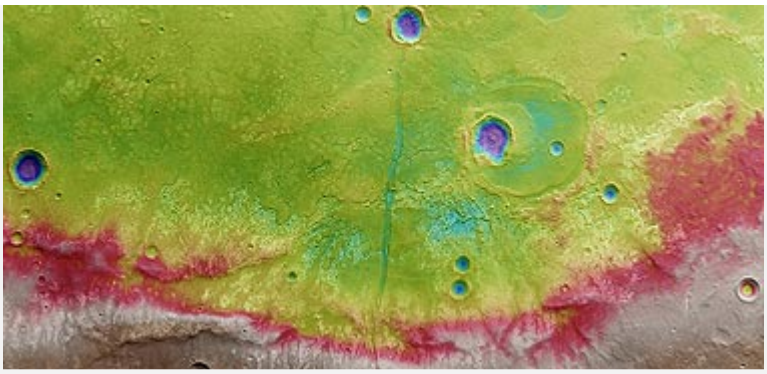
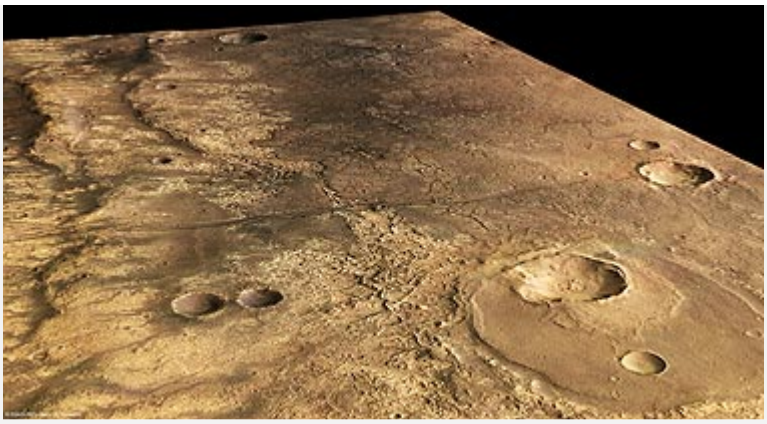
News Archive 2009

Craters, lava flows and tectonic features near Ma'adim Vallis

24 July 2009



Close to Ma'adim Vallis, ortho-image



Close to Ma'adim Vallis

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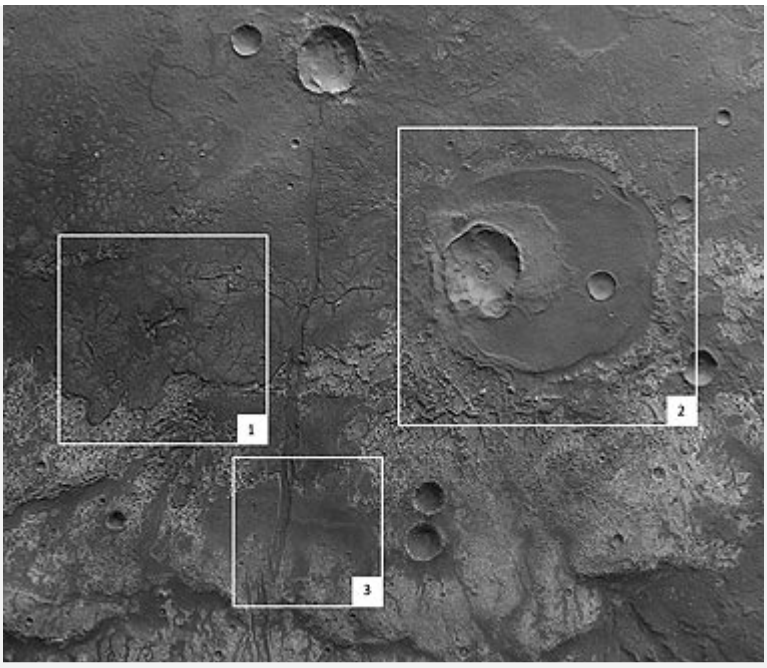
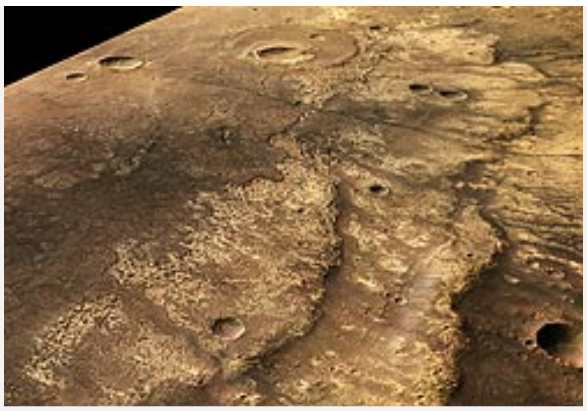
On 24 December 2008, the High-Resolution Stereo Camera (HRSC) operated by the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) on board the European Space Agency's Mars Express orbiter imaged a region close to Ma'adim Vallis, one of the largest canyons on Mars, finding craters, lava flows and tectonic features.

