

Global Constitutionalism and Outer Space Governance

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The 1967 Outer Space Treaty (OST) established core principles governing human and robotic outer space exploration and is often considered the *de facto* constitution for international space law. Yet the OST and subsequent core space treaties were negotiated during a very different era, characterised by Cold War superpower competition between two preeminent spacefaring states, the Soviet Union and United States. The rapid growth of state and non-state space actors and new activities—including mega satellite constellations, space tourism, and space mining as well as expanding military space programs—are challenging this legal framework. This chapter evaluates space law from the perspective of constitutional principles and functions, focusing on the OST as the centrepiece of this legal order. The OST enshrines space as a peaceful domain in which the exploration and uses of outer space should be undertaken on the basis of equality. Yet outer space law reflects a weakly institutionalised legal regime when evaluated from the perspective of core constitutional features and roles which limits its ability to address growing tensions over the meaning, application, and limits of foundational principles. I illustrate these dynamics with examples drawn from military space operations, the allocation of satellite orbits and radiofrequency spectrum, exploitation of natural resources in celestial objects, and human exploration and settlement beyond Earth which implicate questions of recognition, ownership, and the very nature of sovereignty in 21st Century global affairs.

Introduction

Access to, and use of, outer space is rapidly expanding: over 70 states now possess space programs and they are joined by a diverse array of commercial and non-governmental actors. There are now over 5465 active satellites orbiting our planet providing vital data platforms that enable every aspect of modern information-centric societies (Union of Concerned Scientists, 2022). This number is rapidly increasing, posing significant challenges for the allocation of ultimately finite orbital locations and radiofrequency spectrum and the management of space debris which threatens the sustainability of Earth orbit. Further afield, the extraction of natural resources from celestial objects and human settlement on the Moon and (perhaps later) Mars are no longer the stuff of science fiction but may soon become reality. The strategic value of orbital and deep space has spurred competition and increased the prospect of military conflict among the major space powers of China, Russia, and the United States. The deepening human reliance on outer space, and the space environment's inherent fragility, has highlighted the need for coordinated extra-global governance to enshrine foundational expectations and distribute rights, responsibilities, and benefits in this unique domain.

Outer space thus provides an interesting and under-explored setting in which to examine the prospective constitutionalisation of global affairs. The 1967 Outer Space Treaty (OST) is often characterised as the *de facto* constitution for outer space as it establishes the core principles governing human and robotic space activities and provides a framework for further institutional development (United Nations General Assembly, 1966). Most importantly, the OST reserves space as a peaceful domain free from appropriation and assertions of sovereign control, in which the exploration and uses of outer space are undertaken on the basis of equality. And indeed, space *has* been a setting of remarkable cooperation alongside intense competition among the leading space powers (Cross, 2019).

Yet there is widespread agreement that space law has not kept pace with dramatic technological, economic, and political developments that have radically expanded the scope and tempo of space activities (Masson-Zwaan and Cassar, 2019, p. 195). This, in turn, raises the question as to whether existing institutions adequately address the needs of a (loosely defined) “global public interest in outer space” (Jakhu and Pelton, 2017, p. 15).

This chapter uses constitutionalism as a lens for exploring the nature and future prospects of outer space law and governance. I first briefly introduce the main elements of this unique legal regime. The subsequent analysis makes the case that outer space law, with the OST as its centrepiece, is a distinctive but weakly institutionalised regime when evaluated from the constitutional perspective of the rule of law, inclusion (and exclusion) of actors and associated allocation of rights and benefits, and sources and distribution of law-making powers. Following Birdsall and Lang’s distinction (this volume), space law more closely resembles international constitutionalism with states as the primary initiators and subjects. Importantly, the principal institutions were negotiated during the Cold War era dominated by two preeminent spacefaring states, the Soviet Union and United States, and reflect their predominant influence. The marginalisation of other actors and perspectives inevitably informs both the substance and legitimacy of the institutions. Calls for more inclusive forms of governance—akin to global constitutionalism—reflecting the diversity of space actors and impact of space technologies on humanity as a whole have not been translated into institutional forms.

