

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

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OPERATION PLANNING AND RESULTS OF IMPACT EXPERIMENT OF HAYABUSA2

Abstract

Hayabusa2 is a Japanese interplanetary probe launched on December 3, 2014. After the long cruising with the ion engine system, the spacecraft arrived at “Home Position (HP)”, 20 km above the sub-Earth point, on June 27, 2018. It will depart from the asteroid for returning to the Earth by the end of 2019 and reach the Earth by the end of 2020. During the 1.5-year asteroid proximity phase, several numbers of descent operations are scheduled. The first highlight of the Hayabusa2’s asteroid proximity operation was the rover/lander release operation. The spacecraft successfully released the MINERVA-II1 rovers on September 21, 2018, and the MASCOT lander on October 3, 2018. However, the first touchdown operation, the biggest challenge of Hayabusa2, was postponed although we originally planned it at the end of October. We found that the surface of Ryugu is exceptionally rough and covered with many boulders, and we could not find ample space for the safe landing. We decided to introduce the “pin-point touchdown” strategy, and a target marker was released in the final descent operation in 2018. During the conjunction phase, we performed a detailed analysis of the touchdown point and modification of the operation procedure, then the first touchdown operation was successfully conducted on February 21, 2019. We are now preparing the next critical operation, the impact experiment, under such circumstances. One of the most important objectives of Hayabusa2 is to investigate the chemical and physical properties of the internal materials and structures of Ryugu with the aim of understanding the formation history of small bodies. To achieve this goal, we developed a new device called the small carry-on impactor (SCI). The SCI is a simple kinetic impactor which creates an artificial crater on the surface of Ryugu. The SCI is a powerful tool for the exploration of Ryugu, but the very accurate position control of the spacecraft is required in the impact operation. This paper describes the operational planning for the upcoming impact

experiment. The actual impact experiment is scheduled to be conducted around the spring of 2019, and the results of the impact experiments will be presented in the conference.