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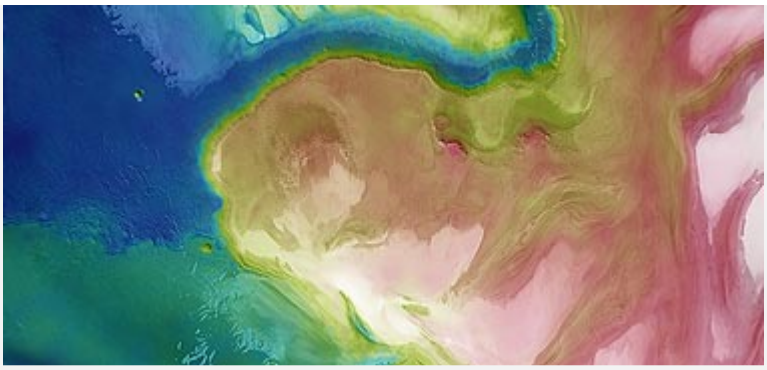
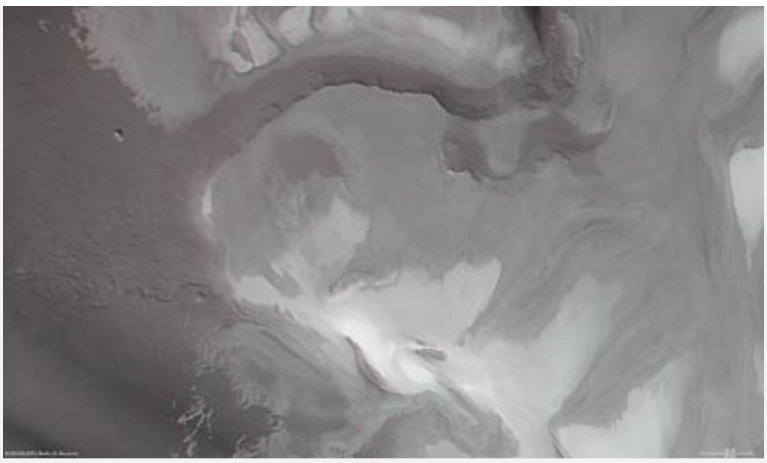
Ice-covered Martian north pole

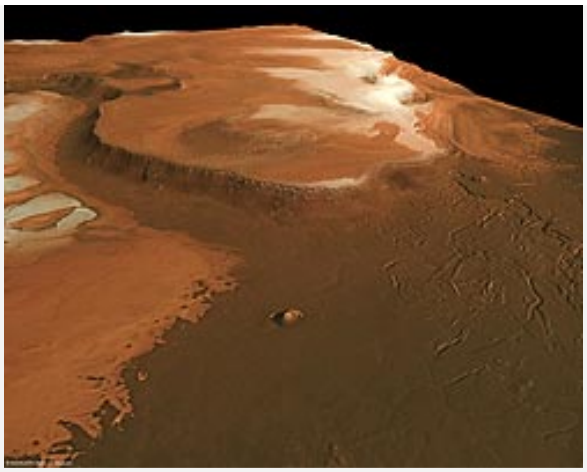
6 March 2009



Rupes Tenuis



Rupes Tenuis in 3D



Rupes Tenuis perspective view

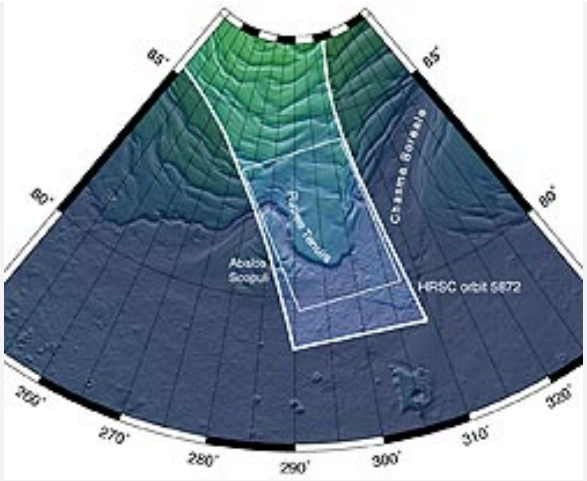
The High Resolution Stereo Camera (HRSC), operated by the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) on board ESA's Mars Express orbiter, imaged the snow-laden region of Rupes Tenuis on the Martian north pole on 29 July 2008.

