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Toward Cooperation or Conflict on the Moon?

Considering Lunar Governance in Historical Perspective

James Clay Moltz

THE QUESTION OF how the moon will be governed once humans return in about a decade and begin to establish permanent bases matters greatly to the future of international security. Already, a range of major powers have plans to participate in the moon's further scientific exploration, commercial exploitation, and possible permanent settlement. If we count both manned and robotic activities, this list currently includes the United States, China, Russia, India, Germany, the United Kingdom, the European Space Agency, Japan, and South Korea. Other countries are likely to join this list in the coming years.

Establishing a peaceful framework for lunar governance will be important, because hostile international relations on the moon are likely to lead to conflicts elsewhere in space and, possibly, on Earth. Such patterns regarding new frontiers have plagued the history of international relations for centuries. Indeed, despite frequent hopes for cooperation, most unclaimed territories historically have become sources of international conflict rather than serving as peaceful lebensraum. Typically, and consistent with realist predictions about international politics, states have had a built-in penchant to pursue relative gains over their rivals and therefore have sought to seize and defend new resources to their own advantage. On the other hand, successful formation of a stable, transnational governance system—a mechanism for sharing or otherwise peacefully allocating the moon's resources—could open the possibility for mutually beneficial and self-sustaining lunar commerce and settlement, consistent with neo-liberal

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Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE 2009		2. REPORT TYPE		3. DATES COVERED 00-00-2009 to 00-00-2009	
4. TITLE AND SUBTITLE Toward Cooperation or Conflict on the Moon? Considering Lunar Governance in Historical Perspective				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Air University, Strategic Studies Quarterly, 155 N. Twining St BG 693, Maxwell AFB, AL, 36112-6026				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

institutionalist predictions. Such a model could have positive spin-off effects on Earth and set a cooperative pattern for further human exploration and development of the rest of the solar system, spurring states to pool resources and engage in joint approaches to space's many challenges. In such scenarios, hopes for "humankind" efforts in space—rather than state-driven rivalries—might be realized, something for which astronauts and cosmonauts who have visited space have often called. As Per Magnus Wijkman wrote on these issues in 1982, the "interdependence" of all actors in space provides "strong incentives" for the emergence of cooperative solutions.¹

Yet predictions from the literature on collective goods suggest that governing the "global commons" of space and the moon is likely to become increasingly difficult when finite resources face claims by multiple, self-interested actors. Such trends historically have led to processes of "enclosure" rather than successful collective management.² Thus, the question facing lunar settlement is: Can such conflicts be avoided and, if so, how?

In seeking to weigh possible alternative scenarios on the moon, this article analyzes historical cases of human settlement of remote regions and attempts to chart and categorize similarities and differences that might provide useful guidance for forecasting lunar governance—and, specifically, with the aim of avoiding international conflict. This study begins by comparing space to the international experience in three prior regions: settling the Americas in the 1500s, establishing permanent bases on the Antarctic continent in the late twentieth century, and managing the deep seabed since the 1980s. It then turns to the moon, starting with a historical survey of predictions about its settlement since the 1950s and relevant developments in the realm of international treaties affecting lunar activity. The article concludes by applying lessons drawn from the historical cases—and differences—to forecast likely directions on the moon. It argues that the current restraints imposed by moon-related treaties and the nonmilitary nature of the likely participants are likely to favor cooperation. But it cautions that such forces will have to be balanced against the likely presence of highly competitive national motivations. This mixed set of influences suggests a less cooperative outcome than on the Antarctic continent but a far more cooperative result than emerged in the struggle over governance and sovereignty issues in the New World of the Americas.

The New World Experience—Territorial Conflict

The European settlement of the New World in the Americas from the 1500s through the 1700s represents a process that is in many ways comparable to that of the coming human settlement of the moon. This earlier case involved nearly all of the great powers of the time (Portugal, Spain, France, Britain, the Netherlands, and Russia) and similarly daring, expensive, and risky national efforts. Their competition posed the prospect of destabilizing the existing international system by opening up a major new source of power and influence. The comparative weakness of the native peoples inhabiting the Americas at the time of this process resulted in their dislocation and eventual defeat by European colonizers, as one world forced itself, its more advanced technology, and its patterns of human organization, on another. In the process, however, these countries entered into conflict among themselves.

An initial “conflict management” regime created by the papal-sponsored Treaty of Tordesillas in 1494 divided the Americas into exclusive zones for the initial colonizers, Spain and Portugal. However, it soon fell apart due to several factors: (1) the wide availability of adequate sailing and navigation technology to locate and send rival missions to the New World, (2) the presence of multiple great powers in the international system, and (3) the absence of taboos against the use of weaponry and the corresponding acceptance of war as a means of conflict resolution. As a result, the outcome of the process of settling the New World became one of repeated warfare and a carving and recarving of the map of the Americas, seen most significantly in North America. One of the reasons for these conflicts was that key European adversaries—who lacked contiguous borders in Europe (such as England and France)—often had intersecting or even overlapping territorial claims in the New World. As historian Clarence L. Ver Steeg notes, “The battle for empire was being fought on the North American continent rather than in Europe.”³ Thus, the New World served in different periods as a kind of *surrogate* battlefield, although these conflicts often spilled back into Europe rather than dampening military tensions. Paul Kennedy summarizes that attitude of European rulers in moving aggressively into the New World: “There was the prospect of gaining glory and riches, of striking at a rival and boosting the resources of one’s own country, and of converting new souls to the one true faith; what possible counter-arguments could hold out against the launching of such ventures?”⁴

