

Results of Hayabusa2 Near Infrared Spectroscopy at Asteroid Ryugu

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The Near Infrared Spectrometer (NIRS3) is installed on the Hayabusa2 spacecraft to observe the target C-type asteroid 162173 Ryugu at near infrared wavelengths of 1.8 to 3.2 μm . It aims to obtain reflectance spectra in order to detect absorption bands of hydrated and hydroxide minerals in the 3 μm -band spectral region. Spectra obtained during the cruising and proximity-operation phases have revealed that the performance of NIRS3, using the newly developed linear-image sensor with indium arsenide (InAs) photodiodes, are good enough as expected from the ground performance tests. Prior to the touch down of Hayabusa2 on the surface of Ryugu, NIRS3 has completed global observations from the Home Position, where the altitude is about 20 km above the surface. NIRS3 also performed low-altitude observations in several opportunities, such as the separation operation of the small rovers and lander, during which the lowest altitude was less than 30 m. Analyzing the spectra, NIRS3 contributed to estimate the temperature of the asteroid surface. After removing the thermal emission, we successfully detected a weak and narrow absorption feature centered at 2.72 μm , which suggests the existence of hydroxyl (OH)-bearing minerals formed by aqueous alteration. This feature is, however, almost uniform over the whole surface in terms of band depth and position. Additionally, it is remarkable that the albedo of Ryugu is extremely low. These results imply the following hypotheses; 1) dehydration caused by heating or space weathering, or 2) masking effects by dark materials on the surface. We will argue about the inspection of the evolution scenario of Ryugu inferred from the above results.

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