The images are at about 81° north and 297° east and have a ground resolution of approximately 41 metres per pixel. They cover an area of about 44 000 square kilometres, almost as large as the Netherlands.

Rupes Tenuis is located at the southern edge of the Martian north polar cap, approximately 5500 km northeast of the Tharsis volcanic region.

At present, the north and south polar caps contain the largest water reservoir on the Red Planet. Recent data from the Mars Advanced Radar for Subsurface and Ionosphere Sounding (MARSIS) on board Mars Express has revealed that the south and north polar ice caps are both 3.5 km thick.

Rupes Tenuis nadir view

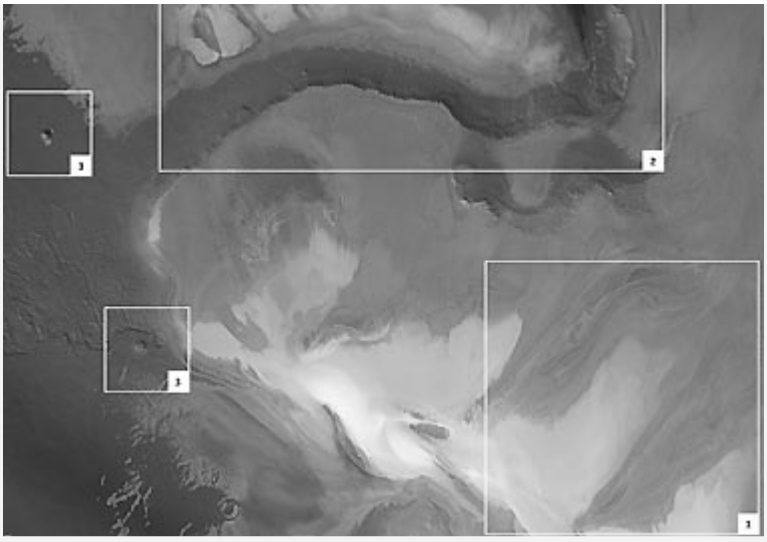


Rupes Tenuis context map

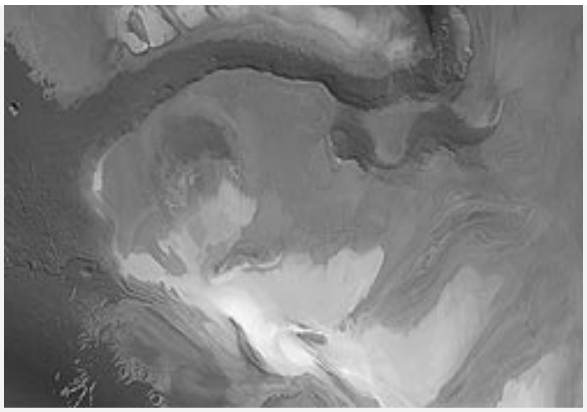
The deep water-ice polar cap is covered by a layer of carbon dioxide ice that is centimetres to decimetres thick. During the warmer summer months, most of the carbon dioxide ice sublimates, i.e. it turns from solid to vapour, and escapes into the atmosphere, leaving behind the harder water-ice layers.

Darker material, mostly dust, is brought in by the wind, and snow and ice are deposited in colder periods. This interplay between sedimentation and ice formation forms the Polar Layered Deposits visible clearly in the images.

An incision visible at top-centre of the image is more than 100 km long. Such curved incisions are common on the edges of the polar caps. Why such structures form is still not known. Chasma Borealis, visible on the right-hand side of the image, is one such incision.


Rupes Tenuis annotated nadir view

Small, cone-shaped mounds have long been interpreted as being volcanic in origin. New data suggest that some of the mounds may be remnants of older material that covered the area earlier. This material may have been more resistant to erosion, forming the mounds.



Rupes Tenuis nadir view

The colour scenes have been derived from the three HRSC colour channels and the nadir channel. The perspective view has been processed from the digital terrain model derived from the stereo channels. The anaglyph image was calculated from the nadir and one stereo channel

The High Resolution Stereo Camera (HRSC) experiment on the ESA Mars Express Mission is led by the Principal Investigator (PI) Prof. Dr. Gerhard Neukum, who also designed the camera technically. 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 German Aerospace Center (DLR), Institute of Planetary Research, Berlin.

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