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SYMPOSIUM ON THE NEW SPACE RACE

SPACE RESOURCES IN THE EVOLUTIONARY COURSE OF SPACE LAWMAKING

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The United States' enactment of the Space Resource Exploration and Utilization Act of 2015[1] marked a significant turn in the evolutionary course of space lawmaking, although not for the reasons commonly cited. The Act is noteworthy not for its substance, but as a symptom of emerging structural change in how space law is made, and by whom. Using space resources as a case study, this essay charts this evolutionary shift in space lawmaking and assesses its implications for the international regime on which a growing and increasingly diverse range of space operators depend.

The Nature of Space Lawmaking and the International Regime

By space lawmaking I have in mind the formulation of the "principles, norms, rules and decision-making procedures around which actor expectations converge"[2] that comprise the international regime for outer space. For most of the first half-century of spaceflight, such lawmaking activity has taken the form of international negotiations interpreting the Outer Space Treaty (OST)[3] and applying it to new capabilities and activities.

The dynamics of these international negotiations are shaped by the OST's constitutional nature as well as its constitutional role within the international regime. Much like the U.S. Constitution, the treaty abstains from regulating specific activities, supplying instead the basic legal building blocks for addressing new activities and capabilities. The treaty's open-textured principles do not prescribe a single solution in most cases, but shape and constrain the universe of solutions.[4] Solutions require negotiation, and the treaty's open texture leaves room for negotiated outcomes that accommodate a range of interests. Changing the OST's principles themselves is not on the table for negotiation. In *Treaty Stasis*, I explained the forces making amendment or replacement of the treaty unlikely and undesirable, placing the treaty in a *de facto* constitutional role within the regime.[5]

As agreement is reached on the application of the OST to new space activities, that agreement becomes part of the international regime. The case of remote sensing of the Earth from space reveals that the path to agreement

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[1] Pub. L. No. 114–90, 129 Stat. 720–22.

[2] Stephen D. Krasner, *Structural Causes and Regime Consequences: Regimes as Intervening Variables*, *in* INTERNATIONAL LAW AND INTERNATIONAL RELATIONS 3, 3 (Beth A. Simmons & Richard H. Steinberg eds., 2007).

[3] Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, Jan. 27, 1967, 18 U.S.T. 2410, 610 UNTS 206.

[4] *See* Brian R. Israel, *Treaty Stasis*, 108 AJIL UNBOUND 63 (2014).

[5] *Id.*

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can be as much political as doctrinal, and that the instrument embodying the agreement need not be legally binding to form an influential piece of the regime. The advent of remote-sensing capabilities sparked an international controversy whose geographic split and distributional politics mirror the contemporary controversy over space-resource utilization. A decade of negotiations in the United Nations Committee on the Peaceful Uses of Outer Space (COPUOS) ultimately produced a set of Remote Sensing Principles adopted unanimously by the UN General Assembly.[6]

A growing proportion of activities in space are nongovernmental, carried out by actors not directly bound by the OST. The crucial interface between these actors and the treaty regime is national legislation and regulation extending the regime to nongovernmental activities. As Setsuko Aoki describes in this symposium,[7] states have been enacting such national space legislation for decades. Here again the remote sensing example is illustrative of what I will call the "Space Law 1.0" paradigm. After the UN General Assembly adopted the Remote Sensing Principles, the United States extended the principles to private U.S. operators by the Land Remote Sensing Act of 1992 and regulations implementing that Act. In this Space Law 1.0 paradigm, the role of national legislatures is to extend agreements reached on the international plane to nongovernmental space activities conducted by their nationals.

By labeling this paradigm Space Law 1.0, I have tipped my hand that it is not the end of the evolutionary course of space lawmaking.

