

Lunar Exploration (3)

Lunar Concepts (3)

Author: Dr. Lutz Richter

OHB System AG - Munich, Germany, LUTZ.RICHTER@OHB.DE

Ms. Diana Dobrea

OHB System AG - Munich, Germany, ext.diana.dobrea@ohb.de

Ms. Andrea Jaime

OHB System AG - Munich, Germany, andrea.jaime@ohb.de

Ms. Janos Biswas

Technische Universität München, Germany, j.biswas@tum.de

Mr. Philipp Reiss

Technical University of Munich, Germany, p.reiss@tum.de

## 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 soil in the polar regions of the Moon, 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.

OHB Munich, along with other partners from European countries, in 2016 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 Belgium. Other partners are: the Open University (UK), DIA (UK), and Munich Technical University (TUM / LRT). The objective of the 2-year study 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, and OHB have already initiated discussions in this regard with Chinese entities vis-à-vis the Chang'e 6 mission opportunity in the early 2020's.

Another line of OHB activities are commercial mission opportunities to the Moon on which OHB have been approached regarding the provision of sampling systems for lunar volatiles scouting missions. Such sample acquisition systems are low mass and low power and are based on earlier work at OHB and by others in Germany, including OHB's on-going development of the sample handling mechanisms (SPDS) for the ESA ExoMars rover. Also related to the OHB experience from the SPDS is a sample presentation / positioning system studied by OHB at Phase A level for the ProsPA analytical instrument considered an ESA contribution to the Russian LUNA 27 lunar polar landing mission planned for the early 2020's.