

Water in a Martian desert

August 2 2013



Tagus Valles colour view. Credit: ESA/DLR/FU Berlin (G. Neukum)

Craters once brim-full with sediments and water have long since drained dry, but traces of their former lives as muddy lakes cling on in the Martian desert.

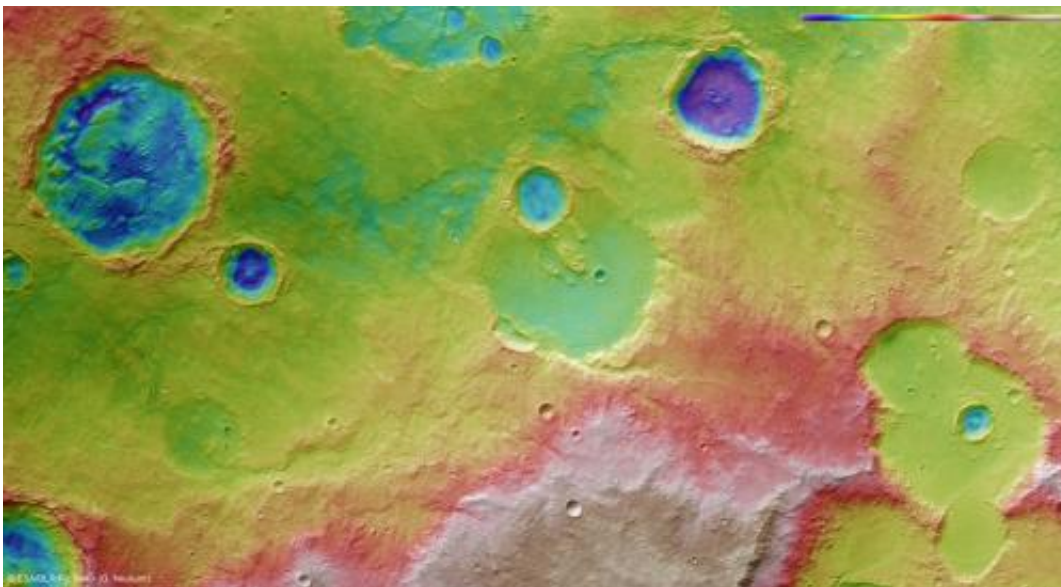
The images were taken on 15 January by ESA's Mars Express, and feature a region just a few degrees south of the [equator](#) within the ancient southern highlands of Mars. The unnamed region lies immediately to the north of an ancient riverbed known as Tagus Valles and east of Tinto Valles and Palos [crater](#) that were presented in an earlier release.

The 34 km-wide crater in the top left of the main images perhaps draws most attention with its chaotic interior. Here, broad flat-topped blocks called mesas can be found alongside smaller parallel wind-blown features known as yardangs.

Both mesas and yardangs were carved from sediments that originally filled the crater, deposited there during a flood event that covered the entire scene. Over time, the weakest sediments were eroded away, leaving the haphazard pattern of stronger blocks behind.

Further evidence of this crater's watery past can be seen in the top right of the crater in the shape of a small, winding river channel.

Clues also hang onto the ghostly outline of an ancient crater some 20 km to the east (below in the main images). While the crater has all but been erased from the [geological record](#), a long meandering channel clearly remains, and flows towards the crater in the centre of the scene.



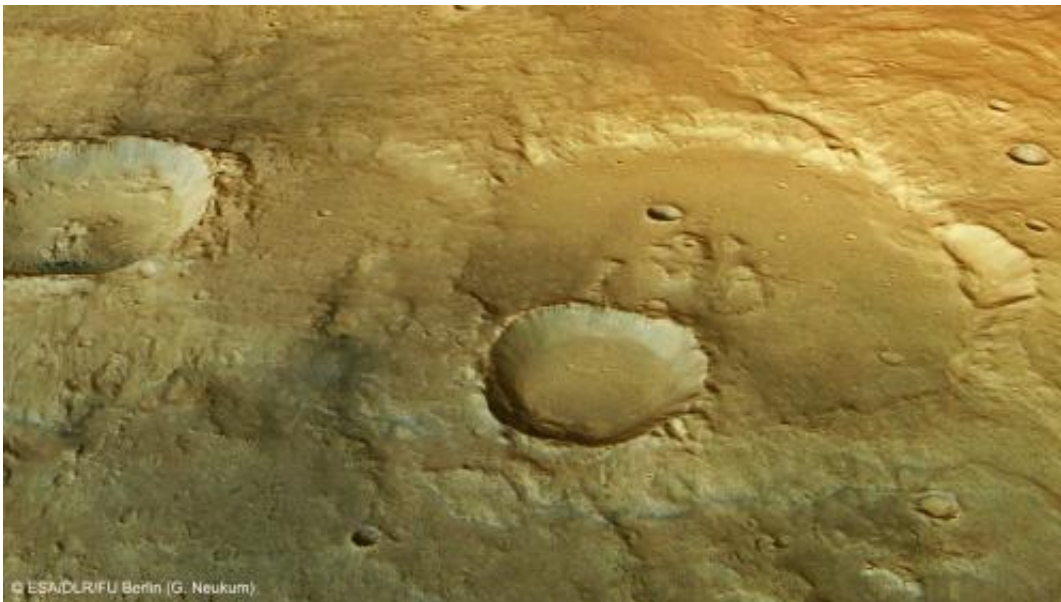
Tagus Valles topography. Credit: ESA/DLR/FU Berlin (G. Neukum)

This central complex of craters is seen close up in the perspective view below, showing in more detail another channel-like feature, along with a highly deformed crater. Perhaps the rim of this eroded crater was breached as sediments flooded the larger crater.

The crater is also seen from a different angle and in the background of the second perspective view below. In the foreground is one of the deepest craters in the scene, as indicated by the topography map.

Numerous [landslides](#) have occurred within this crater, perhaps facilitated by the presence of water weakening the crater walls. Grooves etched into the crater's inner walls mark the paths of tumbling rocks, while larger piles of material have slumped en-masse to litter the crater floor.

A group of interconnected craters with flat floors smoothed over by sediments lie in the lower right part of the main image. One small crater with a prominent debris deposit – an ejecta blanket – lies within the crater.



Deformation in a flooded crater. Credit: ESA/DLR/FU Berlin (G. Neukum)

Ejecta blankets are composed of material excavated from inside the crater during its formation. This particular crater exhibits a 'rampart' ejecta blanket – one with petal-like lobes around its edges. Liquid water bound up in the ejected material allowed it to flow along the surface, giving it a fluid appearance.

But it's not just water that has played a role in this region; volcanic eruptions have also had their say. A dark layer of fine-grained ash covers the top left corner of the main image that may have been deposited from the Elysium volcanic province to the northeast. Over time, the ash was redistributed by wind, and buried deposits exposed in localised areas by erosion.

This region is one of many that exposes evidence of the Red Planet's active past, and shows that the marks of water are engraved in even the most unlikely ancient crater-strewn fields.

Provided by European Space Agency

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