**IN-FLIGHT CALIBRATION OF THE HAYABUSA NEAR INFRARED SPECTROMETER (NIRS).**

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**Introduction:** NIRS is a near-infrared spectrometer on-board the spacecraft HAYABUSA, which rendezvoused with the near-earth asteroid, (25143) Itokawa in September through November 2005. NIRS found a variation of more than 10% in albedo and absorption band depth in the surface reflectance of asteroid Itokawa. Spectral shape over the 1-micron absorption band indicates that the surface of this body has an olivine-rich mineral assemblage similar to that of LL chondrites [1]. In preliminary study, to obtain the reflectance spectra of Itokawa from NIRS data, we used preflight calibration data. There were some difference in slope of NIRS spectra and that of ground-based observational spectrum.

**Procedure of in-flight calibration:** While groundbased observational spectra are disk-integrated spectra, all of the NIRS spectra are disk-resolved spectra. Moreover, observational geometry (e.g. solar phase angle) is different each other. To correct these differences, we simulated spectra using Hapke parameter obtained by NIRS observation [2]. Figure 1 shows comparison between simulated spectra and groundbased observational spectra [3] on the same condition. As shown in Figure 2, NIRS spectra are redder than groundbased spectra.

**Correction of NIRS spectra:** The ratio in Figure 2 is a correction factor obtained by in-flight calibration. To check this correction factor, we compared simulated spectra and groundbased spectra on the different solar phase angle condition (Figure 3). The solar phase angle at 2001 March 12, 23 and 24 are 25, 46 and 49 degrees respectively. In Figure 4, ratio between groundbased data and NIRS data corrected by correction factor of Figure 3 are shown. It is found that the variation of the ratio in the observed wavelength is within about 2%.

**References:** [1] Abe et al. (2006) *Science*, 312, 1334-1338. [2] Kitazato et al. (2006) *38th DPS meeting abstract*, 59.13. [3] Abell et al. (2007) submitted to be MAPS.

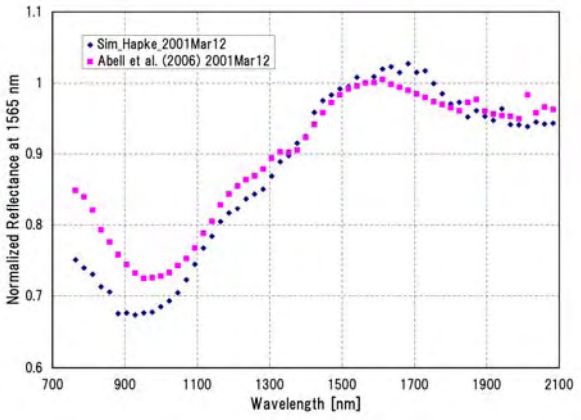


**Figure 1:** Comparison between simulated spectra using Hapke parameter obtained by NIRS observation on the condition of the groundbased observation at 2001 March 12 (blue) and the spectra obtained by groundbased observation at 2001 March 12 (pink). The spectra of groundbased observation are calculated by interpolation at the wavelength of NIRS observation.

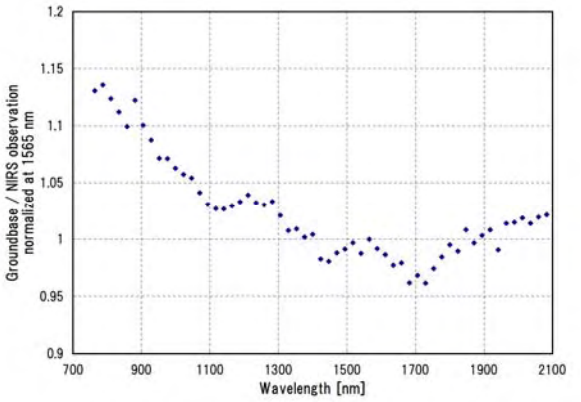


**Figure 2:** Ratio of groundbased spectra and simulated spectra using Hapke parameter obtained by NIRS shown in Figure 1.

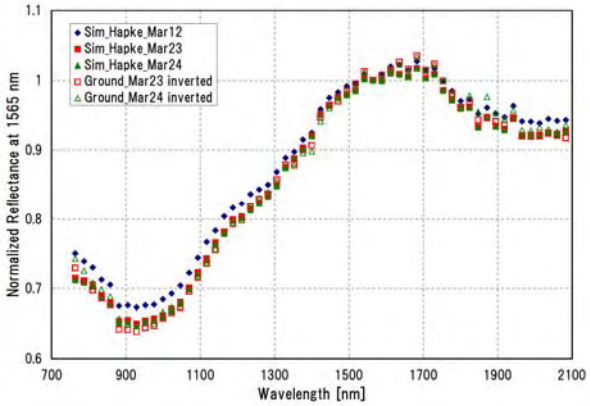


**Figure 3:** Simulated spectra using Hapke parameter obtained by NIRS observation on the condition of the groundbased observation at 2001 March 12 (blue), 23 (red), and 24 (green). Open square and triangle data are inverted spectrum of groundbased data using correction factor shown in Figure 2.

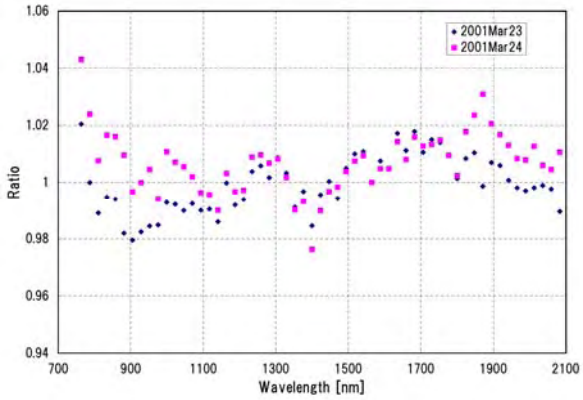


**Figure 4:** Ratio between groundbased data at 2001 March 23 (blue) and 24 (pink) and NIRS data corrected by correction factor shown at Figure 3.