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**To the Moon, Mars, and Beyond:
Culture, Law and Ethics in Space-Faring Societies**

(Note: The views expressed in this paper are solely those of the author. This paper may be cited or quoted, with attribution.)

Introduction

Today's U.S. civilian space program, borne of the 20th century Cold War, is focused on planning for a new round of human missions to the Moon and, later, perhaps, to Mars. These plans are intended to realize the "vision" for 21st century human exploration articulated by President George W. Bush in January 2004. Critics argue that the cost of such missions may be prohibitive in the current fiscal environment, and curious observers keep asking: Why are we going back to the Moon?

It is important to examine this "vision" in the broader context of 21st century space exploration. Since the turn of the century China has launched people into Earth orbit and announced plans for human missions to the Moon. With NASA's space shuttle temporarily out of commission, Russia is currently the only other nation besides China with an operating human space flight capability. Russia is also developing a new human-rated space vehicle, called Kliper, which government officials say could begin flying as early as 2013. Canada, India, Japan, and member countries of the European Space Agency are among nations interested in collaborating on human missions to the Moon and Mars. And there are other nations, too, some with their own capabilities to build satellites, robotic spacecraft, and unpiloted space launch vehicles, that want to be a part of the global space enterprise.

Some important questions must be addressed in considering future human exploration of space, questions that spacefaring nations have given scant attention. How will extending human presence into the solar system affect

society and culture on Earth? What legal, ethical and other value systems should govern human settlements and other activities in space? Do humans have rights to exploit extraterrestrial resources and alter extraterrestrial environments? In keeping with the IASTS 21st annual conference theme, “Where are we going with science and technology, and where are these creations taking us?”, this paper will review the history and status of issues relating space law, ethics and culture and speculate on what the future might hold.

Space law, ethics and culture: historical and present

Issues of space law and ethics have been discussed in international fora since before the launch of Sputnik I in 1957 and the formation of the U.S. National Aeronautics and Space Administration (NASA) in 1958. The International Astronautical Federation (IAF)¹ first considered issues of space law at its 1952 annual congress. The International Institute of Space Law (IISL) was formed in 1958 as an affiliate of the IAF, which tasked the IISL to study and report on “juridical and sociological aspects of the space sciences” (Pepin, 1982, p. 23). Space law issues examined by the IISL include the uses of space; property rights in space; rights, responsibilities, and liability for space activities; contact with extraterrestrial intelligence; and dispute settlement.

A considerable body of national and international space law is in place that defines what is permitted and prohibited in outer space. The foundational U.S. space statute is the 1958 National Aeronautics and Space Act; other federal space statutes address commercial space applications such as satellite communications, land remote sensing, and space launches (CRS, 1990). The United States is signatory to six of seven United Nations treaties governing activities in space, including the 1967 Outer Space Treaty (Treaty on Principles, 1967), which stands as the foundational international space statute.² The U.N. Committee on the Peaceful Uses of Outer Space (COPUOS), established in 1958 (at the urging of the U.S. government), oversees implementation of U.N. space agreements.³

Article I of the Outer Space Treaty states that space exploration “shall be carried out for the benefit and in the interests of all countries.” The treaty also specifies that “outer space...is not subject to national appropriation by any...means.” As a ratified agreement, the Outer Space Treaty stands as “the supreme Law of the Land,” according to Article VI of the U.S. Constitution. Advocates of space settlement and development have argued over the years

that this treaty does not prohibit private property claims, and some U.S. advocates of space development have even asserted that the U.S. is not obligated to abide by the terms of the treaty. The United States has not ratified the so-called 1979 Moon Treaty (Agreement on Principles, 1979). Article XI of this agreement specifies that the Moon and its resources are “the common heritage of mankind” and are not subject to any sort of property claims, sovereign, private, or otherwise. The agreement specifies that nations have the right to explore and use the Moon “in accordance with international law and the terms of this Agreement,” and it calls for “an international regime...to govern the exploitation” of lunar resources.

Existing space law shows that, from its beginnings in the mid-20th century, space exploration has been conceived as a human endeavor with global consequences. And international cooperation has played a major role in space activities from the start. NASA and other national and multinational agencies have entered hundreds of bilateral and multilateral agreements over the years to pursue increasingly costly space initiatives, such as the Hubble Space Telescope, the Cassini-Huygens mission to Saturn, and the International Space Station (ISS). Since the turn of the century, however, international cooperation has experienced some strains.

