Exploration of Near Earth Asteroids (4)
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COLLABORATION OPPORTUNITIES WITH NASA'S ASTEROID REDIRECT MISSION

Abstract

NASA is developing the Asteroid Redirect Mission (ARM), the first to robotically collect an asteroid boulder from deep space and then ferry it to an orbit around the moon. Astronauts in the mid-2020s will visit the asteroid boulder, marking the first opportunity for humans to collect extraterrestrial samples since the final Apollo lunar surface mission in 1972. The mission will demonstrate advanced solar electric propulsion capabilities required for future deep-space missions, autonomous proximity operations with a natural body in deep space, integrated crew and robotic vehicle operations in deep space, and space walks with an untouched solar system body in orbit around the moon. During the robotic segment of the mission, NASA also will demonstrate a widely supported asteroid deflection technique called an enhanced gravity tractor.

While NASA is leading the development of the robotic and crewed mission segments, the agency believes there are valuable opportunities for collaboration from the international, academic and commercial communities—opportunities that will complement NASA's goals as well as amplify the global benefits of the mission. NASA is in discussions with international partners regarding the feasibility of potential collaboration on the robotic mission segment. In September 2016, NASA issued the ARM Umbrella for Partnerships Broad Agency Announcement (ARM-UP BAA), with two initial appendices seeking external engagement in the mission. The first appendix sought proposals for complete, partner-provided flight payloads that NASA will host on the ARM robotic flight, providing vehicle integration as well as associated ground support systems and flight operational support. The hosted payloads may include onboard instruments or small secondary payloads that are deployed from the ARM spacecraft to meet partner goals as well as NASA objectives. The second appendix sought members on an international, multidisciplinary Investigation Team that will support ARM through mission formulation, mission design and vehicle development, and mission implementation. Potential areas of mutual interest include technology and capability demonstration, science, in-situ resource utilization and planetary defense. NASA plans to announce the hosted payloads selections and Investigation Team member selections in June.

This paper will explore opportunities and benefits of international collaboration on the ARM, and discuss potential future solicitations under the ARM-UP BAA. Potential future solicitations could include studies to define partnership opportunities for NASA's planned crew mission to the boulder, opportunities for resource prospecting and development at the asteroid boulder after NASA's crew mission, or other options for collaboration in cislunar space starting in the 2020s.