



Mangala Valles Outflow Region: Morphology and Stratigraphy as seen by the High Resolution Stereo Camera (HRSC).

S. Frei (1), R. Jaumann (1), D. Reiss (1), G. Michael (1), F. Scholten (1), K. Gwinner (1), S. van Gasselt (2), G. Neukum (2), and the HRSC Co-Investigator Team

(1) Institute of Planetary Research, German Aerospace Center (DLR), Berlin, Germany; (2) Institute of Geosciences, Department of Earth Sciences, Freie Universitaet Berlin, Germany.

The Mangala Channel system emanates mainly from one of the graben in Memnonia Fossae. During the first observational period the HRSC experiment on board Mars Express covered almost the entire Mangala Valles head region at high resolution (~ 12.5 m/pxl) in color and stereo.

The high resolution coverage provides an opportunity to identify craters in the small-size range for determining ages. Using the geological map of Craddock and Greeley (1994), we mapped discrete units around the graben on the HRSC nadir images (orbits 286 and 299). To determine the absolute model ages of the units we counted the crater frequencies utilizing the Martian impact cratering model of Hartmann and Neukum (2001) and the polynomial coefficients of Ivanov (2001).

Directly south of the graben is a 25 km impact crater, whose ejecta is transected by the graben. For these crater ejecta our crater counts result in a cratering model age of ~ 3.5 Ga. These data confirm the Hesperian age of the first flood event of Mangala Valles. The morphologically smooth plains, northern and southern of the graben, resulted in a model age of ~ 3.9 Ga, dating this unit back to the Noachian. The relative young age of ~ 175 Ma of the graben floor itself is traced back to a possible aeolian graben-filling. For a better understanding of the evolution of the flooding we use the available HRSC topographic data to calculate the volume of the graben and the maximum volume of the water before the first spill-over. These data are compared with volume measurements, made by Ghatan et al. which are based on MOLA data.

References:

Craddock R.A. and Greeley R. (1994) USGS Misc. Inv. Ser. Map I-2310, 1:500k

Ghatan G.J. et al., (2004) LPSC #35

Hartmann W.K. and Neukum G. (2001) Space Sci. Rev., 96, 165-194

Ivanov B.A. (2001) Space Sci. Rev., 96, 87-104