

The Instrument error on estimation of normal albedo of Ryugu using the laser altimeter on-board Hayabusa2 and the reflectance measurement of the carbonaceous chondrite at zero phase angle

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The Japanese asteroid explorer 'Hayabusa2' was launched at end of 2014 to explore the near-Earth C-type asteroid 'Ryugu'. In this mission, we have a plan to apply the laser altimeter (LIDAR) on-board Hayabusa2 to investigate the distribution of normal albedo of Ryugu at a laser wavelength (1064 nm). The LIDAR instrument for laser ranging which has a function to measure the intensities of transmitted and received pulses. The intensities data can be used to estimate the normal albedo of Ryugu.

In this study, we evaluated the contribution of the instrument error to the normal albedo uncertainty on the estimation from the intensities data. From the evaluation, we found the error due to instrument effects was 18% at an altitude of 20 km based on the verification tests of the LIDAR flight model. The surface slope and roughness elongate the time width of the returned pulse and decrease the intensity. We will also describe how the returned pulse is deformed as a result of slope and roughness.

Currently, we prepare for reflectance measurement of the carbonaceous chondrites at observation condition of the LIDAR to obtain calibration data to interpret the normal albedo variation on Ryugu. In this experiment, we enabled measurement of the reflectance at zero phase angle and wavelength of 1064 nm using a beam splitter. Then, to compare and integrate the normal albedo estimated from the LIDAR data with the reflectance data measured by other instrument equipped on Hayabusa2 (the optical camera and near-infrared spectrometer), the phase angles can be controlled from 0 to 30 degrees on the experiment. In this presentation, we will report configuration of the reflectance measurement and preliminary results.

Keywords: Asteroid albedo, Ryugu, Hayabusa2, Laser altimeter, Carbonaceous chondrite, Reflectance measurement