In regard to forms of governance, the basic political outcomes in the individual colonies were more or less a repetition of the various patterns in Europe, with the main social and political institutions and related forms of organization (religious, legal, legislative, and military) simply being transferred to the respective New World colonies. Although many of the colonies eventually achieved independence, their main postcolonial tendency was toward acceptance of existing concepts and structures (albeit with certain modifications). The ability of colonists to support themselves from the land and natural surroundings, the prevalence of “closed” mercantilist trading networks that reinforced economic links with their mother countries, and the great expanses of land failed to bring any *requirement* among them to form collective political institutions, which might have created *shared* governance across the Americas.⁵ Instead, very broadly speaking, authoritarian national governments with a strong church presence tended to dominate in South and Central America, whereas different forms of representative government tended to prevail in British and French North America (at least following the departure of Holland, Russia, and Spain).

In the economic realm, some analysts argue that the rapid institution of private property rights benefitted New World development, since these rules and incentives stimulated hard work, the improvement of the land, and economic competition. But the rapid emergence of territorially based disputes also made international governance *more* difficult, as states vied to own and occupy the most profitable regions. For all of these reasons, patterns of interstate conflict predicted under theories of realism simply repeated themselves in the New World, as power—rather than cooperative rules and norms—dictated the resolution of differences between states over sovereignty in regard to both territory and resources. Using Robert Jervis’ criteria for the successful development of cooperative security regimes, we can observe that states at the time did not “prefer a more regulated environment,” did not “believe that others share[d] the value they place[d] on mutual security and cooperation,” and faced conditions in which “one or more actors believe[d] that security [was] best provided for by expansion.”⁶ Under the circumstances, efforts at conflict resolution through regime formation were bound to fail.

The Antarctic Experience—Cooperation via the Postponement of National Claims

In the years immediately following World War II, the lessons and record of the establishment of a permanent human presence on the Antarctic

continent seemed poised to duplicate the experience of the New World. Indeed, conflicting territorial claims by Argentina, Australia, Britain, Chile, France, New Zealand, and Norway seemed to be leading toward heightened conflict, as several of these countries hoped to use the Antarctic continent for strategic and economic advantages. However, there were three main differences in the Antarctic case, compared to the New World experience: (1) the presence of a bipolar international structure, in which neither the United States nor the Soviet Union was eager to see war erupt over disputes on the frozen continent; (2) Antarctica's unclear military and commercial value, which raised doubts about the utility of force; and (3) the extreme severity of the climate, which raised the costs of human settlement significantly. As one analyst observed in 1980 regarding the emergence of peaceful relations on Antarctica: "The final reason for cooperation between the personnel of different nationalities is simply one of survival. Given the small number of persons ever deployed in the Antarctic, and the grave risks they run from accidents, they need to co-operate if only to look after themselves."⁷ Some of these factors are similar to those in space and may play an important role in its eventual governance of the moon. However, the shift from bipolarity to today's unipolarity and to possible future conditions of multipolarity may cause problems for the possible transformation of the existing Cold War regime in space.

Influenced by the factors listed above, international negotiations over Antarctica began in the 1950s toward a cooperative regime to ban traditional military and territorial competition. In 1959 these efforts came to fruition in the signing of the Antarctic Treaty, in which the main international actors agreed to postpone indefinitely their territorial claims and to establish a restrictive legal regime that banned military activity and unilateral commercial exploitation on the continent. Although bipolarity assisted in the regime's formation, fear of possible Soviet claims on the region in the early 1950s also helped draw earlier claimants (such as Britain and Australia) into supporting these efforts as well.⁸ After the necessary national ratifications, the treaty entered into force in 1961. While the regime waived issues of sovereignty and prevented relative gains, it lasted for 25 years due to the benefits of conflict prevention and the peaceful scientific study it provided.

In 1991 the regime faced a challenge as it came up for review and possible renewal. Given technological developments and the pressures for new oil supplies worldwide, some governments (and their corporations) pressured the states parties to open the continent for oil and other mineral

exploitation. But scientific and public outcry at the notion of the “loss” of this pristine continent eventually defeated commercial interests, and members of the treaty agreed to extend it for an additional 50 years, thus again putting off conflicting claims and development rights. Today, this historically remarkable experiment in conflict prevention through mutual self-restraint and nondevelopment remains in place, where many countries conduct research in jointly occupied and accessible stations. Commercial development remains limited to tourism, and activities in Antarctica still involve only a very small number of people, in part because of the expense of supporting them in the hostile climate.

Although the regime has survived the end of bipolarity, with the emergence of post–Cold War US hegemony, the reasons seem to have less to do with power than with shared thinking among the states—in political science terms, more of a “constructivist” notion.⁹ In other words, the goals of participants—thanks to the long-standing presence and institutionalization of the Antarctic regime—seem to have converged around the notion of environmental protection of the continent rather than its possible economic development for personal gain.¹⁰ Looking to the future, the question of the regime’s stability will rely on this consensus.

Indeed, some recent authors have criticized this anticommercial Antarctic regime. As one analyst writes:

Today, Antarctica is an example of what happens when property rights are denied and a government monopoly . . . is created. Rather than being a new job and wealth creator, activities on the continent are net expenditures to the taxpayers of the signatory nations. There is no growing infrastructure in and around the continent. There is no self-sustaining economy.¹¹

But environmentalists seeking to use Antarctic research to better understand such issues as climate change, government officials seeking to avoid unnecessary international confrontation, and military leaders who would otherwise be responsible for defending vying national commercial enterprises have remained supporters of the treaty. For these reasons, states have thus far been able to maintain the political consensus needed to sustain it.

