

PPS022-03

Room:IC

Time:May 26 17:00-17:15

Surface science with small landing robots in Hayabusa-2

Tatsuaki Okada^{1*}, Hirohide Demura², Naru Hirata², Takashi Kubota¹, Tetsuo Yoshimitsu¹, Lander-Rover Subteam¹

¹JAXA, ²University of Aizu

Hayabusa-2 is an asteroid sample-return mission to C-class asteroid 1999JU3 and the returned samples are only from a few points on the asteroid. Global features of asteroid by remote sensing and the millimeter to submillimeter scale detailed observation by the surface package are complementary to sample analysis.

In addition to sample analysis, asteroid context information is essential such as global shape, surface geomorphology, mineralogy, particle size and distribution and condition, internal structure and average density. Detailed geologic context at landing site is most important to interpret the sample.

On the other hand, surface condition, particle size, stiffness, chemical and mineral composition is critical to investigate and compare with the results from sample analysis and remote sensings.

In Hayabusa 2, two kinds of landing robots (INERVA-II and MASCOT) is planned to observe the surface. We present here the scientific observation of these robots are considered.

MINERVA-II is based on the heritage of MINERVA on Hayabusa, a small hopping robot of 1.5kg. It is organized by the consortium based on UNISEC (academic community) MINERVA-II has three compact cameras, two for stereo viewing and another for telescopic image. Temperature sensors are equipped at the top of pin-shaped bars to directly contact the surface while temperature is measured. Other candidate experiment is that an LED is prepared to shine the rock surface and image the fluorescence from organic material.

MASCOT is based on the heritage of Philae lander on Rosetta, a small lander of 10kg including mothership element. It is an international collaboration with DLR (Germany), CNES (France), and JAXA (Japan). MASCOT will have a wide angle camera WAC with 12 point multi-band filter wheel or multi-color LEDs for landscape and geologic context around the landing site. Visible to near-infrared imaging spectrometer MicrOmega is to take surface features and mineralogy in tens of micrometer scale at the same time. Laser-induced breakdown spectrometer LIBS is to analyze major and volatile elements to characterize the materials. A small magnetometer is proposed to mount for inform the asteroid magnetism and the interaction with solar wind that depends on the porosity as magnetic permeability and the abundance of metal phase materials as electric conductivity. Other instruments for house-keeping are temperature sensors, accelerometer, clinometer, which are also useful for scientific measurements.

Detailed design and scientific instrumentation is under discussion but final configuration will be determined soon.

Keywords: Hayabusa2, Asteroid Exploration, surface experiment, microscopy, elemental analysis