Some of NASA’s traditional partners in space are concerned about NASA’s perceived reluctance to fulfill commitments under the agreement to develop and operate the ISS, for example – an agreement that has the status of a treaty. A representative of the 2004 Bush campaign ruffled some feathers when he said, at a presidential campaign forum on space policy issues, “The administration is reviewing whether or not we want to be signatory” to the U.N. Outer Space Treaty (Dickey, 2006).⁴ In his public debut to the Washington space community in 2005, NASA Administrator Michael Griffin, a Bush political appointee, said that when human civilization is at the point when more people are living off the Earth than on it, “we want their culture to be Western”; Western civilization is “the best we’ve seen so far in human history,” he asserted, and the values spacefaring people should take with them into space should be Western values.⁵ Griffin has since tempered his rhetoric, but he has not retracted these remarks, and he continues to describe a vision in which NASA builds a highway into the solar system while international partners decide only what to build at the off-ramps.

Meanwhile, advocates of private property rights in space and other

exploitation-oriented agenda items continue to advance their cause in various venues, including the U.S. Congress. The National Space Society (NSS), a space advocacy group based in Washington, D.C., claims its rationale for promoting space settlement is “survival of the human species.” Among the conflicting values and beliefs embedded in NSS’s vision of space exploration and development are “prosperity-unlimited resources”; “growth-unlimited room for expansion”; individual rights; unrestricted access to space; personal property rights; free-market economics; democratic values; enhancement of Earth’s ecology; and protection of new environments. Another advocacy group with a similar vision, the Space Frontier Foundation, claims it is “dedicated to opening the Space Frontier to human settlement as rapidly as possible.” Its goals include “protecting the Earth's fragile biosphere and creating a freer and more prosperous life for each generation by using the unlimited energy and material resources of space. Our purpose is to unleash the power of free enterprise and lead a united humanity permanently into the Solar System.”⁶ High Frontier, Inc., a conservative aerospace “think tank,” also advocates private property rights and resource exploitation in space, recommending application of the principles of 19th century U.S. homesteading law and the colonial Jamestown settlement model to commercial development of the Moon.⁷

Other advocates suggest a more temperate approach, based on the assumption that private property claims are not an option in space – for instance, establishment of a legal/regulatory regime that would permit space resource extraction without allowing property ownership (Dickey, 2006).

Space law and ethics for the future

The social, political, economic and cultural context for the U.S. civil space program has changed radically since the 1960s. But the rhetoric of space policy making has not. In the 21st century, politicians and other advocates are promoting “the Moon-Mars thing” as exploration for the sake of exploring and also as a means of opening up the solar system to private property claims, resource exploitation, and commercial development. In the words of one space advocate, “The solar system is like a giant grocery store. It has everything we could possibly want.... The solar system’s seemingly limitless energy and mineral resources will solve Earth’s resource shortages.”⁸ In these remarks is reflected a belief that the values of materialism, consumerism, and hyper-consumption prevalent today are values worth extending into the solar system. This conception of outer space

depends on the idea of a solar system (and beyond) of wide-open spaces and limitless resources.

The so-called “the myth of the frontier” (Slotkin, 1973) in American history embodies a worldview in which the United States is “a wide-open land of unlimited opportunity for the strong, ambitious self-reliant individual to thrust his way to the top” (p. 5). President Kennedy’s “new frontier” of the 1960s was “a heroic engagement” in a campaign against communism, including the civilian space program (Slotkin, 1990, p. 3). The frontier metaphor has been, and still is, a dominant metaphor in rhetoric about space exploration; it thrives today in discourse of space exploration planning and policy making. “Space frontier” means different things to different people, and it is worth thinking about the range of meanings invoked by the metaphor in considering what values are, could be, or should be embodied in the space exploration enterprise.