Yet despite this example of a successful “conflict prevention” regime in the Antarctic, there are very few experts or officials calling for such a noncommercial structure for the moon. The major question, therefore, is whether the moon’s coming settlement will generate the economic, political, and eventual military conflicts typical of the New World, as well as similar cases of European exploitation of Africa and much of Asia prior

to World War I, or whether more successful conflict-prevention strategies can be developed. Before moving to the emerging moon race, one final and potentially relevant comparative case merits examination—the deep seabed. Like space, this region also contains potentially valuable minerals that might form the source of conflicts, but it has remained peaceful largely due to the impact of regime formation—although, similarly, not without the emergence of strong critics.

The Seabed Experience

In the second half of the twentieth century, the development of floating oil platforms and deep submersibles capable of reaching the sea bottom raised hopes that untold riches might soon be reaped from its development. But the questions in terms of governance were by whom and under whose control. Again, the United States and the Soviet Union sought to avoid conflict and the unilateral seizure of resources by any single country. After a process of international negotiation initiated by the superpowers in the late 1960s, the United Nations emerged as the main body empowered to address these issues and to consider options for international management and conflict prevention. In 1982, participating officials finally reached agreement on a system of rules and guidelines that both expanded national control over coastal regions and also facilitated (and required) international oversight of commercial activity on the ocean floor, which would be excluded from possible national territorial appropriation. By the time of its agreement, however, the United States had largely soured on the process. The Reagan administration refused to sign the eventual UN Convention on the Law of the Sea (UNCLOS) due to its opposition to the extension of exclusionary territorial waters and UN treatment of the seabed as the “common heritage of mankind.”

To govern the seabed, the UNCLOS established a body called the International Seabed Authority (ISA). The ISA required that any prospecting for minerals in the seabed be conducted only after international approval and licensing to ensure compliance with the UNCLOS clause regarding the “common heritage of mankind.” The treaty called for revenues from deep-sea mining to be pooled centrally and redistributed to cover (1) ISA administrative costs, (2) profits for the mining enterprises themselves, (3) compensation for states whose mining operations might be harmed economically by seabed operations, and (4) claims by other countries to

benefit from international seabed development.¹² Due largely to these “redistributive” clauses, the United States remains outside the UNCLOS regime today.

However, there has been an upsurge of recent US interest (including among leading military officials and members of the US Senate) in considering possible accession to the UNCLOS. Today, the main interest is to facilitate antiterrorism efforts and to give the United States a seat at the table in emerging debates over attempts by some countries (such as Russia) to use extensions of national geographical formations into the deep oceans as the basis for mineral and transit control claims, particularly in the Arctic. Some recent critics, however, have argued that joining the UNCLOS agreement will set a precedent of applying the UN redistributive concepts to the moon, thus purportedly harming incentives for commercial activity, since it bans private property and requires international approval of all development schemes. To date, there have been six countries (China, France, India, Japan, Russia, and South Korea) and one international consortium that have registered as “pioneer investors” with the ISA,¹³ thereby retaining exploratory (but not yet exploitative) rights to certain identified regions of the seabed. But no commercial mining has yet taken place. Indeed, to date, the development of the so-called Mining Code has not yet been completed.¹⁴ Critics argue that the weight of international regulations and the inability of states to own sections of the seabed have thwarted development to date. Supporters of the regime have noted the high costs of deep seabed exploration due to the technologies involved and indicated the *benefits* of international control: preventing abuses, unilateral exploitation, and environmental damage. Due to its still-incomplete implementation, however, the UNCLOS remains an experience whose lessons remain unclear for application to the moon’s future governance.

Predictions and Prescriptions Regarding the Moon’s Settlement

The literature appearing since the 1950s on the moon’s future settlement is voluminous. Moreover, it offers a range of governance options, from hostile military predictions to visions of scientific harmony. It is worth surveying this literature in some detail to understand the different concerns raised by various authors over time. As is frequently the case,

their conflicting predictions reflect fundamental differences in their underlying views of international relations, the motivations of states, and the prospects for successful and sustainable cooperation.

In the late 1950s, many military analysts predicted that the moon would become the ultimate “high ground” for defense and associated military operations, reflecting traditional realist assumptions about this new environment and the gloomy outlook for superpower cooperation in the midst of the Cold War. Senior officers, like Lt Gen Donald L. Putt, USAF, called in 1958 for the establishment of a US lunar missile base, which would purportedly give Washington the ability to rain nuclear weapons “down” on the Soviet Union while helping to establish a series of US military outposts on other planets for coming space warfare and competitive colonization. In this scenario, the moon was viewed simply as another pawn in the superpower conflict—bound to repeat the military-led dynamics seen on prior new frontiers. Critics, however, pointed out logical contradictions in this plan, noting that “if you did launch a bomb from the moon, the warhead would take five days to reach the earth. The war might be over by then.”¹⁵ Accordingly, after further vetting, such plans for military forces on the moon never reached fruition.

