

# A GLOBAL 3-D ANAGLYPHIC VIEW OF MARS DERIVED FROM MARS LASER ALTIMETER DATA.

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**Introduction:** We show synthetic 3-D anaglyphic views of the planet Mars useful for science and education. We derived the images using height information from the Mars Orbiter Laser Altimeter (MOLA) instrument [1]. A global anaglyphic image of the entire Mars is presented in Simple Cylindrical projection. In addition, both poles are shown in Stereographic projection.

**Method:** For the global image we first formed a global Digital Terrain Model by merging the four tiles (<http://pds-geosciences.wustl.edu/missions/mgs/megdr.html>) of the gridded MEGDR products (64 pixel/deg topographic heights). Then, a shaded relief representation of this model with a simulated light source from the upper left was created. Now, two artificial oblique views ( $\pm 25^\circ$ ) of the surface model, textured with the shaded relief, were calculated (Fig. 1). Height information has been exaggerated by a factor of 5 in order to accentuate the 3-D effect.

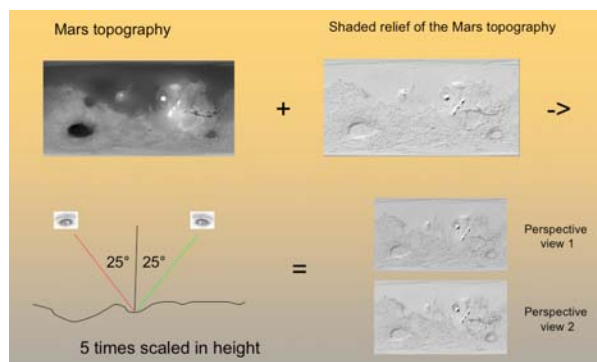


Fig. 1: Computation of two perspective views using the MOLA topography model.

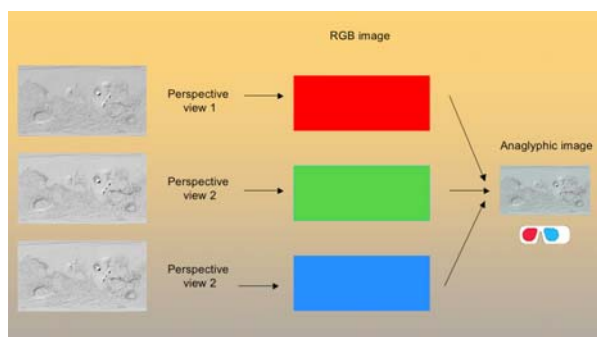


Fig. 2: Creation of anaglyphic images from two perspective views.

These perspective views were finally composed to a stereoscopic red/cyan anaglyph (Fig. 2). The global anaglyphic image in Simple Cylindrical projection is shown in Fig. 3 (reduced resolution, full size is 11,164 lines and 20,230 samples, i.e. approx. 1 km/pxl). Fig. 4 provides an exemplary 3-D view of Apollinaris Patera and crater Gusev in nearly full resolution (use red/blue glasses, red left).

Because of the special MOLA point distribution, we started the creation of anaglyphic images of the poles from the original MOLA (PEDR) profiles (<http://pds-geosciences.wustl.edu/missions/mgs/pedr.html>). PEDR topography data were interpolated to form the initial Digital Terrain Models from  $\pm 70^\circ$  to  $\pm 90^\circ$  for the North and South pole regions. Using special data analysis, more than 20 erroneous outlier profiles were eliminated from the interpolation. Following the procedures described before, shaded reliefs and oblique views were derived. The anaglyphic views of the poles in Stereographic projection are shown in Fig. 5. The full size is 8,311 lines and 8,311 samples each, i.e. approx. 0.3 km/pxl.

**Application:** Synthetically computed anaglyphic 3-D images can be used to support mapping activities, e.g. of tectonic faults [2]. They complement anaglyphic images of the Martian surface derived by stereo cameras or images taken from stereo orbits in different resolutions. These were found to be helpful in other geological/geophysical work and especially for educational purposes.

**Summary:** We present a new global anaglyphic image of Mars useful for science and education. The data will be available online after the conference.

**References:** [1] Smith D. E. et al. (2001) J. Geophys. Res., Vol. 106, No. E10, 23,689-23,722, 2001.

[2] Knapmeyer M. et al. (2006) J. Geophys. Res., Vol. 111, No. E11006, doi:10.1029/2006JE002708, 2006.

