pointing to their limitations. Just as the Dymaxion map challenged citizen-viewers to think differently about the relations between continents or between the lands, air and oceans, orbital maps can encourage them to become more acutely aware of the material relations and historical processes that extend into, unfold within and structure this extraterritorial domain. By putting orbital space into discourse, the orbital map also brings opportunities to (re)claim this vertical field as a public domain.

Contesting orbit

The etymology of "orbit" has a long history that is linked to vision and movement. In Old French (circa 1314), "orbit" referred to the "eye socket" (Oxford Dictionaries, 2004). In classical Latin it had been used to signify a "wheel-track" or the "path of a celestial object" (ibid.) By the late seventeenth century, astronomical use of "orbit" became common, especially in efforts to describe the course of the moon or sun. More recently, orbit has been used figuratively to refer to "a fixed course or path" or to a sphere of activity, influence, or application within which a person or thing normally moves or operates" (ibid.) Not until the twentieth century, in the early days of the space age, did the verb "to orbit" come into use within the English language. By 1946, "to orbit" meant "to travel round (especially a celestial object)" and came to be associated with particular patterns of movement around the earth or other planets (ibid.)

In contemporary times, the word is commonly used to describe the band of space surrounding the earth trafficked by satellites. This area, which extends from the earth's surface to approximately 60,000 km above it, is organized into different orbital domains or paths, includ- ing the geostationary orbit (GEO), medium earth orbit (MEO), low earth orbit (LEO) and super-synchronous or parking orbit. Each is typically used for different satellite applications: GEO is used for telecommunication and broadcasting, MEO is used for global positioning and LEO is used for remote sensing. While paths in LEO and MEO are rela- tively unregulated, to send a satellite into GEO a country must file a multi-stage proposal with the International Telecommunications Union (ITU). Once the proposal is approved, the applicant receives orbital slot and frequency assignments. Orbit is thus a composite resource made up of a physical location (orbital slot and path) and access to the electromagnetic spectrum (frequency assignment).

The concept of orbit is so tightly tethered to scientific innovation, national security and corporate expansion that it is scarcely invoked in relation to public interests or public space. Like many terrestrial spaces, however, orbit is a highly valued and hotly contested domain. In 1983, after more than 20 years of satellite deployments, legal scholar Siegfred Wiessner called upon the international community to "build the public order of the geostationary orbit, " proclaiming, "technology and human ingenuity have made the band of space around the planet a natural resource of advanced global civilization. They have not devised an equally advanced public order for its regulation" (1983, pp. 235, 273). He went on to define orbit as a res publica internationalis (a site of "inter- national public affairs") and proposed a new regulatory regime based on a "congruence of interests and the experience of mutual benefits" (ibid., p. 274). Significantly, Wiessner's vision of orbit as a kind of global commons set out to challenge the orbital hegemony of the USA and the USSR, but it also promulgated a liberal pluralist ideology, assuming there were readily identifiable mutual benefits and shared interests in orbit among nations around the world. Such a view ultimately failed to acknowledge the structural inequities among different nations as well as their different dispositions toward orbital space.

Nevertheless, Wiessner's case for a public order of the GEO relied upon earlier legal precedents and political challenges. In 1967 the United Nations' Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and other Celestial Bodies was signed in the USA, the UK and the USSR. The "Outer Space Treaty," as it is known, established a legal framework for activities in orbit, on the moon and beyond, and it remains the primary regulatory structure for outer space, having been ratified by 98 United Nations members and signed by 27 others as of 2006 (United Nations office for Outer Space Affairs, 2011). First signed on January 27, 1967, the treaty mandated that the exploration and use of outer space, including orbital space, "shall be carried out for the benefit and in the interests of all countries, irrespective of their degree of economic or scientific devel- opment, and shall be the province of all mankind" (US Department of State, 1967). It insisted that outer space should not be "subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means" (ibid.) And it instructed signatories "not to place in orbit around the earth any objects carrying nuclear weapons or any other kinds of weapons of mass destruction" (ibid.) In short, the treaty espoused principles of international equality, peace and collaboration, and recognized the right of all countries to access and use outer space (and orbital space), regardless of the level of their financial and scientific resources.

In his essay "The Invention of Air Space, Outer Space, and Cyberspace," James Hay (2012) suggests that extraterritorial domains have historically been "invented" within juridical and political discourses precisely so that they could be regulated and used to articulate the ideals of liberal democracies. In relation to the Outer Space Treaty, Hay observes, "'Outer space' became a new historical, geographic, and theatrical/performative stage for shaping a discourse about rights and responsibilities, war and peace, security and risk — and thus for redefining the objectives of government and of national sovereignty on a global scale" (Hay, 2012). As the first field of outer space exploration, orbit became an important dimension of this new "stage" as Western governments used it to showcase the new frontiers of entrepreneurial freedoms along with the sprawling reach of national security. As more satellites were launched, more questions and concerns emerged about how and whether governance and sovereignty could operate in this vertical field.

Despite the Outer Space Treaty's high ideals, only a handful of nation-states had the resources to develop and launch satellites during the 1960s (the USA, the USSR, the UK, Canada, France and Germany). As a result, the organization tasked with the assignment of GEO orbit slots, the ITU, decided to grant orbital slots on a "first come first served" basis, which some felt flagrantly violated the equal access principles of the Outer Space Treaty. Developing countries responded to what they perceived as the ITU's favoritism toward wealthy industrialized States in different ways. Recognizing that orbit had become a valuable resource, in 1976 several equatorial States, led by Colombia, asserted sovereignty over the GEO superjacent to their terrestrial borders (Declaration of the First Meeting of Equatorial Countries, 1974). In a vivid demonstration of bottom-up power, Colombia, Brazil, Republic of the Congo, Ecuador, Indonesia, Kenya, Uganda and Zaire (now Democratic Republic of the Congo) declared their sovereignty through the vertical field that extended from their national lands on earth up through the orbital space above them, issuing a bold challenge to countries that already occupied orbital slots. The Bogotá Declaration, as it is known, also mandated that any future satellites to be placed in orbital slots above these equatorial countries would require the country's consent.

Unable to occupy orbit themselves, the signatories of the Bogotá Declaration waged their battle over orbit within the symbolic economy. Declaring their sovereignty in orbit became a way of reminding the world that orbit had been defined as a "non-sovereign" domain "open to all countries," and yet was being rapidly colonized by wealthy world superpowers. As Christy Collis explains,

While Bogotá did not succeed in transforming the GEO into the property of equatorial states, it did firmly situate developing states on the agenda of GEO spatial considerations: that developing states should have equitable access was now largely accepted; that transforming the GEO into Earth-bound sovereign territory was the way to accomplish this was refused. (Collis, 2012)

