CONTROL ID: 3049303

TITLE: Thermal Infrared Observations of C-type Asteroid 162173 Ryugu by Hayabsua2

ABSTRACT BODY:
Abstract (2,250 Maximum Characters): Hayabusa2 [1] is the second asteroid sample return mission organized by Japan Aerospace Exploration Agency (JAXA), and has just arrived at the C-type near-earth asteroid 162173 Ryugu. Hayabusa2 performs remote sensing to characterize global features of the asteroid such as the shape, the rotation state, the gravity and density, the surface geology, the spectroscopic profiles, and the thermal properties. Thermal Infrared Imager (TIR) [2] is one of the remote sensing instruments to take thermal images for investigating thermo-physical properties of the asteroid. TIR is based on the uncooled micro-bolometer array of 328 x 248 effective pixels, with the FOV of 16° x 12°, and with a band pass filter of 8 to 12 μm. At the Home Position, 20 km earthward from the asteroid, TIR has taken images of Ryugu at every 6° for one rotation with about 20 m per pixel resolution. Higher resolved images are taken during descent operations. Those observed thermal images are converted to the brightness temperature images with the pipeline data handling and using the compiled ground calibration database for TIR called HEAT [3]. Using the asteroid shape model and the SPICE kernels, we map surface thermal inertia and consequently the grain size distribution [4] of the surface of Ryugu using the delay of peak temperature from the local noon and by the maximum temperature in rotation, compared with the thermo-physical model [5]. The surface temperature will be verified by *in situ* radiometry for day-night cycles by MARA [6] on MASCOT lander. The information of the surface physical state, grain size, boulder abundance, and the temperature predictions derived from TIR data will contribute to the landing site selection both from the scientific and mission purposes.
[1] Tsuda, Y., et al., *Acta Astronaut.* 127, 702-709 (2016), [2] Okada, T. et al, *SSR* 208, 255-286 (2017), [3] Endo, K. et al., *IEEE Xplore*, 16946502, pp.1-10 (2017), [4] Sakatani N. et al. *AIP Adv*, 7, 015310, (2017), [5] Takita, J., *SSR*, 208, 287-315, (2017), [6] Grott, M., et al., *SSR*, 208, 413-431, (2017).

Category: HAYABUSA2 SPECIAL SESSION

Sub-Category: None

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Plain-Language Abstract Synopsis: First asteroid thermographic movie is obtained and shown to investigate thermo-physical properties of a small body.

Contributing Teams: Hayabusa2 TIR Team, Hayabusa2 Operation Team, Hayabusa2 Science Team