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HRSC 3D Image products of the North Polar Layered Terrain of Mars

Alfiah Rizky Diana Putri, Yu Tao, and Jan-Peter Muller

University College London, Mullard Space Science Laboratory, Department of Space and Climate Physics, Dorking, United Kingdom of Great Britain and Northern Ireland (alfiah.putri.15@ucl.ac.uk)

The NASA Mars Orbital Laser Altimeter (MOLA) Digital Terrain Model (DTM) has the greatest coverage available for Mars with an average resolution of 463 m/pixel (128pixel/ degree) globally and 112 m/ pixel (512 pixels/degree) for the polar regions [1]. The ESA Mars Express High-Resolution Stereo Camera (HRSC) is currently orbiting Mars and continuously mapping the surface, 98% with resolutions finer than 100 m/pixel, and 100% at lower resolutions [2]. Previously, 50m/pixel DTMs were produced using a NASA-VICAR-based pipeline developed by the German Aerospace Centre, with modifications from Kim and Muller [3] for the south polar region, using an image matcher based on the Gruen-Otto-Chau (Gotcha) algorithm [4].

In this research, we demonstrate application of the same method to the North Polar [5] region. Forty single strip DTMs have been processed and corrected to produce a north polar HRSC DTM mosaic at 50m/pixel. The assessment of the dataset to MOLA will be discussed. Moreover, a large number (~50) of the North polar HRSC images are co-registered and orthorectified using the DTM mosaic. We also demonstrate observations of the seasonal ice cap growth and retreat using the orthorectified images for Martian Year (MY) 27-32. In addition, the results for MY28-31 are compared against the observations from the Mars Colour Imager (MARCI)[6].

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