Melas Dorsa reveals a complex geological history on Mars

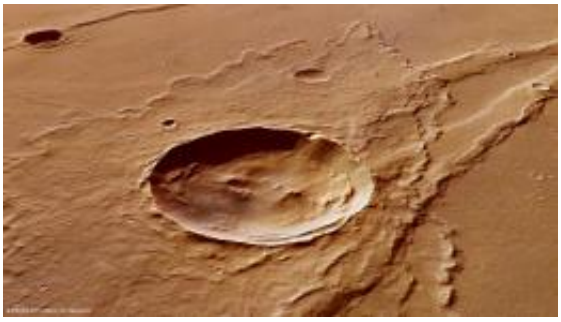
July 5 2012

High-Resolution Stereo Camera (HRSC) nadir and colour channel data taken during revolution 10532 on 17 April 2012 by ESA's Mars Express have been combined to form a natural-colour view of the Melas Dorsa region. Centred at around 18°S and 288°E, this image has a ground resolution of about 18 m per pixel. The image shows the wrinkle ridges bisected by crustal displacement faults known as 'en-echelon' faults along with the large impact crater with its butterfly-shaped fluidised ejecta blanket. En-echelon faults are closely spaced, parallel overlapping or step-like fault structures, which in this view can be seen at the far left of the image, intersecting the wrinkle ridges. Credits: ESA/DLR/FU Berlin (G. Neukum)

(Phys.org) -- ESA's Mars Express has imaged an area to the south of the famed Valles Marineris canyon on the Red Planet, showing a wide range of tectonic and impact features.

On 17 April, the orbiter pointed its high-resolution stereo camera at the Melas Dorsa region of Mars. This area sits in the volcanic highlands of Mars between Sinai and Thaumasia Plana, 250 km south of Melas Chasma. Melas Chasma itself is part of the Valles Marineris rift system.

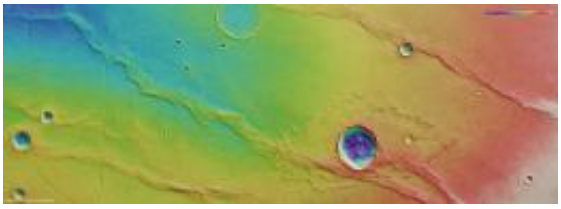
The image captures wrinkle ridges, some unusual intersecting faults and an elliptical crater surrounded by ejecta in the shape of a butterfly and with a strange 'fluid-like' appearance.



This computer-generated perspective view was created using data obtained from the High-Resolution Stereo Camera (HRSC) on ESA's Mars Express. Centred at around 18°S and 288°E, this image has a ground resolution of about 18 m per pixel. The 16 km-wide impact crater and its associated butterfly-shaped ejecta blanket takes up most of this image. The shape of the crater and ejecta blanket indicates a low-angle impact by a comet or asteroid. Credits: ESA/DLR/FU Berlin (G. Neukum)

Elliptical craters like this 16 km-wide example are formed when asteroids or comets strike the surface of the planet at a shallow angle.

Scientists have suggested that a fluidised ejecta pattern indicates the presence of subsurface ice which melted during the impact. Subsequent impacts have created a number of smaller craters in the ejecta blanket.



This colour-coded plan view is based on a digital terrain model of the region, from which the topography of the landscape can be derived. Notable here is the almost complete lack of relief change in the crater at the top of the image, which has been filled in by volcanic activity. Centred at around 18°S and 288°E, the image has a ground resolution of about 18 m per pixel. Credits: ESA/DLR/FU Berlin (G. Neukum)

The rim of another large crater is visible in the upper centre part of the image, but it appears mostly to have been almost buried during some distant epoch by volcanic dust and ash.

This makes any detailed study of it almost impossible. However, its centre shows concentric deposits that could provide insights into the composition of the volcanic material that buried it.

Several wrinkle ridges can be seen across the image. These form when horizontal compression forces in the crust pushes the crust upwards.

To the left, the ridges are bisected by crustal displacement faults. These have cut into the ridges and the surrounding surface at some later epoch. This highlights the different tectonic phases responsible the formation of this region.

Provided by European Space Agency

Citation: Melas Dorsa reveals a complex geological history on Mars (2012, July 5) retrieved 17 April 2024 from https://phys.org/news/2012-07-melas-dorsa-reveals-complex-geological.html