Historian Stephen Pyne (1988) has explained exploration as a cultural invention that “reinforces and reinterprets... myths, beliefs, and archetypes basic to its originating civilization.” The modern cultural invention of exploration in 15th-century Europe functioned as “a means of knowing, of creating commercial empires, of outmaneuvering political, economic, religious, and military competitors – it as war, diplomacy, proselytizing, scholarship, and trade by other means” (Pyne, 2003). The postmodern exploration of space is different, Pyne has observed. “With neither a rambunctious imperialism nor an eager Enlightenment,” the case for space colonization is not compelling. Rationales advanced for space settlement “are historical, culturally bound, and selectively anecdotal: that we need to pioneer to be what we are, that new colonies are a means of renewing civilization...” These rationales do not resonate well with many people outside the space community today. Space advocates continue to conceive of “American history [as] a straight line,” historian Patricia Nelson Limerick (1994) has observed, “a vector of inevitability and manifest destiny linking the westward expansion of Anglo-Americans directly to the exploration and colonization of space. In using this analogy, space advocates have built their plans for the future on the foundation of a deeply flawed understanding of the past, [and] the blinders worn to screen the past have proven to be just as effective at distorting the view of the future.”

The wilderness metaphor has been suggested as an alternative to the frontier. This metaphor is encompassed in the concept of “astroenvironmentalism,”

the idea of applying the values of environmental protection and preservation to space exploration (Miller, 2005, 2001). Treating the solar system like “a space wilderness to protect” rather than a frontier to exploit⁹ could keep nuclear weapons, nuclear power, human-made debris, and environmental hazards out of space and prohibit private and sovereign property claims. The point is to “avoid making the same mistakes in space as we have on earth” (Miller, 2001, n.p.).

One place where legal and ethical considerations of protection and preservation in space currently do intersect is in planetary protection policy. NASA and the international Committee on Space Research (COSPAR) have long-standing planetary protection policies in place directing solar system exploration missions to take steps to prevent the transport of terrestrial biological contamination to extraterrestrial environments and the transport of extraterrestrial biological contamination (should it exist) to Earth through solar system sample returns.¹⁰ The rationale for these policies is to maintain pristine conditions in extraterrestrial environments for the purpose of scientific exploration. An expert panel of the National Academy of Sciences has recently suggested that the space community consider expanding this rationale to include preservation of pristine extraterrestrial environments for their own sake – that is, the wilderness rationale (Space Studies Board, 2005).

Moving from human interactions with the space environment to human interactions with humans in space, the idea of space jurisprudence – the governance of “relations between earthkind and spacekind and among spacekind themselves” – has been addressed by Robinson and White (1986). They propose “first principles for the governance of space societies” and a “spacekind declaration of independence” (p. xxii) for future space migrants and space natives. Noting that “the conception of space as the common heritage of humankind [is] the keystone of all...space treaties” (p. 38), they suggest it could well serve as a keystone for future space law (or “astrolaw”) as well.¹¹ They acknowledge, too, the difficulties terrestrial experts face in conceptualizing social and legal structures for extraterrestrial human communities: “How do we design social structures and reflective legal regimes for human societies in space on the basis of empirical data generated by Earth-sitters” (p. 103)?

Conclusions

Facing an opportunity to envision a new, 21st century era of spacefaring, the aerospace community has chosen to go back to the future, leaning on outdated – and, arguably, dangerous – rhetoric of frontier conquest and manifest destiny to justify mining the Moon and creating human colonies in space. Should the U.S. space program go retro, favoring unilateral decision making, advocating exploitation, and sidestepping international law when it appears to be in the way? Taking this direction would not be productive. Today China, Europe, India, Japan, and Russia have their own space launch capabilities, including human space flight capability in China and Russia. China may land people on the Moon before NASA astronauts can get back there, and Russia is getting back into the game, too. All of these parties are entering bilateral and multilateral agreements to pursue various space flight projects, ranging from robotic planetary exploration missions to human space flight, and many of these agreements do not include the United States.¹² Now is the time to start thinking about space exploration as a global human enterprise....

Much work remains to be done to fulfill President Bush's so-called vision (Gugliotta, 2006). The good news is that large-scale human exploration and settlement of the solar system is further off than the aerospace community would like the world to think. The bad news is that the loudest voices in the public dialogue on our future in space sound like advocates of frontier-style exploitation. NASA and the broader space community have not seriously considered questions of space law, ethics, and culture as they relate to extending human presence into space. Nor have they seriously considered whether legal and ethical issues relating to future space exploration should be addressed in public dialogue or debated only among experts. The space community's preferred mode of communication about science and technology is one-way, expert to non-expert (that is, the cognitive deficit model). A mode that can accommodate public participation – two-way, dialogic, between experts and non-experts – would better serve the public interest. NASA appears to give more lip service than commitment to dialogue; the agency has not solicited public participation in its planning and decision making since 1992.¹³

Former NASA Administrator Daniel Goldin used to say that NASA was good at addressing how to proceed with space exploration, but not why.... The space community still struggles with “why”.... This community is not inclined to reflect on what and where the cultural institution of space

exploration is in postmodern civilization. The question of how space exploration serves society and culture deserves deeper thought. Members of the space community might ask themselves: does space exploration need reinvention to meet social needs?

