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D6.4.1 AMASE Contribution Report

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EXECUTIVE SUMMARY

From 8–21 August 2011, ~30 scientists and engineers involved in Mars exploration took part in the Arctic Mars Analogue Svalbard Expedition (AMASE) 2011 in the Svalbard archipelago, Norway, organized by Hans Amundsen (EPX Expedition lead, on behalf of ESA PRODEX and the Norwegian Space Center) and Andrew Steele (Carnegie Institution Washington Science lead, on behalf of NASA ASTEP). AMASE 2011 was the 9th AMASE expedition in a row since 2003.

The scientific goal of AMASE is to study the geology, geophysics, biosignatures, and life forms that can be found in volcanic complexes, warm springs, subsurface ice, and sedimentary deposits, which are considered good analogues to sites on ancient Mars. This work is carried out using instruments and techniques that will/may be used in future planetary missions, such as NASA's Mars Science Laboratory (MSL), ESA's ExoMars or future Mars sample return missions (MSR). Thus, the expedition provides a platform for scientists and engineers to conduct astrobiology research and test rover instrumentation across a multitude of Mars analogue terrains, both past and present.

While the expedition was underway, researchers lived and worked either in a research station in Ny Ålesund or on board the R/V Lance, a 60m research vessel. Part of the campaign received helicopter support to deploy field teams and equipment and exchange teams between the R/V Lance and Ny Alesund.

This year, the ExoMars PanCam team participated for the fourth year with a PanCam emulator. In addition to that, a WALI (Wide Angle Laser Imager) emulator was part of the equipment. The work was carried out as part of the PRoViScout project. The AMASE 2011 PRoViScout team consisted of Nicole Schmitz (DLR), Arnold Bauer (Joanneum Graz) and Steve Pugh (Aberystwyth University). The PRoViScout instruments were deployed as part of a rover-like instrument suite consisting of ExoMars and MSL instrument breadboards, a suite of life detection instruments and a suite of standard laboratory instruments, which were available in the ship's labs to double-check the results of the breadboard instruments. Details are described in chapter **Fehler! Verweisquelle konnte nicht gefunden werden.**

Main AMASE objectives are to perform stand-alone as well as integrated MSL and ExoMars instrument deployments with the objective to:

- Assess Mars analogue environments for biosignatures and habitability
- Investigate the utility of the MSL, ExoMars and other future Mars-mission payloads to fulfil their science goals regarding future "Search for Life" missions to Mars (test instrument performance, operations and science goals)
- Develop and test protocols to search for past and present habitable environments
- Define a minimal instrument suite for astrobiology science on Mars.

Main objectives of the PRoViScout deployment were:

1. Test and demonstrate the utility of the ExoMars PanCam to correctly identify broad mineralogy, compositional units, geological structures, and morphological biosignatures, and lead a rover-like instrument suite to science targets of astrobiological interest by narrowing down the target space to lithologies of interest. Test and demonstrate the utility of the

PanCam High Resolution Channel (HRC) to enhance the remote identification and characterization of scientific targets.

2. Assess the utility of UV-induced fluorescence measurements using a WALI emulator for the detection of organics and extremophiles in Mars-analogue soils and rocks.

3. Test the AMASE subset of the PRoViScout instrumentation (PanCam+WALI) in combination with other rover instrumentation, in order to learn how to effectively collect and use multi-instrument data to achieve a common astrobiology goal, and to learn how to detect, identify, select and sample compounds, minerals and rock types of interest at suitable spatial and detection sensitivity scales to ensure that the best and most diverse sample set is analyzed.

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