Paper ID: 66210
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IAF ASTRODYNAMICS SYMPOSIUM (C1)
Guidance, Navigation and Control (2) (2)

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HAYABUSA2 TOUCH-DOWN TO RYUGU WITH ONBOARD GUIDANCE SEQUENCE PROGRAM

Abstract

The asteroid explorer Hayabusa2 was launched by Japan Aerospace Exploration Agency (JAXA) on December 3, 2014. The main mission of the spacecraft is to sample material of Asteroid and return back to the Earth. Hayabusa2 has reached Ryugu in June 2018 and observed its geography by operations such as middle/low altitude observation and Touch Down rehearsal. Because of the rough terrain, we have to modify the Touch-Down (TD) operational design. Before reaching Ryugu, we planned to carry out dropping TM (Target Marker) and touching down to Ryugu as a single sequence of TD operation. However after finding the rough terrain, we have firstly carried out dropping TM and close-up observation around the TM as the first step of the TD event in October 2018. As a result of close-up observation, we have found the flat area around TM (about 3m) is narrower than the area we assumed (about 50m).

Just after the TD, a large amount of dust were thrown up. As a result, the touch down sequence was needed to be changed because the performance degradation has occurred on navigation sensor such as navigation camera (ONC) and altimeter (LIDAR, LRF). Hayabusa2 has accomplished second TD after flexible sequence changes with onboard sequencer function called GSP (Guidance Sequence Program). This paper presents how the touch-down events have been carried out with onboard GNC system and operational design with the flight data of the second TD to Ryugu with GSP.