

SPACE ACTIVITY AND SOCIETY (E5)

The Architecture of Space: New Frontiers of 21st Century Space Architecture and Entrepreneurship for a New Generation of Explorers. (3)

Author: Prof. Bernard Foing
European Space Agency (ESA/ESTEC), The Netherlands

ARCHITECTURE, HUMAN AND OPERATIONS ASPECTS DURING EUROGEOMARS CAMPAIGN AT UTAH DESERT RESEARCH STATION

Abstract

Bernard H. Foing and ExoGeoLab/EuroGeoMars Teams

The EuroGeoMars campaign was proposed in order to assess several human and scientific aspects of future robotic and manned missions on planetary surfaces, as part of the ExoGeoLab pilot project developed at ESTEC in collaboration with European and US investigators. The EuroGeoMars campaign lasted 5 weeks encompassing four sets of objectives: 1) Technology demonstration aspects: a set of instruments were deployed, tested, assessed, and training was provided to scientists using them in subsequent rotations 2) Research aspects: a series of field science and exploration investigations were conducted in geology, geochemistry, biology, astronomy, with synergies with space missions and research from planetary surfaces and Earth extreme environments. 3) Human crew related aspects, i.e. (a) evaluation of the different functions and interfaces of a planetary habitat, (b) crew time organization in this habitat, (c) evaluation of man-machine interfaces of science and technical equipment; 4) Education, outreach, communications, multi-cultural public relations aspects

1) Human and crew aspects: The commander summarised daily the matrix of overall timeline of activities for each crew, complemented by individual questionnaires and daily location and time sheets. We contributed to a food study investigation, and performed our own study with multiple tools and methods (pictures, spectra, jokes). Further human and crew aspect analysis will include synthesis of inputs from the EuroGeoMars three crew rotations (Technical, rotation 1 and 2). Results of these investigations could then be used as inputs for future studies on a next generation of planetary habitats and test-benches. From a field operational point of view, some 40 EVAs were conducted for geology, biology, technology, reconnaissance, and outreach purposes. We limited the duration of the EVAs due to the poor state of the EVA suits and backpacks ventilation system. The two weeks spent in the Hab in semi-confinement and semi-isolation were positive in developing bonds between crew members. We had from the start a mutual support and helping and team spirit.

From a reporting and communication standpoint, the following reports were sent to Mission Support: 13 Commander's reports (6 during the Technical week), 13 Commander's Check-in reports, 13 Engineering reports, internal Science reports and EVA reports, outreach reports. We had number of communications with remote support groups. The proportion of outside emails ranged from work 40-80

Social activities were conducted as a group. All meals were prepared by one person in turn, this person being in charge for the entire day of all kitchen chores. All meals were taken together and were the occasion for planning, briefing and debriefing research, outings and crew activities. We had no time for watching movies, but we filmed ourselves many videos clips and took pictures in all styles. The humour and jokes shared between the crew were worth the best comedies.

2) Outreach, education and inspiration: We produced written, pictures, and video materials that can be used for education, outreach and public relations. Two film crew visitors stayed also in the Hab: Jeanette Groenendaal and Zoot Derks (The Netherlands) on 22-24 Feb to film our activities documenting the operational, research, human, simulation, imaginative and fantasy aspects of Moon-Mars-extreme

Earth exploration. They contributed a journalist report. We had earlier during the Tech crew, the visit of film producer Mark Arabella and film crew for a Moon related National Geographics documentary. Specific crew reports were also prepared for some national and international communication channels, including Planete Mars, ILEWG, COSPAR, IAF, IAA.

3) EuroGeoMars campaign results and future prospects From a human point of view, Crew 77 had a stable core of six crew members, namely Bernard Foing (Commander / Instrumentation / Researcher, Mars-Moon-Earth science and exploration), Pascale Ehrenfreund (Executive Officer / Crew Scientist / Researcher/ Health Safety Officer, astrobiology, planetary) , Ludivine Boche-Sauvan (Crew Chief Engineer / Logistics Coordinator/ Database manager / Researcher, human base aspects/ Food study contact), Cora Thiel (Crew Scientist / Researcher, biologist), Christoph Gross (Crew Scientist / Researcher for geochemistry, XRD, Cyborg), Lorenz Wendt Crew Scientist / Researcher (geophysics, Raman). We had also the return visit of Tech crew member Jhony Zavaleta and three colleagues from Ames on 26 Feb for EVA and experiments before the return of equipment to Ames on 27 Feb. The core crew included three nationalities, from France, Germany, Austria. Outreach guest crew members came from US, the Netherlands, Chile and Peru.

In conclusion, the whole of Crew 77 has obtained and documented an impressive set of results relevant to demonstrate in the field the technology of instruments, perform research in geosciences and biology in the diverse and exciting geology sites surrounding DRS, in support of current space missions, and to prepare future planetary robotic and human missions and inspire the next generation.

Results will also contribute to ongoing studies on Robotic and Human Moon-Mars Exploration by space agencies, ILEWG, IMEWG, IAF, COSPAR, IAA, etc...