Near Earth Asteroid Astrometry and Orbit Propagation. D. Bancelin[1], D. Hestroffer[1], W. Thuillot[1].

[1]IMCCE/Observatoire de Paris, UPMC, CNRS, 77 av. Denfert-Rochereau F-75014 PARIS hestro@imcce.fr

With the continuous efficiency increase of ongoing and planned whole sky surveys for discovering new Near Earth Asteroids, the study of NEAs has made constant progress during the last decades. Such discovery and observations yield the typical physical and dynamical characterisation of these objects, and a better comprehension of the Solar System evolution. Besides, NEAs can potentially hit the Earth and - depending on their size – provide some threat for the Earth or its space environment. These objects are, together with space debris and space weather, part of ESA's Space Situational Awareness program (SSA).

Estimation of the impact probabilities in the near future necessitates a good knowledge of the asteroid orbit (dynamical modelling and initial conditions) and its propagation in time. The Gaia mission will contribute to this aim by providing high accuracy astrometry of several PHAs. Since the Gaia telescope is observing at low solar elongation from space it has the capability to discover some Attires objects orbiting inside the Earth orbit. However Gaia is scanning regularly the sky and has no follow-up fonctionnality, so that ground-based observations in alert are needed. We will present the general strategy for the ground-based Gaia-FUN-SSO network, and the advantage of combining ground and space-based data. We will also give particular emphasis to the case of asteroid (99942) Apophis impact risk assessment from the Gaia observations and recent ground based observations. We will moreover show the impact of systematic effects from the astrometric data reduction on this impact prediction and possible detection of a Yarkovsky effect.