

HUMAN SPACEFLIGHT SYMPOSIUM (B3)  
Governmental Human Spaceflight Programs (Overview) (1)

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NASA'S ASTEROID REDIRECT MISSION: PROGRESS AND CONTRIBUTIONS TO HUMAN  
EXPLORATION PLAN

**Abstract**

This paper presents an update on NASA's Asteroid Redirect Mission (ARM). This includes results of Phase B design and acquisitions, the technical reference for mission preliminary design, and recent findings of expanded analyses of the contributions of the capabilities and technologies that will be demonstrated to NASA deep space human exploration plans.

The ARM is part of NASA's plan to advance the new technologies and spaceflight experience needed for human missions to the Martian system in the 2030s. This integrated demonstration will provide a first robotic mission to visit a near-Earth asteroid and collect a multi-ton boulder from its surface. NASA will then demonstrate a key option for asteroid deflection in planetary defense.

The advanced solar electric propulsion (SEP)-driven robotic spacecraft will return the asteroid boulder to a stable orbit around the Moon. In the mid-2020s, astronauts launched in the Orion crewed vehicle will collect samples from the boulder and return them to Earth. This crewed mission uses a number of capabilities and technologies for deeper space human exploration.

The Jet Propulsion Laboratory (JPL) has nearly completed a two-phase procurement process for the Asteroid Redirect Robotic Mission (ARRM) spacecraft bus. Four competitively-selected U.S. companies conducted design studies for the solar-electric-propulsion-based spacecraft. Phase 1 subcontracts were awarded in January 2016 and completed in June 2016. In Phase 2, a request for proposals was issued for the spacecraft to the four companies that participated in the Phase 1 studies. Evaluation of the contract proposals, which began in October 2016, is fully underway with final spacecraft selection planned for spring 2017.

ARM released two solicitations for proposals under the ARM Umbrella for Partnerships (ARM-UP) Broad Agency Announcement with two initial appendices seeking external engagement in the mission. The first appendix sought contributed payloads to be hosted on the ARRM spacecraft. The second solicitation sought members for the ARM Investigation Team (IT), which will collaboratively define and support investigations in science, planetary defense, asteroidal resources, in-situ resource utilization (ISRU), and

technology demonstrations. Proposals for both appendices have been received and are currently under review with final selections scheduled for summer 2017.

ARM has remained engaged with potential strategic international partners. ARM entered into a study agreement with the Italian Space Agency (ASI) in 2016. The study has thus far identified areas of mutual interest and potential areas of collaboration in the ARRM. This study agreement has been extended to facilitate continued collaboration.