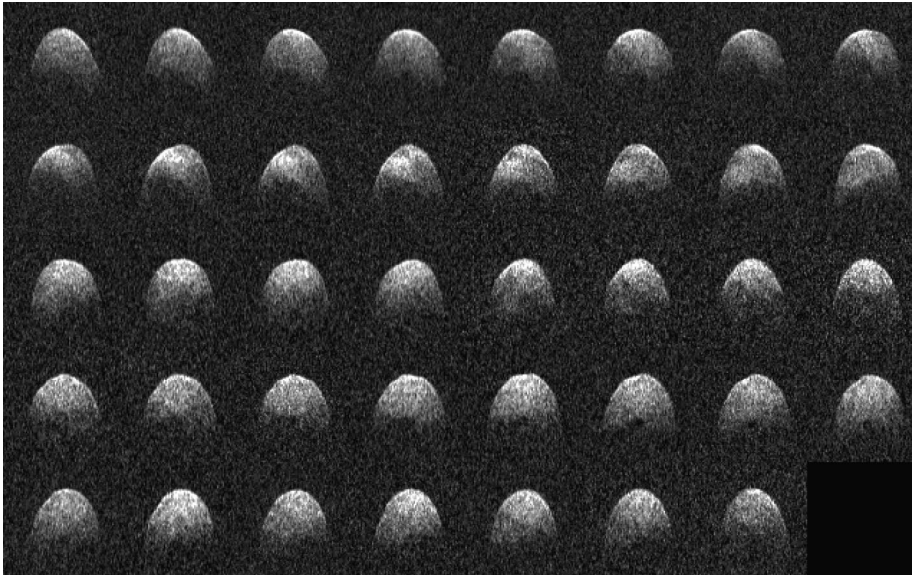


## ASTEROIDS

### Phaethon on the radar

*Planet. Space Sci.* **167**, 1–8 2019



Credit: Elsevier

The close approach of near-Earth asteroid (NEA) (3200) Phaethon in December 2017, with a perigee of only 0.069 au, allowed researchers to study this unusual object with unprecedented resolution. Patrick Taylor and colleagues present radar observations performed with the Arecibo Planetary Radar system, reactivated in record time after the devastating Hurricane Maria that hit Puerto Rico three months before.

Arecibo could acquire range-Doppler radar images of Phaethon down to 75 m per pixel, revealing a rather uniform-looking world (as shown by the figure, which displays a full rotation of Phaethon at different rotation angles. In each image, the pole is at the centre and the equator is at the edge of the body). Two features stand out: a topographic low of ~1 km in diameter — maybe a crater — close to the equator, represented by a bright region adjacent to a darker region in the second row of images, and a dark spot ~600 m in diameter (a flat area, or the shadow of a ridge) near one of the poles, especially visible in the fourth row. Even though

the shape models are still in progress, Phaethon appears to be top-shaped like fellow NEAs Ryugu and Bennu, despite being significantly larger. Phaethon is known to eject dust — it is the parent body of the Geminid meteoroid stream — but the authors do not find any trace of activity, which is not entirely surprising as it was observed quite far from its perihelion.

The observations of Taylor et al. bring additional evidence that top-shaped asteroids are common within the NEA population, seemingly independent of size or spectral type. The flyby of Phaethon by the Japanese DESTINY+ spacecraft, to be launched in 2022, will allow us to determine how the asteroid's peculiar Sun-grazing orbit — its perihelion is barely 0.14 au — and dust activity affected its appearance and evolution.

---

Luca Maltagliati

Published online: 1 April 2019  
<https://doi.org/10.1038/s41550-019-0759-2>