

**Abstract for 11th Low Cost Planetary Missions Conference
June 9-11, 2015, Berlin, Germany**

MASCOT - Asteroid Lander with innovative Mobility Mechanism

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The Mobile Asteroid Surface Scout (MASCOT) is already on its way to the C-type asteroid 1999 JU3. On 3rd December 2014 at 05:22 CEST, an H IIA launch vehicle lifted off from the Tanegashima Space Center and the Hayabusa 2 spacecraft together with its MASCOT lander began their journey through space. After a cruise of almost four years, Hayabusa 2 with MASCOT will reach their target, where MASCOT will descend to the surface of the Asteroid 1999 JU3. The innovative hopping mechanism, which was developed at the Robotics and Mechatronics Center (RMC) allows the lander to upright to nominal position and to relocate on asteroid surface by hopping. A big advantage of this movement principle is the independence of the surrounding environment on the asteroid like rocks, craters and so on. Based on Multi-Body-System simulation the drive was developed and verified by a zero-g flight campaign. Based on the DEXHAND experience, the high power drive system could be realized in a very space saving way. This was necessary due to the small envelope of the MASCOT lander package and the very limited mass budget of only 10 kg. The challenges for the development of this drive system were the space and mass restrictions on the one hand and to overcome the risk of cold welding during the long cruise phase of approximately four years. During the cruise phase multiple check outs will be performed. These check outs could be used to analyze the health of the overall system including the mechanical parts. The possible increase of friction will result in an increased motor current which is one of the parameters that will be monitored during the active check out of the mobility subsystem. This poster gives an overview of the mission and the actual state of the MASCOT lander.