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[7 SS-12] Generation of high cadence SDO/AIA images using a video frame interpolation method, SuperSloMo

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We generate new intermediate images between observed consecutive solar images using NVIDIA's SuperSloMo that is a novel video interpolation method. This technique creates intermediate frames between two successive frames to form a coherent video sequence for both spatially and temporally. By using SuperSloMo, we create 600 images (12-second interval) using the observed 121 SDO/AIA 304 Å images (1-minute interval) of a filament eruption event on December 3, 2012. We compare the generated images with the original 12-second images. For the generated 480 images the correlation coefficient (CC), the relative error (R1), and the normalized mean square error (R2) are 0.99, 0.40, and 0.86, respectively. We construct a video made of the generated images and find a smoother erupting movement. In addition, we generate nonexistent 2.4-second interval images using the original 12-second interval images, showing slow motions in the eruption. We will discuss possible applications of this method.

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[7 SS-13] Near-infrared polarimetric study of near-Earth object 252P/LINEAR: An implication of scattered light from the evolved dust particles

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Comets, one of the least-altered leftovers from the nascent solar system, have probably preserved the primitive structure inside, whereas their surfaces become modified from the initial states after repetitive orbital revolutions around the Sun. Resurfacing makes the surface drier and more consolidated than the bulk nuclei, creating inert refractory dust layer ("dust mantle"). Near-infrared (NIR; 1.25–2.25 μm) polarimetry is theoretically expected to maximize contrast of the porosity between inner fresh and evolved dust particles, by harboring more dust constituents in the single wavelength than the optical; thus, intensifies electromagnetic interaction in dust aggregates. Despite such an advantage, only a few studies have been made in this approach mainly due to the limited accessibility of available facilities. Herein, we present our new multi-band NIR polarimetric study of near-Earth object 252P/LINEAR over 12 days near perihelion, together with the results of optical (0.48–0.80μm) imaging observations and backward dynamical simulation of the comet. Based on the results, we will characterize the dust properties of the comet and discuss the possible environmental (temperature and UV radiation) effects that could produce the observed phenomena.

This study has been accepted for the publication to A&A and available in the arXiv:1907.03952.

[7 SS-14] Strong Haze Influence on the 3-micron Emission Features of Saturn

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Since the detection of 3.3-micron PAH (polycyclic aromatic hydrocarbon) and 3.4-micron aliphatic hydrocarbon features in the spectra of Titan (Bellucci et al. 2009; Kim et al. 2011) and Saturn (Kim et al. 2012), respectively, the 3.3-micron feature of gaseous CH₄ has been thought to be still the important spectral feature in the 3-micron absorption structures of Titan and Saturn. However, the analyses of the 3.3- and 3.4-micron emission structures of Saturn revealed that the influence of the gaseous CH₄ on the structures is rather minimal (Kim et al. 2019). We present synthetic spectra of gaseous CH₄, and the PAH and aliphatic haze particles in order to show the degree of influence of their spectra on the 3.3- and 3.4-micron emission structures of Saturn, and we compare these synthetic spectra with currently available observations. We constructed these synthetic spectra using newly developed

radiative transfer equations. These equations are able to address detailed radiative processes in the atmospheres containing various gases and haze particles. We expect these radiative transfer equations can also be widely applied to the investigation of radiative transfer processes and the analyses of the spectra of celestial objects such as the Earth, the Moon, planets, and interstellar nebulae.

Bellucci et al. *Icarus*, 201, 198-216, 2009.

Kim, S.J. et al., *Planet. Space. Sci.*, 59, 699-704, 2011.

Kim, S.J. et al., *Planet. Space. Sci.*, 65, 122-129, 2012.

[구 SS-15] Polarimetric Survey of Comet 46P/Wirtanen

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Comet 46P/Wirtanen is a Jupiter-family comet whose orbital period is of approximately 5.44 years and perihelion lying at about 1.06 au. The comet is known for being a primary target of the Rosetta space mission prior to it being rescheduled to 67P/Churyumov-Gerasimenko. In its 2018 apparition, comet 46P approached Earth within ~0.08 au, which made possible its study with relatively small telescopes. We used this rare opportunity to conduct a comprehensive study of the 46P polarization from November 16, 2018, about a month prior to its perihelion passage December 12, until January 17, 2019. Over this two-month time period, weather conditions were favorable on 13 nights. Observations were made with the 22-cm telescope located at the Ussuriysk Astrophysical Observatory (code C15), which operates within the International Scientific Optical Network (ISON). We will report our findings at the conference.

[구 SS-16] Shape model and spin state of

non-principal axis rotator (5247) Krylov

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The main-belt asteroid (5247) Krylov is known as a Non-Principal Axis (NPA) rotator. However, the shape model and spin state of this asteroid were not revealed. The physical model of an asteroid including spin state and shape is regarded to be important to understand its physical properties and dynamical evolution. Thus, in order to reconstruct the physical model of Krylov, we applied the light curve inversion method using not only the optical light curves observed with ground-based telescopes in three apparitions during 2006, 2016, and 2017, but also the infrared light curves obtained with the Wide-field Infrared Survey Explorer (WISE) in 2010. We found that it is rotating in Short Axis Mode (SAM) with the rotation and precession periods of 368.71 hr and 67.277 hr, respectively. The orientation of the angular momentum vector is (298°, -58°) in the ecliptic coordinate system. The ratio of moments of inertia of the longest axis to the shortest axis is $I_u/I_c=0.36$; the ratio of moments of inertia of the intermediate axis to the shortest axis is $I_v/I_c=0.96$. Finally, the excitation level of this asteroid is found to be rather low with a ratio of the rotational kinetic energy to the basic spin state energy as $E/E_0 \approx 1.024$. We will briefly discuss the possible evolutionary process of Krylov in this presentation.

천문우주관측기술

[구 AT-01] Korean Participation in All-sky Infrared Spectro-Photometric Survey Mission, SPHEREx

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Since the high throughput for diffuse objects and the wide-area survey even with a small