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Thermal Infrared Imaging of C-type asteroid Ryugu by Hayabusa2

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Global, local and close-up thermal infrared images taken by the Thermal Infrared Imager TIR onboard Hayabusa2 have revealed the thermophysical properties of C-type asteroid 162173 Ryugu. Hayabusa2 is the second Japanese asteroid explorer for near-earth asteroid rendezvous and sample return. The TIR is one of remote sensing instruments on Hayabusa2 that has been developed to investigate the nature of Ryugu and its origin and evolution in terms of thermophysical properties of the asteroid. Observations have been performed mainly for global mapping of the asteroid from the Home Position, at 20 km from the asteroid, and sometimes descent to the lower altitude at 5 km altitude for more detained global mapping. Occasionally close-up imaging of the surface of Ryugu have been conduced during the events like the touchdowns for sample collection and the release of landers (MINERVA-II and MASCOT). The global thermal inertia derived from the TIR global thermal images is almost consistent with the value which was predicted by the ground based observations (e.g., T.G. Mueller et al., 2017). Thermal images show some large boulders whose temperature indicate the thermal inertia of 300 or so [SI unit] that they should have high porosity. It is consistent with that of preliminary result of in situ measurement by a radiometer MARA on MASCOT. Close-up views show more variety of thermal inertia of surface rocks. Such information from thermal infrared images suggests the possible origin and evolution of the asteroid. Outlines of the TIR experiments during the asteroid proximity phase are briefly described.