The Asteroid Redirect Mission (ARM): Exploration of a Former Binary NEA?

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The National Aeronautics and Space Administration (NASA) is developing the Asteroid Redirect Mission (ARM) as a capability demonstration for future human exploration, including use of high-power solar electric propulsion, which allows for the efficient movement of large masses through deep space. The ARM will also demonstrate the capability to conduct proximity operations with natural space objects and crewed operations beyond the security of quick Earth return. The Asteroid Redirect Robotic Mission (ARRM), currently in formulation, will visit a large near-Earth asteroid (NEA), collect a multi-ton boulder from its surface, conduct a demonstration of a slow push planetary defense technique, and redirect the multi-ton boulder into a stable orbit around the Moon. Once returned to cislunar space in the mid-2020s, astronauts aboard an Orion spacecraft will dock with the robotic vehicle to explore the boulder and return samples to Earth. The ARM is part of NASA's plan to advance technologies, capabilities, and spaceflight experience needed for a human mission to the Martian system in the 2030s. The ARM and subsequent availability of the asteroidal material in cis-lunar space, provide significant opportunities to advance our knowledge of small bodies in the synergistic areas of science, planetary defense, and in-situ resource utilization (ISRU). The current reference target for the ARM is NEA (341843) 2008 EV_5, which may have been the primary body of a former binary system (Busch et al., 2011; Tardivel et al., 2016). The ARRM will perform several close proximity operations to investigate the NEA and map its surface. A detailed investigation of this object may allow a better understanding of binary NEA physical characteristics and the possible outcomes for their evolution. An overview of the ARM robotic and crewed segments, including mission operations, and a discussion of potential opportunities for participation with the ARM will be provided in this presentation.