

images. These images were taken on 2005 November 12 during the close approach to the asteroid. As a result, we found the surface exposure timescales of these boulders are an order of 106 years. In this meeting, we will introduce our data analysis technique and evaluate the consistency among previous research for a better understanding of the evolution of this near-Earth asteroid.

#### References

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#### [ㄱ SS-07] DEEP-South: 2<sup>nd</sup> phase of observations for small Solar System bodies

Myung-Jin Kim<sup>1</sup>, Young-Jun Choi<sup>1,2</sup>, Hongu Yang<sup>1</sup>, Hee-Jae Lee<sup>1,3</sup>, Dong-Heun Kim<sup>1,3</sup>, Youngmin JeongAhn<sup>1</sup>, Dong-Goo Roh<sup>1</sup>, Hong-Kyu Moon<sup>1</sup>, Chan-Kao Chang<sup>4</sup>, Josef Durech<sup>5</sup>, Miroslav Broz<sup>5</sup>, Josef Hanus<sup>5</sup>, Joseph Masiero<sup>6</sup>, Amy Mainzer<sup>7</sup>, James Bauer<sup>8</sup>

<sup>1</sup>*Korea Astronomy and Space Science Institute, Korea*, <sup>2</sup>*Univ of Science and Technology, Korea*, <sup>3</sup>*Chungbuk National Univ, Korea*, <sup>4</sup>*National Central Univ, Taiwan*, <sup>5</sup>*Charles Univ, Czech Republic*, <sup>6</sup>*NASA/JPL, USA*, <sup>7</sup>*Univ of Arizona*, <sup>8</sup>*Univ of Maryland*

DEEP-South (DEep Ecliptic Patrol of the Southern Sky) team will start the 2<sup>nd</sup> phase of KMTNet observation in Oct 2020. The DEEP-South observation mainly consists of three survey modes: (1) Activity survey (AS) that aims at finding active phenomena of small Solar System bodies. (2) Light curve survey (LS) targets to discover and characterize light variations of asteroids. And (3) Deep drilling survey (DS) focuses on the objects beyond the orbit of Jupiter (Centaurus and trans-Neptunian objects) as well as near Earth asteroids. For asteroid family (AF) studies and target of opportunity (TO) observations for urgent photometric follow-up, targeted mode will also be used.

DEEP-South team is awarded 7.0% of the telescope time at each site every year from Oct 2020 to Sep 2023 in the 2<sup>nd</sup> phase of KMTNet

operation which corresponds to about 75 full nights a year for the network. In this presentation, we will introduce our survey strategy and observation plan.

#### [ㄱ SS-08] ISudden brightness enhancements on main-belt objects

Hongu Yang<sup>1</sup>, Hee-Jae Lee<sup>1</sup>, Mingyeong Lee<sup>2,1</sup>, Dong-Heun Kim<sup>3,1</sup>, Masateru Ishiguro<sup>4</sup>, Hong-Kyu Moon<sup>1</sup>, Youngmin JeongAhn<sup>1</sup>, Young-Jun Choi<sup>1,2</sup>  
<sup>1</sup>*Korea Astronomy and Space Science Institute*,  
<sup>2</sup>*University of Science and Technology, Korea*,  
<sup>3</sup>*Chungbuk National University*, <sup>4</sup>*Seoul National University*

Dust ejection activities have been discovered from a few tens of asteroids since the first confirmation in 2006. Those objects are known as active asteroids. They provide good observational chances to study ongoing phenomena in the solar system such as sublimation of icy volatiles, mutual collisions among asteroids, rotational disintegrations, thermal fatigue, etc. Although dust ejection mechanisms of individual cases have been investigated through observations, the frequencies of the events and their connection to the overall evolutionary budget of the solar system have not yet been studied thoroughly, mainly because previous studies were based on serendipitous discoveries without any systematic surveys of these objects. In this work, we made wide-field monitoring observations of asteroids using Korea Microlensing Telescope Network (KMTNet) during the 2018/2019 winter season. Among 3,644 asteroids in the field-of-view, we detected nine candidates of brightness enhancements which we suspect as possible activities. It is still possible that some of those brightness increases have caused by long-term rotations. However, our observed frequency and brightness enhancements size-frequency distribution agrees with the expectations from impacts with decimeter sized objects, when the main belt objects size-frequency distribution observed down to decameter sized bodies are extrapolated to decimeter size.

