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# DEEP-South: Lightcurve Analysis of near Earth asteroids

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## Abstract

DEep Ecliptic Patrol of the Southern Sky (DEEP-South) [1] observation is being made during the off-season for exoplanet survey, using Korea Microlensing Telescope Network (KMTNet). KMTNet is a network of three identical 1.6 m wide-field telescopes equipped with 18K×18K mosaicked CCDs located in the southern hemisphere; Chile (CTIO), South Africa (SAAO), and Australia (SSO) [2]. An optimal combination of its prime focus optics and the 0.3 billion pixel CCD provides a four square degrees field of view with 0.4 arcsec/pixel plate scale. Normal operation of KMTNet started in October 2015, and a significant portion of the allocated telescope time for DEEP-South is dedicated to targeted observation, Opposition Census (OC) [1], of near-Earth asteroids for physical and taxonomic characterization. This is effectively achieved through multiband, time series photometry using Johnson-Cousins BVRI filters. We present the lightcurves and rotational properties of NEAs from the DEEP-South Project.

## Facility

Korea Microlensing Telescope Network (KMTNet) is an array of wide-field optical telescopes, each consists of an identical 1.6 m prime focus optics and an 18k×18k CCD covering 4 square deg FOV. It is being operated at CTIO, SAAO, and SSO, providing 24-hour monitoring of the southern sky. Its wide FOV and the round-the clock operation capability enables discovery, astrometry and physical characterization of asteroids in an efficient way.

## Observation mode

Part of the allocated time is used for targeted photometry of NEAs to increase the number of objects with known physical properties. It is achieved by multiband, time series photometry. The Opposition Census (OC) mode targets NEAs near opposition, with km-sized PHAs in an early stage and goes down to smaller ones in a later stage. We adopt R-band for lightcurve study, and BVI-bands for taxonomy and confirmation of possible color variations.

## Network observation

Uninterrupted monitoring of the southern sky with this network of telescopes is optimized for spin characterization of a broad spectrum of asteroids ranging from the near-Earth space to the main-belt, including binaries, asteroids with satellites, slow/fast- and non-principal axis-rotators [3], and thus is expected to facilitate the debiasing of previously reported lightcurve observations. Our software subsystem consists of an automated observation scheduler, a pipelined data processing system for differential photometry, and an easy-to-use lightcurve analysis toolkit [4].

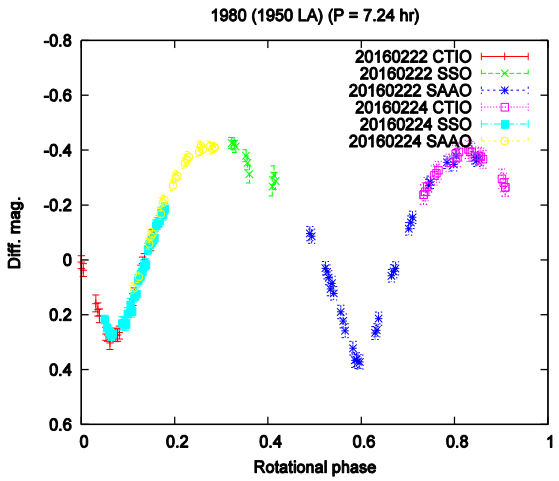


**Figure 1: An example of asteroid lightcurve of 1980 Tezcatlipoca (1950 LA) obtained at three KMTNet stations in the southern hemisphere.**

## Acknowledgements

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## References

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