

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

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MASCOT – PREPARATIONS FOR ITS LANDING IN 2018: A STATUS UPDATE FROM GROUND AND SPACE ONE YEAR AHEAD OF THE LANDING ON RYUGU

Abstract

Launched in December 2014 the Japanese spacecraft Hayabusa2 and its small passenger MASCOT (Mobile Asteroid surface SCOUT) have meanwhile successfully performed half of their 4-year-long voyage to reach their target body, asteroid (162173) Ryugu, formerly referred to as 1999 JU3. While Hayabusa2 is aiming to characterize Ryugu on a global scale and to return samples to Earth, MASCOT's mission is to land on the surface, perform in-situ investigations and thus provide ground truth and context information for the overall Hayabusa2 science activities.

The lander was jointly developed by the German Aerospace Centre (DLR) and the Centre National d'Etudes Spatiales (CNES). It is equipped with a sensor suite of four scientific instruments: a hyperspectral IR spectrometer (MicrOmega, IAS Paris), a camera (MASCAM, DLR Berlin), a radiometer (MARA, DLR Berlin) and a magnetometer (MasMag, TU Braunschweig) to investigate Ryugu's surface structure, composition and physical properties including its thermal behavior and magnetization.

The planned sequence of measurements will be repeated after MASCOT's relocation on asteroid surface. Therefore a mobility subsystem was developed to make MASCOT jump due to applied jerk of an eccentric mass inside the System.

Since the characteristics of Ryugu such as the exact orientation of the rotation axis, the thermal conditions, shape and surface structure will be known only after arrival of Hayabusa2 in July 2018 there is only a few weeks available to select a landing site and refine the specific MASCOT mission parameters according to the conditions found, before the landing can take place, in October 2018. MASCOT's on-asteroid lifetime is limited by the capacity of its primary battery which is the main driver to make maximum use of the

given time.

In order to prepare MASCOT's operation within these constraints, both, space and ground systems have to be well prepared and descent and on-asteroid phases need to be rigorously planned and tested.

This paper will summarize the already performed and planned in-flight activities such as health checks, calibration activities, data transfer tests and will report on MASCOT's overall health state. Beyond that all on-ground activities such as the landing site selection process, the verification of operational timelines, planning and training aspects will be outlined.