

SPACE EXPLORATION SYMPOSIUM (A3)
Space Exploration Overview (1)

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EXOGEOLAB PILOT PROJECT FOR TESTING LANDERS, ROVERS AND INSTRUMENTS

Abstract

The ExoGeoLab pilot project (supported by ILEWG, ESTEC, NASA Ames and other academic partners) includes a sequence of activities: - Data analysis, merging and interpretation of remote sensing and in-situ data - Procurement and integration of geophysical, geochemical and astrobiological bread-board instruments in an surface station and rover (ExoGeoLab) - Research operations and exploitation of ExoGeoLab test bench for various conceptual configurations (Moon, Mars, NEO, outer satellites) - Contribution to the exploitation of surface lander results - Scientific simulation of planetary surfaces using laboratory and modelling tools - Support research for definition and design of science surface packages on the Moon, Mars, NEO, outer satellites - Research support to community preparation of payload for surface lander opportunities

The methodic steps for this hands-on research are: 1) We have been procuring and adapting instruments to equip a mid-size ExoGeoRover and a small surface station (ExoGeoLab lander). 2) This terrestrial payload (instruments, sensors, data handling) has been deployed, operated and used as collaborative research pilot facility (ExoGeoLab), first tested and operated at ESTEC, and transported at Eifel volcanic park, and some instruments tested in extreme environments such as Utah Desert Research station. 3) We have performed functional tests of these instruments, and operated them in terrestrial conditions to correlate measurements using various techniques. 4) We implemented progressively the possibility of remote control of instruments from an adjacent mobile laboratory and control centre, and a remote science desk. 5) The suite of measurements included a comprehensive set with telescopic imaging reconnaissance and monitoring, geophysical studies, general geology and morphology context, geochemistry (minerals, volatiles, organics), subsurface probe, sample extraction and retrieval, sample analysis. 6) We started to reproduce some simulation of diverse soil and rocks conditions (mixture of minerals, organics, ice, penetrations of water, oxydant, organics) and diagnostics 7) We used these instrument packages to characterise geological context, soil and rock properties, 8) Science investigations have included geology, geochemistry, measurements relevant to penetration/survival of water, oxydant, organics, mineral and volatiles diagnostics. 9) After first validations we have been exploiting the facility for collaboration with partners providing some additional guest instruments, and performing specific investigations, 10) We have been organising field campaigns in specific locations of scientific and exploration interest, making use of logistics support and local operations

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