

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 1 (2A)

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OHB INSTRUMENTS DEVELOPMENT FOR VOLATILE SCOUTING ON THE MOON

Abstract

Following up on several different confirmations of enhanced concentration of bound water, ice, and other volatiles in the near-surface regolith of the Earth's moon (especially in the polar regions), OHB has been working on payloads that are capable of detecting and characterising volatile species on future lunar surface missions. Thus far, no landing mission to the Moon has accessed such materials in situ whilst they represent a potentially easily extractable resource for use in extended space operations by humans. In 2016, OHB Munich, along with other partners from European countries, has started the LUVMI payload study, through a grant awarded by the EU's Horizon 2020 technology programme. LUVMI stands for "Lunar Volatiles Mobile Instrumentation" and is led by Space Applications BV from Zaventem, Belgium. Other partners are: the Open University (UK), DIA (UK), and Munich Technical University (TUM / LRT). The objective of the 2-year project is to develop an end-to-end demonstrator of an instrument that would detect and characterize volatiles in the lunar soil. To OHB Munich and TUM / LRT, LUVMI presents a follow-on activity to the LUISE-2 DLR-funded project performed between 2012 and 2015. LUVMI is a drill-like instrument that performs no sampling but emplaces an electric heater into the soil to shallow depth for liberating embedded volatiles that in turn are detected by a miniature mass spectrometer. To enable 'scouting-type' measurements across a larger area, the LUVMI scenario envisions a small rover carrying the actual instrument, deploying it along rover traverse stops. On the other hand, LUVMI can be considered a self-standing payload to be accommodated on lander spacecraft or rovers by other space agencies. The electro-mechanical subsystem of the LUVMI instrument has just been integrated and is now undergoing functional testing, including in simulated lunar conditions. LUVMI can be seen in the same line of OHB Munich projects as the ESA ExoMars rover Sample Handling Subsystem (SPDS) and a newly started study for ESA on the ISRU (In Situ Resource Utilisation) Demonstration Mission to the Moon. ISRU DM intends to show that extraction of volatiles (such as water) and oxygen from lunar near-surface regolith is practical and effective, thus for the first time demonstrating ISRU as a disruptive technology on the Moon.