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SPACE EXPLORATION SYMPOSIUM (A3)
Space Exploration Overview (1)

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PLANETARY PROTECTION CONSIDERATIONS AND CONSTRAINTS IN COMMERCIAL SPACEFLIGHT BEYOND EARTH ORBIT

Abstract

It is well known that ongoing efforts by national and international space agencies to explore outer space are governed by the provisions of the Outer Space Treaty (OST) [1] which allows for the use of outer space as well as for the prevention of "harmful contamination" of the Moon and other celestial bodies. It is also important to recognize that private, commercial entities based in or owned by entities within OST signatories are also governed by the provisions of the Treaty, and that each such signatory is charged by the Treaty to reflect its principles within national laws. Additionally, international organizations like COSPAR act as a keeper of internationally accepted policies that address, in part, the sorts of "harmful contamination" considered of concern [2]. COSPAR's policy focuses chiefly on organic and biological contamination that might jeopardize scientific investigations in space, or threaten the Earth's biosphere upon return. Similar concerns are also of paramount importance in establishing commercial spaceflight beyond Earth orbit. For example, future human missions establishing even a limited presence on the Moon, Mars, or elsewhere in deep space must plan on the use of in situ resources to support human life. Mission systems capable of using human and plant wastes to regenerate food and air can be augmented with outer space resources, and the generation of propulsion gases through in situ resource utilization (ISRU) will be a critical step in enabling a long-term presence for humans off the Earth. While ongoing efforts have identified lunar and martian materials that might contribute to resource production, projections from ISRU advocates typically focus only on the positive aspects of such materials. For example, ices at the lunar poles may preserve a record of cometary impacts (and a proxy record of the deposition of cometary volatiles on Earth), and thus qualify for protection under the OST. They may also contain a large amount of cyanide—as has been observed outgassing from comets—and thus be somewhat less marketable than pure water ice. In such a case, the planetary protection requirements to preserve science and those of a reasonable approach to resource qualification (before use) are highly complementary.

Refs. 1. United Nations, Treaty on principles governing the activities of states in the exploration and use of outer space, including the moon and other celestial bodies, U.N. Doc. A/RES/2222/(XXI); TIAS No. 6347, 25Jan1967. 2. COSPAR: Planetary Protection Policy (revised 24 March 2011). COSPAR, Paris, France, 2011.