

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. Shota Kikuchi

Chiba Institute of Technology, Japan, kikuchi.shota@perc.it-chiba.ac.jp

Dr. Yuto Takei

Japan Aerospace Exploration Agency (JAXA), Japan, takei.yuto@jaxa.jp

Dr. Takanao Saiki

Japan Aerospace Exploration Agency (JAXA), Japan, saiki.takanao@jaxa.jp

Dr. Masatoshi Hirabayashi

Auburn University, United States, thirabayashi@auburn.edu

Dr. Naoya Sakatani

Rikkyo University, Japan, sakatani@rikkyo.ac.jp

Dr. Toru Kouyama

National Institute of Advanced Industrial Science of Technology (AIST), Japan, t.kouyama@aist.go.jp

Prof. Satoshi Tanaka

Japan Aerospace Exploration Agency (JAXA), Japan, tanaka@planeta.sci.isas.jaxa.jp

Dr. Sei-ichiro Watanabe

Nagoya University, Japan, seicoro@eps.nagoya-u.ac.jp

Mr. Yoshikawa Makoto

Institute of Space and Astronautical Science, Japan, makoto@pub.isas.ac.jp

Dr. Satoru Nakazawa

Japan Aerospace Exploration Agency (JAXA), ISAS, Japan, nakazawa.satoru@jaxa.jp

Dr. Yuichi Tsuda

Japan Aerospace Exploration Agency (JAXA), Japan, tsuda.yuichi@jaxa.jp

EXTENDED MISSION OF HAYABUSA2

Abstract

Hayabusa2, the asteroid explorer launched by Japan Aerospace Exploration Agency (JAXA) on December 3rd, 2014, finally brought Asteroid Ryugu's sample back to the Earth on December 6th, 2020. After releasing the capsule containing the sample, the spacecraft departed from the Earth and started a new journey. All the mission operations went successful so far, and the spacecraft still has the half of the ion engine fuel left. The Hayabusa2 extended mission development team has determined Asteroid 1998 KY26 as Hayabusa2's next destination. Searching for potential small bodies with which the spacecraft can rendezvous, given the remaining fuel, found that there are 354 bodies as candidates. We assessed these bodies engineeringly and scientifically. The engineering assessment focused on the amount of delta-V, the accuracy of candidates' orbit determination, and the feasibility of proximity operation. The science study evaluated scientific impacts of proximity investigations on advancing knowledge about transport mechanisms of small bodies into the near-Earth environment and technologies for planetary defense. Both engineering and scientific studies reached 1998 KY26 as the extended mission's target. This asteroid is 30 m in diameter and rotating with a spin period of 10 min. Such a small rotator has never been explored,

providing scientifically rich information to perform comparative studies with Ryugu. Small bodies less than 100 m are the most common in the solar system, and 1998 KY26's small body represents such bodies. These bodies usually enter the Earth atmosphere and induce impacts and fire ball events, leading to regional damage depending on the size and material composition. The exploration to 1998 KY26 will significantly enhance technologies and knowledge of preventing and assessing such potentially disastrous events. Hayabusa2 will arrive at 1998 KY26 in 2031. It is planned to flyby at Asteroid 2001 CC21 in 2026 and swing-by twice at Earth in 2027 and 2028. Technological demonstrations and scientific investigation will be performed during its long cruise phase. In this paper, the overview of the extended mission of Hayabusa2 is introduced.