OSIRIS-APEX COORDINATION WITH OBSERVERS AND MISSIONS. M. C. Nolan[1], D. R. Golish[1], M. C. Moreau[2], A. T. Polit[1], E. G. Rivera-Valentín[3], A. A. Simon[2], and D. DellaGiustina[1], [1]Lunar and Planetary Laboratory, UArizona, Tucson AZ, USA, (nolan@lpl.arizona.edu), [2]NASA Goddard Space Flight Center, Greenbelt, MD, USA, [3]Lunar and Planetary Institute, USRA, Houston, TX, USA.

Introduction: The OSIRIS-REx mission is currently bringing a sample collected from Bennu to Earth. A proposed extended mission using this spacecraft, called OSIRIS-APEX (or APEX for short), would visit Apophis beginning in April 2029 during the asteroid's close approach to Earth. APEX provides an opportunity to combine and compare ground-based and spacecraft rendezvous data collected during this incredibly rare observation opportunity.

The APEX spacecraft will use an Earth gravity assist to put it on a course parallel to Apophis just an hour after Apophis makes its dramatic approach within 32,000 km of Earth. In the weeks and months before the close encounter, Apophis will be well placed for observations with ground-based facilities, but moves to within 20 degrees of the Sun 5 hours after close approach, making most telescopic observations impossible. By June 2029 Apophis will once again be observable, but too faint to be observed optically from Earth except by the largest telescopes (visual magnitude fainter than 19.5 through September 2029). Planetary radar observations will remain possible for days to weeks after close approach.

Because APEX requires the Earth gravity assist to reach Apophis, spacecraft observations before Earth encounter will be too distant to allow resolved imagery, but initial lightcurve observations will be performed to confirm the rotation state and guidance.

The APEX mission does not specifically require any ground-based observations for operations; however, combining results from spacecraft reconnaissance and ground-based observations is likely to provide improved understanding of Apophis—as a source of meteorites, as a remnant of early Solar System history, and as a representative of objects that present a hazard to Earth. We anticipate that APEX will provide "space truthing" that resolves ambiguities in ground-based observations and puts them in geologic context.

APEX Instrument Status: The spacecraft imagers, spectrometers, and laser altimeter are in good health and expected to perform well at Apophis. As Apophis has a much higher albedo than the instruments were designed to accommodate, we will need to make some changes to observing modes, particularly for the imager with the highest spatial resolution, PolyCam, which will need to observe at fairly high phase angles (~45 degrees). The other instruments can largely be used as they were at Bennu by adjusting parameters. The health of the instruments will be monitored during cruise to Apophis with a number of tests and calibration observations planned.

APEX Early Data Products: APEX data products will be delivered to the Planetary Data System on a schedule that allows for careful analysis to assure accuracy, up to six months after downlink for raw and pipeline-processed data and six months after the end of proximity operations for final processed data products. However, the APEX project plans to release data products that would be useful in interpretation of ground-based data as soon as practicable. The products that the APEX team has identified that are likely to be useful to the community are a) shape models from imagery and lidar and b) the evolution of the rotation state. The team welcomes suggestions and discussion of other data products that might be useful for early release.

Coordinated Observations: The APEX observation plan was developed to meet a specific set of goals as a self-contained project (DellaGiustina et al., this meeting). We welcome community input on possible additions or changes that might maximize the scientific output when combined with other ground-based observations or spacecraft missions. At the time of this meeting, the team is concentrating on the return of the Bennu samples to Earth and preparations for spacecraft perihelion passage, so discussions about possible coordinated observations through approximately early 2024 (the Apophis T-5 conference) would allow them to be included in mission planning with flexible constraints. As mission planning progresses, new observations would need to fit within existing detailed designs that will be less flexible.

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