The International Law and Politics of Space-Resource Utilization

On November 25, 2015, President Obama signed the Space Resource Exploration and Utilization Act, which provides that a "United States citizen … shall be entitled to any asteroid resource or space resource obtained, including to possess, own, transport, use, and sell the asteroid resource or space resource *obtained in accordance with applicable law, including the international obligations of the United States*."[8]

Upon first glance, the Act can be easily misunderstood as casually answering one of the most sensitive questions of international space law: whether, and under what conditions, the natural resources of celestial bodies and asteroids may be utilized. On the one hand, the internationally coordinated roadmaps of fourteen space agencies for developing a sustainable presence in space expressly depend on utilizing the resources there.[9] On the other, the prospect of space-resource utilization is connected to a broader global political controversy over the distribution of the benefits from natural resources beyond national jurisdiction, and a clash between positivist and natural law theories of international law, neither of which can be adequately addressed in this essay.

For present purposes, I will simplify the debate down to three positions. At one end is the *preclusive position*: utilization of space resources is not permitted, at least without further lawmaking to expressly permit it. This position sometimes conditions the permissibility of space-resource utilization on a regime for equitable distribution of the benefits. In the middle is the *constrained position*: while recognition of property rights in celestial bodies or their resources in place is not permitted, nothing categorically precludes the utilization of resources removed from their place. The OST shapes and constrains the manner in which such activities may be permitted, making lawfulness a case-by-case assessment. At the other extreme is the *maximalist position*: states are free to recognize and enforce property rights in celestial bodies and their resources in place. To my knowledge, no state recognizes the *maximalist*

[6] G.A. Res. 41/65 (Dec. 3, 1986).

[7] Setsuko Aoki, *Domestic Legal Conditions for Space Activities in Asia*, 113 AJIL Unbound 103 (2019).

[8] Pub. L. No. 114–90, § 402(a), 129 Stat. 721 (codified at 51 U.S.C. § 51303) (emphasis added).

[9] *See* International Space Exploration Coordination Group, The Global Exploration Roadmap (Jan. 2018).

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position as consistent with the OST, yet some proponents of the Space Resource Exploration and Utilization Act promoted this position on economic policy grounds.

Upon closer inspection, the Act does not expressly adopt any of the three positions. The Act embodies an *implicit* interpretation, insofar as it implies that the universe of space-resource utilization that is consistent with the United States' international obligations is not a null set. Yet Congress expressly abstained from interpreting the OST to delineate the contours of permissible space-resource utilization activities. Congress instead left this to the executive branch, which evaluates nongovernmental space activities for conformity with the United States' international obligations through federal licensing processes.[10]

In a December 2016 speech, State Department Legal Adviser Brian Egan confirmed that the Space Resource Exploration and Utilization Act did not represent a shift in the U.S. approach to the OST. Reaffirming the *constrained position* articulated by Secretary of State Cyrus Vance and State Department Legal Adviser Robert Owens three decades earlier,[11] Egan reiterated the U.S. view that while Article II of the OST would preclude the U.S. government from recognizing property rights in celestial bodies or their "resources in place," nothing in the treaty precludes the use of celestial body resources removed from their place.[12]

Space Law 2.0: The Diffusion of Space Lawmaking to National Legislatures

The Space Resource Exploration and Utilization Act is noteworthy not for effecting substantive change in space law, but for the evolutionary trends in space activities that led the U.S. Congress to be seized with a controversial matter concerning the interpretation and application of the OST. With the prospect of private space missions that go beyond what even governments have done in space, national legislatures are wading into controversies over the interpretation and application of the OST in parallel with or even ahead of international lawmaking processes. I have termed this diffusion of treaty interpretation to national legislatures "Space Law 2.0." A distinctive feature of Space Law 2.0 is that national legislators are not simply extending a settled treaty interpretation to their nationals. Absent international consensus on what the rule is, national legislatures are in the position of weighing in on one side or another of an unresolved interpretive debate.

In Space Law 2.0, knotty questions of treaty interpretation that have traditionally been the province of interstate negotiations become the subject of multiple intrastate negotiations. The actors in these intrastate legislative negotiations, and the balance of influence among them, differ from international negotiations in ways that can affect the weighting of international legal considerations. In legislative negotiations, the foreign ministry lawyer is often just one interest group among many, and concern for treaty compliance just one more interest to be balanced. This is not to pretend that industry and other stakeholder interests are absent as foreign ministries formulate positions for international negotiations. But on the international plane, it is industry and legislators lobbying foreign ministry lawyers. With national legislatures in Space Law 2.0, the dynamic is reversed.

