

A NEW MAP OF MARS. M.A. Caplinger and M.C. Malin, Malin Space Science Systems, P.O. Box 910148, San Diego, CA 92191.

Introduction: We have recently completed the compilation of a new map of Mars using Mars Global Surveyor's Mars Orbiter Camera (MOC) Wide Angle images [1] and a shaded relief map derived from the Mars Orbiting Laser Altimeter (MOLA) global dataset [2]. The map also has contour line and nomenclature overlays and follows the projection and presentation style of the classic USGS single-sheet map [3].

Image mosaic: The image mosaic was constructed from about 1,000 individual "red" (575 to 625 nm bandpass) MOC WA images. The portion of the planet north of latitude -65 was imaged during the "geodesy campaign" of May-June 1999. The south polar region was imaged during mapping phases E12 and E13 in January-February 2002, when the southern polar cap was near its minimum extent.

Brightness matching between images was controlled using lower-resolution MOC global map images, built by hand, as base maps. This global mosaic was processed to a resolution of 64 pixels per degree, so each pixel represents an area on Mars about 1 km on a side at the equator. Image selection and edge blending were done during mosaic construction to remove visible flaws caused by transmission errors, atmospheric conditions, and residual brightness mismatches.

Processing was similar to that described in [4], but with more emphasis on selection of images to avoid atmospheric effects and the correction of previously-undetected artifacts and timing offsets.

Shaded relief and contours: The shaded relief map and topographic contours were generated from the MOLA dataset MOLA-MEG0015_TOPO.IMG, produced in January 2002. Elevations are given referenced to the areoid defined by the Goddard Mars potential model GMM1.6, evaluated to degree and order 50. Elevation is the planetary radius minus the areoid radius. The shaded relief map was created using software which simulated the appearance of the terrain as illuminated by the sun, from the west and at an elevation angle of 45 degrees.

Dataset merging: Each pixel of the MOLA shaded relief map was multiplied by the corresponding pixel of the MOC image mosaic, treated as a normalized, approximately accurate red albedo. This also has the effect of making features seen in the MOC images, but too small to appear in the MOLA shaded relief, visible in the merged map. Final map production was done at

a resolution of 32 pixels per degree. Figure 1 shows a sample of the final map.

Planimetric control: Control points located in the MOLA dataset were used to adjust the MOC camera model, as measured before launch. Subsequent map projection was performed using orientation data derived from the spacecraft star tracker telemetry, and position information derived from Earth-based radiometric tracking of the spacecraft. Images were orthorectified using the MOLA dataset MOLA-IEG0062_RADIUS.IMG. While no further control was performed, the 1-sigma position error of features seen by MOC and MOLA is less than 300 meters.

Coordinate system: This map is referenced to the USGS MDIM 2.0 coordinate system, which is used for targeting by MOC. The planet's figure is defined by an oblate spheroid of equatorial radius 3396.0 km and polar radius 3376.8 km. The prime meridian W0 parameter at the epoch of J2000 is 176.7215 degrees.

In keeping with convention dating back at least to Schiaparelli's 1877 map of Mars (and contrary to recent and to our minds ill-advised revisionism), longitude increases to the west. Latitudes are areographic.

Nomenclature: Feature names are those approved by the IAU. For regional names, for brevity we have elided the feature type in most cases according to common usage; for example, "Arabia Terra" is denoted only as "Arabia." (In our view the distinction between "Planum", "Terra", and "Planitia" is little more meaningful than the historical one between "Mare" and "Sinus", as witness the recent controversy concerning the removal of the official IAU status of the name "Terra Meridiani" and its subsequent provisional reinstatement as "Meridiani Planum".)

Color: An empirical function relating red albedo to blue albedo was derived from Viking and MOC two-color mosaics. This function was used to compute a blue image, and then a green image was synthesized as the average of the red and blue values for each pixel. While this should not be considered true color, it is generally representative of the coloration of the planet.

Availability: The map is available for download at <http://www.msss.com/mapping/>

References: [1] Caplinger M. and Malin M. (2001) *JGR* **106**, 23,595-23,606. [2] Smith D. et al (2001) *JGR* **106**, 23,689-23,722. [3] USGS (1991) I-2179. [4] Caplinger (2002) LPSC XXXIII, 1405.

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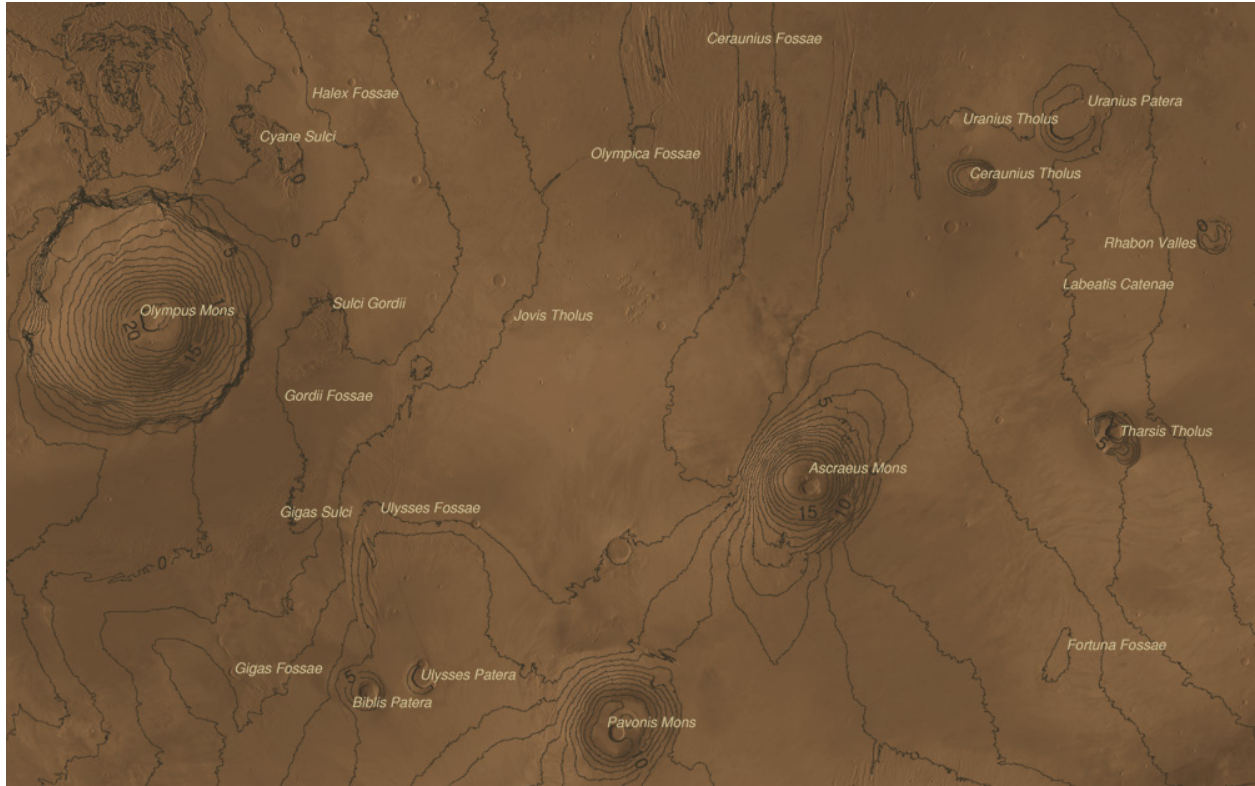


Figure 1: The Tharsis region.