Gaia and the shape of asteroids

An occultation of a star by an asteroid or a minor planet allows us to know their shape and size and if there is an atmosphere, to study its characteristics.

The precision of the positions of the stars in the Gaia catalogue enable us to predict very accurately from where on Earth we will see an occultation.

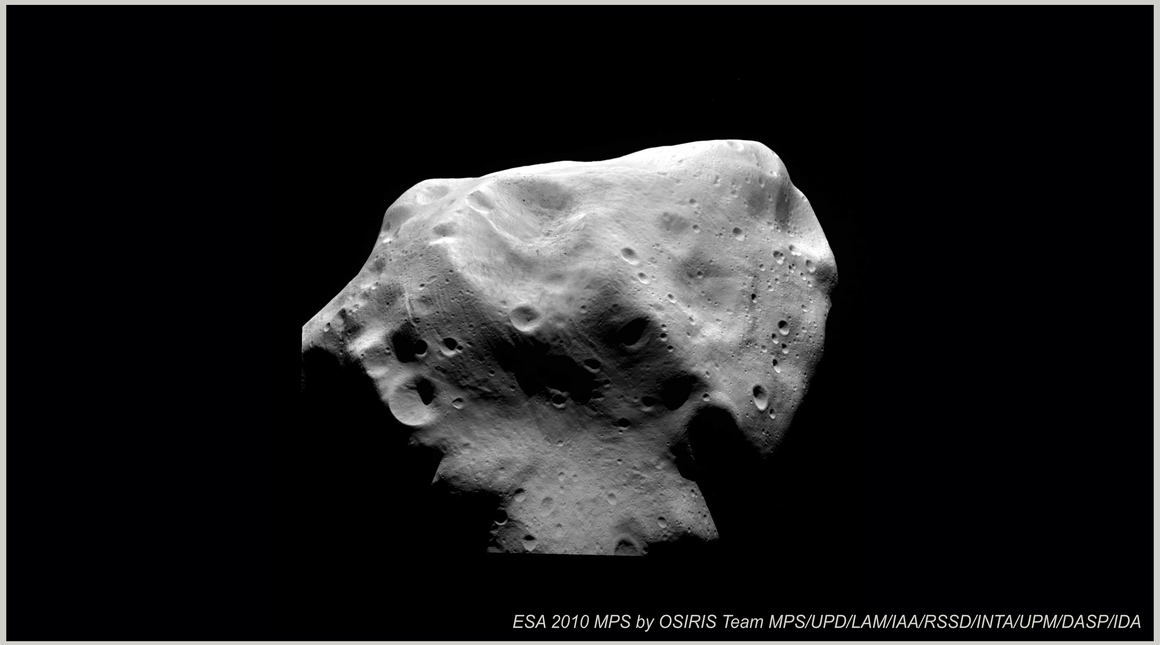
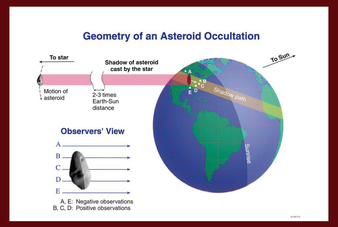
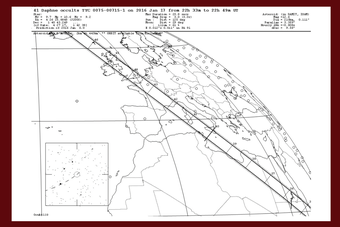


Image of asteroid Lutetia taken by the OSIRIS camera on the Rosetta space probe.

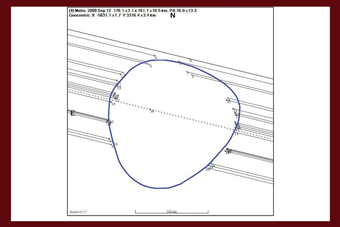
Why are occultations useful?



An asteroid or minor planet passes in front of a star, projecting a shadow on the surface of the Earth that is shifting with the movement of the asteroid and the Earth rotation.



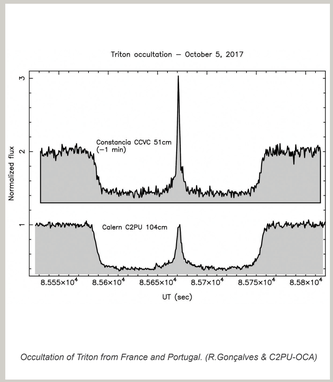
A good knowledge of the position of the star and the orbit of the asteroid let us determine in advance the path of the shadow. The observers can then locate in this path.



Each observer from a different place on Earth measures the instant of disappearance and reappearance of the star. With those data the shape of the asteroid or minor planet can be reproduced.

Triton

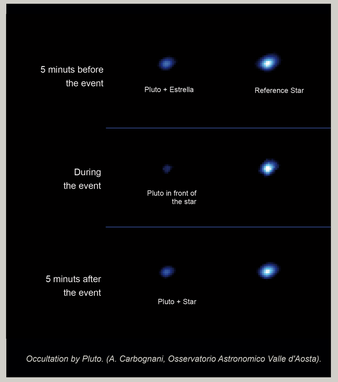
On 5 October 2017 Triton, a satellite of Neptune, occulted an star in the Aquarius constellation. Gaia data helped to plan the best places to observe the occultation. Triton atmosphere acts as a lens and causes an increase of light at the central instants of the occultation, focusing the star light. With these measurements we can obtain very valuable information about Triton and its atmosphere.



Occultation of Triton from France and Portugal. (R.Gonçalves & C2PU-OCA)

Pluto

The ocultation of a faint star by Pluto the 19 July 2016 allowed the study of the atmosphere of this dwarf planet, just measuring how the light of the star gradually disappeared behind Pluto.



Occultation by Pluto. (A. Carbognani, Osservatorio Astronomico Valle d'Aosta).

Did you know that the amateur astronomer Graeme McKay registered the occultation of Carnegia asteroid that was predicted using Gaia data?