Deep Ecliptic Patrol of the Southern Sky (DEEP-South) observations have been conducted officially during the off-season for exoplanet search since October 2015. Most of the allocated time for DEEP-South is devoted to targeted photometry, Opposition Census (OC), of Near Earth Asteroids (NEAs) to increase the number of such objects with known physical properties. It is efficiently achieved by multiband, time series photometry. This Opposition Census (OC) mode target objects near their opposition, with km-sized PHAs in the early stage and goes down to sub-km objects. Continuous monitoring of the sky with KMTNet is optimized for spin characterization of various kinds of asteroids, including binaries, satellites, slow/fast- and non-principal axis-rotators, and hence is expected to facilitate the debiasing of previously reported lightcurve observations. We present the preliminary lightcurves of NEAs from year one of the DEEP-South with our long term plan.

[구 SS-08] A Possible Cause for the Cool Homopause of the 8-micron North Polar Hot Spot of Jupiter

Sang-Joon Kim
School of Space Research, Kyung Hee University, Korea

We have found cool homopause temperatures (Kim et al. 2016) of 180 - 250 K for the 8-micron North Polar Hot Spot (8NPHS) of Jupiter, which has been observed to be stationary at 180 deg (SysIII) longitude since the early 1980s. The 3-micron spectro-images of Jupiter that we analyzed were obtained with GNIRS, Gemini Near-Infrared Spectrograph at Gemini North on January 13, 2013(UT), and at 8 μm on Feburary 6, 2013(UT) with TEXES, the Texas Echelon Cross Echelle Spectrograph at the NASA IRTF. The cool homopause was unexpected, and a possible implication of the relatively cool 8NPHS homopause compared with those of other auroral regions will be presented.

[구 SS-09] A Study of Polarimetric Properties of Comet C/2013 US10 (Catalina) in Optical and Near-Infrared Wavelength Regions

Yuna Grace Kwon[1], Masateru Ishiguro[1], Daisuke Kuroda[2], Hidekazu Hanayama[3], Koji S. Kawabata[4], Hiroshi Akitaya[4], Ryosuke Itoh[4], Tatsuya Nakaoka[4], Hiroshi Toda[2], Michitoshi Yoshida[4], Nobuyuki Kawai[5], and Jun-Ichi Watanabe[6]
[1]Seoul National University, Korea, [2]Okayama Astrophysical Observatory, Japan, [3]Ishigakijima Astronomical Observatory, Japan, [4]Hiroshima University, Japan, [5]Tokyo Institute of Technology, Japan, [6]National Astronomical Observatory, Japan

Polarization is a rich source of information on the physical properties of astronomical objects. In particular, scattered sunlight by optically thin media (e.g., cometary comae) shows linear polarization of light, which highly depends on the phase angle (an angle between the Sun-Comet-Earth), wavelengths, and physical properties of cometary dust particles such as size, composition, and structures. Here, we present a study of polarimetric properties of non-periodic comet C/2013 US10 (Catalina) in optical and near-infrared wavelength regions obtained from imaging, spectroscopy, and polarimetric observations taken on UT 2015 December 17 - 19 welcoming its (probably) first close approach to the Earth. In this presentation, we want to introduce our progress since the last Korean Astronomical Society meeting (at BEXCO, Busan, 2016 April 14 - 15) especially in terms of spatial variations of degree of linear polarization (DOLP) and its possible scenarios to explain the correlations with other observational results. In particular, we found that there is strong anti-correlation between the gas/dust flux ratio and DOLP at the cometocentric distance of (2 - 5) x 104 km. Besides, within 10 arcseconds in radii (corresponding to inner coma region of 104 km from the center), the inverse relationship of these two parameters does not hold anymore. We conjecture that the rapid outward increase of DOLP can be supported by either the sublimation/evaporation of icy volatiles, disaggregation of cometary dust particles ejected from the nucleus, and/or difference of dominant dust particle sizes. From our results, we can conclude that comet C/2013 US10 (Catalina) corroborates rather indefinite traditional classification of poalrimetric classes of comets, and provides good opportunity to study less processed material which probably cherishes its memory at the formation epoch of the Solar System.