The Bogotá Declaration demonstrated that developing countries recognized the value of orbit and sought to benefit from it. By the end of 1986, however, almost half of all geostationary satellites were controlled by the USA alone (Delzeit and Beal, 1996). Given the startling inequality in the possession of orbital slots, the ITU established an a priori policy whereby every country would be allowed at least one orbital position, and countries could submit applications to control slots even if they did not yet have funding to build and launch a satellite to occupy it (ibid.)ß During the 1990s, the Kingdom of Tonga in the Pacific set out to capitalize upon these conditions. Rather than declare its sovereignty in the orbital space overhead, it planned to acquire valuable GEO slots in the Asia/Pacific region. By late 1990 the country had partnered with retired American entrepreneur Matt C. Nilson (who had previously worked for Comsat and Intelsat) to form a company called Tongasat, and had acquired 16 unused orbital slots over the Pacific region that could be used to link North America and Asia (Andrews, 1990b). Since Tonga lacked funds to build and launch its own satellites, it planned to lease these slots to other satellite operators for $2 million per year or to the highest bidder (ibid.; see also Andrews, 1990a). Tonga's maneuver to become an orbital landlord with "paper satellites" became highly controversial (Price, 2002, p. 151). Intelsat argued that these prime orbital slots with a footprint of 3.5 billion people should be allotted to established satellite operators that are prepared to serve populations throughout the Asia/Pacific region (Mendosa, 1994)." In the end, several countries, including the USA, complained to the ITU about Tonga's legal filings and the island nation was left with only seven slots. Plagued by internal business disputes, Tongasat never had funding to build its own satellite, but in 2002 it purchased the used Comstar I D satellite from Comsat, renamed it ESIAFI-I (or "Star Trail") and operated it for approximately three years at 70 degrees east over the Indian Ocean (Tongasat, 2002).

As the Bogotá Declaration and the case of Tongasat reveal, orbital space has historically been a contested domain. In both instances, developing countries asserted control over orbital space by relying on the equal access principles of the Outer Space Treaty, while challenging other aspects of the treaty (e.g. non-sovereignty) in the process. Rather than actually occupying orbital slots, these countries claimed them symbolically through a formal declaration and ITU legal filings. Battles staged in a symbolic economy are all the more crucial when they cannot occur in a physical location. To be able to make such claims, the equatorial states and Tongasat had to imagine a vertical field of power relations, while recognizing that the value of and access to orbital space are determined by hegemonic forces on earth. As Barney Warf aptly puts it, "while satellites float thousands of kilometres overhead, the determinants of access and use are firmly grounded in terrestrial politics" (Warf, 2007, p. 394).

In a world defined by various hierarchizations, the subordinated are all too familiar with vertical metaphors and operations of power. If orbit is yet another domain for such relations to take shape, then it can also become a site for exposing and contesting them. The Bogotá Declaration and Tongasat case are important because they are historical moments in which the meanings of orbit converged with the political imaginary of the subordinated. These events altered the geopolitical stage of outer space by challenging orbital hegemony. The capacity to imagine how power operates through this vertical field is key to future challenges to this dominant order. One way to encourage such imaginings is through the mapping of orbital space. Maps can enable citizen-viewers to feel some material connection to a location or process that is remote, both physically and intellectually. Being able to visualize the new sovereignty boundaries asserted by the equatorial States in the Bogotá Declaration, or the stretch of GEO Tongasat sought to control, could renew and extend the discursive terrain upon which these struggles played out and trigger further public interest and involvement in orbital contestations.

#### Those symbolic effects matter even if the plan’s legal effects fail.

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The Declaration of the First Meeting of the Equatorial Nations adopted on 3rd December 1976 defines the geostationary orbit 1 as a limited natural resource under the sovereignty of Brazil, Colombia, Congo, Ecuador, Indonesia, Kenya, Uganda and Zaire.2 Known also as The Bogotá Declaration the text is an eloquent statement of the emerging inequity caused by the technological advantage of nations with satellites in the geostationary orbit. The language in this official text conveys a seething anger targeted at the "industrialised countries" that continued to shape the rules to their own advantage, even in outer space:

"The solutions proposed by the International Telecommunications Union and the relevant documents that attempt to achieve a better use of the geostationary orbit that shall prevent its imminent saturation, are at present impracticable and unfair and would considerably increase the exploitation costs of this resource especially for developing countries that do not have equal technological and financial resources as compared to industrialized countries, who enjoy an apparent monopoly in the exploitation and use of its geostationary synchronous orbit”. (The Bogotá Declaration, 1976, Article 1)

Here the signatories accuse the regulatory body for the geostationary orbit, the International Telecommunications Union, of unfairness in their allocation of slots in the geostationary orbit, so-called because satellites orbiting at a height of 37,000 kilometers above the Equator synchronise with the Earth's orbit and the satellite appears to remain stationary. Frequently, in space law, this document is interpreted as a misguided and overstated claim for sovereignty (Lyall & Larsen, 2009). What is missed, by interpreting the document in that way, is that the Declaration is evidence of something more phenomenological than legal, that it points to the phenomenon of having and not having a satellite and how that feels. It points to the affective space of space technology production.

The claim of sovereignty is in essence a rhetorical stance. The real purpose of the document is performative. The fullest meaning of the document is not to be found in the legal reading of the text, but through an appreciation of the experiences that gave rise to its claim and language. The treaty is an opportunity to make the consequences of not having satellites palpable, within a limited spectrum of possible moves. The existence of the treaty and its rhetorical resonance poses questions as to the nature of the affective domain of space technology: the satellite footprint's indirect consequences and what it is that the experience of having or not having a satellite translates into. The Bogotá Declaration provides evidence that as the nations able to launch satellites did so, they correspondingly affected the status of those nations not launching satellites. Without satellites in geostationary orbit the eight Equatorial nations perform through the text the otherwise invisible effects brought to their nations by the launching of satellites by other nations.

An equally compelling critique of the problem of ownership and application of satellite technology is found in the formational projects of the Indian space programme. Between July 1975 and August 1976 the Indian space agency conducted the largest experiment anywhere in the world in using space technology for the least advantaged. The Indian Space Research Organisation (ISRO) addressed the emerging inequity of spaceflight by proactively designing an alternative model of spacefaring that foregrounded the needs of the non-elite, rural populations of India. The project was called the Satellite Instructional Television Experiment, or SITE. The Indian space programme has received attention for its distinctive societal emphasis (Sheehan, 2007; Harvey, 2000), but it is rarely framed in terms of a resistant act or critique of the inequitable shaping of space technology during its first decades, nor as creative reinterpretation of a large-scale technology. Accounting for the ideological shaping of ISRO's programme in this way exposes the creative reengineering of India's subaltern position from a minor spacefaring nation, to an imaginative, innovative and ethically motivated spacefaring nation.

The tactic mirrors the broader trajectory of India's international relations at the time as it took the moral high ground as a non-aligned state in the Cold War. Prior to the establishment of its space programme, India had, through the 1950's, defined its own distinctive position internationally through 'moral leadership' and a political 'third way'. In Prime Minister Jawaharlal Nehru's visits to the United States and the Soviet Union he resisted the intense pressure put on him to align with one or the other, much to the annoyance of the US Administration as evidenced in documents from the time (Guha, 2007, pp. 155-167). This independence of spirit is reflected in the kind of space programme adopted by India, which moved into an alternative, unoccupied ideological space: A societal space programme directed at enhancing the livelihood of its population, as distinct from a programme motivated by politics, power or the military aims of the Cold War. The establishment of a societal space programme by India was nonetheless deeply political in that this assertion of a third way, of neutrality, of opting out of the US-USSR binary was far from neutral. The US administration saw India's neutrality as threatening to its own alliance of support. The historian Ramachandra Guha writes, "Nehru at first tried hard to avoid taking sides in the Cold War. But, as he often said, this non-alignment was not mere evasion; it had a positive charge to it. A third bloc might come to act as a salutary moderating effect on the hubris of the superpowers." (Guha, 2007, p. 164). Nehru's neutrality was not an opt out, it was a strong stance and one that was difficult to maintain in the face of the pressure from the United States to choose sides.

