IAF SPACE EXPLORATION SYMPOSIUM (A3)
Small Bodies Missions and Technologies (Part 2) (4B)

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OVERVIEW OF THE RESULTS OF THE OSIRIS REX LASER ALTIMETER AT ASTEROID BENNU.

Abstract

The OSIRIS REx mission commenced proximity operations in December of 2018 around asteroid Bennu. The OSIRIS REx Laser Altimeter (OLA) has since provided data for both navigation and surface characterization – making Bennu the most topologically mapped object in our solar system.

During the Preliminary Survey mission phase, it was determined that the surface roughness of asteroid Bennu was far in excess of what was originally estimated from ground based measurements – with variations in surface boulders at meter scales and beyond. The result was that at OLA's maximum range, the unexpectedly rocky surface of Bennu severely reduced the number of successful range measurements. This increased surface roughness also had consequences for sample site selection in subsequent mission phases.

Subsequent mission phases ultimately provided coverage of ¿80

A complete map of the surface of Bennu was ultimately made by OLA during the Detailed Survey mission phase, which provided global coverage at a resolution of 2m. Such measurements of the asteroid's rocky surface confirmed that sample collection would be much more challenging than initially envisioned, and that alternate sampling strategies would be required.

Following the Orbital B mission phase in which over 3 billion laser shots (range measurements) were collected, Such high resolution OLA data facilitated creation of 10 cm global topology model, and ultimately these detailed maps of Bennu's rocky terrain were employed to assist in the determination of possible risks for each of the proposed sample sites.

The last mission phase that OLA instrument's is nominally active is set to be Recon, in which the surface topology will be measured down to a resolution of ¡1 cm. Such data will both characterize possible sample sites and be employed in final sample site selection.

An overview of the results to date will be presented, as well as successes and challenges encountered throughout the mission. Sample acquisition is currently scheduled to be conducted in summer of 2020.