Mars Express Returns Stunning First Results

Mars Express, ESA's first mission to Mars, has already produced stunning results since its first instrument was switched on, on 5 January. The significance of the first data was emphasised by the scientists at a Press Conference at ESA's Space Operations Centre (ESOC) in Darmstadt, Germany, on 23 January.

***"I did not expect to be able to gather together – just one month after the Mars orbit insertion on 25 December – so many happy scientists eager to present their first results"*, said Professor David Southwood, ESA's Director of Science.**

One of the main targets of the Mars Express mission is to confirm the presence of water in one of its chemical states. Through the initial mapping of the south polar cap on 18 January, OMEGA, the combined camera and infrared spectrometer, has already revealed the presence of water ice and carbon-dioxide ice. This information was confirmed by the PFS, a new high-resolution spectrometer of unprecedented accuracy. The first PFS data also show that the carbon-dioxide distribution is different in the northern and southern hemispheres of Mars.

The MaRS instrument, a sophisticated radio transmitter and receiver, emitted its first signal successfully on 21 January. The signal was received on Earth through a 70-metre antenna in Australia, after it had been reflected and scattered from the surface of Mars. This new measurement technique allows the detection of the chemical composition of the Martian atmosphere, ionosphere and surface.

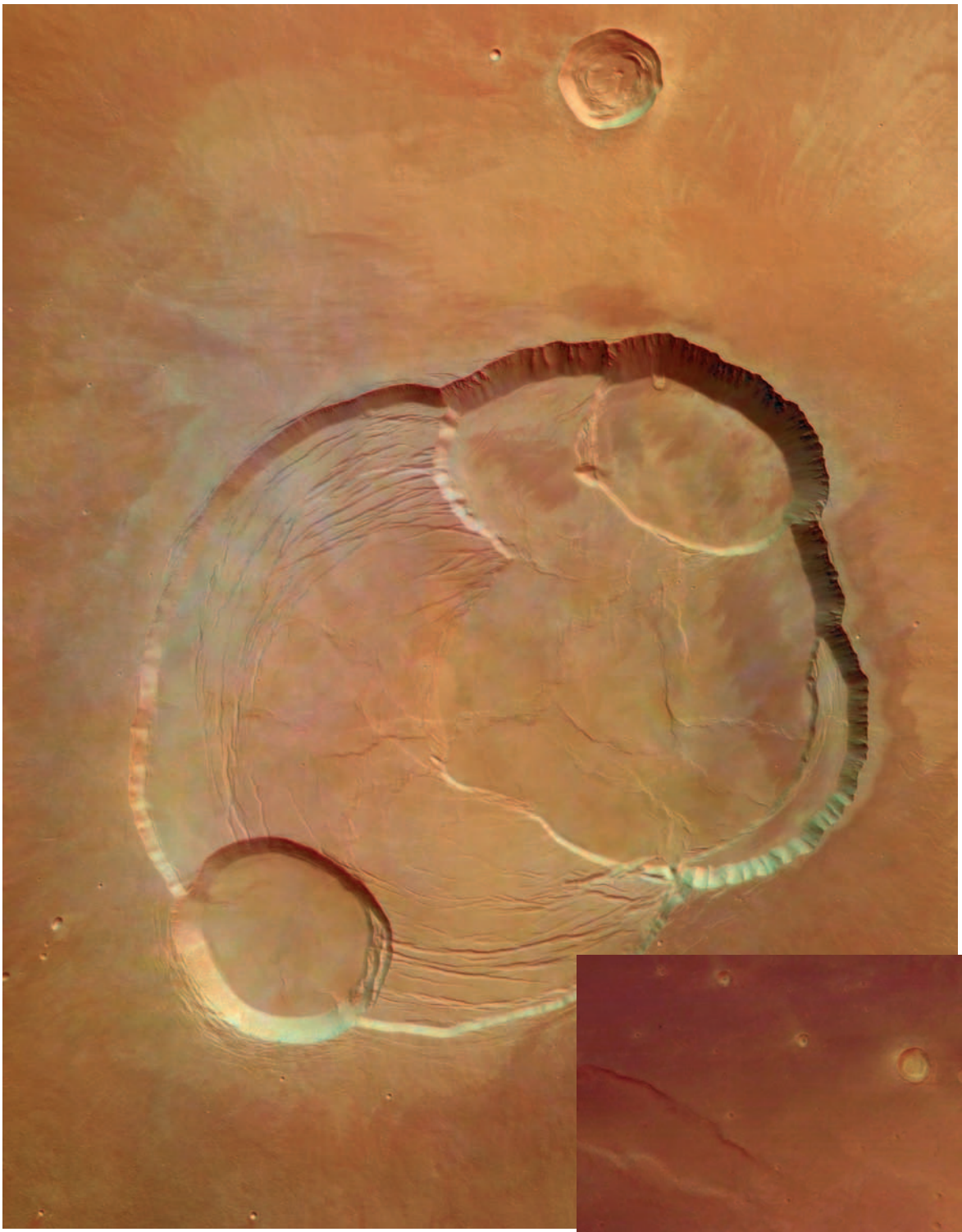
ASPERA, a plasma and energetic neutral atoms analyser, is aiming to answer the fundamental question of whether solar-wind erosion led to the present lack of water on Mars.