Understanding this background helps to put the establishment of a space programme in India in 1962, and its philosophical journey, into some perspective. Its founder Vikram Sarabhai gave a speech in 1966 clearly referring to the space programme's 'non-alignment with the race to the Moon, saying, "man will surely push ahead with adventures of this type backed by motives which will inevitably be mixed" (Sarabhai, 1966, 2001, p. 92). Put within the context of 'neutrality' and 'non-alignment' as a highly political and far from neutral third-way, the societal programme takes shape as a bold move and an act of resistance, on the one hand against the pressure to choose between sides, and on the other hand, as a positive act in exercising the freedom to create a new imaginary of spacefaring. Perhaps also for Sarabhai, who had been active in the cooperative and disciplinary-led International Geophysical Year in 1957, the socialist ideology adopted for the space programme was also a protest against the co-option of scientific instrumentation for political gain. As noted by a later ISRO leader, "it is significant to note that the early inspiration for the Indian Space Programme came not from any military objectives, but from the interests of a large scientific community who have been actively engaged in research programmes related to geophysics and astrophysics" (Kasturirangan and Rajani, 2007, p. 1645). In claiming a socialist agenda and societal remit the founding character of the Indian space programme was symptomatic of the deep flaws in the claim that spacefaring could be an activity carried out on behalf of all humankind. Instead of the idea of humanity, the Indian space programme invoked the 'societal' as a more nuanced concept that could be practically addressed.

The television experiment SITE was a demonstration of how India could invert the logic of political and economic elitism that seemed to characterise space technology by creating new rules of engagement that favoured the non-elite. In other words India constructed a space technology based on the determining needs of the technologically disadvantaged, the hitherto subalterns of spacefaring. The rooted morality of India's invocation of its people and the Earth through its space programme, by dint, exposed and devalued the belligerent aims of the Space Race in an act of resistance favouring those perennially disenfranchised by the preoccupations of spacefaring.

Like the Bogotá Declaration, SITE brought a new dimension to spacefaring imaginaries. Instead of invoking futuristic imaginaries such as space colonisation, silver-suits and epic spaceship voyages, both acts of subterfuge brought new sets of imagery and new geographies of space technology to mind. Unlike the text of the treaty, India conveyed little adversary towards the superpowers maintaining the collaborative culture of the international science community and working with NASA on its national broadcasting experiment. Nonetheless, India drew soft power from the initiative's creative reimagining of space technology and through its collaboration with the United States appeared benign and forestalled failure.

My forays as an artist have been to turn these interventions that attempted to reimagine the culture of orbital space into tangible and shareable ideas: To open up again the current trajectories of spacefaring programmes for critique, modification, interpretation and creative resistance. With Alejo Duque, an artist from Colombia, we have performed The Bogota Declaration as a poetic remix and created public installations of the history of the geostationary orbit. The images below are from an installation created in Bengaluru, India. Each revisiting of the Declaration pulls back into the present the relation of the Equator and Equatorial countries to technology. These are acts of making and improvising that bring to mind historical repositories of the affective, emotional consequences of space technology. The Bogota Declaration remains unratified and the installation, which colour codes satellites belonging to Equatorial nations, confirms the small number presently in geostationary orbit.

In India, I mentored a two-year interaction with scientists from the Chandrayaan Moon mission called Moon Vehicle that gently explored the societal remit of the space programme in the light of its Moon mission. The images give a glimpse of some of the events and interactions, which I have also written about elsewhere (Griffin, 2010; 2015).

A number of Moon Vehicle workshops were held at schools with middle-school children (around the age of twelve) as creative learning projects with design students from Srishti Institute of Art, Design and Technology facilitating. These also involved scientists from the Indian Space Research Organisation (ISRO) and the Indian Institute of Astrophysics (IAA). As such, the workshops were vehicles to bridge neighbouring communities. One of these took place with children from Drishya Learning Centre a school located in an urban slum close to the ISRO.

The workshop was an intensive two-week 'summer school' and one of a number of workshops led by artists that were intended to give the children a different kind of exposure to the world around them through creative, experiential engagements. In the first week of the Moon Vehicle summer school two visits were made to ISRO. The first was to the ISRO Satellite Application Centre where Chandrayaan had been assembled and the second to the ISRO Indian Deep Space Network (ISDN) 30 km south of Bengaluru where the huge tracking antennas were located and images from the Moon's surface streamed from the spacecraft each day. In between and in response to these activities the children discussed what they had seen in the context of scientific and non-scientific ways of knowing the Moon, adding their own invented mythologies and questions. They developed highly creative portfolios of drawings, fabricated their own spacecraft and every morning worked with a dancer, Anitha Santhanam, to develop performances based on their interactions with space technology and technologists. At the end of the two week workshop the children presented their performances and creative work to an audience of other Drishya children and facilitators together with scientists from ISRO and the Indian Institute of Astrophysics.

In this important process of sociability across disciplinary domains, social divides and generations, the ineluctable accomplishment and ingenuity of the visual artefacts and performances produced by the children called attention to their interpretive and generative abilities that took the participant astronomers and space scientists by surprise. The expectation that the scientists would teach the children was inverted to some extent and instead the children's creative work effectively explained back to the scientists the inventive and critical meanings the children developed themselves, through their creative transformations. The workshop emphasised ways that transformative creative processes established the value of the children's own experiences and viewpoints and in so doing appropriated space technology and its rituals of reception.

This appropriation had many facets and was a constant and iterative aspect of the workshop. After their visit to the clean room where satellites were assembled, which they observed from behind glass, the children began to build their own versions of spacecraft and, dressed as ISRO technicians, to some extent usurped the technician's role and accessed imaginatively the inaccessible zone of the clean room. Through their creative work the children further deconstructed the restrictions and social hierarchies which they had observed and been subjected to. Spacecraft and rockets with white coats and button down shirts appeared among their creations as well as drawings of military security guards ordering the children not to bring cameras, mobile phones or USB sticks appeared in their portfolios and performances. The creative work negotiated a position of agency for the children, which in some sense was fleeting in that it was reliant on the context of the workshop. It was an agency that arguably brought no determining influence on space technology. Yet, the performances and creative artefacts presented a space of interpretation in which the children re-ordered ISRO's space technology into schemes of their own devising.

This brief paper draws comparison between the policy-level interventions of nations self-identifying as subalterns to the grand narrative of space exploration and the critical-creative activities which I have been involved in devising as an artist – identifying also as a subaltern to space industry projects which claim to act for my benefit. The Space Race positioned the 1976 Bogotá Declaration and the 1975/6 Satellite Instructional Television Experiment as creative acts of resistance to the dominant shaping of the purpose of space technology by the United Sates and the Soviet Union. Each action re-imagined and inverted assumptions, one with text and the other with the actual and imagined image of residents in Indian villages connecting to the global village via orbiting satellites. The tactics are those of artists who habitually invoke the charged opportunism of the subaltern position to re-engineer imaginaries, opening the possibility that these imaginaries may become self-fulfilling prophecies.

