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OSIRIS-REx Asteroid Sample Return Mission

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OSIRIS-REx Asteroid Sample Return Mission:

Keiko Nakamura-Messenger, Harold C. Connolly Jr., Scott Messenger, Dante S. Lauretta, and OSIRIS-REx team

OSIRIS-REx is NASA's third New Frontiers Program mission, following New Horizons that completed a flyby of Pluto in 2015 and the Juno mission to Jupiter that has just begun science operations. The OSIRIS-REx mission's primary objective is to collect pristine surface samples of a carbonaceous asteroid and return them to Earth for analysis. Carbonaceous asteroids and comets are 'primitive' bodies that preserved remnants of the Solar System starting materials and through their study scientists can learn about the origin and earliest evolution of the Solar System.

The OSIRIS-REx spacecraft was successfully launched on September 8, 2016, beginning its seven year journey to asteroid 101955 Bennu. The robotic arm will collect 60 – 2000 grams of material from the surface of Bennu and will return it to Earth in 2023 for worldwide distribution by the Astromaterials Curation Facility at NASA Johnson Space Center.

The name OSIRIS-REx embodies the mission objectives: (1) Origins: return and analyze a sample of a carbonaceous asteroid, (2) Spectral Interpretation: Provide ground-truth for remote observations of asteroids, (3) Resource Identification: Determine the mineral and chemical makeup of a near-Earth asteroid (4) Security: Measure the non-gravitational that changes asteroidal orbits and (5) Regolith Explorer: Determine the properties of the material covering an asteroid surface.

Asteroid Bennu may preserve remnants of stardust, interstellar materials and the first solids to form in the Solar System and the molecular precursors to the origin of life and the Earth's oceans. Bennu is a potentially hazardous asteroid, with a ~ 1 in 2700 chance of impacting the Earth late in the 22nd century. OSIRIS-REx will determine Bennu's physical and chemical properties, which will be critical to know in the event of an impact mitigation. Bennu is a type of near-Earth asteroid that NASA is considering for human exploration missions as early as 2025. Information that OSIRIS-REx collects from Bennu will help formulate the types of operations and identify mission activities that astronauts will perform during their expeditions. Such information is crucial in preparing for humanity's next steps beyond low Earth orbit and on to deep space destinations. (2260 characters for 2500 limit)