**HIGH-PRECISION TOPOGRAPHIC MAP OF THE MARS 2020 LANDING SITE AS PART OF THE MC-13E SYRTIS MAJOR QUADRANGLE DIGITAL TERRAIN MODEL.** A. Neesemann[1], S.H.G. Walter[1], C. Gross[1], R. Jaumann[1], K. Gwinner[2], G.G. Michael[1], B.P. Schreiner,[1] W. Zuschneid[1], D. Neu[1], H. Balthasar[1], C. Rabethge[1], C. Riedel[1], E. Kersten[2], D. Tirsch[2]
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**Introduction**

For more than 17 years, the High Resolution Stereo Camera (HRSC) [1] onboard Mars Express (MEx) has acquired image data of the Red Planet on a global scale and at high resolution. Although outmatched in spatial resolution by the Context Camera (CTX) [2], the High Resolution Imaging Science Experiment (HiRISE) [3] and more recently by the Colour and Stereo Surface Imaging System (CaSSIS) [4], providing essential and high quality data necessary for detailed geological and geomorphological studies, the unique capabilities of the HRSC lie in its virtually simultaneous coverage of large areas by five panchromatic and four narrow band filters (RGB and IR) at different phase angles. Digital Terrain Models (DTMs) resulting from high-precision 3D point accuracy and density usually have a grid space of 50 m with at least one 3D point per grid cell and are subsequently tied to the Mars Orbiter Laser Altimeter (MOLA) global reference system [5]. Thereby, these datasets not only constitute an ideal base for the production of 12.5 mpx$^{-1}$ panchromatic and 50 mpx$^{-1}$ RGB HRSC orthoimages but can also be used for the improvement of SPICE[1] information and the production of orthoimages and higher-level data products of other cameras.

**Data and Methods**

Within the framework of producing multi-orbit bundle-adjusted DTMs [6] and brightness-adjusted panchromatic and colour mosaics [7] for each of the 30 USGS Mars Chart (MC) quadrangles[2], the eastern half of the MC-13 Syrtis Major (Fig. 1) was only recently finished. It covers i.a. the Mars 2020 Perseverance rover landing site within the 49.8-km-sized Jezero crater (Fig. 3). Based on the new HRSC topography data and orthoimages, we improved information of the camera pointing and spacecraft position of CTX data covering Jezero crater by bundle adjustmend using the USGS ISIS[3] application Jigsaw [9]. CTX orthoimages are then calibrated to an external brightness reference [7,10] in order create seamless CTX orthomosaics and pan-sharpened CTX + HRSC RGB color mosaics of the landing site for scientific studies and VR applications.

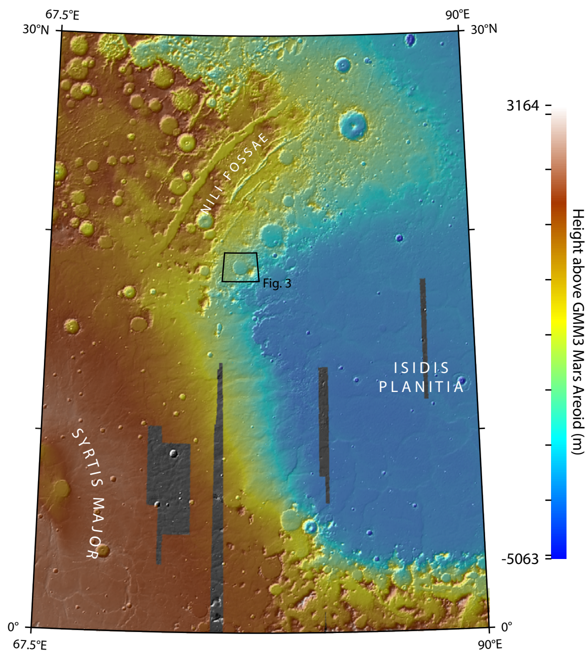


**Fig. 1.** Bundle-adjusted HRSC-based DTM of the eastern half of the MC-13 quadrangle Syrtis Major including large parts of the Isidis basin, the Syrtis Major volcanic complex and thr concentric graben system Nili Fossae. Only few, narrow gaps remain as a result of lower data quality (atmospheric contamination, lower resolution) in these areas.

**Preliminary Investigation, Results, Outlook**

Compared to earlier MOLA-based studies [11] the new data

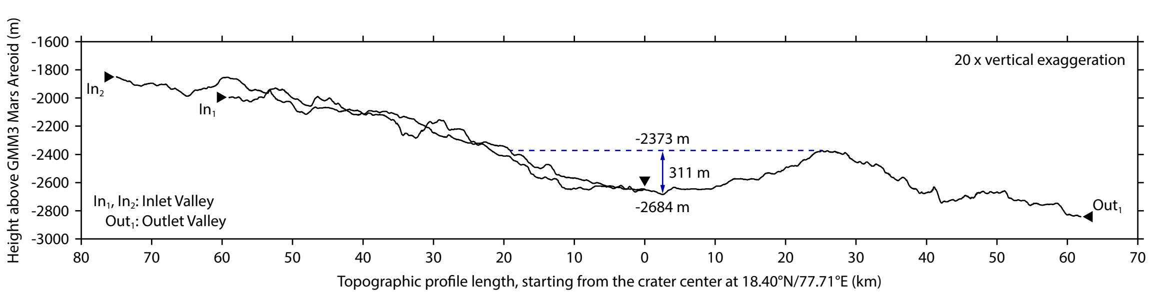


**Fig. 2.** Topographic profiles of the inlet ($In_1$ and $In_2$) and outlet channels ($Out_1$) and across Jezero crater. The dashed line indicates the water level at the end of water inflow and further incision of the outlet channel into the crater. See Fig. 3 for the course of the profiles.

