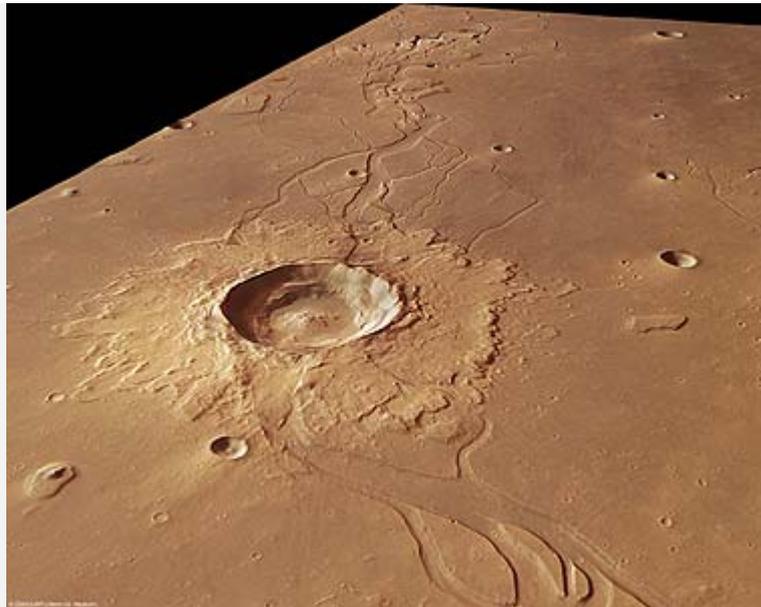


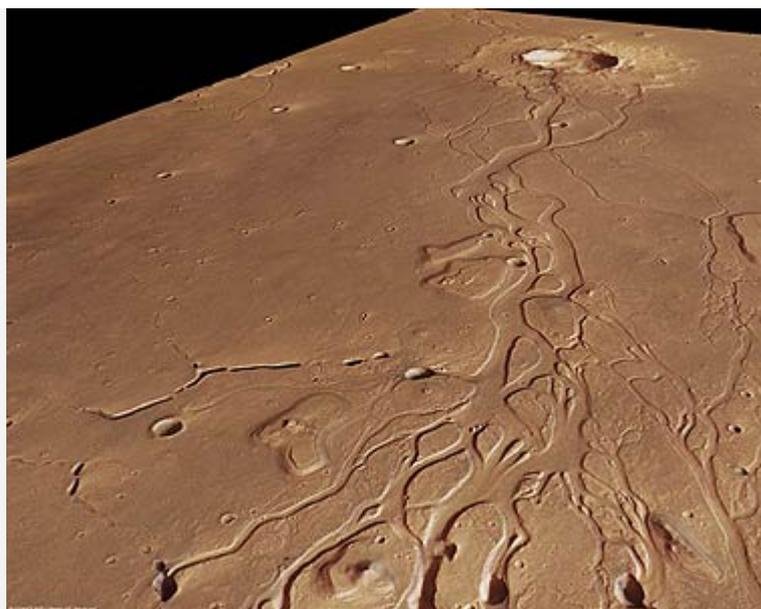
News Archive 2009

## Craters and channels in Hephaestus Fossae

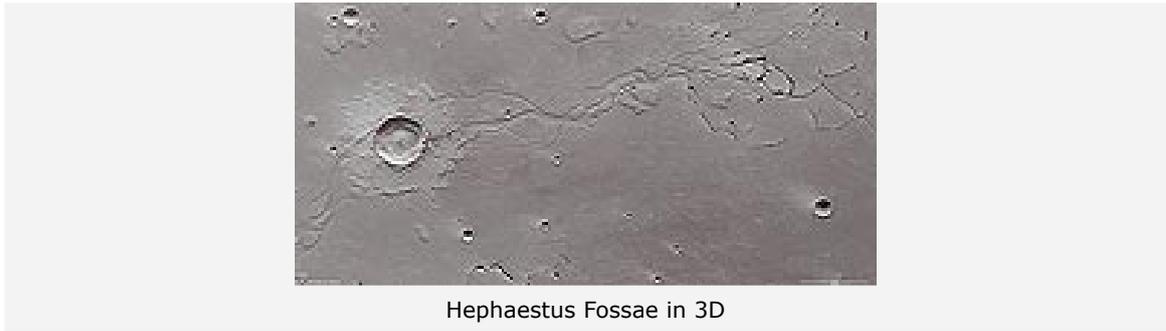
5 June 2009



Hephaestus Fossae perspective view

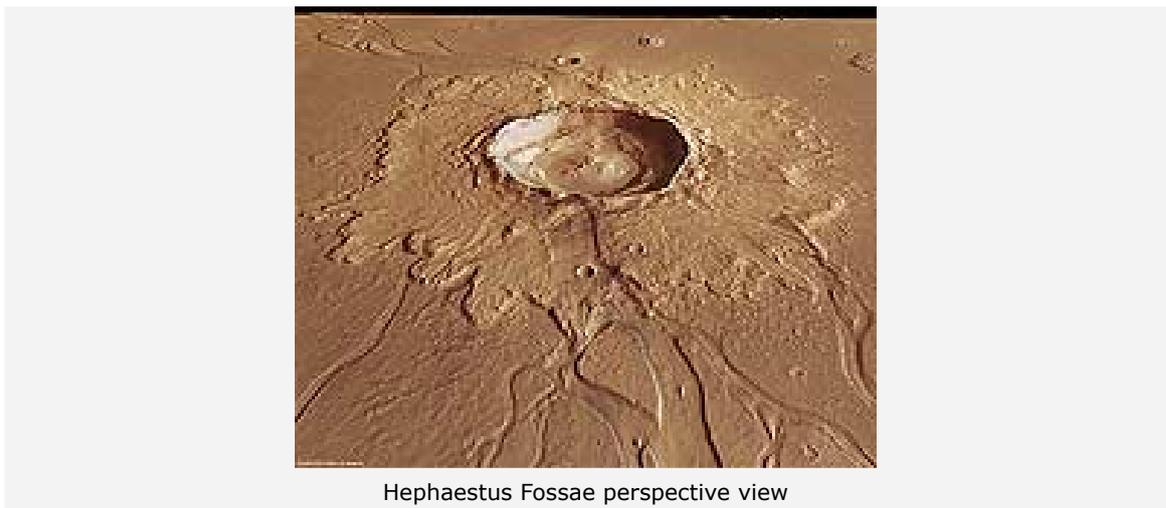
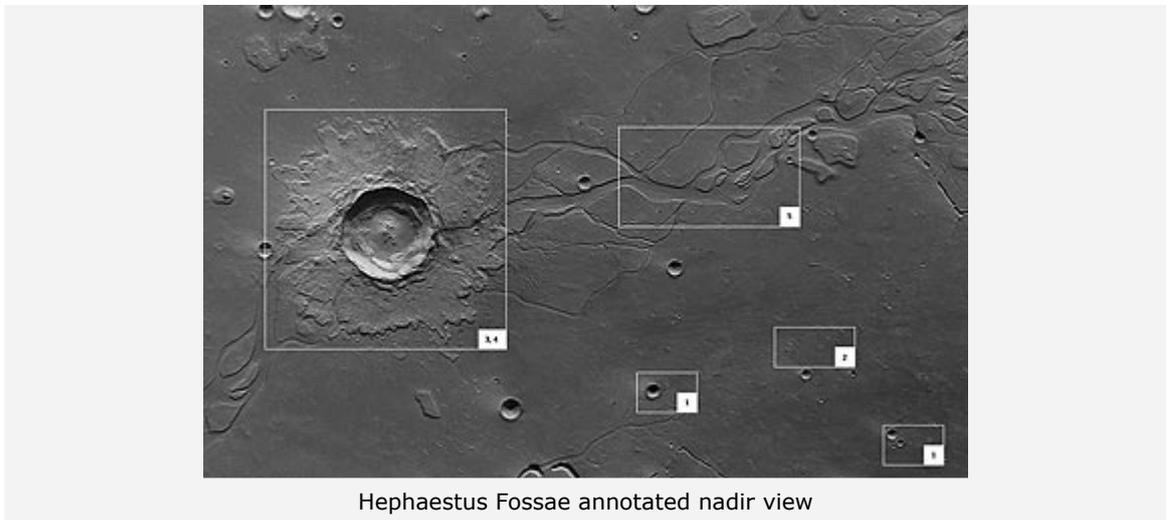


Hephaestus Fossae perspective view



On 28 December 2007, 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 obtained images of Hephaestus Fossae, a region on Mars dotted by craters and channel systems.

Hephaestus Fossae lies at about 21 degrees north and 126 degrees east on the Red Planet. Named after the Greek god of fire, it extends for more than 600 kilometres on the western flank of Elysium Mons in the Utopia Planitia region.



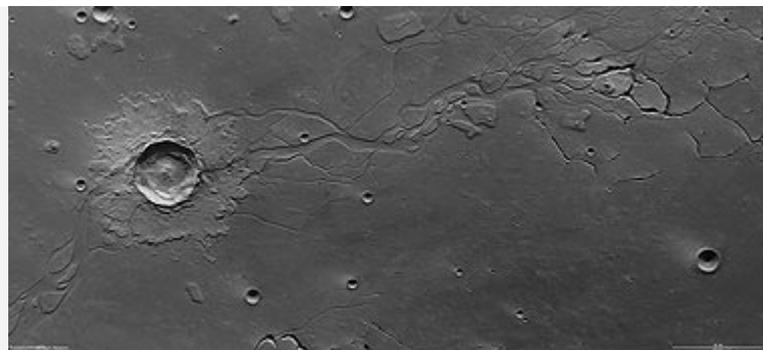
The images have a ground resolution of about 16 metres per pixel. They show that the region has channel systems, the origin of which is unknown.

