OSIRIS-REX: THE RETURN OF UP TO 2 KG OF PRISTINE CARBONACEOUS ASTEROID REGOLITH FOR SAMPLE ANALYSIS.

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Introduction: OSRIS-REx is an asteroid sample return mission selected by NASA in May, 2011 as the third New Frontiers mission. The name, **OSIRIS-REx** is an acronym that stands for **O**rigins, **S**pectral **I**nterpretation, **R**esource **I**dentification, and **S**ecurity-**R**egolith **Ex**plorer. The target, (101955) Bennu, is an Apollo-type NEO that has been extensively investigated through a variety of ground- and orbital-based instruments since it was discovered in 1999.

The key science objectives of the mission are five-fold: (1) Return and analyze a sample of pristine carbonaceous asteroid regolith in the amount sufficient to study the nature, history, and distribution of its constituent minerals and organic material. (2) Map the global properties, chemistry, and mineralogy of a primitive carbonaceous asteroid to characterize its geologic and dynamical history and provide context for the returned sample. (3) Document the texture, morphology, geochemistry, and spectral properties of the regolith at the sampling site *in situ* at scales down to the sub-centimeter. (4) Measure the Yarkovsky effect on a potentially hazardous asteroid and constrain the asteroid properties that contribute to this effect. (5) Characterize the integrated global properties of a primitive carbonaceous asteroid to allow for direct comparison with ground-based and orbital-based telescopic data of the entire asteroid population.

Central to the mission is the return of ≥ 60 g of pristine asteroid regolith for examination by the cosmochemistry and astrobiology communities. Through maintaining the geological provenance of the sample, we (and future generations) can constrain Solar System history in a manner that cannot be easily done with meteorites. The data obtained, including analysis of organics, will be used to test hypotheses on the pre-accretion origins of planet-forming materials, the origin of pre-biotic compounds, geological activity that occurred after small-body accretion, the origin of the pronounced equatorial ridge on Bennu, and the dynamical evolution of Bennu from its parent asteroid family in the main belt to its current Earth-crossing orbit.

Finally, the mission will explore the potential continuum between asteroids and comets by searching for any active outgassing or evidence of paleo-outgassing on Bennu and relate our finding to its dynamical evolution.