Paper ID: 66180
student

19th IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND DEVELOPMENT (D3)
Space Technology and System Management Practices and Tools (3)

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SCIENCE AND TECHNOLOGY PLANNING FOR MIT LUNAR EXPLORATION

Abstract

As countries around the world aim to return to the Moon, including the U.S. through NASA's Artemis Program, MIT has an opportunity to leverage its knowledge and resources to be part of the next phase of lunar exploration. MIT has significant experience in lunar science and exploration, from the early days of the Apollo Program to more recent missions like GRAIL (2011) and collaborations with Israel's Beresheet mission (2019). MIT is well poised to leverage both its lunar experience and its science and technology expertise to assist in returning humans to the Moon.

This paper presents an analysis of MIT's unique areas of expertise and its alignment with prominent science and technology goals in order to develop a strategic plan to bring together the entire MIT community to achieve them. Through the use of MIT's Lunar Open Architecture and extensive data collection, a new graduate course taught in Spring 2021 on "Operating in the Lunar Environment," and a new cross-Institute framing for a "To the Moon To Stay" MIT mission, the authors have developed a science traceability matrix and a technology roadmap that chart the future of MIT lunar exploration. This strategic planning exercise was coordinated via a collaboration between the MIT Space Exploration Initiative, the MIT Department of Aeronautics and Astronautics, and the MIT Media Lab, and revealed many areas of mutual interest among research groups across multiple departments at MIT. The authors note a broad interest in creating a cohesive, organized strategy for MIT's next steps on the lunar surface. This work will help the MIT community optimize its efforts toward lunar exploration, maximize investments into lunar research, and develop a cohesive plan for MIT's role in future lunar exploration. This work also serves as a case study for how a large, complex organization can develop a strategic plan for deep space exploration that both leverages its resources while meeting high-level, external science goals. By following the plan laid out in this paper, MIT can add to its expertise in lunar exploration, gather new scientific knowledge, and be part of the team that lands the first woman and the next man on the Moon.