After Valles Marineris, Ma'adim Vallis is one of the largest canyons on Mars. The imaged region lies southeast of Ma'adim Vallis; the pictures are centred at about 29°S and 182°E and have a ground resolution of 15 metres per pixel.



Close to Ma'adim Vallis, nadir view

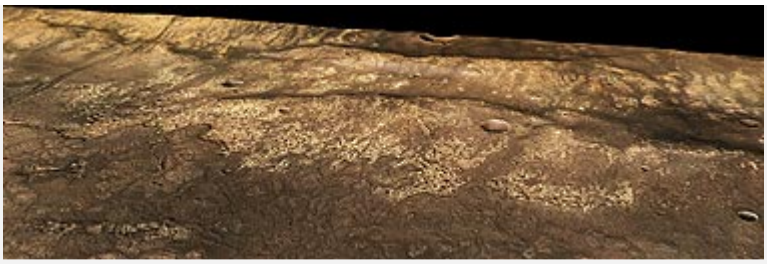


Close to Ma'adim Vallis

Ma'adim Vallis is located between the volcanic region of Tharsis, which harbours four volcanoes, including the largest volcano in the Solar System, and the Hellas Planitia impact basin, and originates in the southern highlands close to the dichotomy boundary and ends in Gusev crater. The canyon is 20 kilometres wide and 2 kilometres deep.

The images cover 138 x 70 kilometres in area, roughly the size of Cyprus. A sharp boundary is visible in the centre (3), dividing dark material to the west and light material to the east. Scientists suspect that this feature is most likely the edge of a basaltic lava flow.

Wrinkle ridges are clearly visible on the surface of the lava flow. They were most likely formed by compressive forces.



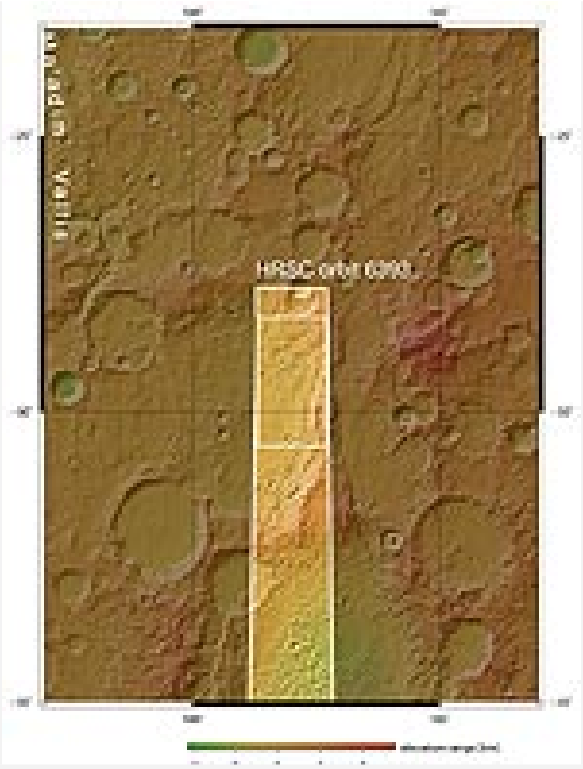
Close to Ma’adim Vallis

Close to Ma’adim Vallis, in 3D

Close to Ma’adim Vallis, nadir view

On the northern side is a crater, almost 20 kilometres in size (9). It is partially filled with lava, which shows that it must have formed before the lava set in. The smaller, 7-kilometre crater at the southern edge of the larger crater must have formed later as it shows an ejecta blanket which possibly formed from water-ice-rich material ejected during impact.

A linear feature, more than 200 kilometres long, divides the image almost in the centre (5). It is most likely a trough associated with the uprising of the Tharsis volcanic region located to the northeast. The uprising may have created a lot of stress in the crust, which was released when the fracture zones formed, creating the trough.
The colour scenes have been derived from the three HRSC colour channels and the nadir channel. The perspective views have been calculated from the digital terrain model derived from the stereo channels. The anaglyph image was calculated from the nadir and one stereo channel. The black and white high-resolution images were derived from the nadir channel, which provides the highest detail of all channels.



Ma’adim Vallis context map

The High Resolution Stereo Camera (HRSC) experiment on the European Space Agency’s Mars Express mission is led by the Principal Investigator (PI) Prof. Dr Gerhard Neukum, who was also responsible for the technical design of the camera. The science team of the experiment consists of 45 Co-Investigators from 32 institutions and 10 nations. The camera was developed at the German Aerospace Center (DLR) under the leadership of the PI, G. Neukum, and built in cooperation with industrial partners (EADS Astrium, Lewicki Microelectronic GmbH and Jena-Optronik GmbH). The experiment on Mars Express is operated by the DLR Institute of Planetary Research, through ESA/ESOC. The systematic processing of the HRSC image data is carried out at DLR. The scenes shown here were processed by the PI-group at the Institute for Geosciences of the Freie Universität Berlin in cooperation with the DLR Institute of Planetary Research, Berlin.

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