[1]https://naif.jpl.nasa.gov/naif/index.html

[2]To gain an insight into the status of produced higher level HRSC data products please visit https://maps.planet.fu-berlin.de/#map=3/2074498.35/0 [8].

[3]Integrated Software for Imagers and Spectrometers (https://isis.astrogeology.usgs.gov/)

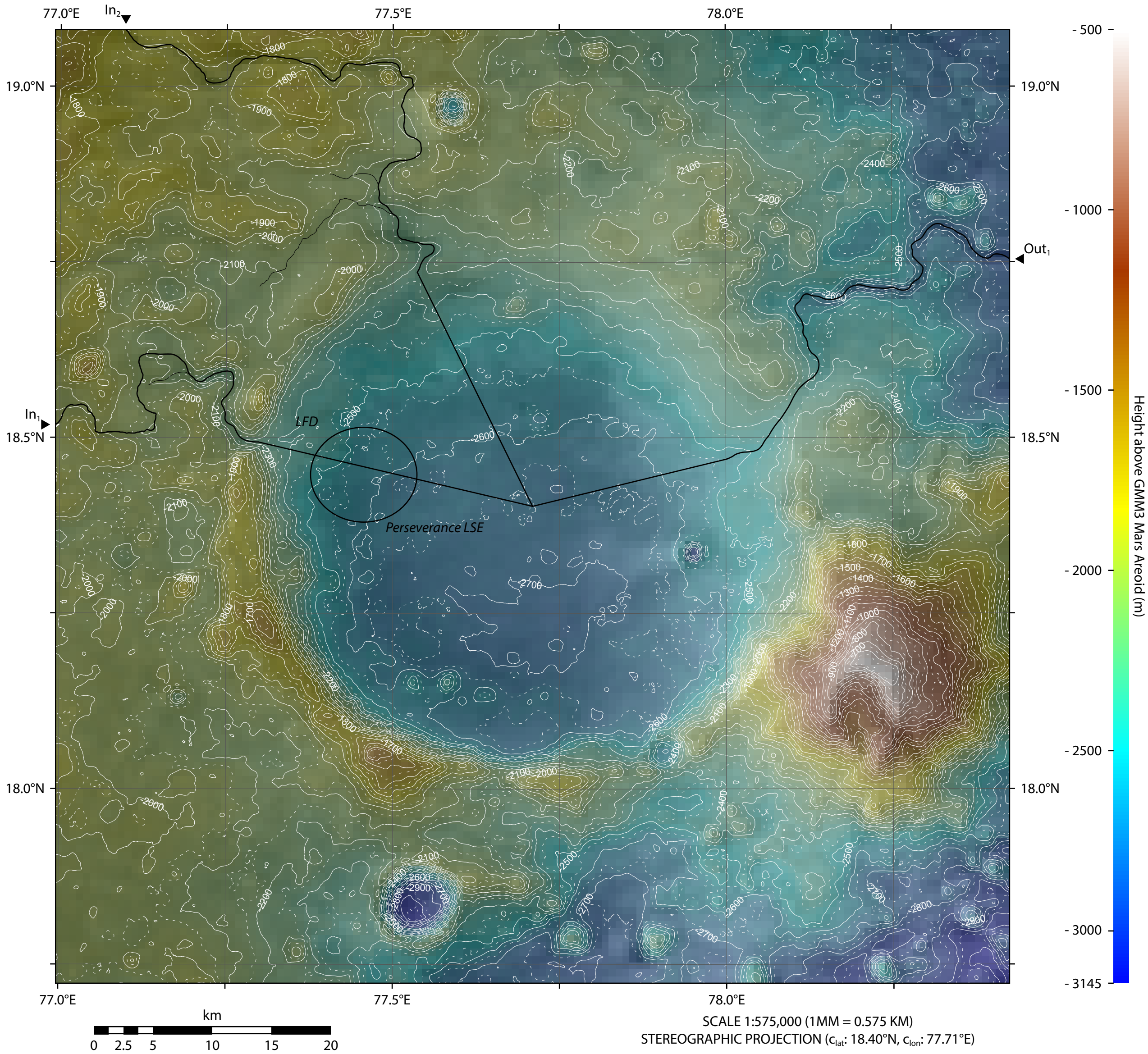


**Fig. 3.** HRSC-based topographic map of the 49.8-km-sized Jezero crater and its surroundings. The solid ellipse indicates the landing site ellipse (LSE) close to the Lacustrine Fan Delta (LFD) in which the Mars 2020 Perseverance rover is supposed to land on February 18, 2021. A high resolution version of this map can be accessed at https://www.geo.fu-berlin.de/en/geol/fachrichtungen/planet/presse/2020_jezero_topo/_content/galerie_li/map-image.jpg?html=1&11214960&ref=111216438.

enable for the first time for detailed geomorphologic investigation of the Jezero crater on a broad scale at high lateral precision. In the first step we calculated the water level when the inflow dried up (Fig. 2 and 3) thus stopping further incision of the outflow channel into surrounding terrains. Further investigation of volumetric flow and erosion rates are in progress with the potential of improving results from previous studies [11].

**Acknowledgement**

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**References**

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