Space Education and Strategic Applications (SESA) Abstract 2024

Individual Paper presentation

Title: **A RAD Adaptive Support Framework for Lunar Exploration**

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****speaker***

The increasing number of human and robotic missions from national and international agencies, and private sectors, will lead to a dynamic, unpredictable flux to (and from) the lunar environment, which challenges the decision-making processes of project managers. The lunar environment gives a prime opportunistic space for technological development, in situ resource utilization techniques, and scientific advancements. However, decisions made under the assumption that available supplies and demands will remain constant will be suboptimal because decision-makers will not consider the changing context. Adaptive management must include the extent to which lunar surface activity transformation necessitates new management policies and identification of plausible futures, along with expected consequences of the alternatives and respective uncertainties.

We propose using the RAD (Resist-Accept-Direct) framework to organize lunar surface activity management. This framework has been applied to a variety of Earth natural resource decisions. Resisting represents working to maintain current or restore historical conditions; Accepting allows changes toward a new ecosystem to occur autonomously; and Directing actively shapes change toward a new, desirable condition. Our approach will present lunar managers options to explore possible outcomes and objectives, considering uncertainties in the natural or human exploration environments (e.g., human-made dust impingement within the exploration area), and influences of decision-making from institutional, multi-national, societal/cultural, and historical aspects.

The science, exploration, and commercial communities can benefit from using RAD because it helps manage complex change by encouraging decision makers to consider the full decision space beyond just historically common approaches.

Topic/Section: Environmental considerations/space exploration