IAF SPACE EXPLORATION SYMPOSIUM (A3)
Small Bodies Missions and Technologies (Part 2) (4B)

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MASCOT OPERATIONS ON RYUGU – FOCUS ON SPECIFIC TASKS

Abstract

Hayabusa2 is an asteroid sample return mission operated by the Japanese space agency, JAXA. It was launched in December 2014. In July 2018, the spacecraft has reached the mission target after a 4-year-long cruise. The objective is a C-type primordial asteroid called Ryugu, in search of organic and hydrated minerals that might give essential clues for the solar system formation. The small lander MASCOT (Mobile Asteroid surface SCOuT) carried aboard Hayabusa2 landed on the surface on the 3rd of October 2018 for preliminary in-situ investigations while the probe is aiming to study Ryugu on a global scale and to return samples to Earth. MASCOT was jointly developed by the German Aerospace Centre (DLR) and the Centre National d'Etudes Spatiales (CNES). It is equipped with a sensor suite consisting of four fully-fledged instruments. DLR was responsible for developing the MASCOT lander and ground segment, and was in charge of planning and conducting lander joint operations from MUSC. CNES supplied the hyperspectral IR spectrometer (MicrOmega, IAS Paris), antennae and power system, provided a support to operations and was in charge of the flight dynamics aspects of the mission. The 17 hours of on-asteroid operations exceeded expectations and the overall landing and operations were a huge success. Indeed the characteristics of the Ryugu asteroid such as the shape and the gravity were known only after arrival of Hayabusa2 in July 2018 and the operating ccontext was very constrained but did not provide from fulfilling the objectives. This paper is a complement to the overall paper on MASCOT landing and first results. It will focus on several operational tasks such as communication and power subsystems assessments as well as flight dynamics computations needed in real time and a posteriori.