IAF SPACE EXPLORATION SYMPOSIUM (A3)
Small Bodies Missions and Technologies (Part 1) (4A)

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SCIENCE AND OUTREACH OF HAYABUSA2 MISSION

Abstract

Hayabusa2 is the second asteroid sample return mission in the world following Hayabusa. The target asteroid was (162173) Ryugu, C-type near-Earth asteroid. The principal purpose is to study the organic matter and water in the early stages of the solar system. Our aim is to understand the origin of the Earth's water and that of the substances that began life, as well as the origin and evolution of solar system bodies.

Hayabusa2 stayed near Ryugu for about one and half years. It observed Ryugu with four remote sensing instruments, released two small rovers and one lander to the surface of Ryugu, conducted an impact experiment to make an artificial crater, and executed touchdown twice to collect material from Ryugu. In addition to these predetermined operations, we released three small objects into the orbit around Ryugu and they became artificial satellites. All these operations were done successfully.

These operations revealed many features about Ryugu. Ryugu is a rubble pile object, with low density of 1.19 g/cm^3. Ryugu has a spinning top shape, which can be explained if we assume that the spin period of Ryugu was about 3.5 hours in the past. The surface of Ryugu is very black, the geometric albedo is about 4%, and we found absorption at the 2.7μm in the near infrared spectrum. These features indicate that the surface materials of Ryugu contain carbon and water. The detailed analysis of visible spectrum revealed features from space weathering, and we were able to estimate the orbital evolution of Ryugu. From the results of the impact experiment and the temperature observations, we found that Ryugu's surface material had an extremely low strength and boulders might be fluffy, not dense. Now we have the samples returned from Ryugu, which will reveal much more detailed information about the surface materials.

In addition to the spacecraft operations and the scientific research, we also focused on outreach. We carried out a number of special campaigns such as observation campaigns and art campaigns, many talk

events, web and twitter releases among other activities. We tried to inform people about our mission in real time and also tried to publish information both in Japanese and English. By these activities, we think we were able to make people feel connected with Hayabusa2 and we hope that many people will feel inspired by the space mission and those in the future.