

Exploration of Near Earth Asteroids (06)
Human Exploration of NEAs (1)

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HUMAN HEALTH AND PERFORMANCE CONSIDERATIONS FOR EXPLORATION OF NEAR
EARTH ASTEROIDS**Abstract**

This presentation will describe the human health and performance issues that are being considered for the human exploration of NEAs. Humans are considered a system in the design of any exploration mission including those to asteroids. Ensuring both the health and performance of the human system depends upon meeting Human System Standards which in turn drive development of specific requirements for a NEA mission. Exploration of NEA represents unique challenges for the human system. Key mission parameters which are strongly impacted by duration include deep-space radiation exposure without even the temporary shielding of a nearby large planetary body; limited food supplies; restricted habitable volume; continuous weightlessness leading to muscle and cardiovascular atrophy; and behavioral concomitants of isolation, confinement, communications delays, autonomous operations and small crew size. The most critical of these is the current space radiation permissible exposure limits (PEL) which limits mission duration to 3-6 months depending on age and gender. Geological properties of the NEA will influence design of sample handling and containment, extravehicular activity (EVA) capabilities including suit ports and tools. A robotic precursor mission that collects basic information on NEA surface properties would reduce uncertainty about these aspects of the mission as well as aid exploration task design. Limited abort and return options for a NEA mission are anticipated to have important effects of crew psychology as well as influence medical supplies and training requirements of the crew. An area of great uncertainty relates to requirements for habitable volume. It is likely an integrated research and development effort will be needed between NASA's Human Research Program (HRP), engineering and human factors groups to design a habitat that can maintain the physical and psychological health of the crew and support mission operations with limited intervention from earth.