

## Can Hayabusa-2 reveal the distribution of organics on asteroid surface?

KITAZATO, Kohei<sup>1\*</sup>; FUJIWARA, Ayaka<sup>1</sup>; NAKAMURA, Akiko<sup>2</sup>; OHTAKE, Makiko<sup>3</sup>; ABE, Masanao<sup>3</sup>

<sup>1</sup>University of Aizu, <sup>2</sup>Kobe University, <sup>3</sup>JAXA/ISAS

Japanese asteroidal mission "Hayabusa-2" aims at bringing back samples of a C-type asteroid to the Earth, which is expected to extend our knowledge about the early evolution of the solar system and the origin of Earth's life through the on-ground analysis of the returned samples. To maximize its scientific outputs, it is important to reveal the distributions of hydrated minerals and organics on the asteroid surface by remote sensing. Although we can examine the distribution of hydrated minerals by using the near-infrared spectrometer on-board the Hayabusa-2 spacecraft, the method to examine that of organics has not been established yet. Since the total amounts of carbon including carbonaceous meteorites show a clear negative correlation with their absolute reflectance in visible, the absolute reflectance might become a useful index for estimating the organics content. However, the absolute reflectance also depends on the physical properties such as particle size and porosity. Then, we considered discerning the organics content and particle size by using the photometric properties in addition to the absolute reflectance, and performed an experiment to verify this idea using analog materials of asteroid surface. The samples that we used are dunite and humic acid as silicate and organics analogs, respectively. We measured the photometric properties of (1) silicate-organics mixtures and (2) dunite samples with different particle size in the phase angle range of 5-60 degrees. The measurements were performed with a gonio-spectrometer developed in University of Aizu. As a result, in the case of increasing the organics content, the reflectance becomes lower and backward scattering becomes stronger. While in the case of increasing the particle size, the reflectance becomes lower and forward scattering becomes stronger. Also we found that those variations could be matched with the predictions from a theoretical model. Thus, we conclude that it is possible to discern the organics content and particle size based on the absolute reflectance and photometric properties. We need more experiments to examine the effect of space weathering.

Keywords: Hayabusa-2, asteroids, organics, photometric properties