

# A COMBINED TOPOGRAPHIC-THEMATIC MAP OF THE CENTAURI AND HELLAS MONTES AREA, MARS

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### EXTENDED ABSTRACT:

With its entry into the operational orbit in January 2004, Mars Express brings us an unprecedented wealth of spectacular multispectral digital image data of high resolution as well as systematic stereo coverage of the Martian surface. During the past two years, the High Resolution Stereo Camera (HRSC) on board of Mars Express covered more than half of the Martian surface, whereas 27% of the data already obtained is provided in resolutions better than 20 m/pixel. HRSC images are processed systematically to various data levels. Based on these products, high-quality large-scale topographic and thematic image maps are generated. The standard map series for the Mars Express Mission is the *Topographic Image Map Mars 1:200,000*, which covers the planets surface in 10,372 individual map sheets. A sophisticated cartographic concept was developed and forms the basis for the topographic image map series as well as for thematic maps of the Red Planet. The Martian reference body for planimetry is a rotational ellipsoid defined by the International Astronomical Union (IAU) as the *Mars IAU 2000* ellipsoid. An areoid (Martian geoid) is defined as the topographic reference surface for heights. Equal-area map projections are used for compiling the map sheets. Because of its useful mathematical and graphical properties, the *Sinusoidal* projection is applied to map sheets between 85° north and 85° south. For mapping the polar regions the *Lambert Azimuthal* projection was selected. In principle, the cartographic concept perfectly meets all requirements for both mapping features and regions of special interest as well as particular HRSC orbits that don't fit with the sheet line system.

The Centauri and Hellas Montes assembly of remnant massifs, located at 97° East and 38° South, have been interpreted as crustal uplifts and ejected material from the Hellas impact event in early Martian history. Subsequent mechanisms led to formation of adjacent lobate debris aprons which are considered to be composed of a debris-ice mixture with rheological similarities to terrestrial rock glaciers. Recent investigations of this working area resulted in the discovery of a degraded caldera complex, formerly been recognized as impact crater structure. The discovery of this collapsed caldera feature bears new implications on the history of the Eastern Hellas rim assembly. The region was covered in HRSC orbits 2510, 2466 and 0506. In conclusion the recently obtained orbits 2510 and 2466 provided a highly interesting insight in morphologic and geologic features never seen before.

For the generation of this thematic map the cartographic software system, the Planetary Image Mapper (PIMap) has proven to be an essential map production tool. PIMap has been developed at the Technische Universität Berlin and was generally designed for the production of topographic maps, particularly the Topographic Image Map Mars 1:200.000. It comprises all cartographic processing steps such as compilation and nomenclature of the map content including contour lines, generation and placement of graphical elements, e.g. naming of surface features, including the map frame and all necessary marginal elements for every single map sheet. However, while only few post processing steps are required to yield high quality topographic maps, the integration of thematic data is mainly an interactive follow-up work.

The geologic map sheet of the Centauri and Hellas Montes area is spread from 95° to 100° Eastern longitude and 36° to 40° Southern latitude. This new thematic map project is realized in a close co-operation between the German Aerospace Center (DLR) in Berlin-Adlershof, providing photogrammetric processing, the Institute for Geosciences, Remote Sensing of the Earth and Planets, Freie Universität Berlin for the geologic interpretation and the Institute of Geodesy and Geoinformation Science, Technische Universität Berlin, responsible for all cartographic aspects.

With the map of the Centauri and Hellas Montes area the authors present a new design in high-quality thematic cartography which benefits from the quality of HRSC images and DTMs as well as the sophisticated cartographic concept and the flexibility of PIMap.