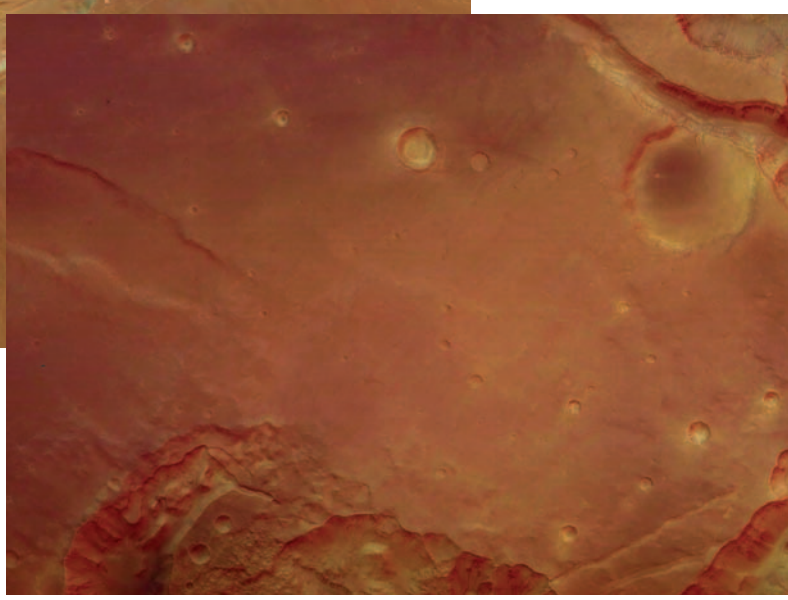
Another exciting experiment has been run with the SPICAM instrument (an ultraviolet and infrared spectrometer) during the first star occultation ever observed at Mars. It has simultaneously measured the distribution of ozone and water vapour, which has never been done before, revealing that there is more water vapour where there is less ozone.

ESA also presented astonishing pictures produced with the High Resolution Stereo Camera (HRSC) on Mars Express. They represented the outcome of 1.87 million km^2 of surface coverage, and about 100 gigabytes of processed data. This camera was also able to record the longest swath (up to 4000 km) and largest area in combination with high resolution ever taken in the exploration of the Solar System.

Mrs Edelgard Bulmahn, German Minister for Research and Education, who also currently chairs the ESA Council at Ministerial Level, said at the Press Conference: *"Europe can be proud of this mission: Mars Express is an enormous success for the European space programme."*

The pictures that follow here are just a sample of the imagery that has already been returned by Mars Express's High Resolution Stereo Camera during its first few weeks of operation. They have been selected by Agustin Chicarro, the Mars Express Project Scientist, who also kindly provided the summary captions.



