AOGS 2005

Asteroid Science opened by Hayabusa Samole Return Mission

A. FUJIWARA
Institute of Space and Astronautical Science (ISAS/JAXA)

A large gap between meteorite research and asteroid research exists in spite of great many works in each field. To bridge knowledge in both fields it is necessary to establish correspondence between asteroid spectral type and meteorite type by comparing the asteroid sample with the meteorite sample.

HAYABUSA is, following this scheme, the first mission to collect samples from a near-earth asteroid and return them to the earth. The HAYABUSA spacecraft was launched by the M5 rocket from Kagoshima Space Center in May 9th 2003.It is a spacecraft for demonstrating technologies such as ion engine, autonomous navigation, sampling, and reentry. The target asteroid is 25143Itokawa, one of S-type Apollo asteroids. After 1-year's cruise by the successful operation of the ion engine the spacecraft made the swing-by with the earth on May 19th 2004, and now it is on the route to the target asteroid. It will arrive near the asteroid in the end of August 2005. It will hover above the asteroid and make remote sensing observation by an camera, a near infrared spectrometer, and a LIDAR and a X-ray spectrometer and then make sampling from the asteroid surface. The sampling will be made by shooting a small projectile onto the surface and catch the fragments in the touch-and-go mode. A small robotic rover carrying cameras will be dropped on the asteroid surface. The spacecraft will return to the earth in June 2007.

The returned sample will be analyzed through the initial analysis period of one year and the following detailed analysis period. The curation facility to receive, characterize, distribute, and preserve the samples is being prepared.

In this mission the asteroid is observed with spatial scale ranging from the ground-based observation, to the onboard instruments,and up to the very local micro scale.. All these information, as well as the information from the returned sample, will provide us a strong tool to connect the ground-based observational data and meteorite data to the physical and chemical "real" properties of asteroids.

To establish the relationship between asteroid type and meteorite type a few more sample returns from other major spectral types are necessary and cooperative or collaborative missions among space organizations are required in the future.