Technological challenges and achievements in Hayabusa2 mission

*Makoto Yoshikawa[1], Yuichi Tsuda[1], Satoru Nakazawa[1], Fuyuto Terui[1], Takanao Saiki[1]

1. Japan Aerospace Exploration Agency

Hayabusa2 is a Japanese second asteroid sample return mission following Hayabusa. The principal purpose of Hayabua2 is science, especially to study organic maters and water at the time of the birth of the solar system, and to study the birth and the evolution of the solar system. In order to do these studies, the technology or engineering is very important. In this talk, we will summarize the technological challenges and achievements in Hayabusa2 mission.

The Hayabusa2 spacecraft was launched on 3 December 2014 and arrived at its target asteroid Ryugu on 27 June 2018. It stayed there until November 2019 for in situ observation and sample collection. Now Hayabusa2 is on the way back to the earth and will return to the earth in November or December 2020. During the stay around Ryugu, the spacecraft performed many descent operations, such as, deploying rovers and a lander, dropping SCI(Small Carry on Impactor) to create an artificial crater, and two touchdowns. The first touchdown operation was performed successfully on 22 February 2019, and the second touchdown was carried out near the artificial crater on 11 July 2019. By these two touchdowns we think we were able to get both the surface materials and the subsurface materials.

Hayabusa2 achieved the world's first seven engineering accomplishments during its stay around Ryugu. They are as follows:
(1) Hayabusa2 deployed small exploration robots on the surface of the asteroid that moved autonomously and corrected information of the asteroid
(2) Hayabusa2 deployed multiple (three) exploration robots on the surface of the asteroid.
(3) Hayabusa2 touched down to the specified point on the surface of the asteroid with accuracy of 60cm.
(4) Hayabusa2 created an artificial crater by releasing SCI(Small Carry on Impactor) and obtained images representing the process of crater creation
(5) Hayabusa2 touched down two different places on the same asteroid Ryugu
(6) Hayabusa2 sampled subsurface material during the process of 2nd touchdown to the proximity of the created crater
(7) Hayabusa2 released multiple objects which could be artificial satellite of the asteroid

In addition to these world's first accomplishments, we have done a lot of technological challenges and achievements. In this talk, we will summarize the technological challenges and achievements, which are very important to obtain scientific data.

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