As this Handbook makes clear, global constitutionalism is characterised by the complex intersection of politics, law, and ethics. At core, outer space governance is animated by a tension between visions that respectively emphasise individualistic freedom versus collective equality in the access to, use of, and benefit from space. I suggest that the outer space legal order rooted in the OST is under increasing strain in the face of rapidly expanding

scientific, commercial, and military space activities. From a constitutional perspective, the space law regime possesses limited tools for managing these challenges and thereby mitigating congestion, competition, and conflict in the heavens. There is, however, no consensus as to whether governance gaps stem from a lack of law (which necessitates further institutional development) or the under-use of existing mechanisms. I illustrate these dynamics with reference to examples involving military space operations, the allocation of satellite orbits and radiofrequency spectrum, exploitation of natural resources in celestial objects, and human exploration and settlement beyond Earth.

The structure of international space law

Outer space law is conventionally understood to comprise, first and foremost, the five core multilateral treaties¹ and five sets of principles² negotiated in the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS) and adopted by the UN General Assembly (UNGA) (Tronchetti, 2013; Jakhu and Dempsey, 2016). These instruments establish the primary legal norms and rules in this domain. Intergovernmental organisations with a global (e.g., International Telecommunications Union) or regional (e.g., European Space Agency) focus contribute to the further elaboration of this legal regime. Finally, in response to rapidly proliferating space activities, a growing number of states are adopting national laws and establishing regulatory bodies to implement international legal obligations and manage civilian and commercial space operations under their jurisdiction.

¹ The *Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies* (Outer Space Treaty, 1967), *Agreement on the Rescue and Return of Astronauts and Objects Launched into Outer Space* (Rescue Agreement, 1968), *Convention on International Liability for Damage Caused by Space Objects* (Liability Convention, 1972), *Convention on Registration of Objects Launched into Outer Space* (Registration Convention, 1975), and *Agreement Governing the Activities of States on the Moon and Other Celestial Bodies* (Moon Agreement, 1979).

² The *Declaration of Principles* (1963), *Broadcasting Principles* (1982), *Remote Sensing Principles* (1986), *Nuclear Power Sources Principles* (1992), and *Benefits Declaration* (1996).

Along with other specialised branches of public international law, space law is subject to the fundamental rules of the international legal order found most especially in the United Nations Charter (Hobe, Schmidt-Tedd and Schrogl, 2017, pp. 271–284). As such, outer space activities are conducted in the shadow of the constitutive norms of *pacta sunt servanda*, sovereign equality, territorial integrity, non-interference, the right of self-defence, and the peaceful settlement of disputes. At the same time, space law is connected to the much more intensely developed legal regimes in other issue areas such as the law of armed conflict, human rights, trade, and environmental protection (Aganaba-Jeanty, 2016; Aoki, 2016). This, in turn, offers opportunities for extending existing space institutions through the application of adjacent legal norms and rules, rather than via multilateral negotiation.

The rule of law in outer space

A primary question for any legal order concerns its temporal, substantive, and spatial boundaries. Outer space is widely recognised as a distinctive domain owing to its unique physical properties: it is effectively infinite and an extremely inhospitable environment for robotic systems and—especially—human beings. Moreover, the vast distances and substantial limitations on travel imposed by physics mean that the vast majority of space activities take place very close to Earth, in the orbits around our planet and on nearby celestial objects (our Moon and asteroids). So, while outer space is “out there,” space missions begin on Earth and service its communities; as such, our uses of outer space are inherently embedded within terrestrial political, economic, and normative systems.

But while outer space is understood as unique, there is less clarity regarding its precise parameters. Outer space law emerged in parallel with early space exploration and as such was informed—and limited—by the contemporary scientific understanding of the universe. Even key terms like “outer space” and “celestial bodies” lack clear definitions in

core legal texts. Interestingly, there is no internationally agreed boundary between terrestrial air space and outer space and thus a clear dividing line where space law begins and ends.³ These factors raise important dilemmas concerning the ultimate scope of space law's application, in light of expanding activities and vastly greater scientific knowledge of the outer space environment.

Among the corpus of space law, the 1967 Outer Space Treaty (OST) enjoys a degree of supremacy that is characteristic of constitutions, due to its temporal primacy, substantive scope, and widespread adoption (United Nations General Assembly, 1966).⁴ Prominent scholars have thus characterised the OST as “the Magna Carta for outer space” (Hobe, Schmidt-Tedd and Schrogl, 2017, p. 137; Masson-Zwaan and Cassar, 2019, p. 181) owing to the manner in which the treaty establishes the foundational normative framework governing human and robotic space activities provides the animating impetus for the subsequent development of space law. It has thus been argued that the core provisions of the OST in Articles I-VII now constitute customary international law (Larsen, 2018, p. 138, fn. 3). Subsequent, more specialised, treaties and principles can be considered the *lex specialis* of space law established by the OST (Masson-Zwaan and Cassar, 2019, p. 192).

