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Assessment of HRSC Digital Terrain Models Produced for the South Polar Residual Cap

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The current Digital Terrain Models available for Mars consist of NASA MOLA (Mars Orbital Laser Altimeter) Digital Terrain Models with an average resolution of 112 m/ pixel (512 pixels/degree) for the polar region. The ESA/DLR High Resolution Stereo Camera is currently orbiting Mars and mapping its surface, 98% with resolution of $\leq$100 m/pixel and better and 100% at lower resolution [1]. It is possible to produce Digital Terrain Models from HRSC images using various methods. In this study, the method developed on Kim and Muller [2] which uses the VICAR open source program together with photogrammetry sofrware from DLR (Deutschen Zentrums für Luft- und Raumfahrt) with image matching based on the GOTCHA (Gruen-Otto-Chau) algorithm [3].
Digital Terrain Models have been processed over the South Pole with emphasis on areas around South Polar Residual Cap from High Resolution Stereo Camera images [4]. Digital Terrain Models have been produced for 31 orbits out of 149 polar orbits available. This study analyses the quality of the DTMs including an assessment of accuracy of elevations using the MOLA MEGDR (Mission Experiment Gridded Data Records) which has roughly 42 million MOLA PEDR (Precision Experiment Data Records) points between latitudes of 78 o -90 o S. The issues encountered in the production of Digital Terrain Models will be described and the statistical results and assessment method will be presented. The resultant DTMs will be accessible via http://i-Mars.eu/web-GIS

References:
[1] Neukum, G. et. al, 2004. Mars Express: The Scientific Payload pp. 17–35. [2] Kim, J.-R. and J.-P. Muller. 2009. PSS vol. 57, pp. 2095–2112. [3] Shin, D. and J.-P. Muller. 2012. Pattern Recognition, 45(10), 3795 -3809. [4] Putri, A.R. D., et al., Int. Arch. Photogramm. Remote Sens. Spatial Inf. Sci., XLI-B4, 463-469

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