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Citation

Reilly, H., Foing, B. A. C. H. J. S., Brady, G., Mohan, C., McGrath, K., Lakomiec, P., ...
Pagano, I. (2021). Instruments operations, science and innovation in expedition support:
EuroMoonMars-Etna campaign 2021. *Epsc Abstracts*, EPSC2021-848.
doi:10.5194/epsc2021-848

Version: Publisher's Version

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Note: To cite this publication please use the final published version (if applicable).



Instruments Operations, Science and Innovation in Expedition Support: EuroMoonMars-Etna campaign 2021

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An expedition EMM-Etna to simulate the Lunar and Martian volcanic and soil environment will be carried out at Mount.Etna's Cratere del Laghetto in Sicily, near Catania Italy by the EuroMoonMars TUDublin and LEAPS ExoMars groups. This scouting campaign intends to train in using instruments to be used on MoonMars landers and rovers, with a perspective of ARCHES DLR telerobotics campaign to be conducted in June 2022, and in preparation for ExoMars rover instruments (PANCAM, CLUPI and spectrometers) science and operations.

Figure 1: Lunar Lander and REMMI Rover for Sample Analysis

The aim of this EMM-Etna expedition is to investigate and analyse the terrain with the use of different scientific instruments. The topography of the landscape will be photographed using a 360° panoramic camera and drone; it will be processed, and a 3D model developed. The terrain will also be investigated using the REMMI Rover, the abilities of the rover to operate and transport equipment will be monitored. This will further develop the knowledge available of the terrain and help future expeditions to identify different landmarks. The use of a Radio Jove Antenna will permit the team to monitor transmissions from both the Sun and Jupiter. This will allow different cosmic events or changes in the celestial objects to be studied and explored. On site a selection of different samples will also be collected and examined using the REMMI Rover. An Ocean Optics UV-Vis-NIR spectrometer will be operated in order to evaluate the existence of biological compounds and substances within these samples and in the area itself. It is key to understand the molecular makeup of one's surroundings when in an unknown environment. By analysing samples collected,

spectroscopy can be used to identify and determine a diagnostic for each substance. This process will be monitored by a Logitech camera to ensure it is carried put correctly. A selection of photographs will be captured of each sample using a portable optical microscope. This will allow an in-depth analysis of the microscopic structure of each collected sample. The use of all of the instruments mentioned above is key in the investigation and research into the Moon and Martian-like volcanic environment that is Mount Etna.

We would also like to thank Prof I. Pagano's team from the University of Catania and Dr A.Wedler's team from DLR Deutsches Zentrum für Luft- und Raumfahrt for their support in organising this expedition.