[구 SS-10] Thermal Modeling of Comet-Like Asteroids from AKARI Observation

Yoonsoo Bach Park[1], Masateru Ishiguro[1], Fumihiko Usui[2]
[1]Department of Physics and Astronomy, Seoul National University, Gwanak-ro 1, Gwanak-gu,

Seoul, 08826, Republic of Korea
[2]Center for Planetary Science, Graduate School of Science, Kobe University, 7-1-48, Minatojima-Minamimachi, Chuo-Ku, Kobe 650-0047, Japan

Recent analysis on the thermophysical property of asteroids revealed that their thermal inertia decrease with their sizes at least for main belt asteroids. However, little is known about that of comet-like bodies. In this work we utilized a simple thermophysical model (TPM) to calculate the thermal inertia of a bare nucleus of the comet P/2006 HR30 (Siding Spring) and an asteroid in comet-like orbit 107P/(4015) Wilson-Harrington from AKARI observation data. From five spectroscopic observations of the targets, we find out that the former has thermal inertia of around 2,000 J m^{-2} K^{-1} $s^{-1/2}$ (using pV = 0.055) and the latter has about 1,000-2000 J m^{-2} K^{-1} $s^{-1/2}$ (using pV = 0.055 and 0.043, respectively). These are high enough for both of them to deposit water ice at few centimeters depth, and hence it is difficult to say they are cometary based on the results of this study. These values, however, dependent significantly on the errors of observation and the uncertainties of the input parameters, as well as other conditions which are ignored in simple TPM approach, such as shape model and surface roughness. Further detailed analyses on these cometary bodies will shed light on our understanding of the detailed surfacial characteristics of them.

[구 SS-11] P/2010 A2: Dynamical properties of dust and fragments

Yoonyoung Kim, Masateru Ishiguro
Seoul National University

We revisited a recent dust emission observed at a main-belt asteroid P/2010 A2 in terms of dynamical properties of dust particles and large fragments. This is a continued research that we made a presentation at the Korean Astronomical Society 2016 Spring Meeting, but we have strengthened the dynamical analysis of the ejecta to afford the conclusive evidence for the enigmatic phenomenon. We thus constructed a model to reproduce the morphology of the dust cloud based on the dust dynamics, and succeeded in reproducing the observed morphologies in different epochs over several years. For further analysis, we reconstructed the proper motion of large fragments with respect to the dust emission source estimated from our dust model. We found that (i) the dust cloud morphologies and (ii) observed trajectories of fragments are reasonably explained only when we assumed that both were ejected from a position where no object was detected from any observations. This result suggests that the original body was shattered by an impact, leaving only debris into space. In this presentation, we will compare our results with impact laboratory studies and provide an impact interpretation of the P/2010 A2 activity.

[구 SS-12] Opposition effect on asteroid (25143) Itokawa taken with the Asteroid Multi-band Imaging Camera(AMICA)

Mingyeong Lee and Masateru Ishiguro
Seoul National University

Hayabusa, the Japanese asteroid sample returning mission, acquired more than 1400 scientific images of its target asteroid (25143) Itokawa using the Asteroid Multi-band Imaging Camera (AMICA). It took images at a wide coverage of the phase angle a (Sun-Itokawa-Hayabusa) from a~0˚ to ~35˚, providing a unique opportunity for studying the opposition effect (a sharp surge in brightness of asteroidal surface). Here we present a study of the opposition effect on Itokawa using the AMICA multi-band data. We found that (1) the opposition strength near the opposition is independent of the incident/emission angles of the light, also (2) it weakly depends on the wavelength showing the strongest surge around 0.7 um, and (3) the reflectance increases linearly at a>1.5˚ while nonlinearly at a<1.5˚ as approaching the opposition point. In particular, we noticed that the increasing rate has a correlation with the reflectance in the nonlinear domain whereas no detectable correlation with the reflectance in the linear domain. From these results, we conjecture that the coherent backscattering opposition effect is a dominant mechanism for the nonlinear opposition surge at a<1.5˚ while shadow hiding opposition effect is responsible for the linear opposition surge at a>1.5˚.