INTEGRATED VISIBLE/NEAR-INFRARED SPECTRA OF THE HAYABUSA SAMPLING SITES AND THEIR IMPLICATIONS ON MATURITY OF THE RETURNED SAMPLES: R. Nakamura[1], N. Hirata[2], M. Ishiguro[3], K. Kitazato[2] , T. Noguchi[4], T. Nakamura[5], T. Hiroi[6] and H. Yano[7], [1]National Institute of Advanced Industrial Science and Technology, [2]University of Aizu, [3]Seoul National University, [4]Ibaraki University, [5]Tohoku University, [6]Brown University, [7]JapanAerospace Exploration Agency.

Introduction: The HAYABUSA spacecraft attempted two touch-down sampling of Itokawa in November, 2005. In the first trial on 19th, the spacecraft unexpectedly came into contact with Itokawa's suface before the final landing around the South-Pole. In contrast, the second touch-down on 24th is supposed to be located near the target marker on Muses-Sea Regio as originally planned [1]. We present the combined visible multiband spectra and near-infrared continuous spectra around these sites. The spectral analysis predicts that the returned samples, if they were collected by the direct contact between the HAYABUSA's sampler horn and sampling sites, show a different degree of space weathering [2]. Otherwise, electrostatically-floated dust particles might have been captured in the course of a descent to the surface [3].

Data analysis: The multiband images of Itokawa's eastern hemisphere, which cover both the sampling sites, were taken by Asteroid Multiband Imanig CAmera (AMICA) on October 24th, 2005 (Figure 1). The four images in the b(~430nm), v(~550nm), w(~700nm) and p(950nm) bands were spatially coregistered by manually picking up control points (Figure 1). The ran DN was converted into the relative reflectance as described in [4].

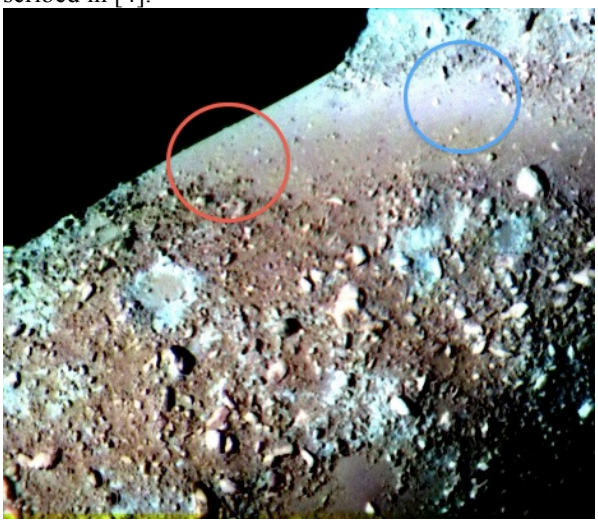

Figure 1. False color composite (RGB=pwb) image of AMICA. The red and blue circle denote the approximate location of the first and second touch-down, respectively.

Near-InfraRed Spectrometer (NIRS) provided continuous spectra between 0.75 and 2.1 um [5]. The failure of reaction wheels hampered accurate control of the spacefract attitude. Consequently, NIRS footprints are irregularly scattered on Itokawa's surface as shown in figure 2. We compiled all the NIRS data in the proximitiy phase and picked up the spectra around the sampling sites. The illumination geometries are calculated through SPICE kernels and 3D shape model of Itokawa. The absolute reflectance can be derived from photometric correction procedures given in [5]. Then, we connect AMICA multiband spectra and NIRS continuous spectra through their overlap around p band (~950nm).

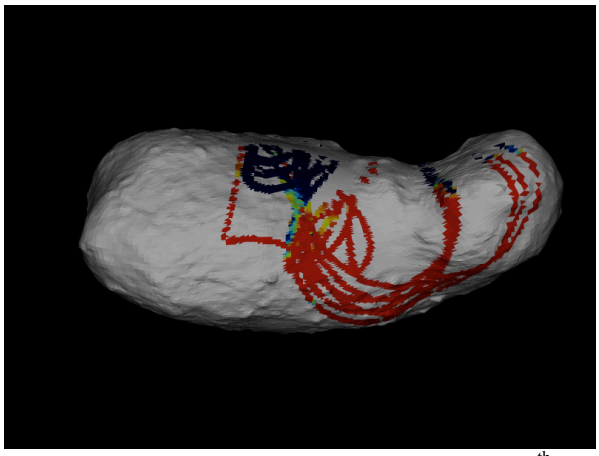

Figure 2. Loci of NIRS footprints on October 20th.

Results: The combined AMICA-NIRS spectra show that space weathering degree of the first landing area is higher than that of the second sites. It is likely that dust particels underwent more maturation in their migration into the gravitationally "lowest" South-Pole. Noguchi et al. [2] reported the evidence of space weathering in 5 out of 10 particles collected at the second sampling site. In the future analysis of the samples collected from the first touch-down sites, we will find more maturation in terms of the fraction of space weathered particles and the size/shape distributions [6].

References: [1] Kawaguchi, J., Fujiwara, A. and Uesugi, T. (2000) *Acta Astronautica 62* 639–647. [2] Noguchi, T. *et al.* (2011) *Science 333*, 1121-1125. [3] Lee, P. (1996) *Icarus 124,* 181–194.[4] Ishiguro, M. et al. (2010) *Icarus 207*, 714–731. [5] Kitazato, K. et al. (2008) *Icarus 194*, 137-145. [6] Tsuchiyama, A *et al.,* . (2011) *Science 333*, 1125-1128.