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Systems and Infrastructures to Implement Sustainable Space Development and Settlement - Technologies  
(2B)

Author: Dr. Serge Chevrel

Institut de Recherche en Astrophysique et Planétologie (IRAP), France, Serge.Chevrel@irap.omp.eu

Prof.Dr. JEAN JACQUES FAVIER

Spartan Space, France, ps1sts78@gmail.com

Mr. Nisheet Singh

Spartan Space, France, n.singh@spartan-space.com

Dr. Yves Daydou

Institut de Recherche en Astrophysique et Planétologie (IRAP), France, yves.daydou@irap.omp.eu

Dr. Julie Patarin-Jossec

Spartan Space, France, j.jossec@spartan-space.com

Dr. Peter Weiss

Spartan Space, France, p.weiss@spartan-space.com

PLATFORM FOR AN IN SITU LUNAR SAMPLES PRE-ANALYSIS - PRELIMINARY CONCEPTS  
AND REQUIREMENTS FOR A FACILITY IN EUROHAB

**Abstract**

A new era of space exploration has begun with the return of crewed missions to the lunar surface under the US-led ARTEMIS program. These missions will focus on a limited geographic zone: the lunar South Pole. Concentrating several missions to the same spot bears a significant advantage from a Concepts of Operations point of view: Different missions or crews can share the same instruments in order to reduce launch mass and increase efficiency. The analysis of rocks taken at the surface of a planetary bodies are essential to understand the formation and evolution of this body. During future missions on the Moon, astronauts will carry out extravehicular activities (EVA) during which numerous rock and soil samples will be collected for geological purposes and to evaluate the ISRU potential. The weight and volume constraints for their return to Earth will require to make a selection of the samples on the Moon. Unlike the Apollo era, where a selection had to be done in real time during the sampling by the crew in communication with the scientists on ground, the new mission configuration bear the possibility to use an analysis platform that allows to examine samples and to perform a deeper evaluation of which sample has to be brought back (immediately or by a consecutive mission) according to its degree of scientific interest, or left on the Moon. This paper proposes to develop an instrumentation for the pre-analysis of lunar rock and soil samples which can be hosted in the European secondary habitat EUROHAB. The interest of such a facility is to achieve a priority among the samples to be returned to Earth, which considerably increases their scientific value. The interest is also to understand in real time the geology of the site (for science and ISRU purposes) and possibly reorganize future EVA, according to the results from the analyzes. This facility will also allow to validate analysis methods for future habitats or on board mobile laboratories (robotic or crewed) on the Moon (and Mars). The objective of our study is to evaluate the sample conditioning procedures for their analysis, the methods and the instruments necessary for the analyses, in connection with scientific teams located in a backroom on the ground.