#### It’s valuable to research and debate the opportunity costs of legal correctives to inequitable space access under the common heritage principle even if the law can’t guarantee justice. Critiquing legal structures from outside reifies empire if it doesn’t offer an alternative to the law.

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This article presupposes that there is a dominant position in interpreting the freedom of outer space, which undervalues the idea of common benefit.1 With no clearly defined conception of common benefit, the debate around common benefit is exploited to protect individual benefits, as opposed to determining what the effort to use space collectively can generate for the common good. In other words, in line with the dominant conception of sustainable development, every nation is free to determine how to meet its own needs and accrue its own benefits as long as it does not prejudice the ability of future generations to do the same.

This presents a problem on two levels: (1) legally and (2) socially. On the first level, the dominant position goes against the cardinal principle and intention of Article 1 of the Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, hereinafter Outer Space Treaty (OST), that exploration and use of outer space “must be carried out for the benefit and interests of all countries irrespective of their degree of economic or scientific development, and shall be the province of all mankind,” that freedom to explore and use outer space exists “without discrimination of any kind” and “on the basis of equality.”2 In short, the dominant position, where it does not take into account common benefit, either amounts to a general breach of international law or to the proclamation of a legal regime that is unachievable and out of touch with reality.

On the second level, socially speaking, the dominant position perpetuates the serious divide between states and gives rises to the perception that legal rules designed to promote equality and equity are simply disguises to ensure that forms of hegemony are maintained. As a result, we find it difficult to find an adequate answer to collective action problems, like achieving international stability, and there is a lack of trust in sharing space technology due to conflicting national goals. This is generally referred to as a quest for space sustainability when sustainability is understood as “Space Governance for Global Security.” Under this conception, all space actors seek “to secure the space domain for peaceful use; to protect space assets from all hazards; and to derive maximum value from space for security, economic, civil and environmental ends.”3

Though space technology and space exploration systems are complex, the logic of the global space governance problem calling for space sustainability is relatively simple to describe. Acknowledging, but putting aside, the focus purely on technical risks, a review shows that the following issues constitute the greatest risk to space activities: (1) space debris and collisions; (2) lack of international space situational awareness; (3) purposeful interference, such as satellite jamming and unintentional harmful interference; (4) effects of space weather and radiation; (5) aggressive actions and behaviors, and their geopolitical causes; (6) human error and lack of capacity as a substantial cause of risk; and (7) failure to meet societal needs and reduced space budgets. This list of risks, however, belies the enormous complexity of devising a means of mitigating and adapting to their consequences. For instance, while there is broad consensus on the increasing importance of space debris, there are a number of uncertainties and complicating factors that restrict our ability to make straightforward policies to address the problem, and the sociopolitical obstacles to addressing the same can hardly be overestimated.

A reason for this problem is that, contrary to the way man and outer space were envisaged to coexist toward the beginning of the spacefaring era with the adoption of OST, common benefit is constructed as a property claim (“give me my part”) instead of a distributive justice claim (access to an equitable share derived from a common pool resource). This is observable at both sides of the capabilities divide. One the one hand, a review of “Third World Approaches to International Law” reveals that the idea of common benefit leads to affirmation that those on the margins of space activity can make a claim upon the public good without reciprocity; and secondly, that equitable sharing means that any advantage derived for the hegemonic space powers is considered to bring advantages for the other states. What we find is that, despite increasing number of new entrants to space activities or usage, barriers to entry still exist, largely disguised as security constraints, and lack of enablement to increase capacity emerges through restricted international cooperation or technology transfer, even where commercial. This positions newer entrants unfairly, and they are disadvantaged because there exists a disproportionate accrual of benefits, and those capable of meeting common benefit obligation appear to view it as a soft, non-legally binding norm based on good intentions.

The difficult question is what would proportionality look like? The goal of distributive justice is focused on common outcomes, while considering that some actors and users need more assistance on the way to achieving those common outcomes, paying close attention to the aspects of domination referred to earlier. This paves the way for an evolution in the general principles, allowing all actors to think more coherently and systematically about cooperation in outer space at a time when impacts asymmetrically affect aspirant states. Such an evolution is opportune at a time when cooperation is needed to produce greater capacity to share and manage collective goods.

The effort to prompt an evolution in thinking, in turn, calls for undertaking an assessment of the range and organization of possible space benefits, taking account of where potential partners are in their development, what can be enabled through relationships and on a practical level, and how these participants are enabled. The framework of analysis for such an assessment brings hard and soft law together. Developing such a framework requires theory because we have to know something about how actors are involved in global space governance and about the role of benefit sharing.

This article draws on a combination of insights from the writings of legal, political, and social theorists,4 and methodologies from critical legal schools, in order to contextualize the historical ideological debate about common benefits, the current understanding of the freedoms granted by the OST, and the issue of space sustainability. One main outcome of this work is to provide guidance to actors engaged in space exploration who attempt to fulfill their treaty obligations, while seeking space sustainability, and who are mindful of issues of concern to emerging space users and actors.

Introduced herein is the argument that when the issue of benefit sharing is raised, the dominant position encounters a tension between established spacefaring nations and emerging and aspirant states, and the idea that “freedom” takes on a different meaning depending on where one is on the scale of development. It is therefore proposed to analyze on the basis of a cosmopolitan approach,5 which is grounded in Third World Approaches to International Law (TWAIL) mentioned earlier.6 While TWAIL is an interesting and useful starting point to understand issues from the perspective of a diverse range of actors, in the space context the approach must be infused with cosmopolitan ideas to ensure that all actors benefit. The hypothesis here is essentially that the existing emphasis on some topics of national or individual concern obscures the larger issues of international structural inequalities—lack of access, barriers to capacity building and technology transfer and absorption—while simultaneously magnifying issues related to market protectionism, which are actually disguised as security issues. I claim that it is possible to correct this distortion while safeguarding the focus on global issues, such as space sustainability. Tools designed with the “Cosmopolitan Approaches to International Law” (CAIL) express forms of cooperation that help to produce reciprocal obligations to enable all participants. Discussed as well is the advent of sustainability as a concept applicable to space activities. This discussion highlights the plurality of meanings to the concept and focuses on the position that ensuring continued operations for present space actors is the priority, with little emphasis on the issues of importance to emerging or aspirant space actors. The article concludes by proposing the need for a conceptual tool to analyze space sustainability initiatives achieved through cooperation based on the ability to address concerns relevant to all present and future space actors.

Cosmopolitan approaches to international law

CAIL, unlike classic cosmopolitism, is shaped by TWAIL, which seeks to bring the perspectives of marginalized actors to the foreground. There are, however, limits to TWAIL that CAIL addresses. While CAIL is not free from power asymmetries because polarity exists, it chooses to focus on possible middle grounds versus extremes. Importantly however, this article purposely does not delve specifically into a socio-legal assessment of Third World perspectives, but relies on a summary of the general sentiments expressed by marginalized emerging space nations at conferences and in writings. The goal is to trace how the official discourse can be shaped toward a cosmopolitan outcome.

