ASTEROIDS

Characterizing an ex-menace

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Earth-grazing asteroid (99942) Apophis rose to fame in 2004, when estimates showed that it would have had a particularly high probability (~2.5%) of impacting the Earth during its close encounter in 2029. Even if more refined calculations ruled out any impact, the 2029 flyby will still be a precious chance to study a mid-sized near-Earth asteroid (Apophis has a diameter of ~350 m) from close-by. Vishnu Reddy and co-authors suggest using this occasion to test a peculiar theory.

It has been proposed that close asteroid–Earth encounters provoke tidal-induced seismic activity on the asteroid, which would bring pristine deeper material to the surface and remove alterations due to space weathering. This geophysical phenomenon could happen to Apophis but, in order to verify it post-2029, good quality spectra are needed. Reddy et al. show the best pre-encounter spectra of Apophis, obtained in January 2013 from the NASA InfraRed Telescope Facility (IRTF).

The main results of previous studies are confirmed and refined, allowing the attribution of Apophis to the category of LL ordinary chondrites, low in metals and rich in olivine-pyroxene, at 90% probability. Compositional similarities and dynamical modelling trace its origin to the Flora family of asteroids. In addition to sheer characterization, Reddy et al. suggest a practical method to monitor the effect of eventual resurfacing after 2029: the measure of the depth of the olivine-pyroxene 1- μm band, which changes in different categories of asteroids according to the degree of freshness of their surface material.

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