

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

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## LUVMI-X: AN INNOVATIVE INSTRUMENT SUIT AND VERSATILE MOBILITY SOLUTION FOR LUNAR EXPLORATION

### Abstract

The 2018 ISECG Global Exploration Roadmap stated that future lunar exploration activities must be affordable and incorporate innovative approaches, meet exploration objectives as well as providing public benefits, be able to evolve and incorporate standard interfaces and support the preparation of human presence on the moon. This analysis was comforted by a Global Exploration Roadmap (GER) supplement in 2020. Aligning on this guidance, and leveraging former LUVMI project outcomes, LUVMI-Extended (LUVMI-X), in addition to mapping the lunar surface and subsurface for volatiles also aims to:

1. Generate a deeper understanding of lunar resource potential by developing new instruments and new techniques to detect volatiles in new locations not accessible by the mobile instrumentation.
2. Incorporate new instruments and techniques to study the lunar environment and its effects on human health (dust, radiation).
3. Address sustainable presence on the lunar surface by making key measurements associated with in-situ resource utilisation (ISRU).
4. Developing an architecture that makes the lunar surface accessible to key enabling technologies such as new instruments and new power generation techniques.

Noticeably LUVMI-X incorporates three innovative low mass payload families:

- Mounted payloads for local remote sensing through “geochemical vision”, based on standardized mounting interface
- Droppable payloads for long-duration environmental monitoring
- Launchable payloads to analyse areas not accessible to the mobile instrumentation.

All these three payloads categories can be accommodated on the LUVMI-X rover - a mobile platform based on, and extending the original LUVMI rover. Modular payload accommodation was a major driver for the LUVMI-X rover, with the aim of making it an appealing small-size ( 60 kg dry mass), versatile mobility platform that may serve as a competitive mobility solution baseline for recurrent lunar missions in the coming years. This paper presents the LUVMI-X instruments developed through the project, as well as the LUVMI-X platform hosting these instruments. Latest analogue test results are presented with the integrated LUVMI-X system.