

HRSC on MEX - Operational Data Processing from Raw Data to Digital Terrain Models

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The HRSC onboard Mars Express is a multi-line pushbroom scanner which returns to Earth a large volume of raw image data from 5 panchromatic stereo channels and 4 spectral bands (Neukum et al, 2004). A completely automated ground data processing line has been developed in the past years and is being applied on a routine basis for data from each MEX orbit. The processing includes the conversion of the original data stream transmitted to ground to de-compressed data (Level-1 data), the radiometric correction of the image data (Level-2 data), the calculation of orbit and pointing information for each image line, and a first rectification to standard scales of up to 12.5 m/pixel (Level-3 data) using a-priori topography information from MGS MOLA.

Level-2 and Level-3 data from HRSC's Super Resolution Channel (SRC) in scales of up to 2.5 m/pixel complete the HRSC systematic data products. Level-2 and Level-3 images are typically ready for distribution to the HRSC Co-Investigator team within one day after data acquisition.

An automated photogrammetric processing chain is started after the completion of Level-2 data. The first goal is to derive Digital Terrain Models in a standard 200 m grid. These DTMs are finally used for the generation of orthoimages from the high-resolution nadir channel and all 4 spectral bands. This standardized processing provides 3D and image data products within a few days after data acquisition for first science analyses. Though based on nominal pointing and reconstructed orbit information the standard Level-4 data products have a mean absolute accuracy of a few hundred meters in planimetry and height.

Reference:

Neukum, G., Jaumann, R. and the HRSC Co-Investigator Team, 2004. HRSC: The High Resolution Stereo Camera of Mars Express. ESA Special Publications SP-1240.