Other, more scientifically inclined space analysts predicted instead the possible supplanting of earthly competition through space exploration, reflective of institutionalist concepts regarding international relations. Such sentiments stemmed naturally from the hoped-for cooperation of scientists within the context of the International Geophysical Year (IGY) in 1957–58. British space enthusiast Arthur C. Clarke went even further—toward contemporary constructivist notions—in suggesting that cooperative space activities could provide a peaceful sublimation of man’s “aggressive and pioneering instincts.”¹⁶ German-born analyst Willey Ley¹⁷ and US physicist Albert R. Hibbs also expressed hopes for significant international cooperation in space and on the moon.¹⁸ A similar form of technological optimism and the expected rapid settlement of the moon pervaded Erik Bergaust’s 1964 book, *The Next Fifty Years in Space*, which predicted an active settlement program by the 1970s led by nuclear-powered rockets and moon-based nuclear reactors.¹⁹

While falling far short of the cooperative hopes of scientists, efforts by the two superpowers to “manage” space competition and rule out its more harmful manifestations—such as nuclear weapons—began in 1963. Two UN resolutions approved in the fall of that year called for states to refrain

from placing weapons of mass destruction in orbit and to apply existing legal principles and protections to space activity. Meanwhile, the signing of the 1963 US-Soviet-UK Limited Test Ban Treaty banned further tests of nuclear weapons in space after nine orbital explosions from 1958 to 1962 had caused serious damage to a number of first-generation satellites. Subsequent steps went further, as the superpowers sought to prevent the moon race from spilling over into direct conflict or other hostile actions. In negotiating and signing the 1967 Outer Space Treaty (OST), the superpowers accepted a range of mutual legal restrictions on their own activities, including those planned for the moon.²⁰

For example, Article II of the OST stated that the moon “is not subject to national appropriation by claim of sovereignty, by means of use or occupation, or by any other means.”²¹ While most experts have since argued that this bans private property, the language was vague enough to suggest that some forms of commercial appropriation (particularly if carried out under international sanction) were possible. A perhaps more critical issue in terms of conflict prevention was Article IV, which drew on the 1959 Antarctic Treaty’s restrictions and required that “military bases, installations and fortifications, the testing of any type of weapons, and the conduct of military manoeuvres on celestial bodies shall be forbidden.”

Also limiting potential lunar commercial activities and promoting notions of sustainable development was Article IX, which required states in their activities on the moon and other celestial bodies alike to “avoid their harmful contamination.” Finally, Article XII of the treaty outlined an inspection regime to promote transparency and cooperation, stating: “All stations, installations, equipment and space vehicles on the Moon and other celestial bodies shall be open to representatives of other States Parties to the Treaty on a basis of reciprocity.” Again, these principles came directly from the Antarctic Treaty, which was fresh on the minds of the government lawyers and diplomats who put together the OST.

With the *détente* era just beginning to emerge and with the OST in place, analyst Neil P. Ruzic boldly outlined in 1970 a possible “phased” progression from competition to gradual cooperation on the moon. Ruzic predicted an initial phase characterized by rival US and Soviet bases followed by eventual collaboration spurred by the practical needs of the two sides to join together to overcome common survival challenges on the moon.²² As he predicted the progress of superpower rapprochement on the moon by 2010, “it became cheaper for the two spacefaring nations of

Earth to pool their resources in a cooperative effort than to compete.”²³ Although clearly overly optimistic about the date of this development—and the presence of several thousand “lunarians” by this time—Ruzic’s approach was rooted in the influence of practical settlement-related demands on governance and the eventual institutionalization of cooperation. Ruzic predicted that, indeed, as cooperation on the moon developed further and the lunar population increased, an independent “lunar legislature” would emerge to decide critical functional issues, thus suggesting the transfer of sovereignty questions from Earth residents to those of the moon itself.

In reality, however, interest in moon settlement dampened considerably after the Apollo landing in 1969. Pres. Richard Nixon shelved the US lunar program in the early 1970s, and no human beings have since stepped on the moon’s surface. The technologies for a permanent settlement were deemed too expensive, and the “demand” for the moon’s colonization proved relatively weak, particularly when placed into the context of the more urgent resource demands of the Vietnam War, Johnson’s Great Society programs, and dealing with the economic implications of emerging US oil dependency on the Middle East. Meanwhile, the Soviet Union declined to take on the risks and expense of its own human exploration on the moon since the Americans had already taken the big prize. Visions of lunar futurists moved quietly to the back burner.

But as other countries sought to prevent what appeared to be a threat of the moon’s exclusive future settlement by the two superpowers, the United Nations hosted an effort to craft a moon treaty in the 1970s. The eventual draft document called for international control over lunar resources and the formation of an international organization to allocate profits, similar to efforts at the time in regard to the seabed. The draft also emphasized that the moon’s resources could not be “claimed” by any nation and that they constituted instead the “common heritage of mankind.” The Moon Treaty’s signing by several states in 1979 and its entry into force in 1984 (despite lack of support from either superpower) caused scholars and analysts to begin to examine possible international governance models for the moon in the context of the new treaty.

