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THE HIGH RESOLUTION STEREO CAMERA (HRSC) EXPERIMENT ON THE EUROPEAN MARS EXPRESS MISSION

Gerhard Neukum[1], Harald Hoffmann[2], HRSC Science and Experiment Team Neukum Gerhard

[1] DLR-IWP, [2] DLR Berlin

Imaging Mars is one of the main goals of the European Mars Express mission and will be performed by the German High Resolution Stereo Camera (HRSC). The HRSC experiment is a pushbroom scanning instrument with 9 CCD line detectors mounted in parallel on the focal plane. Its unique feature is the ability to obtain nearly simultaneously imaging data of a specific site at high resolution, with along-track triple stereo, with four colours, and at five different phase angles, thus avoiding any timedependent variations of the observation conditions. An additional Super-Resolution Channel (HRSC-SRC), a framing device, will yield nested-in images in the meterrange thus serving as the sharpening eye for detailed photogeologic studies. The spatial resolution from the nominal periapsis altitude of 250 km will be 10 m/pixel and 2.3 m/pixel for the HRSC-SRC. The manufacture of the flight hardware has been accomplished. Before delivery of the flight model to ESA in January 2002, tests of the instrument were performed demonstrating its imaging capabilities and performances. During the nominal operational lifetime of the mission of 1 Martian year, it will be possible to cover at least 50% of the Martian surface at a spatial resolution of better than 15 m/pixel. More than 70% of the Martian surface can be observed at a spatial resolution of better than 30 m/pixel, while more than 1% of the surface will be imaged at about 2.5 m/pixel. HRSC on Mars Express will be able to close the existing gap between medium to low-resolution coverage on the one hand and the very high resolution images of Mars Global Surveyor as well as the in-situ observations and measurements by landers on the other hand. The HRSC on Mars Express will make a major contribution to the study of Martian geosciences with special emphasis on the evolution of the Martian surface in general, the evolution of volcanism, and the role of water throughout the Martian history. The instrument will obtain images containing morphologic and topographic information at high spatial and vertical resolution allowing the improvement of the Martian cartographic base down to scales of 1:50,000. In order to optimize the science return, a thorough selection of primary target sites is actually performed by the international Co-Investigator team comprising 40 scientists from 10 countries. This experiment will also address atmospheric phenomena and atmosphere-surface interactions and will provide urgently needed support for ongoing and future lander missions as well as for exobiological studies.