Local variation in thermal inertia around the artificial impact crater on Ryugu

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The Hayabusa2 spacecraft has completed the rendezvous phase around Cb-type asteroid Ryugu in 2019. From thermal infrared imaging by TIR, global temperature distribution of Ryugu is consistent with the thermal calculation with thermal inertia of 300±100 J m^{-2} K^{-1} $s^{-0.5}$ [1], and thermal inertia values of the floors of craters are in general roughly comparable with the global average [2]. On the other hand, few small and fresh craters show anomalously low thermal inertia less than 100 J m^{-2} K^{-1} $s^{-0.5}$, contributed from the highly porous nature of boulders exposed by the impact cratering [3]. On April 2019, Hayabusa2 performed an artificial impact (Small Carry-on Impactor or SCI) experiment [4], whereby a ~2 kg mass was fired at 2 km/s against the asteroid surface. As a result of the successful operation, an artificial crater (SCI crater) with diameter larger than 10 m was created on the asteroid.

In the preliminary analysis of TIR data of the SCI crater, we suggested no thermally-anomalous materials on the crater floor [3]. In other words, the SCI crater has similar thermal inertia with the global average, and physical properties of the subsurface materials are similar to that of the top surface, at least on the SCI impact site. However, regional difference in the thermal inertia inside and outside the SCI crater have not been discussed. We will present whether the regional variation of the thermophysical properties appears around the SCI craters.

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