Recognizing the presence of the Moon Treaty, but seeking to avoid possible obstacles to development posed by its “common heritage of mankind” clause and requirement for the formation of an international authority to govern commercial operations, Christopher C. Joyner and former astronaut Harrison H. Schmitt sought an interpretation of the agreement that could

nevertheless promote successful economic development of the moon. In this effort, they looked not to the experience of the UNCLOS, but instead to the more space-relevant example of INTELSAT, the US-led organization that had helped foster the satellite communications industry while sharing the benefits of this technology with non-space-faring nations. Their concept, which they dubbed INTERLUNE, aimed at creating a “feasible administrative system and a peaceful management environment” to facilitate the moon’s settlement and development without conflicts.²⁴ The idea behind INTERLUNE was inherently collaborative but, like the Antarctic system, would be based on governance according to participation in settlement activities. It went further, however, in calling for shares and voting within the organization to be determined by a country’s level of investment. Such a structure, according to Joyner and Schmitt, would avoid the problem of nonspace actors trying to “dictate” to space pioneers while both allowing profits to be had from the moon’s settlement and creating a viable international governance structure that would be peacefully oriented, legally transparent, and open to new members. At the same time, INTERLUNE would avoid the problems of unilateral settlement schemes and the almost inevitable conflicts such models would likely entail. Interestingly, the current literature on lunar governance seems to have forgotten this innovative suggestion. But the idea remains relevant, particularly as states and nonstate actors seek to move from initial return flights to more permanent lunar settlements.

Other writings from the mid-1980s predicted a very gradual process of settling the moon, starting first with the goal of “scientific observation” and only much later (likely after 2035) moving into commercial exploitation.²⁵ From this context, early moon return missions could be compared historically to some of the great scientific expeditions that had spurred exploration of the American West, Africa, and the Antarctic from the early 1800s to the early 1900s. As Phillip M. Smith writes, these missions by Great Britain, France, Russia, and the United States (among others) were similar to likely future lunar or Mars missions in that “one left with the expectation of being away from home for several years, possibly not returning at all.”²⁶ The more advanced state of international cooperation in scientific exploration by the late twentieth century, according to Smith, increased the chances that lunar governance might be developed on the basis of multinational scientific collaboration. However, writing at the height of US-Soviet tensions during the Reagan administration, Smith argued that

analysts should not neglect the importance of nationalism in motivating expeditions like the moon's settlement. He predicted that true international collaboration by 2035 was "difficult to imagine."²⁷ Smith viewed the most likely outcome as one in which a major country—probably the United States—would take the lead in lunar exploration and then accept partners on a *per contribution* basis, similar to the then-developing plan for the then-US-led international space station.

A competing, institutionalist approach developed by Amanda Lee Moore offered the model of the International Telecommunications Union's regulation of radio frequencies and geostationary orbital slots as a possible example for successful lunar governance.²⁸ She proposed that a conference of states might address contentious issues, such as the Moon Treaty's "common heritage of mankind" clause, and simply lay out an interpretation of this vague phrase that would rule out national sovereignty over lunar real estate but accept notions of profit and economic development. In general, Moore posited that muddling through in an ad hoc manner via bilateral agreements among states active in moon exploration, while possible, would lead to far from optimal solutions to the lunar governance dilemma compared to formal, international efforts to lay out clear rules to govern state behavior.

As technology advanced in the late 1990s and global tensions eased following the Soviet Union's demise, another "take" on the moon's settlement emerged from Artemis Society²⁹ member and chief executive of the so-called Lunar Development Corporation Gregory Bennett—one led by space tourism.³⁰ The concept outlined the initial reestablishment of human exploration on the moon via privately funded tourism, which would create the necessary life-support infrastructure. While most analysts focused on industrial enterprises—like the mining of helium-3—Bennett argued provocatively, "I'd rather see it developed like Honolulu." Such a scenario ruled out national competition as the primary motivation, focusing instead on profit and "fun."³¹ However, such notions challenged the Outer Space Treaty (given its lack of specific mechanisms for allotting lunar locations) and rejected the Antarctic model outright, possibly sowing the seeds for at least commercial conflict. Today, whether the tourism industry will lead the process of lunar settlement still remains to be seen, although a few private organizations supporting moon development (such as the Netherlands-based LUNEX group) have already crafted elaborate scenarios around this possibility. The question raised by realist theory is

whether military forces might eventually be required to “defend” such commercial assets. Such future pressures, on the other hand, might be mitigated by multinational ownership or at least financing of such ventures, which is likely.

In the twenty-first-century literature on lunar governance alternatives, some of the most active and vocal authors have focused on commercial issues and the perceived “anti-development” bias of the OST—also explicitly rejecting the Antarctic experience. Indeed, a virtual cottage industry has emerged criticizing the OST as “unworkable” and even an *impediment* to settlement of the moon because of its ban on private property rights. The argument is that Antarctica “proves” that such treaties impede commercial development to the detriment of all plans for lunar mining, solar farms, construction, tourism, or other profit-oriented activities.³² As Robert Zimmerman argues, “While [the United States] might have won the Cold War here on Earth, the Soviet Union apparently has won the Cold War in space,”³³ implying a link between Soviet communism and UN-based governance formulas. He foresees no possible future for moon development under the current legal regime and urges the United States to withdraw from the OST.

Although some recent analysts argue that such a “free for all” approach would best benefit lunar development, others, such as Everett Dolman, support an OST withdrawal only in the context of its replacement by a new regime.³⁴ In Dolman’s view, the new structure “must rest on principles and norms consistent with capitalism and liberal democracy, and at the same time must recognize the obligation the richer states have to assist the poorer ones in a domain in which they cannot compete.”³⁵ To others, given the growing trend toward capitalism already extant across the globe (even in China), this might better be done by clarifying implementation clauses for the OST and the Moon Treaty, rather than walking away from the existing legal framework for space entirely.

