

Disk-Resolved Spectra of (25143) Itokawa with *Hayabusa*/AMICA observations

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Abstract. We introduce a new data reduction method for *Hayabusa*/AMICA data to subtract a scattered light inside the optics. As the result, we obtained a map of space weathering on Itokawa for all available channels.

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1. Introduction of *Hayabusa*/AMICA

Hayabusa is a spacecraft developed by JAXA to return a sample of material from a near-Earth asteroid named 25143 Itokawa to Earth. It was launched on 9 May 2003 and rendezvoused with Itokawa in September 2005. After the arrival, *Hayabusa* studied the physical properties of Itokawa, such as shape, spin, color, and composition before the sampling in November. AMICA is one of the optical navigation cameras (ONC) designed not only for the optical navigation but also the scientific observations. It thus equipped broadband filters originally contrived for ground-based telescopic observations.

2. Outline of Data Reduction Method

AMICA acquired more than 1400 multispectral and high-resolution images during the mission phase. Our group established the calibration method for AMICA images. The major steps in calibration include corrections for linearity, modeling and subtraction of bias, dark current, read-out smear, pixel-to-pixel responsivity variations, and flux calibration. It was reported that AMICA images are contaminated by light scattered inside the optics in the longer wavelength (Ishiguro *et al.* 2010). Unlike telescopic observations carried out in dark places, off-axis light from the Sun or target bodies may be an inherent problem with space exploration data. It is reported that approximately ten percent of the data taken by spacecrafts onboard cameras was contaminated by scattered light (NEAR/MSI and Galileo/SSI). Since the brightness of off-axis light depends on wavelengths and positions on the detector, it could mislead reflectance spectra. We examined the point-spread functions (PSFs) of AMICA using lunar images and Itokawa's images taken during the approaching phase, and developed a new technique to subtract the scattered light by PSFs. As the result, the background sky level is suppressed down to 10 DN, which corresponds to <1 % of Itokawa signal (1000-3000DN). The color map using us-band, x-band, p-band, zs-band is available for all channels. We plan to publish the results with this method in near future.

Reference

Ishiguro, *et al.* 2010, *Icarus*, 207, 2, 714–731.