Simulated Imaging Experiment for Landing Site Selection by Hayabusa2

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The Hayabusa2 spacecraft was launched in 2014 and is expected to arrive at the asteroid Ryugu, which belongs to the C-type asteroids in 2018. One of the objectives of the Hayabusa2 mission is to return with primordial samples from Ryugu. By using reflectance spectroscopy from the ground, Vilas (2008) detected the 700 nm-band absorption of Ryugu, indicating the presence of hydrated minerals. The *Hayabusa2* spacecraft performs multi-band spectrum observation using a telescopic optical navigation camera (ONC-T) with seven bandpass filters, and specifies the point at which the 700 nm absorption feature exists for the landing site selection. Thus, it is important to confirm the detectability of the absorption of 700 nm from multi-band spectral observation. Multi-band spectral imaging was performed using the ONC-T flight model on the carbonaceous chondrites having the similar reflectance spectrum as that of the C-type asteroid (Kameda et al., 2015). The ONC-T is equipped with a wheel containing seven bandpass filters that is rotated to perform multi-band spectrum observation. When the filter wheel is rotated to change the bandpass filters, the field of view of the ONC-T at the Ryugu surface drifts owing to asteroid spin; however, previous research that showed the detectability of the absorption of 700 nm did not simulate the drift of the field of view of each band.
In this study, this effect is confirmed by using a camera that simulates ONC-T.
An experimental system is used in which the x-axis stage is placed beneath the sample holder to simulate the drift of the field of view whereby the camera has the similar CCD and bandpass filters as that of the ONC-T. Multi-band spectral imaging was performed on these carbonaceous chondrites in which the x-axis stage moves with each change the bandpass filter.
Moreover, the amount of drift in the field of view varies depending on the altitudes from the Ryugu surface, which in this study are assumed as 20 km (HP) and 5 km, respectively. Therefore, we measure the reflectance spectra and depth of 700 nm absorption feature in the case of 30 m spatial resolution, which is specified as the region at which hydrated minerals are present.

Keywords: Hayabusa2, Multi-band spectral imaging

