Spectrophotometric studies of near-Earth asteroids at the Terskol Observatory

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We report the results of precise astrometric and spectrophotometric observations of potentially hazardous asteroids (PHAs) at the Terskol Observatory in the Northern Caucasus. Spectra of asteroids have been obtained by using a low-resolution imaging spectrograph attached to the Zeiss-600 telescope. Objects were observed down to V magnitude of 15, with individual exposure times of 10-30 s; their spectra were recorded over the wavelength range from 300 to 900 nm. Appropriate observing and data-analysis techniques have been developed and applied to derive asteroid's properties from spectrophotometric observations. Light curves of asteroid were obtained using the convolution of observed spectra with photometric filters transmission curves. On the basis of these data, rotation period of asteroid and form of its surface could be estimated. From observations of standard stars, extinction-corrected magnitudes and color indices of asteroid were calculated. Furthermore, spectra of solar-type stars were used to obtain the relative reflectance spectra for each asteroid.

A special attention was given to the taxonomic classification of Earth-approaching asteroids because in most cases their physical properties are previously unknown. In 2012, observations of 2007 PA8, 2012 QG42, 4179 Toutatis, and other PHAs were performed. Analyses of the spectra obtained have allowed the majority of these objects to be classified as S-type.

In this paper, the different aspects of monitoring and study of near-Earth asteroids will be presented; the results and some findings will be discussed.