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[U-06_28AM1]New Progress toward the Understanding of Small Solar System Bodies

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Mon. Apr 28, 2014 9:00 AM - 10:45 AM 503 (5F)

This session is aimed at setting up a forum to discuss how we can make progresses in our understanding of the solar system evolution with our hands on data. Presentations related to the science of the small bodies in the solar system (satellites, asteroids, comets, interplanetary dust particles, trans-Neptunian objects, and planetesimals) are invited. In addition to the extensive astronomical/remote-sensing observations and theoretical works, Hayabusa has brought us samples back from Itokawa (S-type asteroid) for unprecedentedly detailed analysis. The results of the Hayabusa sample initial analysis do prove that analysis of returned samples will play a key role in our future study of the solar system evolution. While the mission preparation of Hayabusa2, which is targeted at a more primordial asteroid than Itokawa (1999JU3, C-type), is being matured, expectation of building a new gateway to biology-flavored topics via organic material and aqueous alteration analysis is ramping up. In this session, after summarizing the cutting-edge results obtained by various studies, including the impact physics important for the asteroid evolution, we will discuss the future shape of the study of the solar system evolution.

10:30 AM - 10:45 AM

[U06-P21_PG]Development of a wide-band optical filter optimized for deep imaging of small solar-system bodies

3-min talk in an oral session

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Keywords:optical, small solar system body, light pollution, wide-band filter

We developed a newly designed wide-band optical filter and evaluated its performance. It is optimized for deep imaging of small solar-system bodies. The new filter, which we denote as *Wi*, is designed to reduce contamination by light pollution from street lamps, especially strong mercury and sodium emission lines. For the reasons that (1) much of artificial light pollution concentrates in the *V* band, (2) the photon numbers peak at a wavelength of 6350 Å in the spectrum of sunlight, and (3) many asteroids have their peak/plateau reflectance at around 7000 Å in the optical range, the new filter's cut-on wavelength is set to 5880 Å by using an OG590 Schott color glass filter. On the other hand, the cut-off wavelength, which is achieved by a short-pass interference coating, is set to 9380 Å in consideration of worst of the OH night sky emission and the atmospheric water vapor absorption band at 9400 Å.Compared with the use of a commercially available long-wave cut wide-band filter (*W* filter, 4900-9100 Å), the sky brightness is 10-20 % reduced by the *Wi* filter under bright-sky conditions by not only artificial light pollution but scattered moonlight. In the detection of asteroids, the detected total flux of an asteroid through the *Wi* filter has been 3% larger than that through the *W* filter, though the width of the *Wi* filter response function is 16% narrower than that of the *W* filter. By using the *Wi* filter, the S/N ratios in the detection of asteroids were improved by about 6%, on average, compared with the use of the *W*

filter, and the improvements were slightly larger in a brighter sky. The use of the CCD with high sensitivity at longer wavelength, such as the back-illuminated, fully-depleted CCD, will show a larger improvement in the S/N ratio by using the *Wi* filter.Reference: Wide-Band Optical Filter Optimized for Deep Imaging of Small Solar-System Bodies, Okumura *et al*. Publications of the Astronomical Society of Japan, **64**, 47 (2012)