

IAF SPACE EXPLORATION SYMPOSIUM (A3)  
Moon Exploration – Part 3 (2C)

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LUNAR VOLATILES MOBILE INSTRUMENTATION (LUVMI) PROJECT'S RESULTS

## Abstract

The International Space Exploration Coordination Group (ISECG) identifies one of the first exploration steps as in situ investigations of the Moon or asteroids. Europe is developing payload concepts for drilling and sample analysis, a contribution to a 250kg rover as well as for sample return. To achieve these missions, ESA depends on international partnerships. Such missions will be seldom, expensive and the drill/sample site selected will be based on observations from orbit not calibrated with ground truth data.

By making use of an innovative, low mass, mobile robotic payload following the LEAG recommendations, many of the international science community's objectives can be met at lower cost.

As a main objective LUVMI (European Commission Horizon 2020 co-funded project) is designed specifically for operations at the South Pole of the Moon with a payload accommodated by a novel lightweight mobile platform (rover) with a range of several kilometers.

Over the 2 past years, the key LUVMI scientific instruments (volatiles analyzer and volatiles sampler) were successfully developed and validated (up to TRL 5-6). In addition a ground prototype of the LUVMI rover was developed and tested in a series of outdoor trials, in rocky and sandy environments. This rover, with a target mass of 40kg for a flight version, features an adjustable height chassis to adapt to terrain roughness and allowing to bring instruments very closely and precisely to the surface. The locomotion capabilities of the LUVMI rover could be fully tested as part of the project. Novel light field camera perception system was additionally implemented for the rover.

This paper reports on project results and lessons learnt, and gives indications of how LUVMI may be further matured to target potential mission slots in the mid-2020s, as part of ESA mission and/or supported by private funding.