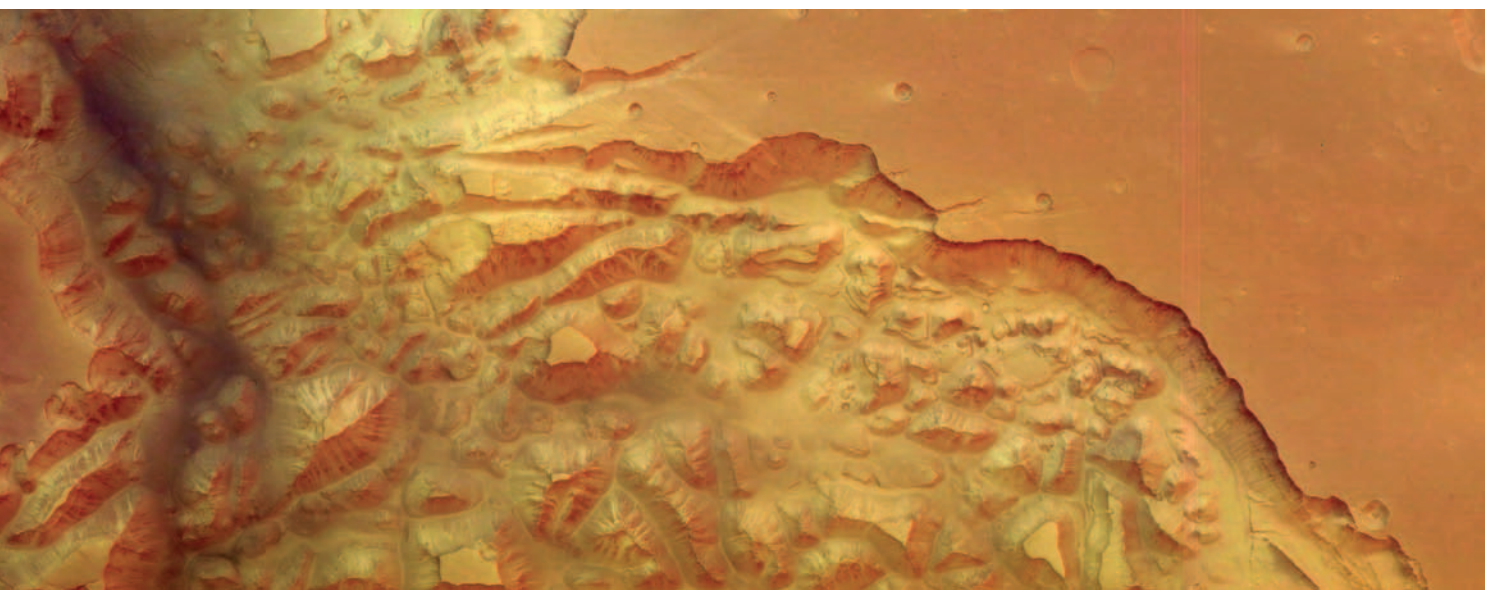


This vertical view shows the complex caldera at the summit of Olympus Mons on Mars, the highest volcano in our Solar System. Olympus Mons has an average elevation of 22 km and the caldera has a depth of about 3 km. This is the first high-resolution colour image of the complete caldera. It was taken from a height of 273 km (resolution 12 m per pixel) by the High Resolution Stereo Camera (HRSC) on 21 January 2004. The image is about 102 km across. South is at the top.

Credit: ESA/DLR/FU Berlin (G. Neukum)

Image taken by the High Resolution Stereo Camera (HRSC) on 4 January 2004. It shows a portion of a 1700 km-long and 65 km-wide swath, which was imaged in the south-north direction across the huge canyon of Valles Marineris. It is the first image of this size that shows the surface of Mars in high resolution (12 metres per pixel), in colour and in 3D.
Credit: ESA/DLR/FU Berlin (G. Neukum)

Full-colour image, taken by the High Resolution Stereo Camera (HRSC) on 14 January 2004 from a height of 275 km (resolution 12 m per pixel). This image is 50 km across and shows the Martian equator north of Valles Marineris. In this landscape, mesas and cliffs are visible, as well as flow features indicating erosion by the action of flowing water.
Credit: ESA/DLR/FU Berlin (G. Neukum)