An important question emerges from this new lens. If the focus is on non-classic perspectives, what does one learn specifically from the space law context that prompts us to reorient the frame of analysis from TWAIL to CAIL? The reciprocity of relationships is not just about emerging nations wanting “in,” but also about modes of cooperation and forms of enablement that will be multidirectional. It does not seek to empower just one group, but acknowledges particular vantage points in regard to assure sustainable space resources. The CAIL test is whether international instruments enable participation. It is not a mechanical test, but one that takes account of different levels of capacity. The answer to the “so what” question sometimes put to space law is that the law helps to foster a deeper commitment to translating our common sentiments of wonder and forging common obligations of stewardship of the space domain. Everyone cannot be “in” in the same way, but bearing in mind the different places that actors come in, this article seeks to describe the processes through which enabling tools are produced.

A CAIL perspective pays close attention to recognizing the effect of historical events on how space engagement and cooperation unfolds today. The space race of the 1950s and 1960s played to the whole world’s imagination. What began as fear ultimately subsided and is now remembered as hope and inspiration. While there are many vantage points upon the challenges of our times, space can help observe, overcome, and manage the effects of our growing collective impacts. The vantage point from space reveals four main priorities of all established or aspirant space actors: (1) the need to be connected; (2) the need to be data rich and to be informed; (3) the need to be respected; and (4) the need for security.

The objective of deriving common benefit from any given space activity sets these four priorities in constant interaction. I refer to this as the “Space Benefits Constant.” However, when understood as a hierarchy of needs, the objective is to move up the needs hierarchy, going from a focus on meeting individual basic needs to the collective goal of common actualization, which is mainly understood around issues of global security.7 One can draw an analogy to the needs and priorities of an individual. At birth, we seek to meet basic needs and start on the path to self-actualization. As we develop and grow to become adults, and go on to get married and have children, we realize that individual needs and goals cannot be met or fulfilled without also the attempt to meet the needs of the collective narrowly or broadly defined: namely, as formed between spouses, with children, with aging parents, with friends, with co-workers, and with the wider community. The point is to help actors understand the logic behind cooperation and to switch from a debate between the “haves” and “have-nots” to a discussion of how best to enable space activity for all and to reduce barriers to cooperation for everyone.8

I approach the hypothesis stated earlier by questioning underlying philosophical and political assumptions; namely, the understanding of freedom of outer space for the benefit of all countries,9 and arguing that the provision of Article I of OST is flexible enough to allow an interpretation in accordance with the current needs of the international community. I identify that the real issue with the current interpretation of the common benefit principle under Article I is that it is viewed as a limitation to the freedom of outer space instead of as a condition of freedom. Some scholars, such as Hobe10 and Schrogl,11 stress the dominant understandings of this underexplored obligation without fully considering underlying nuances.

There are five questions relating to general notions of freedom that are central to this article.

(1) How are the freedoms of outer space used to gain benefits from space activities?

(2) What can freedom mean when it is conjoined with common benefit?

(3) What is the understanding of freedom granted from the perspective of both those exercising the freedom of outer space and those expecting that the freedom will be exercised for their benefits or interests?

(4) Which issues of contention continue to block the effort to lend significance to the notion of common benefit?

(5) What principles ought to govern the relationship of political units seeking to generate common benefit?

Cooperation is at the heart of all these questions, yet any form of collective action is beset with problems of strategic behavior and free riding. It is therefore inherent in any attempt at cooperation to promote sustainability. The contemporary context provides relatively favorable conditions, listed as follows, for solidifying an obligation to cooperate.

(1) The number and types of actors increased and diversified. With more actors, there is increased opportunity for forms of cooperative behavior, as there are more potential partners to collaborate with, leading to increased information sharing to address global issues, such as climate change.

(2) Globalization and ascendancy of fast-developing states create a situation of more polycentric governance underscored by the broader availability of technology. New cooperative networks, such as the African Space Agency,12 are being proposed. The result is a gain for cooperation because it is easier to collaborate where there are central institutions that unite smaller actors. In the context where Africa and other emerging regions become space players, it makes sense to revisit the prospects of cooperation.

Despite these potentially favorable conditions, one of the main ideas investigated in this article is that increasingly polycentric approaches to global space governance still require effective central institutions.13 Ineffective multilateral institutions bear some responsibility for the current inadequacy of global space governance and benefit sharing. In recent years, there has been opposition to the centralized, but stalemated, mega-multilateral process I refer to here as monocentricism.14 At the same time, the scale of certain problems is more amenable to one-off solutions in order to gather the resources to make a public good available. The idea is that, by specializing and breaking down tasks into manageable pieces, a more effective decentralized global response to many governance issues will emerge. For example, the perceived inadequacy of global institutions, like the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS), led to polycentrism, and it is important, in this regard, to see how networks can produce maximization of space benefits. So, is it polycentric or monocentric approaches that will address ongoing governance issues? Also, can one avoid the negative aspects of a regime complex15 whereby clusters of efforts are neither integrated nor fully fragmented, but rather loosely coupled and linked in a variety of ways, sometimes conflicting or mutually enforcing?

Keohane and Victor underscore that such a regime complex arises from three generic forces that have led to the failure to govern sustainability and common benefit issues under one centralized authority: (1) distribution of interests; (2) uncertainty among countries about the benefits of action and compliance in the face of costly commitments; and (3) the struggle to find productive linkages among issue areas.16 The challenges involved in resolving these forces are compounded by problem diversity, political difficulties, and path dependence. This article seeks to make a case for the importance and benefits of both polycentric and monocentric governance approaches. It is proposed that this can only be achieved through a connection between strengthened global institutions and plural local initiatives through which all converge polycentrically upon a more CAIL-based approach.

Pogge analyzes this possibility through his concept of institutional cosmopolitanism and the interplay of centralization and decentralization.17 The idea that people can be governed through a number of political units of various sizes without one being dominant is a version of sovereignty that, he argues, leads to peace and security, reduction of oppression, global economic justice, and respect for ecology and democracy. This understanding is instructive when new regional institutions, such as the African Space Agency, are proposed which seek to strengthen access to space and other goods inadequately addressed or protected at the global level that affect emerging space nations. Of consequence, the legal subcommittee of UNCOPUOS, where space governance issues are deliberated, finally recognized that it is in a state of flux and needs to re-invent itself. A new agenda on working methods of the committee is currently under discussion and proposals are in the process of development. However, according to its current chairman, this much-needed discussion engendered skepticism from the African group.18 There might indeed be some merit in skepticism, leading one to act with caution and question the ideas and motives of the powers that be. However, where a latecomer to the table attempts to contribute meaningfully to a system that appears flawed, the latecomer must answer the question, “what is the extent of my knowledge and what is the criterion for knowing?” If we do not know what we do not know, how can we meaningfully engage?19

It is suggested that one of the causes of this state of flux in global space governance, and particularly in implementing international space cooperation to the satisfaction of all, is that we do not know the scope and meaning of the “legal right” to benefit from space activities. An important question to ask, therefore, is what do we make of principles or obligations that on their face appear to be indeterminate? Does that place them outside the law or instead give broad resonance to the law? French recognizes three levels of uncertainty to global justice: indeterminacy of scope (to what is it relevant?), of content (what does it require?), and of application (is such a concept something that can even be understood at the global level?).20 These levels of indeterminacy give rise to additional questions concerning the means, methods, and operational principles that might otherwise comprise a framework of implementation. In the space law context, all three levels of indeterminacy are present. There is a relationship between justice and law, but law will never completely fulfill justice. This does not mean that law is not orientated towards justice; instead, the law will sometimes announce what it is seeking to do to contribute to justice. In other words, “while the recourse to principle in political and legal debate can never anticipate the attainment of justice, this should not marginalize the significance [or the] relevance of striving for fairness at the global level, particularly between economically divergent States.” 21 Article I (1) of the OST announces the form of justice that is sought and it is the aim that space benefits be available to all that orients the justice outcome of the law.