The OST's emergence in the midst of the Cold War Space Race provides the critical context in establishing the core commitments of the space regime. The launch of the first artificial Earth-orbiting satellite, Sputnik 1, by the Soviet Union in October 1957 generated both wonder and widespread concern as the ability for an object to freely transit above the Earth and across national borders (as required by orbital physics) “creat[ed] a new spatial reality” that challenged the UN Charter's newly-established geopolitical order rooted

³ It is generally accepted that outer space begins at roughly 80-100 kilometres above the Earth's surface, where the atmosphere becomes too thin to sustain flight by aircraft and other aeronautical vehicles. Yet an object cannot sustain itself in orbit below approximately 160km, which marks the lower boundary for artificial satellites.

⁴ As of August 2022, 112 states are parties to the OST, while a further 23 are signatories. <https://www.unoosa.org/oosa/en/ourwork/spacelaw/treaties/status/index.html>.

territorially-defined sovereign states (Blount, 2021, p. 111). The UN General Assembly soon took up the issue and a dedicated institution—UNCOPUOS—was established in 1959 as the focal point for scientific and legal deliberations concerning space activities which prominently included the negotiation of the OST. Of course, the initial spacefaring states, the Soviet Union and United States, were also the nuclear-armed superpowers engaged in a global ideological competition in which the potential utility of satellites for military and intelligence applications was quickly appreciated. Early diplomatic initiatives were thus explicitly motivated by a desire to prevent the spread of Cold War superpower conflict to outer space.

In this light, the OST sought to address the emerging technological possibilities for human and robotic spaceflight, but more fundamentally to establish a normative framework for international peace and security above Earth by enshrining basic principles that distinguished outer space as an exceptional domain. Yet in so doing, diplomats had to navigate between competing ideological (capitalist and socialist) and geopolitical (Global North and Global South) perspectives, leading to necessary compromises and ambiguities. In keeping with the constitutional form, therefore, the OST expresses its core objectives in broad language. This decision to eschew detailed elaboration of substantive issues enabled a rapid negotiating process but introduced significant interpretative challenges especially given the technical nature of space activities (Hobe, Schmidt-Tedd and Schrogl, 2017, pp. 178–179).

The OST articulates three fundamental principles, each of which contains internal tensions that persist to the present day. First, OST Article I asserts that outer space “shall be the province of all mankind” and establishes four freedoms—for exploration, use, access, and scientific investigation—that render celestial objects and the voids between them available to all and for the benefit of all, “on a basis of equality and in accordance with international law.”

Questions of constituent power are addressed below, but for now it is important to highlight that the OST applies to *states* as the chief spacefaring actors and representatives of human communities. This conception of freedom is a double-edged sword: spacefaring actors may engage in space activities without approval from other states, but these freedoms are conditioned by an expectation that “such activities are undertaken for the common benefit of all [s]tates.” (Hobe, Schmidt-Tedd and Schrogl, 2017, pp. 194 and 204). Moreover, Article I maintains that states should enjoy these benefits “irrespective of their degree of economic or scientific development,” and hence their current space capabilities (or lack thereof).

Relatedly, Article II prohibits the appropriation of celestial objects and rejects assertions of sovereignty beyond Earth via forms of ownership, occupation, annexation, or conquest. This provision needs to be read in the context of the decolonisation movement that was radically reshaping the global order in the same period. These experiences were fresh in the minds of newly created states who wanted to avoid the extension of extra-territorial jurisdiction and resource exploitation as replacement for direct colonial control. As such, Article II reflects an attempt to pre-emptively prevent forms of coercive acquisition that were central to the development of the modern international system, both as a means of ensuring greater equity and foreclosing a historically prominent source of conflict among states. In these respects, Article II serves as a counter-balance to Article I’s permissive approach. Its normative centrality is such that Article II is now widely regarded as a *jus cogens* norm that shapes the orderly conduct of space exploration and use (Hobe, Schmidt-Tedd and Schrogl, 2017, pp. 248–269).⁵ The refusal to grant sovereign rights *in space* holds further implications for governance on Earth: while conventional aircraft must respect national borders, domestic jurisdiction over airspace does not extend to outer space; hence, a spacecraft traversing high above does not constitute a violation of territorial integrity. This is vital concession to physics

