MASCOT –a Mobile Lander on-board Hayabusa2 Spacecraft - Operations and Status after Launch

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MASCOT (‘Mobile Asteroid Surface Scout’) is a 10 kg mobile surface science package on board JAXA’s Hayabusa2 spacecraft, currently on its way to the near-Earth asteroid (162173) Ryugu. MASCOT has been developed by the German Aerospace Center (DLR) in cooperation with the Centre National d’Etudes Spatiales (CNES). The concept of MASCOT is to perform in-situ measurements on the asteroid’s surface and to support the Hayabusa2 mission in the sampling site selection. MASCOT is equipped with 4 scientific instruments, a wide angle camera, a hyperspectral IR microscope, a radiometer and a magnetometer. MASCOT is powered by a primary battery which shall enable MASCOT to investigate the asteroid surface for up to 2 asteroid days. An internal mobility mechanism shall relocate MASCOT on the asteroid surface to investigate different landing sites in detail.

MASCOT will be separated at a low altitude above the asteroid surface and its science activities will already start during the descent phase. After touching the asteroid surface MASCOT will bounce across the asteroid surface till it comes to rest. After autonomous self-rightening the scientific surface operations will start. Hayabusa2 will hover above the asteroid surface near the sub-solar point. MASCOT will also operate autonomously without visibility to its mother spacecraft during the asteroid night-time. The MASCOT system and its operational concept are designed to enable an optimum science return within its lifetime, which is driven by the capacity of the battery.

After an intensive development, integration and test campaign MASCOT is now on its way to its target Ryugu. Hayabusa2 launch took place on December 3rd, 2014 from Tanegashima Space Center, Japan. The target asteroid will be reached in summer 2018. Several In-Flight activities like health check and calibration of the scientific instruments have been performed on MASCOT during the past 2.5 years of the 4 years cruise phase. In cooperation with the Hayabusa2 team the MASCOT team is presently planning and testing the on-asteroid phase. First tests of an on-asteroid baseline scenario were performed with a functional-representative MASCOT Ground Reference Model. For environmental tests a MASCOT flight spare model is available.

The presentation will provide an overview of the MASCOT system and its planned operation concept on the asteroid as well an update of MASCOT status and its first operations in cruise.

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