HUMAN EXPLORATION OF NEAR-EARTH ASTEROIDS AND SAMPLE COLLECTION CONSIDERATIONS.

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Introduction: In 2009 the Augustine Commission identified near-Earth asteroids (NEAs) as high profile destinations for human exploration missions beyond the Earth-Moon system as part of the Flexible Path. Subsequently, the U.S. presidential administration directed NASA on April 15, 2010 to include NEAs as destinations for future human exploration with the goal of sending astronauts to a NEA in the mid to late 2020s. This directive became part of the official *National Space Policy of the United States of America* as of June 28, 2010.

Human Exploration Considerations: These missions would be the first human expeditions to interplanetary bodies beyond the Earth-Moon system and would prove useful for testing technologies required for human missions to Mars, Phobos and Deimos, and other Solar System destinations.

Missions to NEAs would undoubtedly provide a great deal of technical and engineering data on spacecraft operations for future human space exploration while conducting in-depth scientific examinations of these primitive objects. However, prior to sending human explorers to NEAs, robotic investigations of these bodies would be required in order to maximize operational efficiency and reduce mission risk. These precursor missions to NEAs would fill crucial strategic knowledge gaps concerning their physical characteristics that are relevant for human exploration of these relatively unknown destinations.

Sample Science Benefits: Information obtained from a human investigation of a NEA, together with ground-based observations and prior spacecraft investigations of asteroids and comets, will also provide a real measure of ground truth to data obtained from terrestrial meteorite collections. Major advances in the areas of geochemistry, impact history, thermal history, isotope analyses, mineralogy, space weathering, formation ages, thermal inertias, volatile content, source regions, solar system formation, *etc*. can be expected from human NEA missions. Samples directly returned from a primitive body would lead to the same kind of breakthroughs for understanding NEAs that the Apollo samples provided for understanding the Earth-Moon system and its formation history.

International Participation: In addition, robotic precursor and human exploration missions to NEAs would allow the NASA and its international partners to gain operational experience in performing complex tasks (*e.g*., sample collection, deployment of payloads, retrieval of payloads, *etc*.) with crew, robots, and spacecraft under microgravity conditions at or near the surface of a small body. This would provide an important synergy between the worldwide Science and Exploration communities, which will be crucial for development of future international deep space exploration architectures and has potential benefits for future exploration of other destinations beyond low-Earth orbit.