⁵ Interestingly, the US and USSR did not assert ownership claims in relation to their respective Moon missions.

since, with limited exceptions, an object orbiting Earth must continually circumnavigate the globe.⁶

Yet the relative brevity of Articles I and II leaves some critical questions unanswered. In terms of substantive scope, the text does not specify whether the articulated freedoms are unlimited or whether some forms of exploration, use, access, and investigation might be excluded or circumscribed due to their anticipated or observed effects. Presumably, activities are permitted unless explicitly prohibited elsewhere in the OST (Hobe, Schmidt-Tedd and Schrogl, 2017, pp. 194–198). More fundamentally, these articles reflect an uneasy compromise between two opposing conceptions of freedom that respectively emphasise the individualistic exploitation of resources versus collective stewardship and equity in the interests of all humanity (Aganaba-Jeanty, 2016). Cris van Eijk perceptively characterises this as “a site of hegemonic contestation fought with normative weaponry.” (van Eijk, 2021, p. 6) Notably, outer space is frequently described as a global commons—like Antarctica or the high seas—beyond national jurisdiction and protected from all forms of collective or individual ownership. However, international law does not formally designate space as a commons and major space powers (especially the US) reject this legal interpretation.

Finally, OST Article IV insists that human and robotic space activities shall be “exclusively for peaceful purposes.”⁷ Blount has argued that this commitment amounts to the “underpinning norm of space exploration” and “the normative threshold for the legality of any space activity.” (Blount, 2021, p. 114) Yet Article IV is notably under-inclusive and ambiguous in key respects: it bans the placement of nuclear weapons and other weapons of mass destruction in space but does not address so-called conventional weapons, and prohibits

⁶ Satellites positioned in geosynchronous or geostationary orbit (35,786 km above the Earth’s equator) have an orbital period that matches the Earth’s rotation, and so remain over the same area when viewed from the ground.

⁷ This normative commitment is reinforced by Article III’s insistence that all activities be undertaken “in accordance with international law, including the Charter of the United Nations, in the interest of maintaining international peace and security and promoting international co-operation and understanding.”

military installations and weapons on the Moon or other celestial objects but not in the voids between these objects. This outcome reflects the desires of the then-dominant Soviet and US superpowers to institutionalise the notion of space as a peaceful domain within the UN system but retain negotiations over limitations on military space technologies as a bilateral prerogative (Hobe, Schmidt-Tedd and Schrogl, 2017, p. 112).

At a more basic level, the OST does not define “peaceful purposes” and this foundational principle has subsequently come to be interpreted in accordance with the interests of the most militarily advanced spacefaring states. The international community has adopted the view, initially promoted by the US, that the use of satellites and ground stations to support national security operations on Earth—including for intelligence collection and reconnaissance, missile early warning, communications, command and control of forces, and directing precision-guided munitions—is permitted. Peaceful purposes therefore specifically prohibit hostile acts against another actor’s space assets or the use of space-based weapons to target Earth if not undertaken in self-defence (Azcárate Ortega, 2021)... Consequently, Article IV’s substantive limitations provide the basis for enduring contestation concerning the precise threshold for determining a use of force in outer space and the permissible targets and forms of attack. This is a pressing concern in light of expanding military space programs and the increasing integration of commercial space systems into core national security missions (Weeden and Samson, 2022).

Constituent power: recognition, rights, and responsibilities in space governance

The above considerations raise the even more fundamental question of who sets the rules and to whom those rules apply. As the Handbook editors note, by associating conceptions of constituent power and contestation, constitutionalism offers a more inclusive normative and analytical account of agency which can encompass agents of differing local-to-global scales,

objectives, and relationships to existing institutions. In a constitutional order, inclusivity stems from formal recognition. Seen from this perspective, the OST defines legitimate actors and by implication allocates rights and responsibilities, as well as benefits, on that basis. It is therefore important to ask: for whom does space law claim to speak and who (or what) *should* it represent? While couched in legal language, these choices are inherently political (van Eijk, 2021).

