

Geomorphological characteristics of asteroid Ryugu: implications to its evolutionary history

*Hideaki Miyamoto¹, Ryodo Hemmi¹, Hiroshi Kikuchi¹, Goro Komatsu², Chikatoshi Honda³, Tatsuhiro Michikami⁴, Tomokatsu Morota⁵, Yuichiro Cho¹, Olivier S Barnouin⁶, Sho Sasaki⁷, Naru Hirata³, Naoyuki Hirata⁸, Rie Honda¹⁰, Shingo Kameda¹¹, ERI TATSUMI¹, Yasuhiro Yokota¹², Toru Kouyama¹³, Hidehiko Suzuki¹⁴, Manabu Yamada¹⁵, Naoya Sakatani¹², Masahiko Hayakawa¹², Kazuo Yoshioka¹, Moe Matsuoka¹², Masatoshi Hirabayashi⁹, Hirotaka Sawada¹², Seiji Sugita¹

1. University of Tokyo, 2. D'Annunzio University, 3. Aizu University, 4. Kinki University, 5. Nagoya University, 6. Johns Hopkins University, 7. Osaka University, 8. Kobe University, 9. Auburn University, 10. Kouchi University, 11. Rikkyo University, 12. ISAS/JAXA, 13. AIST, 14. Meiji University, 15. Chiba Inst Tech

Observations by Hayabusa 2 spacecraft indicate that Ryugu is a highly porous C-type asteroid. Ryugu's surface is covered by numerous boulders. These are consistent with the idea that Ryugu is a rubble-pile asteroid. Interestingly, Itokawa, the only other similarly-sized rubble-pile asteroid closely observed by spacecraft, is different from Ryugu in many aspects. For example, while the shape of Ryugu is a top-shape, that of Itokawa is somehow elongated cigar-like. Though Ryugu is generally homogeneous in terms of roughness, Itokawa has two distinctive areas such as smooth and rough terrains. Ryugu has an almost continuous equatorial ridge, though Itokawa does not have such a large-scale topographic feature.

These differences may come from the difference in evolutionary processes; a top-shape of rubble pile asteroid is believed to result of rotationally induced deformation or from re-accumulation. Another possibility is that the differences may come from variations in mechanical properties of asteroid forming materials. We are investigating geological characteristics of Ryugu, which may hold clues for these aspects. In this talk, we report initial results of geological investigations mostly using visible images obtained by the Optical Navigation Camera (ONC) onboard the Hayabusa2 spacecraft, and discuss about their implications to evolutionary history of Ryugu..

Keywords: asteroid, Hayabusa 2, Ryugu