

Crater size-frequency distribution on Itokawa

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On September 12th, 2005, the Hayabusa spacecraft arrived at the destination, at tiny S-type asteroid 25143 Itokawa. The onboard Asteroid Multiband Imaging Camera (AMICA) scrutinized the surface from the Home Position (HP), which is about 7 km sunwards of Itokawa. One of the most interesting characteristics is the dichotomy of the surface roughness. We classified the rocky regions covered by numerous boulders as rough terrains and the flatter regions, possibly mantled by finer regolith particles, as smooth terrains. While the smooth terrains may have experienced large scale resurfacing by regolith transportation, rough terrains show no clear indications of regolith. The lack of thick regolith layer would increase the lifetime of small craters through ineffective covering and erosion by ejecta blanket. Consequently, we expect that rough terrains, which covers about 80 percent of Itokawa's surface, are appropriate regions to study crater population statistics.

Based on numerical integration of Itokawa's clone orbits, Michel and Yoshikawa calculated the typical lifetime of Itokawa as a Near-Earth asteroids to be several million years. On the other hand, the collisional lifetime of Itokawa in the main belt is estimated to range between 10 and 100 million years. Then, the flux and size-frequency distribution of craters on Itokawa would reflect those of sub-meter sized bodies in the main belt rather than the interior regions. In this presentation, we report results of crater counting on Itokawa and the potential to investigate unseen small bodies, which links asteroids and interplanetary dust particles.