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USING LIDAR TO EXPLORE AND ENABLE MISSIONS TO NEAR EARTH ASTEROIDS

**Abstract**

Lidars have long been used to provide critical information for performing on-orbit rendezvous. Performing a rendezvous with an uncooperative, dark object is a daunting task. Lidars can be used to provide an important science return, to map a dark asteroid, and to provide crucial range, bearing, slope and edge detection for rendezvous and/or landing within a safe zone on the asteroid. On the Mars Phoenix mission a lidar-based instrument allowed scientists to conclude the presence of snow on Mars.

In the case of NASA's OSIRIS-REx mission, set to be launched in 2016, a lidar-based instrument will be employed to provide a detailed map of the asteroid. A second lidar will be employed to provide the necessary range information to the spacecraft guidance navigation and control system which will determine when to initiate a touch and go sequence to collect a sample of the asteroid.

This paper will review prior missions involving lidar and compare other means of achieving mapping, imaging and ranging functions for both robotic and human missions to asteroids.