Full-colour image, taken by the High Resolution Stereo Camera (HRSC) on 14 January 2004 from a height of 275 km (resolution 12 m per pixel). The location of this landscape is north of Valles Marineris. It shows mesas and cliffs indicating erosion by the action of flowing water. North is to the right.
Credit: ESA/DLR/FU Berlin (G. Neukum)

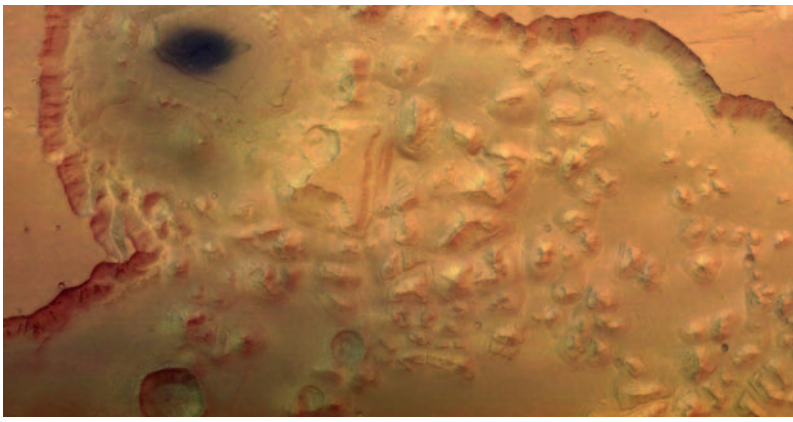
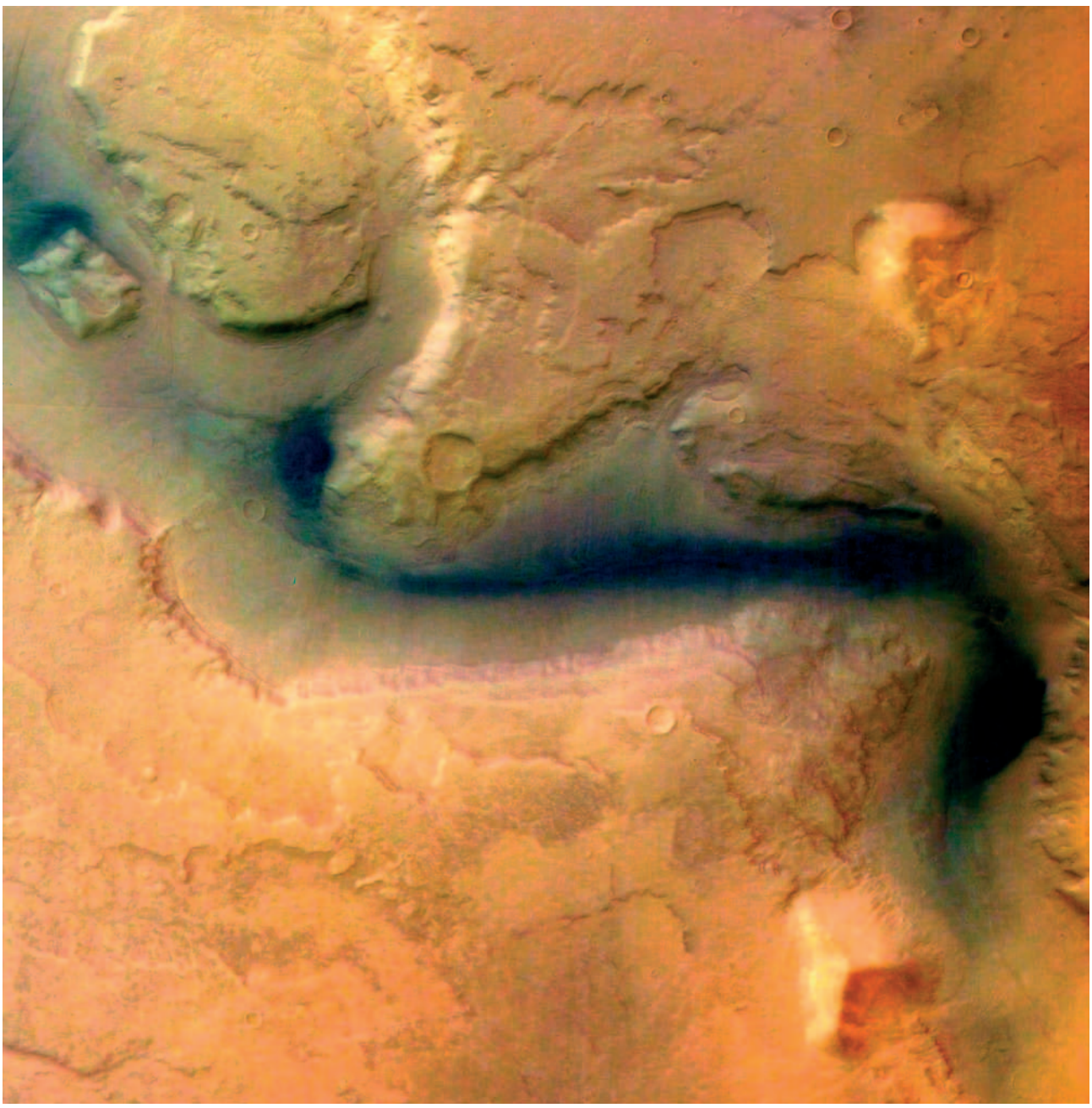
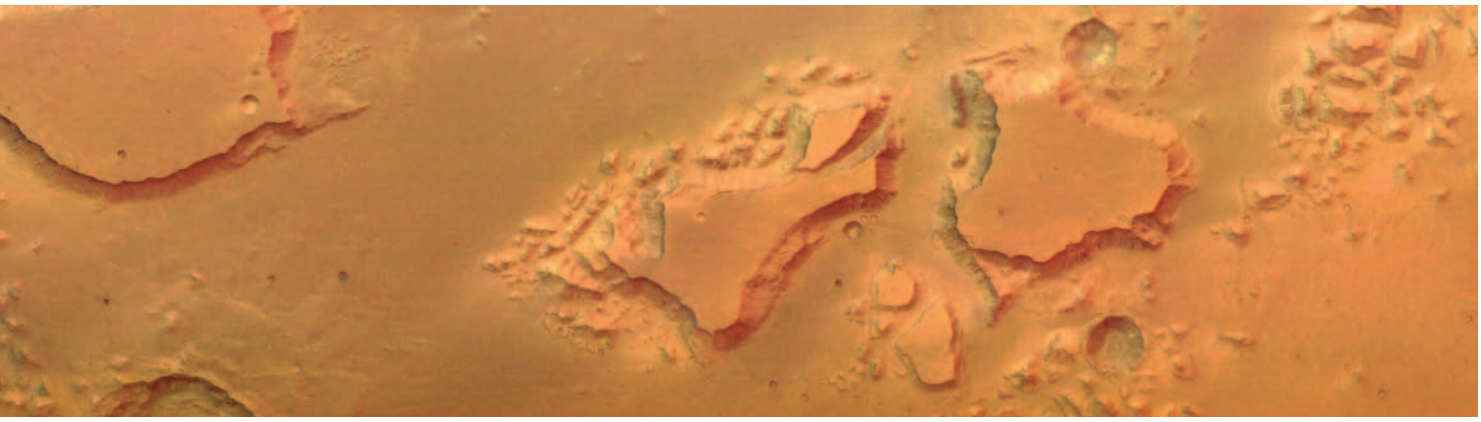