In one sense, the OST offers the broadest possible conception of space law's constituency by framing outer space as "the province of all mankind" and, in Article V, classifying astronauts as "envoys of mankind" (more on this last word shortly). Yet only around 600 people have ever been to space and the vast majority of human beings will never have this opportunity (Roulette, 2021). Nevertheless, space technologies are increasingly central to the operation of modern societies and entwined in our daily lives. And we are all biologically reliant on energy from our Sun and vulnerable to solar radiation and collisions from asteroids. Hence, on a quite fundamental level, the entire global community (to say nothing of all other living species) is implicated in human and robotic space activities and the natural environment in which they take place. This has led to more recent suggestions that outer space law contains a foundational commitment to ensuring the preservation and sustainability of outer space itself, rooted in a conception of inter-generational social justice (Aganaba-Jeanty, 2016).

Despite this, space law is state-centric and does not provide rights and protections, or impose obligations, directly on human beings but rather encompasses individuals and groups by virtue of their nationality (Hobe, Schmidt-Tedd and Schrogl, 2017, pp. 191–198). The outer space regime thus constitutes a form of what Birdsall and Lang (this volume) characterise as international constitutionalism in which states are the central subjects and agents of the legal and political order. Notably, OST Article IX establishes an expectation of

reciprocity whereby spacefaring actors “shall be guided by the principle of co-operation and mutual assistance and shall conduct all their activities in outer space... with due regard to the corresponding interests of all other States Parties to the Treaty.” Much of the proceeding discussion applies, legally speaking, to states alone. The procedural dimensions of this statist focus will be explored in the subsequent section. Here I want to suggest that the regime established by the OST is constituted by four more specific omissions involving: (i) “developing” states (and by extension, Global South peoples); (ii) non-state actors; (iii) women; and (iv) the future of our species beyond Earth.⁸ Each of these substantially limits the universal aspirations expressed in the OST.

First, the temporally specific emergence of outer space law during the Cold War left an indelible mark on the legal regime by prioritising the interests of the leading space powers and their allies. As noted above, decolonisation informed the normative impetus and substance of the OST, particularly in its commitment to freedom and collective benefit and corresponding rejection of appropriation. But while decolonisation rapidly produced a large number of newly independent states, these actors initially lacked national institutions and high-technology sectors that would allow them to access outer space. As such, while Global South states (which are by no means a monolithic entity) made major contributions to the development of international law in other domains, their influence over space law was impeded by their enduring marginalisation in key diplomatic fora; formal legal equality did not translate into recognition as consequential stakeholders (van Eijk, 2021, p. 8).

Yet developing states have not been not without agency. Indeed, in 1976 a collection of equatorial countries joined together to assert sovereignty over the valuable geostationary orbit (GEO) above their territories (Brazil *et al.*, 1976). Due to orbital mechanics, satellites in a GEO orbit match the Earth’s rotation and remain in a fixed point in the sky when viewed

⁸ Other authors have provided much richer examination of these themes. I offer only brief reflections here.

from the ground. This is hugely beneficial for military monitoring, weather observation, and commercial telecommunications. Yet at that time, GEO satellites were operated exclusively by the US, its allies, and the USSR. Signatories to the Bogotá Declaration thus characterised GEO as a “natural resource” and “unique facility” dominated by a few states, representing a “technological partition of the orbit, which is simply a national appropriation” by other means. The involved states advanced a novel claim that since GEO “depends exclusively on its relation to gravitational phenomena generated by the earth... it must not be considered part of the outer space” and is thus not subject to the prohibition on national appropriation in OST Article II. Rather, since satellites in GEO are stationed over the equator, segments of the GEO zone should be considered as extensions of the sovereign territory (airspace) of the states underneath. Pointedly, these states contended that the OST

cannot be considered as a final answer to the problem of the exploration and use of outer space, even less 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 omissions, contradictions and consequences of the proposals which were prepared with great ability by the industrialized powers for their own benefit.

This position was rejected by the USSR and US and did not progress. Nonetheless, the Bogotá Declaration represents an important early attempt to interpret core provisions of the OST in order claim benefits from space activities in which states (and their peoples) were not directly involved.

In recent decades, the number of states with national space programs and assets has rapidly increased, but “barriers to entry still exist, largely disguised as security constraints... [connected to] restricted international cooperation or technology transfer, even where commercial.” (Aganaba-Jeanty, 2016, p. 3) As a consequence, space activities remain overwhelmingly concentrated among the core space powers of China, Russia, and the United

States.⁹ Membership in the OST and UNCOPUOS has steadily grown, but remains at roughly half of all states.¹⁰ This has led to calls for regional institutional development—such as the creation of a dedicated African space sector—to enable developing societies to engage in, and benefit from, 21st century space activities (Asiyanbola *et al.*, 2021).

