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

Author: Dr. Yuya Mimasu
Japan Aerospace Exploration Agency (JAXA), Japan, mimasu.yuya@jaxa.jp

Dr. Satoshi Tanaka
Japan Aerospace Exploration Agency (JAXA), Japan, tanaka.satoshi@jaxa.jp
Dr. Takanao Saiki
Japan Aerospace Exploration Agency (JAXA), Japan, saiki.takanao@jaxa.jp
Dr. Satoru Nakazawa
Japan Aerospace Exploration Agency (JAXA), ISAS, Japan, nakazawa.satoru@jaxa.jp
Dr. Makoto Yoshikawa
Japan Aerospace Exploration Agency (JAXA), Japan, yoshikawa.makoto@jaxa.jp
Dr. Yuichi Tsuda
Japan Aerospace Exploration Agency (JAXA), Japan, tsuda.yuichi@jaxa.jp

RECENT STATUS OF HAYABUSA2 EXTENDED MISSION

Abstract

The asteroid explorer Hayabusa2 was launched by Japan Aerospace Exploration Agency on December 3rd, 2014. The main mission of this spacecraft is to sample pieces of asteroid and bring it back to the Earth. After six years' mission phase, Hayabusa2 finally bring the asteroid sample back to the Earth on December 6th, 2020. The sample analysis is continuing, and many significant results are produced. After release the capsule containing the sample, the spacecraft was diverted from the Earth and start the new journey. All the nominal mission went successful, and the spacecraft still had the half of the ion engine fuel left at the time of Earth return.

As a result of search for celestial bodies that can be reached using this residual fuel, it was found that there are 354 bodies as candidates. From these bodies, we finally selected the asteroid 1998 KY26 as the next rendezvous target. The asteroid 1998 KY26 is a very small object with a diameter of about 30m and its rotation period is very fast about 10min and called a "fast rotator". Such a small rotator has never been explored, providing scientifically rich information to perform comparative studies with Ryugu. Such kind of object has a special dynamic environment in which centrifugal forces are stronger than gravity on the surface of the asteroid since the rotational speed is too fast for the size of the asteroid. Recently we have started to study the proximity operation under this special environment. Hayabusa2 will arrive at 1998 KY26 in 2031.

In the meantime, it is planned to flyby to another asteroid 2001 CC21 in 2026. Hayabusa2 was originally designed for rendezvous operations, so the telephoto capability of the onboard camera is not so good. Then, it is necessary to approach the asteroid as far as the spacecraft can for the higher-resolution observation. For this flyby mission, the spacecraft is planned to approach super proximal region of the asteroid with high navigation accuracy. In this paper, the recent status of operation and mission analysis of this extended mission are introduced.