Advent of sustainability as a concept applicable to space

In this article, space sustainability is explored as a justice claim that unconditionally provides for the enablement of present and future others to ensure that benefits are shared from the use of space. Sustainability is now a widely invoked concept, but there is as yet no consensus on the precise meaning of the term. The ordinary meaning of the word “whereby” is to maintain or endure, and bearing in mind that all conceptions of sustainability consider the future, sustainability can be simply defined as “the ability to maintain or support an activity over the long term.” 22 In assessing the concept of sustainability, it must be realized that many bad programs, practices, and behaviors are sustainable, and the idea that present circumstances and their present societal arrangements might be sustained is in reality the unsustainable thought for the majority of the world’s people.23 Therefore, a Realpolitik position is that the concept of sustainability is simply a new label to hide for a number of reasons: (1) the imposition of the will of a particular state or small group of states on others24; (2) lowest common denominator dynamic whereby the minimum standards are laid down to ensure agreement25; (3) an attempt to erode and limit or elevate the powers of some states vis-à-vis others26; and (4) the legitimation and maintenance of the unequal structures and processes that manifest themselves in the growing north and south divide. 27

Marcuse calls the pursuit of sustainability a delusion, stating that getting to the “long run” entails conflicts, controversies, issues of power and redistribution of wealth; namely, conflicts that the sustainability slogan hides instead of revealing.28 Bell and Morse,29 however, note that flexibility to the meaning of the term is a strength in a diverse world, and that it is no surprise that there is still diversity in viewpoints regarding its meaning, despite the often-quoted World Commission on Environment and Development definition of sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” 30 They conclude, in agreement with Kidd, that there is no wrong definition and that the search for the “proper” definition of sustainability is futile. Kidd states that the key to avoiding controversy is for all who use the term to describe clearly what they mean by sustainability in the context of the specific problem being dealt with.31

That said, there are some broad underlying themes that cut across the sustainability literature such that some of the roots of sustainability are identified as producing a baseline definition. It is suggested that the ecological core of the concept of sustainability is crucial and permeates all other roots.32 The basis of the ecological root is the notion that an ecosystem contains a certain density of individuals because each individual utilizes resources in the system; too many individuals, overshooting the carrying capacity, results in overuse of the resources and eventual collapse in the population.33 As sustainable development involves a delicate balancing of competing environmental, social, and economic interests, the claim is that without ecology and carrying capacity at the core, environmental, social, and economic interests cannot share space.

At the conceptual level, sustainability is represented by a change in a property referred to as “system quality.” 34 It equates a situation where quality either remains the same or increases, and if quality declines, the system is unsustainable. This is in line with its definition from one legal perspective whereby it is proposed that a deeper meaning of sustainability is systemicity.- 35 According to the systemic view, sustainability is the self-evident term for the dynamic equilibrium between man and nature and for the co-evolution of both within the “Gaia mega-system.” 36 The Gaia system is understood as a compound of the geosphere and biosphere. The Gaia theory proposes that all organisms and their inorganic surroundings on Earth are closely integrated to form a single and self-regulating complex system, maintaining the conditions for life on the planet. On a practical level, this can be understood as a requirement of “harmonization of all public policies and social practices and their convergence towards ensuring the co-evolution of manmade systems and ecosystems.” 37 It is this harmonization and convergence that makes it a modern conception of justice, “focused on social justice, justice towards nature and future generations and justice between private individuals.” 38

Definitions of space sustainability

The Secure World Foundation defines space sustainability as “ensuring that all humanity can continue to use outer space for peaceful purposes and socioeconomic benefit.” 39 It is also described as “the ability of all humanity to continue to use outer space for peaceful purposes and socioeconomic benefit over the long term.” It is proposed that, read together, these broad definitions take as their premise that: (1) all humanity thus far is using space for peaceful purposes and for socioeconomic benefit; (2) this use is threatened; (3) measures must be taken to protect it; and (4) all humanity currently possesses the ability, in the sense of having a skill or the capacity, to ensure space sustainability for peaceful purposes.

Under this conceptualization, the negative effect of not using space sustainably is primarily economic.40 Bearing in mind the governmental origins of space exploitation, where market economics did not play a primary role in decision making, the growing focus on the economic perspective in space affairs acknowledges Carolyn Deere’s opinion that problems emerge in the international domain from an absence of powerful economic interests.41 Of course, as more space applications are developed, economic interests become more prevalent in that market protectionism then underlies the rationales for many positions taken.

Space sustainability is also conceptualized as defining good behavior, its boundaries, and disincentives for negative behavior in space.42 Space sustainability then becomes a much more limited political concept calling for specific measures to strengthen norms.43 Some notable examples follow:

● An International Code of Conduct—the European Union proposed a non-binding voluntary code whose purpose is “security, safety, sustainability” for all space activities providing for general measures on space operations and space debris.44

● The Scientific and Technical Subcommittee of UNCOPUOS working group objective of establishing guidelines for the long-term sustainability of outer space activities.

● Proposed International Civil Aviation Organization for Space—the establishment of an international organization focused on space safety and the establishment of binding safety standards similar to the International Civil Aviation Organization.45

● Industry efforts for a global space situational awareness database

● Group of Governmental Experts (GGE) on Transparency and Confidence Building Measures

Depending on the forum for discussion and in line with the previously mentioned initiatives, the concept of space sustainability is also used interchangeably with the following: (1) space security, which entails access to space and freedom from threats;46 (2) space stability addressing space situational awareness;47 (3) space safety, which is protection from all unreasonable levels of risk (primarily protection of humans or human activities);48 and (4) responsible uses of space.49

These all reflect the two components of space sustainability as described by the founder of Secure World Foundation:“the first is the physical environment, which includes management of space debris, electromagnetic and physical crowding and congestion, and space weather. . .. The second component is the political environment, and includes promoting stability and preventing conflict between nations.”- 50 Bearing this in mind and notwithstanding the potential confusion caused by the interchangeability of terms used, at the core of all proposals conceptualizing space sustainability or related concepts are the notions that: (1) space assets are kept safe and secure, and that the assets are not harmed or interfered with; (2) peaceful space activities continue as free from purposeful/intentional or unintentional harmful interference; (3) the space environment is preserved for peaceful uses; and (4) international cooperative efforts are required. These four points are understood to be the current core conditions for and of space sustainability. It must be acknowledged that space sustainability, in this context, is severed from the ecological roots of sustainable development.

