

GLOBAL SHAPE AND GENERAL GEOLOGY OF ITOKAWA. H. Demura¹, R. Gaskell², N. Hirata¹, H. Miyamoto^{2,3}, S. Sasaki⁴, D. Scheeres⁵, J. Saito⁶, and geomorphology group of Hayabusa, ¹University of Aizu, Ikki-machi, Aizu-Wakamatsu City, Fukushima 965-8580, Japan (demura@u-aizu.ac.jp), ²Planetary Science Institute, ³The University Museum, University of Tokyo, ⁴National Astronomical Observatory of Japan, ⁵Department of Aerospace Engineering, University of Michigan, ⁶Institute of Space and Astronautical Science, Japan Aerospace Exploration Agency (ISAS/JAXA).

Global geology[1-7]: Asteroid (25143)Itokawa seems to be composed of two rounded parts, a larger part is called Body, a smaller one is done Head, and their constricted boundary is done Neck (Fig.1). Numerous boulders (~10s m in diameter) and pebbles in spite of its micro-gravity environment. The boulders show uneven distribution; a region with boulders is defined as rough terrain and the rest region without boulders is done as smooth terrain (Fig.2). Because the latter coincides with a region with low elevation (low gravitation potential), embayment of fine materials is strongly suggested. This is consistent with a discovery of regolith migration with closeup images. Surface composition appears to be homogenous from viewpoints of minerals and elements. Low density of Itokawa indicates this Itokawa is a rubble pile.

Regional geology (~100 m): The two rounded parts display facets, and their subset would be derived from impacts. Candidates of craters show distinctive pattern of impacts on curved surface[8]. All topographic features (e.g., crater rims) are unclear because of abundant boulders. Many facets at both ends denote polyhedron appearance, and their fringes show relatively high elevation. They are ridges in the literature. Many features of mass-movement are found at the ridges, and they overlap high albedo regions with low degree of space weathering[9]. Some pedestal facets on the Body and no global groove suggests that this Itokawa would be composed of rubbles of several tens - one hundred meters in diameter..

Local features (<100 m): Some types of alignment of boulders are found at the boundary of rough terrain and smooth one(e.g. Fig.2). Some larger boulders such as Yoshinodai seems to be gathers to fringes of facets. These behavior implies that surface boulders were also activate such as pebbles (regolith migration found on closeup images), but the most boulders with angular appearance shows the small degree of ablations and resurfacing process.

References:

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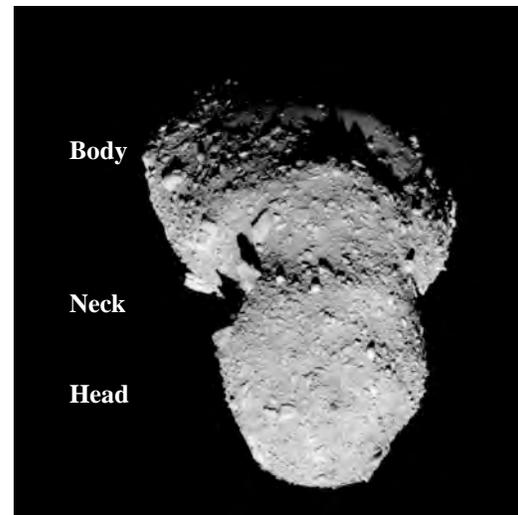


Figure 1 Two parts of Itokawa

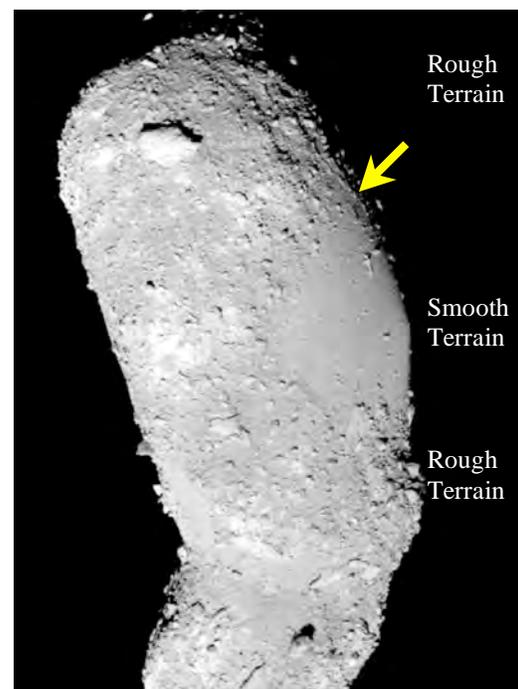


Figure 2 Surface appearance of Itokawa

The arrow points an alignment boulders at the boundary of rough/smooth terrains.