

The accuracy of geometric albedo of the 1999JU3 estimated from observation by the LIDAR and the following results

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The Japanese asteroid explorer 'Hayabusa2' was launched at end of 2014 to explore the near-Earth C-type asteroid '1999JU3'. In this mission, we have a plan to apply the laser altimeter (LIDAR) on board the Hayabusa-2 to investigate the distribution of geometric albedo of the 1999JU3 at the laser wavelength (1064 nm). The LIDAR has functions to measure the intensities of sending laser pulse and receiving laser pulse reflected from the asteroid surface in addition to measurement of distance between the spacecraft and the asteroid. We can evaluate the geometric albedo on the 1999JU3 using the measured intensities of sending and receiving pulses.

We have evaluated how accurately we can estimate geometric albedo of the C-type asteroid from the intensities of lasers measured by the LIDAR. We investigated the characteristics of the LIDAR required to estimate the geometric albedo through some performance tests before the launch. Firstly, the characteristics and the expected accuracy of geometric albedo estimated using data from the LIDAR with the characteristics will be described. Then, intensity of receiving laser pulse can vary depending on degrees of inclination and roughness of the asteroid surface. We will also describe effects of the inclination and roughness on estimation of the geometric albedo.

We consider three types of scientific topics evaluated from information of the geometric albedo distribution of the 1999JU3 estimated from the LIDAR data at 1 μ m and reflectance investigated from other equipment in other wavelengths. The topics are (1) rock and mineral category of the 1999JU3, (2) degree of water content on the asteroid surface and (3) variation of the asteroid surface caused from space weathering and/or exterior material. We will report prospects to obtain information about these science topics applying the LIDAR which has our evaluated performance.

Keywords: Albedo of asteroid, C-type asteroid, 1999JU3, Hayabusa-2, Laser altimeter