ExoMars PanCam field testing during the 2009 Arctic Mars Analogue Svalbard Expedition (AMASE).

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Abstract: The ExoMars mission as the first element of the ESA Aurora program is scheduled to be launched to Mars in 2016.The ExoMars rover will be equipped with a suite of analytical instruments for exobiology research (the Pasteur payload). As Part of Pasteur, the Panoramic Camera system PanCam is specifically designed for visual characterization of the rover's surroundings and remote detection of potential sample sites. It consists of two wide angle multispectral cameras (WAC), each with a field-of-view (FoV) of 34° square, and a monoscopic camera (High Resolution Camera, HRC) currently designed to have a 5° FoV. PanCam is the primary source for 3D overviews and context for the ExoMars experiment locations, required to enabling the exobiological aims of the mission. [3]

For field testing of a PanCam demonstrator in a representative environment the ExoMars PanCam team joined the Arctic Mars Analogue Svalbard Expeditions (AMASE) in 2008 and 2009. This annual expedition takes place in the Svalbard archipelago, Norway, which is considered to be an excellent site, analogue to ancient Mars. In each of these expeditions an international crew of scientists and engineers involved in Mars exploration including the MER, MSL and ExoMars robotic missions, as well as human space flight planning, conducted instrument testing and simulated Mars mission training exercises. Twelve instruments were deployed in the field, testing their individual capabilities and utility within an instrument suite, as well as the performance during simulated Mars mission conditions. This work has been carried out by using instruments, a rover (NASA's Athena and Cliff-Bot rover), and techniques that will/may be used in future planetary missions, thereby providing the capability to simulate a full mission environment in a Mars analogue terrain.

Main objectives for PanCam were the test and verification of the interpretability of PanCam data for in-situ geological context determination and scientific target selection. During integrated instrument deployments and mission training exercises, PanCam's stereo capabilities have been used to produce Digital Elevation Models (DEMs), and rendered virtual reality views of the of the science sites, being the main means for quick decisions on further scientific operations in the whole (simulated) mission context. In addition, the mosaiking of panoramas in a true spherical coordinate system enabled the identification and location of scientifically interesting sites and their incorporation in the overall context. Telephoto imaging of distant or hard to access features from HRC within selected regions of the panorama provided high resolution information of regions of special interest. [1]

To process the collected data, a first version of the preliminary PanCam 3D reconstruction processing & visualization chain was used. The current status of implementation of the PanCam vision ground processing workflow supports key functionalities such as panorama mosaiking, generation of textured triangular meshes and Digital Elevation Models (DEMs) in different projection geometries (Cartesian, spherical, cylindrical) from stereo images, and the fusion of WAC (filtered in various wave lengths) and HRC image data. [2]

Airborne images with the HRSC-AX camera (airborne camera with heritage from the Mars Express High Resolution Stereo Camera HRSC), collected during a flight campaign over Svalbard in June 2008, provided large-scale geological context information for all field sites.

References: [1] Schmitz, N. et al. (2009) Geophysical Research Abstracts, Vol. 11, EGU2009-10621-2. [2] Paar, G. et al (2009) 9th Conference on Optical 3-D Measurement Techniques, July 1 – 3, 2009, Vienna, Austria. [3] Griffiths, A.D. et al. (2006) International Journal of Astrobiology 5 (3): 269–275, doi:10.1017/ S1473550406003387.

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