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EIFEL 2009 FIELD CAMPAIGN: ANALOG ASTRONAUT EXTRAVEHICULAR SURFACE/SUBSURFACE ACTIVITIES AND HUMAN ASPECTS

Abstract

During a 5 day field campaign from 26th -30th September 2009 the Austrian Space Forum (ÖWF) has been invited by the ILEWG (International Lunar Exploration Working Group) to work together with other organisations in Mendig, Germany, in the volcanic Eifel region. In a cascading exploration regime, different hardware and software systems from various groups (e.g. ESA/ESTEC, MECA etc.) worked together to achieve remote sensing, robotic and human exploration objectives. Systems were tested in a setting that is well suited for the simulation of lunar or planetary mission operations. In addition for the first time a simulation spacesuit and a rover have undergone trials in a subterranean setting (the Mendig Lavadome) intended to emulate a typical lunar or Martian lava tube exploration scenario.

The "Aouda.X" spacesuit simulator created by the Austrian Space Forum is designed to study contamination vectors in planetary exploration analogue environments using a special surface coating. It facilitates the simulation of variable suit pressure regimes using tension belts. Sub-systems include: Hard-Upper-Torso, ambient air ventilation, Panox/Kevlar tissue outer hull, modifiable exoskeleton, biomedical and engineering telemetry (including continuous video stream).

An analog rover ("Dignity") with a griper system has been used independently and in conjunction with the Aouda suit. A lander model has been inspected for damage both with rovers and a human simulation astronaut. Samples have been brought back to the lander for further analysis. Hand held Raman spectrometer measurements have been taken by the suit tester. Simulated repair and recovery activities have taken place, aided by a multi-agent system technology supplied by the MECA team (Mission Execution Crew Assistant).

Human aspects like stress, heavy workload, tight schedules, equipment failure, poor communication quality and fatigue have been simulated. Lessons learned from this field campaign are being applied to modify the existing hardware. These experiences were compared to the data obtained during the AustroMars mission simulation of the Austrian Space Forum in 2006 in the Moab desert in Utah.

A significant amount of outreach activities have taken place including hands-on experience for the interested public.

References: [1] Groemer, G. (2008), Planet. Space Sci., doi:10.1016/j.pss.2008.07.021. [2] Groemer, G., Frischauf, N., Soucek, A., Sattler, B. (2007), Mars 2030 Peer reviewed Conf. Proceedings, 2007, pp 4-12.