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Some results from the National Observatory of Turkey, Kazan State University, and Nikolaev Astronomical Observatory on small bodies of the solar system

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Abstract

A scientific collaboration between TÜBİTAK National Observatory (Turkey), Kazan State University (Russia) and Nikolaev Astronomical Observatory (Ukraine) involves observations of minor planets and near-Earth asteroids (NEAs) with the 1.5 m Russian–Turkish telescope (RTT150). Regular observations of selected asteroids in the range of 11–18 magnitudes began in 2004 with the view of determining masses of selected asteroids, improving the orbits of the NEAs, and studying physical characteristics of selected asteroids from photometric observations. More than 3000 positions of 53 selected asteroids and 11 NEAs have been obtained with an internal error in the range of 30–300 mas for a single determination. Photometric reductions of more than 4000 CCD frames are in progress. Masses of 21 asteroids were estimated through dynamical method using the ground-based optical observations, mainly from the RTT150 and Minor Planet Center. A comparison of the observational results from the RTT150 in 2004–2005 with observations of the same objects at other observatories allows us to conclude that RTT150 can be used for ground-based support in astrometry for the space mission GAIA.

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1. Introduction

A scientific collaboration between TÜBİTAK National Observatory (TUG) (Turkey), Kazan State University (KSU) (Russia), and Nikolaev Astronomical Observatory (NAO) (Ukraine) on small bodies of the solar system and near-Earth asteroids (NEAs) began in 2004. First results of these observations have been reported elsewhere, in several international meetings. Here we will give an overview of the collaboration and its relevance to other international collaborations such as PHEURA07 and the GAIA mission.

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2. Astrometric observations

Regular observations of asteroids in the range of 11–18 magnitudes were started in 2004 (Aslan et al., 2004) with a view to determine masses of selected asteroids and improve the orbits of the NEAs, using the 1.5 m Russian–Turkish telescope (RTT150) equipped with an ANDOR CCD camera, 2K × 2K, 13.5 × 13.5 μm, 8.2' × 8.2' FOV, 0.24"/pixel, and a GPS time inserter with an accuracy better than 0.1 ms. The limiting magnitude of this system, determined from the asteroid observations, is about 18 for 60 s of exposure.

The RTT150 is also equipped with a low-medium dispersion spectrograph and camera TFOSC (see Aslan et al., 2007), which can be used for photometry and spectroscopy of the solar system bodies.