



Derivation of high-resolution topography from Mars Express HRSC data

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The High Resolution Stereo Camera (HRSC) experiment onboard the European Mars Express Mission has been specifically designed for 3D mapping purposes [1]. The multi-line pushbroom stereo scanner features 5 (panchromatic) stereo and 4 multi-spectral channels, all of which are operated simultaneously. For the stereophotogrammetric analysis of HRSC data, a comprehensive software system comprising procedures for image correlation, object point determination, DTM interpolation and map projection has been developed at DLR [2]. Additional tools for orbit and pointing adjustment have been developed within the HRSC Co-Investigator team [3].

The results of surface reconstruction strongly depend on variable parameters such as ground resolution, data compression, scene contrast, the quality of the orbit and pointing information, and variation of image texture - particularly the occurrence of weakly textured regions and high optical depths. Processing by fixed standard parameters does not address these variable data characteristics. This contribution focuses on the stereophotogrammetric analysis of Mars Express HRSC data at full spatial resolution, applying experimental procedure setups and pre-processing steps. We focus on the improvement of the interior accuracy of the DTM, assess quantitative quality indicators relevant to the spatial resolution of the derived data product, and compare the results to external data sources.

Mars Express HRSC has begun its imaging campaign on January 9, 2004. Since then,

we analyzed more than 30 selected orbits at high resolution, and we obtained DTM with mean point accuracy from intersections of up to 10 m (i.e. in the sub-pixel domain) and lateral resolutions of 50-100 m.

References: [1] Neukum, et al. 2004, ESA SP-1240. [2] Scholten et al. 2005, *Photogr. Eng. Rem. Sens.*, *subm.* [3] Albertz et al. 2005, *Photogr. Eng. Rem. Sens.*, *subm.*