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Integrated ExoMars PanCam, Raman, and close-up imaging field tests on AMASE 2009

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Arctic Mars Analog Svalbard Expedition (AMASE) uses Mars analog field sites on the Arctic islands of Svalbard (Norway) for research within astrobiology and for testing of payload instruments onboard Mars missions Mars Science Laboratory, ExoMars and Mars Sample Return. AMASE 2009 marked the seventh consecutive year of field testing. Instrument shakedowns were arranged to mimic rover operations on Mars and included the panoramic camera (PanCam), mineral- and organic chemistry sensors (Raman-LIBS) and ground penetrating radar (Wisdom) onboard ExoMars together with CheMin and SAM instruments onboard MSL and testing of sampling and caching protocols using JPL´s Fido rover. Test sites included volcanic rocks within the Bockfjord Volcanic Complex (BVC) with carbonate deposits identical to those in ALH84001 and Carboniferous sandstones and paleosols at Ismåsestranda.

In view of the 2018 ExoMars mission, field models of the PanCam and Raman instruments, as well as an Olympus E410 camera having similar technical specifications to the ExoMars Close-Up Imager (CLUPI) were used in an integrated exercise to characterise the geology and habitability of the different field sites.
The BVC locality consisted of volcanclastic sediments deposited on the flanks of the 1 Ma old Sverrefjell volcano. This volcano is constructed of primitive alkaline basalt with abundant mantle xenoliths. The sediments were a mixture of hyaloclastite, ash, volcanic bombs, lava detritus, and xenoliths (peridotites, granulites) deposited in a roughly laminated fashion on the slopes of the volcano. Late stage carbonate deposits were also present. The Ismåsestranda locality consisted of fine-grained sandstone deposited in a littoral environment. The sandstones were characterised by a variety of sedimentary structures reflecting a marginal marine depositional environment. They were highly variegated in colour due to diagenetic remobilisation of trace elements.

PanCam made general context observations using the stereo Wide Angle Camera for taking images at 12 VIS-NIR wavelengths. More detailed images were made with the narrow angle colour High Resolution Channel of PanCam (PanCam HRC). These images were complimented by colour images made at 50-7 cm distance from the rock targets by the CLUPI-simulator camera. Compositional information was provided by the Raman spectrometer.The images and analyses obtained from the instruments permitted preliminary characterisation of the geological context at the two test sites. However, full characterisation of the rocks using more than one site is necessary to correctly interpret the nature of the rocks and their environment of formation, especially in the case of the Ismåsestranda sediments.

Joint testing of ExoMars, MSL and MSR instruments on AMASE provides a unique opportunity to high-grade instrument selection for future Mars missions and to foster collaboration between ESA and NASA teams towards the tandem launch of ExoMars and MAX-C in 2018.