in total cloud complex mass and mass supply rate, when these physical quantities are confined by observed zodiacal light brightness and dust particle SFD at 1 au. We noticed that, if we assume the existence of fluffy aggregates discovered in the Earth's stratosphere and the coma of 67P/Churyumov-Gerasimenko, the required mass supply rate decreases significantly. We also found out that close encounters with planets (mostly Jupiter) are the dominating factor of the orbital evolution of dust particles, as the result, the lifetime of cometary dust particles are shorter than Poynting-Robertson lifetime (around 250 thousand years). As another consequence of severe close encounters, only a small fraction of cometary dust particles can be transferred into the orbit < 1 au. This effect is significant for large size particles of β < 0.01. The exceptional cases are dust particles ejected from 2P/Encke and active asteroids. Because they rarely encounter with Jupiter, most dust particles ejected from those objects are governed by Poynting-Robertson effect and well transferred into the orbits of small semimajor axis. In consideration of the above effects, we directly estimated probability of mutual collisions between dust particles and concluded that mutual collisions in the IDPs cloud complex is mostly ignorable, except for the case of large sized particles from active asteroids.

[구 SO-02] Spectropolarimetric Signals of Comet 2P/Encke During Its 2017 Apparition

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Comets are one of the most primordial solar system objects that hold the information of the early days of solar system formation inside their nuclei. Orbiting the Sun, they spew such ancient materials that have been buried for many years, creating dust and gas comae. Cometary dust grains absorb and scatter sunlight radiating the continuous light, while gas molecules form the line emissions. Eachof the comets has its own light patterns, which depends on the physical and chemical properties of the dust and gas components. In this regard, spectropolarimetrycan be a powerful tool to study the properties of cometary constituents free from contamination of each other.This methodology offers a series of information on the polarization degrees of the dust and gas components as well as on wavelength dependence of the polarization degree and polarization angle of cometary dust simultaneously. Herein, we will report the results of the spectropolarimetric study of comet 2P/Encke, which is one of the well-known objects for its shortest orbital period and its prominent aging signals. We performed a spectropolarimetric observation of comet 2P/Encke in its inbound orbit using the Higashi-Hiroshima Optical and Near-Infrared Camera (HONIR) at the Higashi-Hiroshima Observatory, Japan, on UT 2017 February 21 at high phase angle of =75.7 deg. Ourstudy of this interesting comet is the first and only one done through spectropolarimetry in a referred publication. We will discuss the most recent polarimetric results of our study in terms of 2P/Encke'scurrent evolutionary status.

[구 SO-03] The fragmented asteroid 354P/LINEAR (2010 A2) captured by the K-GMT science program

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With support from the K-GMT science program (PID: GN-2016B-Q-14), we conducted observations of active asteroid 354P/LINEAR (2010 A2) when it made its closest approach to Earth (i.e., the geocentric distance of 1.06 au on 2017 January 27-28). Taking advantage of the best observing geometry since the discovery, we obtained the first evidence for the rotational status of the largest fragment (~120 m in diameter), which was slowly rotating, that is, the rotational period of 11.36 hours. In addition, we succeed in direct imaging of 10 sub-fragments (~20 m in diameter or larger). Based on these new observational results, we conjecture that this active asteroid was created as a result of catastrophic collision among unknown asteroids. The details of this work are given in Astrophysical Journal Letters, 842, L23.

[구 SO-04] Thermal Modeling of Comet-Like Objects from AKARI Observations

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There have been recent studies which revealed a tendency that thermal inertia decreases with the size of asteroidal bodies, and suggestions that thermal inertias of cometary bodies should be much smaller than those asteroidal counterparts, regardless of comets' nuclear sizes, which hints a way to differentiate cometary candidates from asteroids using thermal inertia information. We thus selected two comet-like objects from AKARI satellite of JAXA, namely, 107P/ (4015) Wilson-Harrington and P/2006 HR30 (Siding Spring), and applied simple thermophysical model to test the idea. Both targets did not show any comet-like activity during the observations. From the model, we found Wilson-Harrington to have size of 3.7-4.4 km, geometric albedo 0.040-0.055 and thermal inertia of 100-250 J m-2 K-1 s-0.5, which coincide with previous works, and HR30 to have size of 24-27 km, geomoetric albedo of 0.035-0.045 with thermal inertia of 250-1000 J m-2 K-1 s-0.5. HR30 is found to have the rotation pole near the ecliptic plane (the latitude between -20 and +60 deg). Based on the results, we conjecture that comet-like objects are not clearly distinguishable from asteroidal counterpart using thermal inertia.

[구 SO-05] The Spin State of NPA Rotator (5247) Krylov

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The Non-Principal Axis (NPA) rotators can be clues to spin evolutionary processes of asteroids because their excited spin states evolve due to either internal or external forces. The NPA rotation of (5247) Krylov was confirmed by Lee et al. (2017) based on KMTNet photometric observations during the 2016 apparition. We conducted follow-up observations in 2017 apparition using the 0.6-2.1m telescopes in the northern hemisphere to determine the spin state and shape model of this asteroid. We found that it is rotating in the Short Axis Mode (SAM) based on the determined rotation period ($P_{\psi}=374.6\,hr$) and precession period ($P_{\phi}=67.48\,hr$). The greatest and intermediate principal inertia moments are nearly the same as $I_b/I_c=0.94$, but the smallest principal inertia moments are nearly half that of the others, $I_a/I_c=0.43$. This ratio of principal inertia moments suggests that dynamically equivalent shape of this asteroid is close to that of a prolate ellipsoid. In this presentation, we will provide the physical model of (5247) Krylov to discuss its possible spin evolutionary processes that acted on its spin.

[구 SO-06] The polarimetric study of (331471) 1984QY1: an asteroid in comet-like orbit

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Spatial distribution of atmosphereless bodies in the solar system provides an important clue as to their origins, namely asteroids from Mainbelt or comets from outer solar system. It is, however, difficult to distinguish asteroids and dormant comets due to their similar appearances. In this study, we conducted a unique observation to differentiate asteroids and dormant comets in terms of 'polarimetry'. We observed (331471) 1984 QY1 (hereafter QY1) at large phase angles using the Multi-Spectral Imager (MSI) on the 1.6-m Pirka Telescope from UT 2016 May 25 to June 24. QY1 is a dormant comet candidate in terms of the dynamical properties (i.e. the Tisserand parameter with respect to Jupiter, TJ = 2.68). We analyzed the polarization degree of QY1 as a function of phase angle and found its maximum polarization degree, Pmax = 8.68 ± 0.28 % and 8.72 ± 0.38 %, in RC- and V-band, respectively, around the phase angle of α = 100°. In addition, we obtained the geometric albedo, pV = 0.16 ± 0.02 by means of an empirical slope-albedo law. The polarimetric properties and the albedo value we acquired are similar to those of S-type asteroids rather than cometary nuclei. In this presentation, we introduce our observation and findings. In addition, we further discuss a dynamical transportation process from Mainbelt to the current orbit.