Rationale for space sustainability

The proposed baseline conditions for the current conception for space sustainability coincide with Gallagher’s analysis of the logic for space cooperation as “Space Governance for Global Security” where all space actors seek “to secure the space domain for peaceful use; to protect space assets from all hazards; and to derive maximum value from space for security, economic, civil, and environmental ends.” 51 Based on this understanding, the current conception of and rationale for space sustainability ties more clearly to global security than to sustainable development. This logic emphasizes that “the more different countries, companies, and individuals depend on space for a growing array of purposes, the more they need equitable rules, shared decision-making procedures, and effective compliance mechanisms to maximize the benefits that they all can gain from space, while minimizing risks from irresponsible space behaviors or deliberate interference with legitimate space activities.” 52

While it is acknowledged that such a need exists, the difficulty in reaching agreement on how to bring it about is one reason why some states are more focused on producing a dialogue on long-term sustainability. This is seen in the proliferation of reports outlining best practices and options that enhance sustainability through increased information sharing, as well as a focus on technical issues rather than on the creation of any new legal regimes. To minimize some of the risks of non-sustainable space use, Weeden53 proposes a three-pillar technical approach to space sustainability: (1) debris mitigation; (2) debris removal; and (3) space traffic management. This is conjoined with an immediate need for data in support of conjunction assessment and collision avoidance. This emphasis on data sharing/collection includes enabling research into potential solutions to the problem of space debris, and enhancing transparency and cooperation among states. Weeden also suggests that this narrow approach to space sustainability serves both to educate space actors about the severity of the space debris problem and to provide stability to reduce the likelihood of conflict. A common approach to data also serves as verification for a potential code of conduct in space, setting the stage for future space governance models.

These proposals follow the logic of sustainability for global security. While this logic is in line with the dominant conceptualization of benefit sharing and freedom of outer space, the position taken in this article is that it does not adequately speak to sustainability from the perspective of aspirant space states. To do so requires a significantly broader discussion and solutions aimed towards aligning space law and policy with the sustainable development paradigm, if understood as being an inclusive paradigm and not focused on the individualistic/self-interested nature of the current conception of sustainable development.

A systemic, sustainable development law approach calls for a conscious engagement with the web of overlapping social, environmental, cultural, and legal frameworks, as well as cultural considerations, economic policies, expectations, players, and interests.54 Bearing in mind current U.S. space policy,55 such a broad overarching objective may not be achievable as part of the dialogue on the “Long Term Sustainability of Outer Space Activities,” but U.S. policy regarding preservation of the space environment nevertheless offers insights because international initiatives congruent with it are likely to garner the most support.

Schrogl56 proposed that sustainability is rendered to threats and risks to satellite operations. This approach acknowledges the intersection of multiple issue areas: environment, security, mobility, knowledge, resources, and energy. This intersection of issue areas is more akin to the wider discourse of sustainability development of and on the Earth, and prompts a discussion of value to emerging and aspirant space actors. Otherwise, the dominant conceptualization of space sustainability removes any focus upon providing for the needs of those not among the most advanced space nations. This problem is highlighted in Peter and Rathgeber’s definition of space sustainability:

Sustainable space activities can be seen as activities (in space, from space, through space and towards space) that meet the needs of the present space actors without comprising the ability of future generations to meet their own needs of performing space related operations safely.57

Peter and Rathgeber claim that the emergence of new institutional space actors, particularly from the south, is putting a greater pressure on the space environment and that the participation of the south in space sustainability efforts is unsatisfactory.58 Yet, the role of less-advanced nations in sustainability initiatives is more so on the receiving end in that advanced nations seek to engage newcomers to space during the early phase of the development of future directives and codes of conduct for sustainable space activities; that is, not really to seek their input, but to ensure compliance by the less-advanced nations.59 Their space activities are judged as either threats to or consistent with space sustainability, rather than as part of articulating the content of space sustainability.60 This indicates that, for national space programs of established space nations, a truly international focus on space sustainability is not a priority.

It is interesting to note, at this juncture in the discussion, a fundamental provision proposed by a group of developing states during the development of the U.N. Space Benefits Declaration.61

(1) All States should pursue their activities in Outer Space with due regard to the need to preserve Outer Space, in such a way as not to hinder its continued utilization and exploration.

(2) States should pay attention to all aspects related to the protection and preservation of the Outer Space environment, especially those potentially affecting the Earth’s environment.

(3) States with relevant space capabilities and with programs for the utilization and exploration of outer space should share with developing countries on an equitable basis the scientific and technological knowledge necessary for the proper development of programs oriented to the more rational utilization and exploration of Outer Space.62

Paragraph 3 is fundamental and truly revealing when read in the light of the analysis of Schrogl.63 Schrogl claims that the declaration takes up the problem of space debris, which might endanger future space utilization to a significant extent. However, he also states that “the wish [of the Developing countries] to be informed about debris prevention measures voiced. . . is reasonable but actually needs no mentioning since these technological developments are discussions and documented publicly to the greatest extent.” 64

Andsell et al. suggested that, when forging an understanding of the rationale and development paths of all space actors, in particular emerging ones, it is critical to engaging these actors in the promotion of space sustainability;65 and Peter and Rathgeber proposed bridging the participatory gap through cooperation and other forms of exchange with the north and established space actors, including data sharing, knowledge transfer, and discussion fora and core groups.66 While such proposals open the door to a broader conception of space sustainability in the north, it is important to ask whether actors orient toward fulfilling the responsibility inherent in the existing space law regime. Are they holding themselves accountable for inadequacies of their own procedures? How well is a cooperation ethic internalized? After all, aspirational norms are best tested by the extent to which agents and legal subjects integrate them as part of their identity. In addition, Ellis67 argues for another topic on whether Article VI of the OST obligation for states to authorize and continually supervise national space activities is a useful responsibility to uphold in order to enable others?

The rhetoric of inclusion is pervasive in that all actors purport to pursue it and can point to instances of adherence. Even positions articulated by developing states today are read to suggest that the status quo is adequate, since there are limits to what the law requires.68 Nesiah argues that, in the current landscape, a focus on what states can do for each other is misguided because it contributes to the production of legitimacy for empire.69 Further, Nesiah states that it is not enough to situate critique outside existing normative structures, suggesting that it is important to enable developing states to produce real change, taking account of the existing framework. In other words, how can the existing framework enable all countries to foster capabilities in a way that is of mutual benefit to all?

Lopez succinctly offers insights on the space sustainability concerns and priorities of three emerging space nations in Latin America, asking how these actors define space sustainability, what actions they are taking to address it, and their views on space sustainability mechanisms under development. The common themes that emerge are threefold. Firstly that space sustainability has clear linkages with parallel concerns over sustainability on Earth namely the issue of access and that the need to ensure that the interests, needs and limitations of developing countries is duly recognized in sustainability discussions. Secondly, Lopez highlights that involvement at the multilateral international level is an important priority shared by these actors. To this end, the discussion above about polycentricism vs mono centricism is more focused towards the perspective of current actors as these countries analyzed would prefer a focus on monocentric initiatives. This ties in with the third perspective that there is a strong preference for legally binding measures to address space sustainability issues. This preferences has surfaced largely as a result of criticisms of the process undertaken and lack of inclusiveness in development of some initiatives.70

One way to address this is through better understanding of the benefits of cooperation. The North American Aerospace Defense Command, a collaboration between Canada and the United States that conducts aerospace warning, aerospace control, and maritime warning in the defense of North America, provides an example of collaboration at the highest level which acts as a fruitful model for cooperation on space sustainability issues. The proposed pathway is for potential partners to start from sharing information to creating conditions of interoperability, to full integration of projects and, finally, partnership on mission goals. In order to get to this point, it is instrumental that there is an effort to enable partnerships where capacity differs.