#### [ㄱ SS-09] DEEP-South: Asteroid Light-Curve Survey Using KMTNet

Hee-Jae Lee<sup>1,2</sup>, Hongu Yang<sup>1</sup>, Dong-Heun Kim<sup>1,2</sup>, Myung-Jin Kim<sup>1</sup>, Hong-Kyu Moon<sup>1</sup>, Chun-Hwey Kim<sup>2</sup>, Young-Jun Choi<sup>1,3</sup>  
<sup>1</sup>*Korea Astronomy and Space Science Institute*,  
<sup>2</sup>*Chungbuk National University*,  
<sup>3</sup>*University of Science and Technology*

Variations in the brightness of asteroids are

caused by their spins, irregular shapes and companions. Thus, in principle, the spin state and shape model of a single object or, a combined model of spins, shapes and mutual orbit of a multiple components can be constructed from the analysis of light curves obtained from the time-series photometry. Using ground- and space-based facilities, a number of time-series photometric observations of asteroids have been conducted to find the possible causes of their light variations. Nonetheless, only about 2% of the known asteroids have been confirmed for their rotation periods. Therefore, a follow-on systematic photometric survey of asteroids is essential.

We started an asteroid light curve survey for this purpose using Korea Microlensing Telescope Network (KMTNet) during 199 nights between the second half of 2019 and the first half of 2020. We monitored within a  $2^\circ \times 14^\circ$  region of the sky per each night with 25 min cadences. In order to observe as many asteroids as possible with a single exposure, we mostly focus on the ecliptic plane. In our survey, 25,925 asteroids were observed and about 8,000 of them were confirmed for their rotation periods. In addition, using KMTNet's 24-hour continuous monitoring, we collected many composite light curves of slow rotating asteroids that were rarely obtained with previous observations.

In this presentation, we will introduce the typical light curves of asteroids obtained from our survey and present a statistical analysis of spin states and shapes of the asteroids from this study.

### [구 SS-10] Asteroid Taxonomic Classification in Photometry

Sangho Choi<sup>1,2</sup>, Dong-Goo Roh<sup>2</sup>, Hong-Kyu Moon<sup>2</sup>, Myung-Jin Kim<sup>2</sup>, and Young-Jong Sohn<sup>1</sup>

<sup>1</sup>*Department of Astronomy, Yonsei University, Seoul 03722, Korea*

<sup>2</sup>*Korea Astronomy and Space Science Institute, 776 Daedeokdae-ro, Yuseong-gu, 34055 Daejeon, Korea*

Multi-band photometry provides an advantage in being able to perform taxonomic classification analysis on a large number of asteroids in a much shorter period of time than spectroscopy. We observed main-belt asteroids using Korea Microlensing Telescope Network (KMTNet) in CTIO during the summer seasons in the southern hemisphere, mostly in December 2015, 2016 and 2017 with two visible photometric systems, SDSS (g, r, i, and z), and Johnson-Cousins (B, V, R, and I). Targets were selected for the asteroids which had already been classified based on Bus-Binzel taxonomy (Bus & Binzel, 2002) and DeMeo taxonomy (DeMeo et al. 2009).

Not only the targets but also numerous serendipitously observed asteroids were identified. In summary, 6817 and 5456 known objects, including 307 and 233 already classified asteroids were observed with SDSS and Johnson-Cousins systems, respectively. Using principal component analysis, the three major asteroid complexes and a class, S-, C-, and X-complexes and V class are found to be well separated in the principal component plane (spectral slope and 1 micron absorption depth) with both filter systems. We will present and discuss the results of our newly proposed three-dimensional color taxonomy for asteroids using the whole dataset (Roh et al., to be submitted).

## 우주론/암흑물질

### [구 CD-01] Interpretation of the EDGES observation in light of Planck 2018 Legacy Data

Kyungjin Ahn<sup>1</sup>, Paul R. Shapiro<sup>2</sup>

<sup>1</sup>*Chosun University,*

<sup>2</sup>*University of Texas at Austin*

The Experiment to Detect the Global EoR Signature (EDGES) has probed the status of the early Universe through the global 21cm observation. The claimed (brightness temperature) of  $\sim 500$  mK absorption dip at  $z \sim 17$  against the continuum background cannot be explained in the standard LambdaCDM framework. In the meantime, the Planck 2018 Legacy Data, especially the E-mode polarization power spectrum, puts rather strong constraints on the high-redshift reionization process. We show how these two observational constraints can be accommodated in a series of reionization scenarios, with a special focus on the strongly self-regulated reionization by first stars.

### [구 CD-02] "There's no Place like Home: The Sejong Suite"

Graziano Rossi

*Department of Physics and Astronomy, Sejong University, 209 Neungdong-ro, Gwangjin-gu Seoul, South Korea, 147-747*

I will present the Sejong Suite, an extensive collection of state-of-the-art high-resolution cosmological hydrodynamical simulations spanning a variety of cosmological and astrophysical parameters, primarily developed for modeling the