

## Dust detection by using laser altimeter on board Hayabusa-2

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LIDAR (LIght Detection And Ranging) on board Hayabusa-2 is basically used to measure the distance between the satellite and the target asteroid, 1999JU3. This instrument can also measure the absolute reflectance at the wavelength of 1064nm by itself since it monitors the energies of the laser pulse and receiving signal. The accuracy of determining the reflectance is so far estimated no better than 25%, but it would become better through further calibration tests using a pre-flight model of the LIDAR.

Dust count mode is one of the operational modes of LIDAR on board Hayabusa-2 in which it detects faint scattered light from dust grains on the line of sight. The distribution of dust grains along the line of sight is determined from the time resolved energy profile of received light. We need the optical property of a dust grain and size distribution function of dust grains to obtain the true number density. The optical property of a dust grain is modeled by using Mie scattering model assuming that a diameter of dust is larger than the wavelength of laser and that the complex dielectric constant of a dust grain is same as typical value of dirty silicate cosmic dust analogue. The distribution function of dust grains above the surface of an asteroid can be modeled assuming photoelectric dust levitation, but we need to know the initial condition of dust at the surface to carry out the model. Dust observation by LIDAR on board Hayabusa-2 is the first-ever direct observation of the distribution of dust grains around an asteroid and would constrain the models on the origin and evolution of dust grains on and above the surface of an asteroid.

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