Space-resource utilization is merely the beginning of Space Law 2.0. In 2017, Luxembourg's Chamber of Deputies enacted a law on space-resource utilization that, on its face, edged closer to legislating an interpretation of international law,[13] and a handful of other countries are also considering enacting space-resource legislation.

[10] *See, e.g.*, 14 C.F.R. § 415.57(b)(2) ("The FAA consults with the department of State to determine whether launch of a proposed payload or payload class would present any issues affecting U.S. foreign policy interests or international obligations.").

[11] *See* 1979 Dig. U.S. Prac. Int'l L. 1172–73 (1979); 1980 Dig. U.S. Prac. Int'l L. 671–82 (1980).

[12] *See* Brian J. Egan, Legal Adviser, The Next Fifty Years of the Outer Space Treaty, Galloway Symposium on Critical Issues in Space Law (Dec. 7, 2016).

[13] *See* Exploring New Frontiers: Draft Law on the Exploration and Use of Space Resources (July 13, 2017) (Lux.); Explanatory Statement, Draft Law on the Exploration and Use of Space Resources (Nov. 11, 2016).

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The evolution of space activities by which new ground will increasingly be broken by private missions is only just beginning, and there does not appear to be sufficient political will for negotiated resolutions of intractable interpretive controversies on the international plane. As a result, national legislatures and regulators will continue to be seized with interpreting the OST and applying it to new activities.

I predict that private planetary missions will present a Space Law 2.0 moment with respect to the obligations under Article IX of the OST to avoid harmful contamination to celestial bodies. National space agencies—the only actors to visit celestial bodies to date—have ordered their decontamination measures according to guidelines promulgated by the Committee on Space Research (COSPAR). Concerns about the burdens of adherence to the COSPAR guidelines for commercial missions to Mars are beginning to manifest in legislation under consideration by the U.S. Congress.[14] The COSPAR guidelines are not law and Article IX affords a great deal of flexibility to accommodate the foreseeable evolution of humankind's relationship with celestial bodies, from scientific specimens to be sampled, to resources for exploration, to home for human habitation. As states' approaches to harmful contamination evolve, the coherence of the regime will depend on some level of international coordination.

Constitutional Multipolarity and its Discontents

With the increasing decentralization of the interpretation and application of the OST—from an international negotiation to multiple intrastate negotiations—comes new risks to the project of maintaining a single, coherent regime for all actors in space. Among them is the diminished influence of foreign ministry lawyers in legislative negotiations, making the treatment of the treaty as constitutional source—a fixed constraint on policy options—incrementally less likely. At worst, legislative outcomes are divorced from available interpretations of the treaty and thus fracture the regime. At best, multiple good-faith-but-uncoordinated interpretations of the treaty's open-textured principles undermine the uniformity of the regime.

I conceptualize this best-case scenario for Space Law 2.0 as *constitutional multipolarity*. The constitutional role of the OST is preserved across multiple uncoordinated national lawmaking processes, in that policy options are constrained to available interpretations of the treaty. The absence of a centralized, authoritative mechanism for adjudicating divergent interpretations suggests that there will be more variability in national approaches than in the Space Law 1.0 paradigm. The difference between constitutional multipolarity and regime-destroying fragmentation is in the degree of variability permitted. Good faith interpretations may diverge but remain tethered to the treaty. The regime bends but does not break.

In process and in substance, the space-resource-utilization laws enacted by the United States and Luxembourg are instances of constitutional multipolarity. Read together with the explanatory statements of the respective governments, each rests on the *constrained position*. Of course, my conclusion is premised on my view that this is an available interpretation of the OST. Those who disagree or prefer a different interpretation on policy grounds may find little comfort in my characterization. Yet even critics of the *constrained position* should favor a legislative outcome tethered to the longstanding interpretation of the OST by many of the most active spacefaring states over an outcome that severs U.S. law from a foundational pillar of the regime. That could have happened. Influential companies and legislators favored the *maximalist approach* on economic policy grounds, a cautionary reminder that constitutional multipolarity is not inevitable in Space Law 2.0.

