

Gaia and the asteroids

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The ESA Gaia satellite is scanning regularly the sky and sending daily to ground 100Gb of data. While the Gaia space mission is aimed at providing a 3D census of our Galaxy, it is nevertheless observing a large number of solar system objects, mainly 350,000 asteroids down to V20.7. Gaia is hence unique in providing photometric and astrometric measurements for a huge number of objects with unprecedented accuracy. Indeed, the Gaia stellar catalogue provides positions and parallaxes of stars almost free of zonal errors; and transit astrometry for SSO at sub-milli-arcsec level and photometry at milli-mag level. The first data to be released for (selected) asteroids will be published starting on the GDR2, mid-2017. All the data acquired so far is presently reduced and validated. Among the many scientific results we expect from Gaia for SSO [Hestroffer & Tanga 2014] there is the derivation of masses and bulk densities of asteroids. These two parameters are fundamental to better understand the interior of such bodies, the Solar System, and also to derive more accurate ephemerides of the planets. Gaia will make it possible to "Unveil a population of asteroid satellites" and produce an entirely new statistics of these systems. Given the resolution and astrometry capabilities of Gaia, we expect to detect a large number of binaries either by resolving the system, or from its astrometric signature, as well as deflections during close encounters between big and smaller asteroids. The size and shape are derived through the 'light-curve' inversion, possibly combined with other data as WISE or stellar occultations. Indeed Gaia will also enable a giant step forward in the technique of stellar occultations. Besides, combination of space and ground-based data will bring new insight in research on binary and multiple asteroids. We will present general aspects of the Gaia mission and observations of SSOs, with particular emphasis on the mass and density determination with binaries.