Second, outer space law beginning with the OST recognises the potential contributions by non-state space actors like companies and academic institutions, but delegates their regulation to states, via national laws and institutions. OST Article VI insists that State Parties to the treaty retain legal responsibility for all space activities undertaken under their jurisdiction. States are thus obliged to authorise, monitor, and register space launches and satellite operations. And in contrast to most domains of international law, under OST Article VII states (and not the ultimate operators) remain legally liable for damage involving space assets.¹¹

As a progressively larger proportion of space activities are undertaken directly by commercial operators, the space law regime will inevitably grapple with how to extend recognition and incorporate these actors into global governance processes (Dickey, 2022). This will not be straightforward, not least because space companies operate complex transnational supply chains and customer relationships that often implicate multiple states as potential regulators. And the sheer proliferation of commercial actors argues against fully inclusive engagement. Private actors do have some avenues for directly contributing to governance mechanisms, particularly through the development of non-binding technical and operational standards at the International Telecommunications Union (ITU) (Jakhu and

⁹ Cris van Eijk has calculated that “the United States, Russia, and China have jurisdiction over 89% of all space objects, 72% of active satellites, and 91% of all orbital debris. The entire Global South controls 11.5% of active satellites; the US alone regulates 59%.” (van Eijk, 2021, p. 4)

¹⁰ As of August 2022, 112 states are parties to the OST, while 100 states are members of UNCOPUOS. <https://www.unoosa.org/oosa/en/ourwork/copuos/members/evolution.html>.

¹¹ These obligations are further developed in the Liability Convention and Registration Convention. Intergovernmental organisations can also register spacecraft (Hobe, Schmidt-Tedd and Schroggl, 2017, p. 191).

Pelton, 2017, p. 35) and through private industry bodies like the Consortium for Execution of Rendezvous and Servicing Operations. But these entities lack direct international law-making authority.

The commercialisation of space activities also challenges the current configuration of rights and responsibilities established by the OST and its emphasis on common benefit in outer space exploration. For example, does the prohibition of appropriation still permit the extraction minerals from celestial objects, and their subsequent sale on Earth, if there is no underlying assertion of ownership of the physical territory itself? In a related vein, there are growing concerns that the rapid expansion of satellite mega-constellations—most notably SpaceX’s Starlink constellation¹²—will prevent other actors from accessing and using the most valuable orbital locations, representing a *de facto* form of appropriation in Low-Earth Orbit by first-movers (Boley and Byers, 2021). Do commercial operators—or their state of registration—have an obligation to limit the size of their satellite networks given that Earth orbits are a shared and ultimately finite resource and we do not actually know their sustainable carrying capacity? Commercial human space travel also raises novel questions regarding who is encompassed by space law. Should paying customers on short-duration space tourism trips be classified as astronauts, and thus “envoys of mankind,” or merely parties to a commercial transaction (like passengers on a conventional airliner)? Permanent human settlement beyond Earth will push these ambiguities further still. SpaceX, the most prominent proponent of interplanetary travel, harbours a distinctly libertarian perspective and rejects Earth-based legal jurisdiction over its intended human missions to Mars.¹³

¹² As of August 2022, over half of all active satellites in orbit are part of SpaceX’s Starlink constellation (McDowell, 2022).

¹³ SpaceX’s terms of service for its (separate) Starlink broadband internet service state: “For [s]ervices provided on Mars, or in transit to Mars via Starship or other spacecraft, the parties recognize Mars as a free planet and that no Earth-based government has authority or sovereignty over Martian activities.” (SpaceX, no date, para. 10). This statement has no basis or standing in international law.

