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Impact craters in the Tyrrhena Terra region

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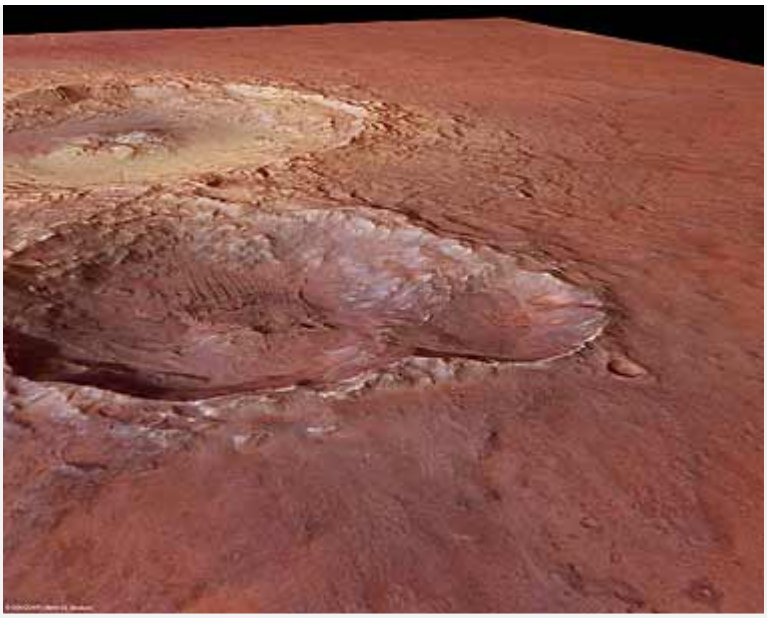
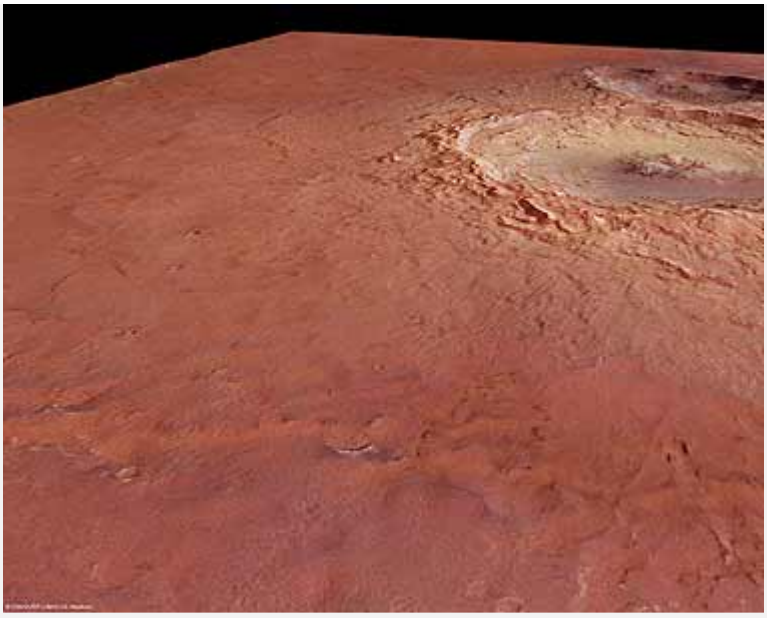
Perspective view of the central massif within an impact crater

These images, from the DLR-operated High Resolution Stereo Camera (HRSC) onboard the ESA spacecraft Mars Express show the Tyrrhena Terra region, part of the ancient heavily cratered southern Martian highlands.

The region is located north of Hellas Planitia, the largest impact basin on Mars. The image scene shows three impact craters at the eastern border between Tyrrhena Terra and Hesperia Planum.



Perspective view from the southwest



Perspective view of impact craters in Tyrrhena Terra

Colour view of the impact craters of Tyrrhena Terra

The western part of the scene is dominated by a 35 kilometre-wide and approximately 1000 metre-deep impact crater with an extremely cliffed and chiselled edge. The edge rises up to 400 metres above the surrounding plain. The crater is surrounded by multiple layers of material which was ejected during the impact. These so called "ejecta blankets" spread up to 50 kilometres around the crater. Their round, lobate-like appearance hint to possible ice- and water-rich subsurface material at the time of the impact.

Black and white image of impact craters in Tyrrhena Terra

The raised feature in the centre of the crater most likely originated from the elastic rebound of the compressed subsurface material after the impact. One can observe this phenomenon morphologically on Earth when a drop of water hits a puddle.

Another 18 kilometre-large and approximately 750 metre-deep impact crater, most likely a "double impact crater", is located south of the large crater. These "double impact craters" develop when a binary object hits the surface almost simultaneously.

The impact of the larger northern crater, which displays an intact crater wall, occurred after the double-impact crater had been formed. The double-impact crater has been reshaped by ejecta material: the northern part has been filled and so-called ejecta extend at the crater bottom in the direction of the explosion point towards the larger neighbouring crater.

3-D image of the impact craters in Tyrrhena Terra

The images were acquired on 10 May 2007 in orbit 4294 with a ground resolution of approximately 15 metres per pixel. The images show an area at approximately 18° southern latitude and 99° eastern longitude. The Sun illuminates the scene from the southwest (from the top-left in the images).

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 HRSC stereo channels. The anaglyph images were calculated from the nadir channel 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 Tyrrhena Terra region in the southern Mars highlands

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 Universitaet Berlin in cooperation with the German Aerospace Center (DLR), Institute of Planetary Research, Berlin.

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