[14] H.R. 2809, 115th Cong. § 80103(C)(2)(D) (2017).

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Layers of Space Lawmaking

Space Law 2.0 has not displaced Space Law 1.0. They exist in layers that intersect and interact. If the OST is the formal tether binding together decentralized lawmaking processes, foreign ministry lawyers are the informal link maintaining constitutional multipolarity. The same lawyers advising their legislatures on the interpretation of the OST are also engaged in multilateral dialogues in the COPUOS Legal Subcommittee and bilateral dialogues with their counterparts around the world. While these informal linkages are not a substitute for more formal international negotiations, they contribute to the convergence of national approaches in a state of multipolarity.

The evolutionary course of space lawmaking is not unidirectional. It is foreseeable that space-resource utilization will again[15] become the subject of major multilateral lawmaking, at such time as a critical mass of spacefaring states recognize a practical need and a practical basis for such lawmaking. At a point in time when space-resource-utilization activities progress beyond theory and early-stage research and development to a possibility of operations at scale, states' interests in an international regime for resource utilization may converge sufficiently for a Space Law 1.0 solution. Such international lawmaking may also have the effect of straightening out the kinks in the regime as states revise their national laws for consistency with a new international agreement.

Even in these early days of Space Law 2.0, another layer is visible on the horizon. "Space Law 3.0" will be a private law system of contracts between operators. The smart contract functionality of blockchain networks such as Ethereum introduce new possibilities for private ordering in the space domain, and may be particularly enabling of a space-resources economy. Imagine a supply chain in which water harvested from asteroids or celestial bodies by a Chinese company is delivered to an orbital refinery operated by a French company for conversion into liquid oxygen propellent, which is then sold to British, American, and Japanese refueling companies for sale to spacecraft operators from dozens of countries. Native digital smart contracts remove friction and contractual hazards from such a chain of transactions executed by machines, far from Earth, where there is little sense in importing such terrestrial baggage as negotiating which country's laws, courts, and language govern contracts. Code is universal; smart contract enforcement is automatic. If a critical mass of operators store value on interoperable blockchain networks, it is even theoretically possible to have a private contractual regime for allocating and enforcing quasi-property interests in space resources, in which infringement triggers an automatic transfer of value.

Layers of space lawmaking will increasingly resemble the layers of public and private law common to terrestrial legal systems. Participants in a private contractual regime for space resources would not be at liberty to contract around international law to the extent they are bound by national laws and regulations implementing the OST and its progeny. If, for example, the states of nationality of participants in this theoretical space-resources economy enter into an international agreement providing for the redistribution of some proceeds from space-resource utilization, private contracts must comply with whatever requirements are passed down through national law. Blockchain functionality lends itself well to tracing resources and proceeds through complex supply chains. In this way, Space Law 3.0 functionality may well unlock new possibilities for agreement in Space Law 1.0 lawmaking.

Amidst weekly press coverage of the promise of space-resource utilization, it is useful to keep in mind that a scalable method of harvesting space resources has yet to be demonstrated. That is not to cast doubt on the inevitability of a space-resources economy, but a reminder of the distance between the state of the art and the informed ambitions of public and private space actors across the globe to sustainably explore and develop space using its natural resources. As these and other capabilities progress in the second half-century of spaceflight, we should not count on the Space Law 1.0 paradigm of centralized international negotiation and agreement passed down to

[15] The 1979 Moon Agreement was intended to coordinate space-resource utilization but did not gain the traction of the four multilateral space treaties that preceded it. *See* Agreement Governing the Activities of States on the Moon and Other Celestial Bodies, Status as at June 2, 2019, UN Treaty Collection (reporting that eighteen states have ratified or acceded to the treaty).

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private actors by national legislatures. Instead, some push and pull between international and national lawmaking processes is foreseeable. Nor will all space lawmaking be regulatory, as contracts between space actors contribute to a *lex mercatoria*-like private law layer governing economic relations in the fourth domain of human activity.

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