Third, scholars like Cassandra Steer have persuasively argued that the OST's gendered framing of its constituency as "mankind," reinforces existing power structures that privilege "male biology and the male experience as the norm" in space exploration (Steer, 2021, p. 169). Given the enduring structural inequality in high-prestige sectors, it is unsurprising that women have been systematically underrepresented in space sciences and engineering, human spaceflight programs, and space law.¹⁴ Terminology is especially important in constitutional contexts where texts articulate grand aspirations and delineate boundaries of recognition. Language thus reflects, and shapes, social expectations and processes which in turn have tangible effects in limiting women's access to everything from astronaut training and operational missions to biologically suitable microgravity toilets and spacesuits; this exclusion extends to the limited scientific literature examining the differential effects of gravity and radiation on female bodies (Gorman, 2021). While by no means a panacea, adopting the neutral term "humankind" would provide a more inclusive basis for imagining, describing, and governing the future of space exploration (Steer, 2021).

Fourth, extra-terrestrial human settlement will deeply upend our established notions of sovereignty, political order, and identity (Cockell, 2015). In the nearer term, permanent settlements on the Moon will likely remain closely tethered to terrestrial political and economic structures. In the longer term, however, the extreme distances mean that for most travellers, interplanetary exploration will be a one-way trip. This fact challenges our existing notions of citizenship: for how long would they continue to feel allegiance to an Earth-bound government? In a matter of generations, environmental forces of radiation and low gravity would fundamentally alter our biological processes. At that point, space settlers may no

¹⁴ Note, for example, the still-common use of "manned" and "unmanned" to describe human crewed and robotic space missions, respectively.

longer regard themselves as “human” beings at all, with rights and obligations stemming from Earth.

Sites of law-making, mangagement, and enforcement

In the face of these substantial challenges, space law lacks consolidated and, in many cases, even explicitly enumerated legislative, executive, and judicial features that are found in other domains of international law. Most notably, the OST has no provision for regular meetings of the State Parties to review the operation of the treaty, exchange information, or address compliance issues. And while OST Article XV allows members to propose formal treaty amendments, this mechanism has not been utilised to date. Former Canadian diplomat Paul Meyer has therefore warned of a systematic “neglect of the Outer Space Treaty by the very states that championed its creation.” (Meyer, 2017)

Instead, legislative functions are distributed among various fora with differing memberships and largely separate mandates. This substantive siloing is intentional, as the leading space powers have long insisted on a strict division of labour between “hard” security and purportedly “softer” issues involving the safe and sustainable uses of outer space. UNCOPUOS serves as the principal international venue for discussing scientific, technical, and legal dimensions of outer space activities and thus partially fills the diplomatic void of the OST. UNCOPUOS is widely esteemed but limited to subjects relating to peaceful uses of outer space and thus excludes explicit consideration of the security dimensions of space operations. Multilateral negotiations relating to military space matters take place in the Conference on Disarmament (CD). Both of these bodies operate on the basis of consensus which has increased their legitimacy but also frequently impeded their diplomatic output. The ITU, a specialised UN agency representing 193 member states, is responsible for allocating radio frequencies and orbital slots and convening regular conferences where governance

procedures and technical standards are adopted. Finally, the UNGA has been active in promoting space diplomacy on topics ranging from debris to arms control. While the UNGA lacks law-making authority, its outputs can reflect *opinio juris* that contribute to the development of customary international law (Cheng, 1997, pp. 125–149).

This fragmentation in the sites of normative development is mirrored in a notable absence of centralised executive and judicial functions within the core space institutions. Along with the lack of diplomatic meetings, the OST has no standing administration to manage the treaty's day-to-day affairs. The UN Office of Outer Space Affairs (UNOOSA) acts as the secretariat to UNCOPUOS and assists the international community through extensive capacity-building, technical assistance, and transparency functions. The UN Inter-Agency Meeting on Outer Space Activities (UN-Space) provides a further focal point within UNOOSA that brings together national regional space agencies for annual coordination meetings. Yet these bodies lack their own decision-making powers.

As Scheuerman (this volume) asserts, “a viable global constitutional order requires effective legal sanctions.” The OST makes no mention of judicial remedies and the space regime enjoys no centralised court or expert legal expert body that can address constitutional questions relating to the interpretation and application of foundational norms or more specific subsidiary rules. And while the OST contains general injunctions towards cooperation and peaceful settlement of disputes, the treaty does not create new mechanisms for dispute resolution, verification, or enforcement (Brisibe, 2016). These lacunae can be traced to the concentration of material and diplomatic power in the early Space Age, when it was assumed that conflicts among the few spacefaring states could be managed bilaterally rather than via novel multilateral means (Tronchetti, 2013, p. 47). This model of great power management is no longer sustainable in light of the proliferation of spacefaring actors and applications.