The images cover 170 by 80 square kilometres, an area almost as large as Montenegro. The surface is mostly smooth and is covered by several small impact craters (6) measuring 800 to 2800 metres in diameter. Smaller craters are scattered across the entire region (9).

The left side of the image shows a larger impact crater (5) measuring 20 kilometres in diameter. Covering an area of approximately 150 square kilometres, this crater could contain cities such as Bonn or Kiel. In contrast to the smaller craters, it shows a blanket of ejecta with flow forms surrounding the rim (1).



Hephaestus Fossae ortho-image

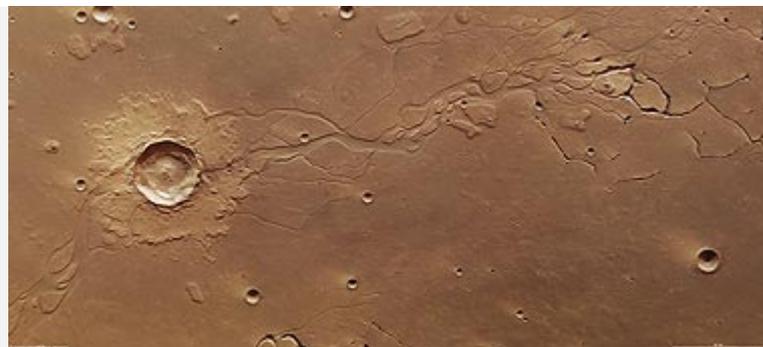


Hephaestus Fossae nadir view

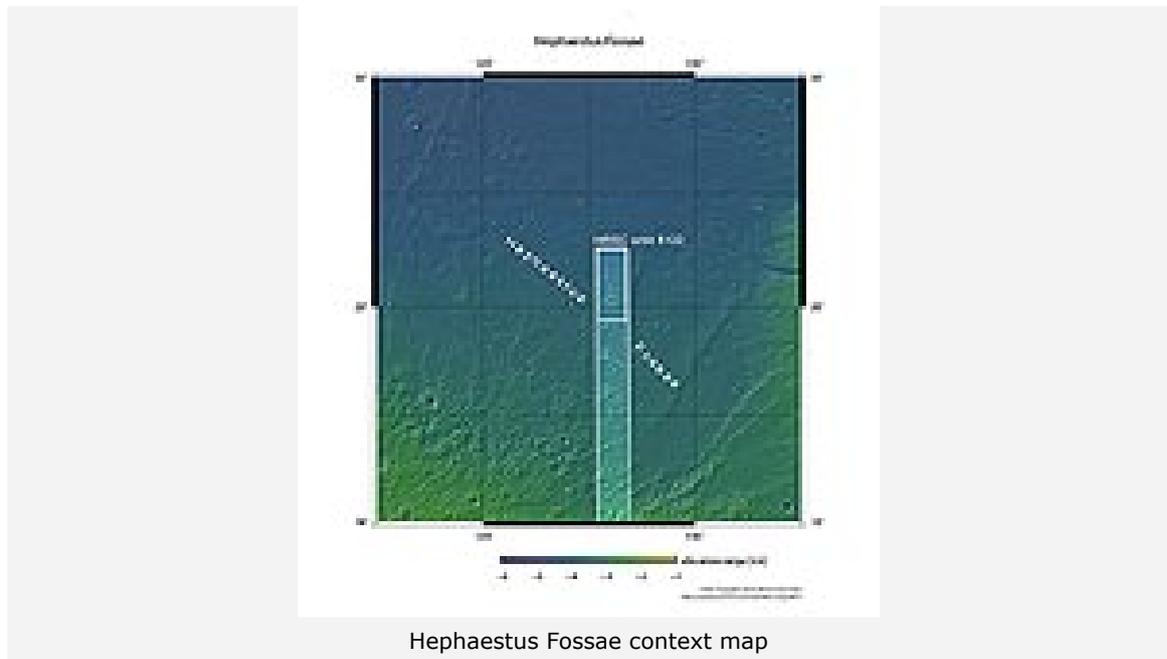
The large craters were formed when loose, soft material was ejected due to impact and the smaller ones formed due to secondary impacts – when consolidated material was ejected on a ballistic path and impacted the original crater at varying distances.

Most Martian water exists in the form of subsurface ice. The presence of a blanket of ejecta and outflow channels (2) around the crater suggest that the primary impact may have penetrated the surface enough to melt a buried frozen water reservoir.

Since the smaller impact craters show neither a blanket of ejecta nor any kind of outflow channel, they did not impact the surface strongly enough to reach the subsurface ice. It is possible to calculate the depth of a possible frozen water reservoir beneath the surface by determining the depth of the impact craters.



Hephaestus Fossae nadir view



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.

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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