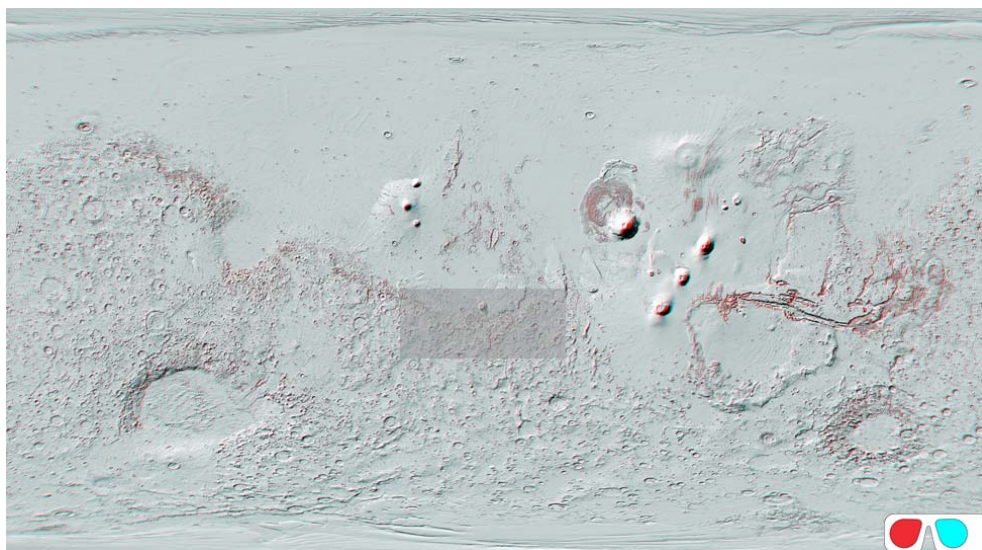


Fig. 3: Global anaglyphic view of Mars in Simple Cylindrical projection from 0° to 360° East longitude (left to right) and -90° to 90° latitude (use red/cyan glasses, red left).

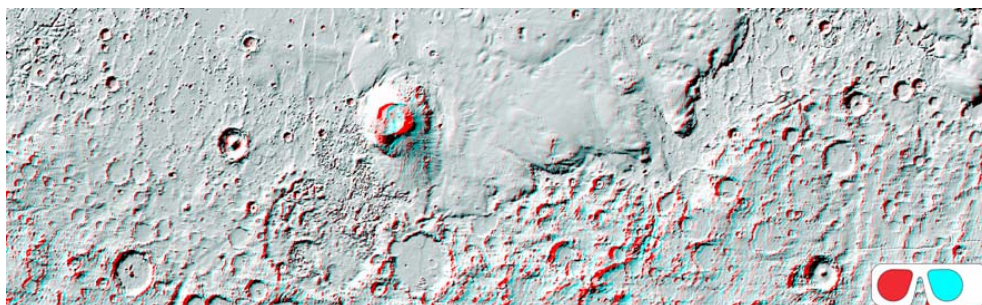


Fig. 4: Detail of the global anaglyphic view, showing Apollinaris Patera and crater Gusev, marked in gray in Fig. 3, (use red/cyan glasses, red left).

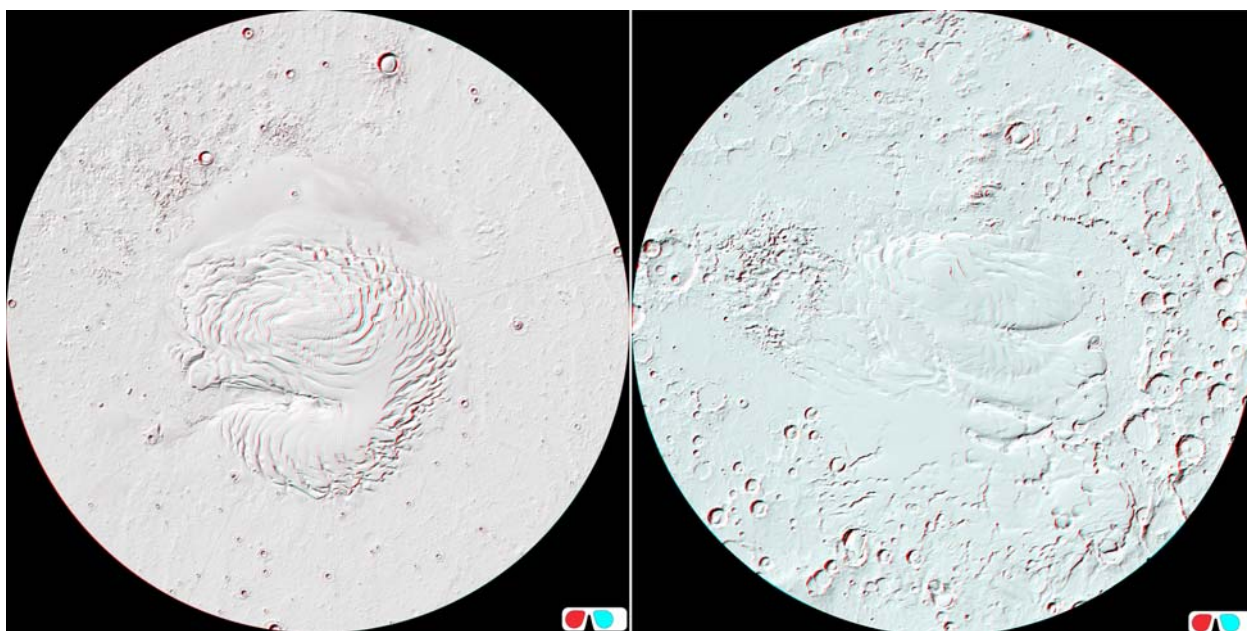


Fig. 5: Anaglyphic view of the Martian North (left) and South pole (right) in Stereographic projection from  $\pm 70^\circ$  to  $\pm 90^\circ$  latitude, 0° East longitude is at the bottom for the North and at the top for the South pole image (use red/cyan glasses, red left).