Bearing in mind these insights, Dennerley also highlights an important consideration from emerging nations perspective that is very relevant in the development of technology and responses to space sustainability, largely that what often occurs in the realm of international standard setting is that countries aim to embed their technology into international regimes, essentially making their technology the industry standard. This he highlights causes a potential inequality between emerging and established space nations which he suggests can be offset through education and capacity building in space law, establishing and maintain an increased international presence in various fora, thus becoming engaged at the standard setting table pushing for standards that are informed by principles of open access, interoperability and non-discrimination and increased cooperation.71

#### Researching space policy develops emancipatory skills and combats inequality and discrimination—but doesn’t trade off with radical energies.

Weeks, 12—Adjunct Professor of International Relations Online Program, Webster University (Edythe, “OUTER SPACE DEVELOPMENT: THE SOLUTION FOR GLOBAL INEQUALITY,” *Outer Space Development, International Relations and Space Law: A Method for Elucidating Seeds*, Chapter 7, pg 171-174, dml)

This is the time to discuss equality. Once societies in outer space are established it will be too late. The first wave of outer space development in the last half of the 20th century changed the world. This process included establishing a satellite telecommunications infrastructure in the geostationary orbit along with the globalization of new high-tech products and services. The retirement of the NASA space shuttle program symbolized the start of the second wave of outer space development, which is likely to be propelled by the privatization of space tourism and space mining. This type of space industrialization will undoubtedly result in extreme wealth for a few who know what is happening, while those who have no knowledge will be left behind. Decision makers, scholars, trouble-shooters, and others worry constantly about existing inequality gaps, lack of development, poverty, and economic hardship. This chapter suggests a method for preventative maintenance prior to humankind’s next development project. It argues that education, information, and sharing knowledge can become tools for generating perpetual equality as we embark on our journey to colonize the final frontier. Those historically disenfranchised can gain a fresh advantage through preparation and education to develop an expertise aimed at providing valuable knowledge useful for space endeavors. In addition, in these times of crashing economies, job loss, high unemployment rates, and school system failures, people are searching for ways to create prosperous futures for themselves and their families. Outer space could prove to be a way for many to find their answer.

Newly Emerging Trends Relevant for Outer Space Development

The passage of the NASA Authorization Act of 2010 demonstrates a willingness by the U.S. to fund a stepped-up phase of space activities. During bad economic times, this Act provides $58,400,000,000 for various space-related programs from 2011 to 2013. In 2010/2011, media reports constantly alerted the general public to be ready for the retirement of the NASA Space Shuttle program. This initiative complemented the New Vision for U.S. Space Exploration Policy (2004), as well as various other laws and policies initiated by the United States and discussed in previous chapters. When read together, it is fair to assume the newly emerging space industries will be related to achieving advanced space transportation systems, private spacecraft development, commercial space habitats, space stations, space settlements, commercial space mining, spacecraft trajectory optimization techniques for landing on near-Earth asteroids, commercial spaceport construction, interplanetary telecommunications, and space exploration missions. The thing for teachers, students, and members of the general public to do in order to prepare to take advantage of these linked opportunities is to imagine how these goals are likely to play out, and what types of goods, services, and skill-sets will be needed.

Education as the Solution

Outer space development historically has been the purview of skilled professionals in the science, technology, engineering, and math (STEM) fields. The STEM-oriented opportunities for those proficient in physics, astrophysics, space medicine, engineering, calculus, etc., have always been limited to a few select students. But now global society is calling for something, more since the STEM fields have failed to attract diverse people on an equal footing.186 A bridge can be created by using social and behavioral sciences curricula, thereby to attract people from a wider range of backgrounds to learn about outer space development and newly emerging industries.

New education paradigms can help ensure equity and enable wider citizen participation throughout the international community. Curricula using the new paradigm can be used to motivate and inspire a new generation of scholars who can play a key role in the process of outer space development. In effect, an educational system that unleashes human creativity and curiosity will empower students with the knowledge and competencies not only for the second wave of outer space development, but also for the global engagement necessary for the 21st century and beyond (Weeks and Tamashiro, 2011).

It is never too early to begin cultivating a person’s intellectual and academic talents. Most children are naturally curious. As part of the curriculum, students of all ages can be shown how to do research, how to write a research paper, to compile and present data, perform critical analytical thinking, and to anticipate and develop relevant skill-sets for newly emerging industry trends. Learning these skills will enable more people to develop an expertise aimed at supplying talent that will be in demand as future industries emerge. This can change people’s lives. Students can learn how to anticipate and prepare for future emerging industries while they are at the K-12 level. Students can also learn at young ages how to get recognized by publishers, editors, the mass media, and others.

In situations where the resources necessary for teaching science are unavailable, space studies can be introduced through the social and behavioral sciences and the arts. For many years, space studies has remained the exclusive purview of engineers, scientists, and technology experts. However, there is room at the table for social and behavioral sciences students to join in and develop a specialty area of expertise. Key actors within the outer space development community have expressed an interest in advancing space studies to a broader audience. Orchestrating such a process carries with it the power to improve international relations, education, inspiration, dreams, and creativity, and to boost the global economy by creating a myriad of new jobs and degree programs. We can open an additional door to allow a broader range of knowledge into the minds of more people by introducing outer space development studies through the social and behavioral sciences (Hammond and Weeks, 2011). Unlike engineering, an interdisciplinary social and behavioral sciences lens enables us to interpret the meaning behind sets and patterns of human behaviors—this includes the behavior of individuals, institutions, groups, presidents, members of congress, business and other organizations, mass media, international organizations, and lawmakers.

Humankind can progress beyond the “STEMs = space studies” model by including, encouraging, involving, and preparing a new breed of social and behavioral sciences geniuses. These would be people who are naturals in international relations, conflict resolution, and peace studies, as well as versed in international law, politics, social psychology, critical analysis, discourse analysis, international communication, artistic architecture, race and ethnic studies, gender studies, religious studies, economics, finance, business and entrepreneurship, history, and political economy, while also being concerned with inequality gaps, oppression, subjugation, revolts, uprisings, revolutions, and various other social and behavioral phenomena. People who understand the issues concerning human beings now have a way of participating in future emerging space industries. The audience of learners scheduled to receive cutting-edge knowledge of fields relevant for outer space development will be expanded by online learning techniques and sharing of information through the open-source technologies of the Internet.

Shaping Ideology

Imagine teaching students about the newly emerging trends related to outer space development. This would give students permission to envision and carve out their role in designing future space societies. Students from all disciplines can be taught to see what’s coming next by learning to research and interpret economic policies, laws, and international relations. This will enable them to detect newly emerging industries and to anticipate the elements likely to be in demand. Students can then shape their skill-sets and prepare to satisfy these emerging needs. Students can be taught to perform this type of interdisciplinary analysis and to research combined dynamics—government hearings and transcripts, policy statements and speeches, laws, economic initiatives, and international treaties. They can also be taught to combine this type of primary data with theoretical understandings of historical, ideological, institutional, political, economic, psychological, and structural phenomena.