

Space weathering deduced from the observation of asteroid Itokawa

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HAYABUSA observed asteroid (25143) Itokawa between September and November 2005 by Asteroid Multiband Imaging Camera (AMICA) as well as Near Infrared spectrometer and X-ray spectrometer. AMICA observed the whole surface of Itokawa with the solar phase angle around 10 degree from the Home Position (HP) (7km) with nominal resolution 70cm. The highest resolution during touch down phase is better than 1cm.

Itokawa has heterogeneity in both color and brightness. Local high zones include rims of facets which would be remnant structures of large impacts. In general, brighter areas are bluer in color and darker areas are redder. Figure (a) is Little Woomera - Yoshinodai zone with faceted polygonal feature. Rims of facets (locally elevated zone denoted by light blue) are usually brighter. Figure (b) is a close-up v-band image of the rectangular box in (a). Scale in the figure is 10 m. Brighter regions occur by removal of upper darker boulder-rich layer.

Our observation suggests that the rock surface without regolith can be weathered. Weathering rate of rock surface would be slower than regolith surface. However, regolith surface would be mixed by impacts in cm scale. Although we should be careful of erosion rate of rocky surface, weathering rate of rock surface might be as fast as or faster than that of regolith surface.

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