Image taken by the High Resolution Stereo Camera (HRSC) on 15 January 2004 from a height of 273 km. The location is east of the Hellas Basin. The area is 100 km across (resolution 12 m per pixel), and shows a channel (Reull Vallis) once formed by flowing water. North is at the top.
Credit: ESA/DLR/FU Berlin (G. Neukum)





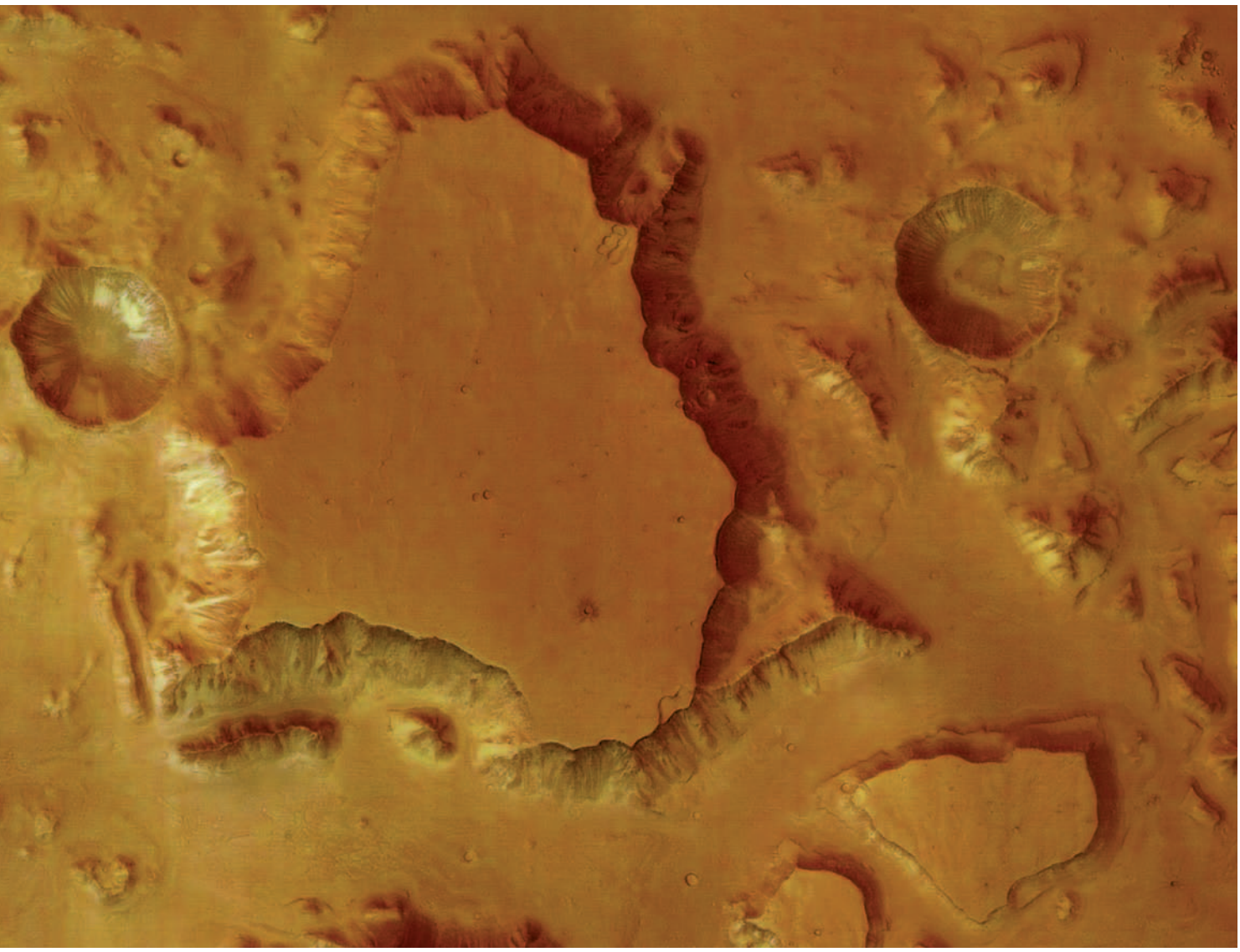


Image taken by the High Resolution Stereo Camera (HRSC) on 14 January 2004. It shows a vertical view of a mesa in the true colours of Mars. The summit plateau stands about 3 km above the surrounding terrain. The original surface was dissected by erosion, and only isolated mesas remain intact. The large crater has a diameter of 7.6 km.
Credit: ESA/DLR/FU Berlin (G. Neukum)