The literature on regime transformation suggests that such developments most often occur in the presence of one of three factors: (1) internal contradictions within the regime, (2) a change in the structure of power that affects the regime, or (3) an exogenous change in technology or other relevant influence.³⁶ In regard to the first factor, some critics might argue that the OST regime is contradictory by allowing for lunar development but denying national property rights. While it is true that the OST forbids national ownership, existing practice in certain other areas allows

such development without providing specific property rights to the developer. (An example might be a lease to drill for oil in a national park or forest.) Regarding the second factor, it is clear that the structure of the international system has shifted from superpower bipolarity to conditions of unipolarity since the end of the Cold War and may be on its way to some form of future multipolarity. At the same time, no countries have indicated an intention to withdraw from the OST to date. Whether such shifts in relative power will lead to future withdrawals remains to be seen. Finally, we cannot rule out the possibility of an exogenous change that might affect the OST. For example, a sudden breakthrough in the cost of spaceflight allowing all nations to send missions to the moon could put unbearable commercial (and political) pressure on the existing OST system. To date, however, it is hard to imagine a shift that would allow more than a small number of the most technologically advanced countries to lead the process of settling the moon. For these reasons, any “requirement” for the OST regime’s transformation is as yet unclear.

In a provocative recent article, space analyst Andrew Brearley argues for the OST’s continued relevance, albeit with possible future modifications or clarifications. He makes the point that “even though the OST prevents states from owning the moon, it does not prevent them from exploiting it.”³⁷ Brearley compares the future lunar legal environment to that associated with the seabed, a similar “global commons.”³⁸ He makes the case that an international management organization modeled on the UNCLOS arrangement could serve as an effective governance tool for the moon. Pointing specifically to follow-on implementation agreements in 1996 associated with the UNCLOS to make it more palatable to major states that might become engaged in seabed mining, Brearley argues that similar implement agreements might be reached regarding the Moon Treaty, if agreed to by major space-faring states.³⁹ He proposes what he calls a Lunar Resource Authority to govern applications for and management of mining operations by states or commercial consortia. This agreement would allow profit making, but without transferring actual ownership of sections of the moon to specific countries or enterprises, thus remaining consistent with the OST. One option would be through a licensing system, which would create the “pseudo property rights” that Brearley believes are needed to allow successful commercial operations to be pursued.⁴⁰

Another take on these institutional issues is provided by space lawyer Rosanna Sattler.⁴¹ She points out the gaps in the existing legal framework for the moon's development and accepts the problems posed by trying to follow the Antarctic model. But she suggests that solutions can be found by modifying current treaties and looking to other models within existing space law, citing in particular the International Space Station Intergovernmental Agreement (ISSIA). The ISSIA, she argues, "could easily be applied to space tourism, settlement, and bases of operation on . . . the Moon and Mars."⁴² Although under the coordination of NASA, the ISSIA provides for individual technological development by member states and a system for international dispute resolution by referral either to the International Court of Justice or the World Trade Organization, depending on the nature of the conflict. To date, no disputes have risen to that level. Another concept Sattler views as worthy of investigation is that of the UNCLOS Exclusive Economic Zones, which could be activated on the moon through a system of "long-term leases or licenses." Overall, Sattler outlines a system based on "combining and refining elements" of existing international law while emphasizing the importance of gaining "support from the industrialized nations."⁴³

The debate on the issue of commercial development of the moon's resources is an important and still unresolved one. As Brearley notes, it would be highly desirable for states to settle these issues before the next humans set foot on the moon. Once humans begin landing and staying on the moon, complex issues will quickly arise. Key variables in the process of international discussion and possible negotiation include (1) the nature of the leading space actors and their interrelations at the time of the moon's settlement, (2) the status of existing space-related treaties and restraint-based norms, (3) the prospects for lucrative contracts (which could promote either competition or cooperation), (4) the extent of the resources and locations available (more likely to promote competition), and (5) the availability of cost-effective technology for their exploitation.

Of all these factors, the first two—the status of international relations among participants and their willingness to comply with existing space treaties and norms—may be the most important, even above resource scarcity or the availability of technology. It almost goes without saying that friendly relations and cooperative exploratory projects on the moon and in the solar system will greatly increase the chances of successful management of moon conflicts. This suggests that realist factors alone are not likely to

dictate a break-up of the OST or the existing consensus on cooperative restraint on the exercise of military power. Of course, hostile relations (such as between the United States and China) cannot be ruled out and could lead to unilateral efforts to seize locations and establish nationally oriented keep-out and governance regimes, whether or not resources are scarce. However, violation of the OST in this manner could have other repercussions on space security and would have to be considered carefully by any state undertaking such policies. Hostile or self-serving actions on the moon could harm a country's interests in other areas of space or on Earth, leading to rival coalitions against it and efforts to undercut its attempted unilateral gains—possibly through military means.

Considering the rival conceptual approaches reviewed above, while looking back at the three prior cases analyzed in this article (the New World, Antarctica, and the seabed) and comparing them to the moon, we see in the table below that the presence or absence of certain incentives and institutional factors have affected outcomes on past international frontiers and might be expected to contribute to outcomes on the moon as well. These include the nature of the international system (and the level of conflict); the nature of the physical environment (and related costs of settlement); the acceptability of territorial acquisition and military activities; the viability of commercial activities; and the existence (or absence) of a transnational governance structure (regime) for the new frontier. These factors have all contributed in various ways to either conflictual or cooperative outcomes. On the last point, the role of the existing international regime embedded in the OST may be especially significant.