The Society for Social Studies of Science, in its recent “visions” committee report, proposed that social scientists consider broadening their engagement with scientists and engineers and playing a larger role in policy making. The space program provides an opportunity for us to broaden the public dialogue on whether, where, how, and, perhaps most importantly, why we should be going into space.

Notes

1. The IAF is an organization of national and regional organizations that included Communist and non-Communist countries from its inception.
2. U.S. government officials played a significant role in drafting the Outer Space Treaty (CRS, 1990). Other U.N. space agreements to which the U.S. is signatory include a space rescue agreement, liability and registration conventions, principles relating to space-based television broadcasting and remote sensing.
3. COPUOS has encouraged and promoted the utilization of space data and technology in the developing world, with considerable success (metsats, remote sensing, telecom, telemedicine).
4. The author was present at this event. This statement caused a small uproar in the Washington space community, prompting administration representatives at the State Department and NASA to disown the remark (Dickey, 2002).
5. Griffin made these remarks at a breakfast sponsored by Women in Aerospace in Washington, DC, on May 3, 2005. The author attended this event.
6. Space Frontier Foundation founder Rick Tumlinson testified to the Senate Commerce, Science and Transportation Committee on October 29, 2003. Also see the National Space Society's congressional briefing. "A Blueprint for the Exploration and Development of Space: Recommendations for the 108th Congress" (http://www.nss.org/docs/102003_NSS_Hill_pitch.pdf).
7. See www.jamestownonthemoon.org. High Frontier's director reportedly has said of the Outer Space Treaty, "The UN is just playing King George at the time of the American revolution thinking they can tell everyone else what to do. They can't" (Adam, 2005).
8. X-Prize Foundation Chairman Peter Diamandis reportedly made these remarks at a 2004 conference on space exploration at the Massachusetts Institute of Technology (Baard, 2004). See www.xprize.com.
9. Historian Neil Maher (2004) argues that while the now-iconic "Earthrise" photograph of Earth taken from space by an Apollo 8 astronaut in 1968 "helped extend America's Manifest Destiny into the ultimate wilderness – outer space," the equally iconic "Whole Earth" photograph taken by an Apollo 17 astronaut in 1972 "debunk[ed] the

- frontier narrative suggested in Earthrise” by drawing attention to “an environmentally threatened home.”
10. Compliance with NASA’s planetary protection policy is mandatory; compliance with COSPAR’s policy is voluntary. See <http://planetaryprotection.nasa.gov> for more information.
 11. “Both astrolaw and the spacekind declaration,” according to Robinson and White (1986), “are pedagogical devices of social science, designed to alert space law theorists, practitioners, and subjects...that the changes in space are not just changes in space, [but] also changes in kind” (p. 164).
 12. In a report provided to the Clinton administration in 1993 as transition advice, a working group of the American Institute of Aeronautics and Astronautics (AIAA) on international cooperation policies and approaches said advancing space cooperation was a worthy goal and recommended the formation of a World Space Conference that would function as a bridge between programmatic and political levels of governments regarding space activities. (The World Space Conference would be modeled on the World Administrative Radio Conference that operates under the auspices of the United Nations and coordinates global use of the broadcast spectrum.) Such a body could be responsible for considering “the social impact of particular space activities and thus anchor the process of defining politically acceptable arenas in society at large” (AIAA, 1993, p. 52). Such a body could still be a good idea today, but nothing of the sort has yet been organized.
 13. In 1992 then-NASA Administrator Daniel S. Goldin initiated a series of town meetings across the United States to solicit public input on space program plans. (The author supported these meetings as a contractor.) NASA has made no similar organized effort since then. NASA is required by the National Environmental Policy Act to solicit public comments on plans for projects deemed in need of environmental impact statements (such as launches of spacecraft carrying nuclear fuel).

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