

Exploration of Near Earth Asteroids (06)  
Precursor Missions to NEAs (2)

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## MULTIPLE NEO RENDEZVOUS USING SOLAR SAIL PROPULSION

**Abstract**

The NASA MSFC Advanced Concepts Office performed an assessment of the feasibility of using a near-term solar sail propulsion system to enable a single spacecraft to perform serial rendezvous operations at multiple Near Earth Objects (NEO's) within six years of launch on a small-to-moderate launch vehicle. The study baselined the use of the sail technology demonstrate in the mid-2000's by the NASA In-Space Propulsion Technology Project and required that the solar sail be the only new technology on the flight; all other spacecraft systems and instruments must have had previous space test and qualification.

The resulting mission concept uses an 80-m X 80-m 3-axis stabilized solar sail launched by an Athena-II rocket in 2017 to rendezvous with 1999 AO10, Apophis and 2001 QJ142. In each rendezvous, the spacecraft will perform proximity operations for approximately 30 days.

The spacecraft science payload is simple and lightweight; it will consist of only the multispectral imager flown on the Near Earth Asteroid Rendezvous (NEAR) mission to 433 Eros and 253 Mathilde. Most non-sail spacecraft systems are based on the Messenger mission spacecraft.

This paper will describe the objectives of the proposed mission, the solar sail technology to be employed, the spacecraft system and subsystems, as the overall mission profile.