As Robert Keohane argues on the impact of regimes in shaping the behavior of states:

International regimes alter the information available to governments and the opportunities open to them; commitments made to support such institutions can only be broken at a cost to reputation. International regimes therefore change the calculations of advantage that governments make.⁴⁴

The challenge in space will be whether legal and political developments that emerged in the late twentieth century can mitigate possible twenty-first-century hostilities while also allowing the moon (and other celestial bodies) to be both explored scientifically and developed commercially under likely conditions of future multipolarity in the international system.

Summary of factors affecting governance in four “frontier” environments

Frontier	<i>World political structure at time of governance agreement</i>	<i>Nature of physical environment</i>	<i>Territorial acquisition acceptable?</i>	<i>Military activities allowed?</i>	<i>Commercial activities allowed?</i>	<i>Transnational governance structure</i>	<i>Outcome</i>
New World	Multipolar	Hospitable	Yes	Yes	Yes	No	International conflict
Antarctica	Bipolar	Harsh	No	No	No	Council of Member States	Joint scientific research and cooperation
Seabed	Bipolar	Difficult	No (beyond EEZ)	Yes	Yes	International Seabed Authority	Lack of consensus
Moon	Moving from Unipolar to Multipolar	Extremely harsh	No	No	Yes	Outer Space Treaty (but no current implementing authority)	?

Historical Governance Models and Their Associated Outcomes

In reviewing the findings of this study, we can observe that there is no predetermined outcome in regard to the moon. At the same time, there are certain tendencies that will affect lunar governance and shape the factors likely to play an important role in determining the specific regime formed. In terms of policy recommendations for avoiding hostile outcomes on the moon, several specific measures should be considered by states—and, preferably, soon.

First, if conflict is to be avoided, countries planning to go to the moon would be well advised to begin discussions *in advance* of the actual missions to develop protocols for peaceful interaction. Fortunately, some of these measures are tentatively being developed in the context of the International Lunar Network, a collective effort by national space agencies and universities to develop a common set of scientific standards and communicative mechanisms to ensure international ability to cooperate and benefit from one another’s data in upcoming lunar missions.

Second, national governments would be wise to clarify existing ambiguities in the OST regime. This might require a formal review of the treaty to discuss definitions and develop an implementing agreement for multilateral understandings on how to interpret the OST in regard to specific lunar activities (particularly, regarding permitted and prohibited

settlement practices). A similar review of clauses in the 1968 Agreement on the Rescue of Astronauts, the Return of Astronauts and the Return of Objects Launched into Outer Space would be beneficial to clarify possible provisions that may foster mutual assistance during moon operations.

Third, countries planning human or robotic commerce on the moon would be well served to begin discussions toward development of a code of “lunar commercial conduct,” particularly in terms of compliance with the OST. As stated above, the OST is vague on these provisions, and considerable leeway is available to states collectively to determine how they wish to divide resources, benefits, and claims to specific areas. Such a commercial code could substitute for the dearth of support for the Moon Treaty’s provisions and yet still provide meaningful guidelines and help prevent conflict. It could also help create a workable formula (or mechanism) for sharing the moon’s “benefits” internationally, in compliance with Article I of the OST that calls for all space exploration to be conducted “for the benefit and in the interests of all countries.” Such efforts will have to be constructed in such a manner that they are not unduly burdensome for the individual commercial aims of states on the moon or such states (and their companies) may decide to break out of such accords.

Fourth, states, companies, universities, and other entities planning activities on the moon might usefully establish a formal consultative council for the settlement of any problems that might emerge among scientists, tourists, or commercial operators on the moon. This body could simply be a standing committee that would meet only to address specific disputes raised before it, or it could serve as a clearinghouse for emerging problems that are best dealt with in a preventive manner.

Fifth, political relations affecting the moon’s settlement would benefit if all of the parties planning to become involved in lunar exploration would publicly reiterate their support for Article IV of the OST on nonmilitarization of the moon. Similarly, the voluntary development of practical protocols and transparency mechanisms to facilitate mutual inspections of lunar facilities—as in the Antarctic—would also promote trust and cooperation and work in the service of conflict prevention.

While pressures for “enclosure” of the moon and the privatization of its resources are likely to increase in the coming decades—at least until more specific management structures are developed and implemented—there are reasonable grounds for believing that cooperative efforts may eventually succeed. The combined effects of economic globalization, modern

communications, increasing lunar mission transparency, and the recent internationalization of large space activities (such as the International Space Station), should help facilitate these trends. Broader international trends toward the adoption of rule-based behavior (such as in the World Trade Organization) and negotiated approaches to conflict resolution support institutionally based outcomes on the moon. Thus, while history's "lessons" in regard to international cooperation on the moon may be pessimistic, specific differences in the factors surrounding lunar settlement offer reasons to believe that the negative experience on certain past frontiers may be avoided. The remaining question seems to be the willingness of current and future leaders to recognize the remaining risks and challenges that exist regarding successful lunar governance and to begin talks to address possible disputes through preventive diplomacy and existing international agreements and organizational structures. These developments are far from inevitable, but such possibilities—in the context of the relevant history of similar environments and the implications of direct military conflict today—seem to have the force of mutual self-interest behind them. **SSQ**