Instead, these functions fall to existing global institutions. The incorporation of the UN Charter and general international law presumably grants jurisdiction over outer space activities to the International Court of Justice and international courts, under some circumstances. But these judicial avenues remain untested: to this point, states have not sought advisory or binding judgements concerning the legitimacy and legality of the use of force, environmental damage from space activities, or private property rights on celestial objects in international courts. Similarly, space-related disputes have not been addressed by the UN Security Council,¹⁵ or specialised institutions like the Liability Convention.¹⁶

As such, there is no single venue where affected actors can meet to address fundamental questions concerning space governance writ large. Some analysts have proposed amending the OST to expand its authority or creating a new overarching institution—such as an International Outer Space Authority—that could consolidate and expand these currently disparate and under-developed functions (Meyer, 2017; Kealotswe-Matlou, 2021). In the meantime, alternative institutional forms have emerged which are variously described as hybrid or polycentric modes of governance (Jakhu and Pelton, 2017; Morin and Richard, 2021). Outside the UN system, a myriad of multilateral institutions (e.g., Inter-Agency Debris Coordination Committee), industry consortia (e.g., Consortium for Execution of Rendezvous and Servicing Operations), and scientific bodies (e.g., Committee of Space Research) provide additional fora for information-sharing, dialogue, and standard-setting.

These transnational responses are further supplemented by a rapidly growing range of national laws and regulatory bodies which have in effect localised the governance of key

¹⁵ While OST Article III brings the UN Charter to bear in space matters, it does not explicitly mention the UNSC. The UNSC has not been called upon in (thus far limited) inter-state disputes, and there is still considerable ambiguity regarding the extent to which, and under what conditions, the Council's Chapter VII enforcement powers would apply in the space domain (Hobe, Schmidt-Tedd and Schrogl, 2017, p. 282).

¹⁶ The Liability Convention (in Articles XIV-XX) allows for the creation of an independent Claims Commission to adjudicate inter-state disputes over liability and compensation from damages caused by space launch or operational accidents, in cases where agreement cannot be reached among the respective states. However, the treaty does not specify a means of enforcing the decisions of a Claims Commission. This mechanism has never been utilised.

space activities like launch services and satellite operations at the domestic level. For example, the US Federal Aviation Administration (FAA) regulates US-registered space launch companies—including by conducting pre-flight environmental impact assessments—while the Federal Communications Commission (FCC) approves satellite deployments. The most developed legal scrutiny is therefore found in national courts. Competitor companies have sued the FCC in US federal courts in an—unsuccessful—attempt to overturn rulings which they perceived unfairly favoured SpaceX’s Starlink mega-constellation (Brodkin, 2021). Similar domestic institutions are being developed in many states, including Luxembourg and the United Arab Emirates, suggesting a further decentralisation of outer space governance.

Conclusions

Outer space is inextricably implicated in the social, economic, political, and ethical dynamics that characterise relations within and between communities on Earth. At the same time, rapidly emerging opportunities for the exploration and utilisation of outer space promise to extend human life beyond our planet. This unique domain thus provides another setting in which to assess the extent of constitutional structures and practices in global affairs, and to reflect on their impact for tangible governance challenges.

This chapter has suggested that outer space law constitutes a coherent but weakly institutionalised regime. While not reflecting a consciously designed constitutional system, space law does possess some discernible quasi-constitutional features. But as I have shown, the emergence of space law at a time when only a select few states and companies could access space raises questions about its inclusivity and normative legitimacy. Human and robotic space exploration is thus defined by a series of inescapable tensions concerning the fundamental values that should govern outer space activities, the means of extending and

enforcing these norms and rules, and the actors to be encompassed within this legal system. These challenges will only become more pronounced as the scope and tempo of outer space activities dramatically expands.

Yet from a constitutional perspective, foundational legal documents are not expected to anticipate all potential scenarios; contestation is neither surprising nor necessarily harmful to a well-functioning legal and political system. Effective governance may therefore not be best achieved through the accumulation of more international law in the form of long-term multilateral negotiations to create a more comprehensive space treaty. Actors may instead be better served by reinforcing the relevance of existing principles and pursuing the gradual expansion of more specialised mechanisms. This can be done by directly invoking core OST provisions in disputes, developing norms and rules that address specific technical subjects, and encouraging the creation of national laws and regulatory frameworks in line with the overarching objectives contained in the OST.

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