Notes

1. Per Magnus Wijkman, "Managing the Global Commons," *International Organization* 36, no. 3 (Summer 1982): 535.
2. On this line of reasoning, see Garrett Hardin's classic article, "The Tragedy of the Commons," *Science* 162, no. 3859 (December 1968): 1243–48.
3. Clarence L. Ver Steeg, *The Formative Years: 1607–1763* (New York: Hill and Wang, 1964), 293.
4. Paul Kennedy, *The Rise and Fall of the Great Powers* (New York: Random House, 1989), 29.
5. Even the much-later emergence of the Organization of American States fails to meet the criteria of a true regional governance body along the lines of the European Union today.
6. Robert Jervis, "Security Regimes," in Stephen D. Krasner, ed., *International Regimes* (Ithaca, NY: Cornell University Press, 1983), 176–77.
7. K. D. Suter, *World Law and the Last Wilderness* (Sydney, Australia: Friends of the Earth, 1980), 22. Suter mentions a specific case, for example, where a gravely ill Australian technician had to be evacuated in 1978 through cooperation between the United States and the Soviet Union.
8. Christopher C. Joyner, *Governing the Frozen Commons: The Antarctic Regime and Environmental Protection* (Columbia: University of South Carolina Press, 1998), 21.
9. On the principles of the constructivist approach within international relations theory, see John Gerard Ruggie, "What Makes the World Hang Together? Neo-Utilitarianism and the Social Constructivist Challenge," *International Organization* 52, no. 4, (Autumn 1998): 855–85.
10. On the process of the institutionalization of such ideas under the influence of regimes, see Judith Goldstein and Robert O. Keohane, "Ideas and Foreign Policy: An Analytical Frame-

work,” in Goldstein and Keohane, eds., *Ideas and Foreign Policy: Beliefs, Institutions, and Policy Change* (Ithaca: Cornell University Press, 1993), 20–24.

11. Alex Gimarc, “History and Frontiers—What Works. What Doesn’t,” in Rick Tumlinson, ed., *Return to the Moon* (Burlington, Ontario: Collector’s Guide Publishing/Apogee Books, 2005), 39.

12. See text of the UNCLOS, part XI, section 4, article 173, on the Web site of the UN Division for Ocean Affairs and the Law of the Sea at http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm.

13. See the Web site of the UN Division for Ocean Affairs and the Law of the Sea report entitled “The United Nations Convention on the Law of the Sea (A Historical Perspective)” at http://www.un.org/Depts/los/convention_agreements/convention_historical_perspective.htm.

14. See the Web site of the International Seabed Authority at <http://www.isa.org.jm/en/documents/mcode>.

15. Lee A. DuBridge (then-president of Cal Tech), “Plain Talk about Space Flight” (1958), reprinted in Lester M. Hirsh, *Man and Space: A Controlled Research Reader* (New York: Pitman Publishing Corp., 1966), 101.

16. Arthur C. Clarke, *The Exploration of Space* (New York: Harper, 1959), 181.

17. Willey Ley, *Harnessing Space* (New York: Macmillan, 1963).

18. A. R. Hibbs, “Space Man Versus Space Machine,” in Hirsh, *Man and Space*, 87.

19. Erik Bergaust, *The Next Fifty Years in Space* (New York: MacMillan, 1964).

20. See the text of the Outer Space Treaty on the State Department Web site at <http://www.state.gov/t/ac/trt/5181.htm#treaty>.

21. Ibid.

22. Neil Ruzic, *Where the Winds Sleep: Man’s Future on the Moon, A Projected History* (Garden City, NY: Doubleday and Co., 1970).

23. Ibid., 127.

24. Christopher C. Joyner and Harrison H. Schmitt, “Extraterrestrial Law and Lunar Bases: General Legal Principles and a Particular Regime Proposal (INTERLUNE),” in W. W. Mendell, ed., *Lunar Bases and Space Activities of the 21st Century* (Houston, TX: Lunar and Planetary Society, 1985), 745.

25. See Phillip M. Smith, “Lunar Stations: Prospects for International Cooperation,” in Mendell, ed., *Lunar Bases and Space Activities*.

26. Ibid., 718.

27. Ibid., 723.

28. Amanda Lee Moore, “Legal Responses for Lunar Bases and Space Activities in the 21st Century,” in Mendell, ed., *Lunar Bases and Space Activities*.

29. The Artemis Society is a private group devoted to the study, development, and settlement of the moon.

30. See Fred Gutler, “What Should We Do With the Moon?” *Discover* 19, no. 9 (September 1998), 84.

31. Ibid.

32. Gimarc, “History and Frontiers,” 40.

33. Robert Zimmerman, “Brave New World? American Colonial History as a Guide for Designing the New American Space Initiative,” in Tumlinson, ed., *Return to the Moon*, 80.

34. Everett C. Dolman, *Astropolitik: Classical Geopolitics in the Space Age* (London: Frank Cass, 2002).

35. Ibid., 177.

36. Oran R. Young, “Regime dynamics: the rise and fall of international regimes,” in Stephen D. Krasner, ed., *International Regimes* (Ithaca: Cornell University Press, 1983), 106–11.

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37. Andrew Brearley, "Mining the Moon: Owning the Night Sky?" *Astropolitics* 4, no. 1 (Spring 2006): 59.
38. *Ibid.*, 49.
39. *Ibid.*, 62.
40. *Ibid.*, 56.
41. Rosanna Sattler, "Transporting a Legal System From the Earth to the Moon," in Tumlinson, ed., *Return to the Moon*.
42. *Ibid.*, 100.
43. *Ibid.*, 103.
44. Robert Keohane, *After Hegemony: Cooperation and Discord in the World Political Economy* (Princeton, NJ: Princeton University Press, 1984), 26.