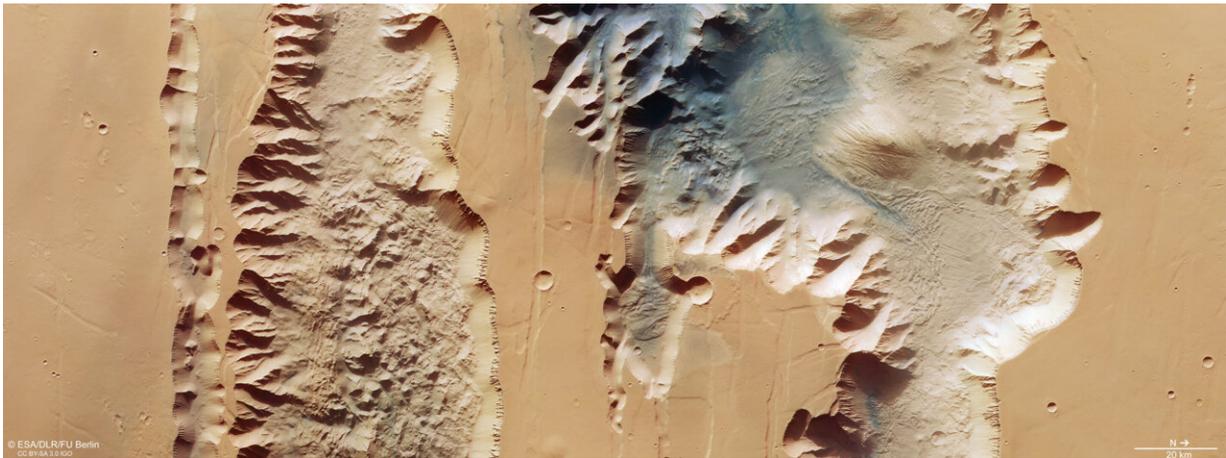


Mars Express peers into Mars' 'Grand Canyon'

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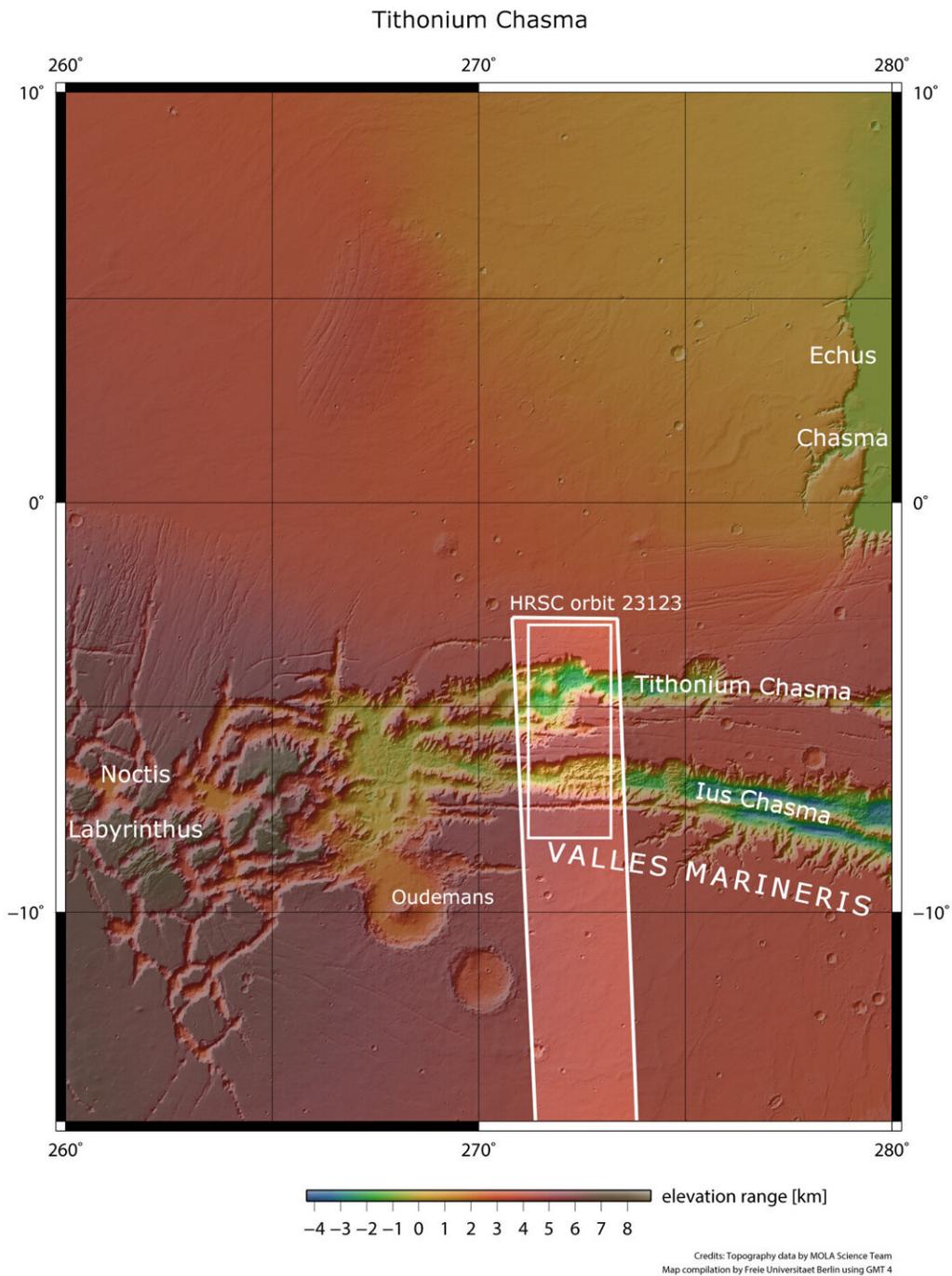
This image from ESA's Mars Express shows Ius and Tithonium Chasmata, which form part of Mars' Valles Marineris canyon structure. This image comprises data gathered by Mars Express' High Resolution Stereo Camera (HRSC) on 21 April 2022. It was created using data from the nadir channel, the field of view aligned perpendicular to the surface of Mars, and the colour channels of the HRSC. It is a 'true colour' image, reflecting what would be seen by the human eye if looking at this region of Mars. The ground resolution is approximately 25 m/pixel and the image is centred at about 272°E/6°S. North is to the right. Credit: ESA/DLR/FU Berlin, CC BY-SA 3.0 IGO

The latest image release from ESA's Mars Express takes us over two ruptures in the Martian crust that form part of the mighty Valles Marineris canyon system.

Valles Marineris cuts across Mars like the Grand Canyon cuts across the United States, except the latter is miniscule in comparison. At 4000 km long, 200 km wide and up to 7 km deep, Valles Marineris is almost ten times longer, 20 times wider and five times deeper than the Grand Canyon. As the largest [canyon](#) system in the Solar System, it would span the distance from the northern tip of Norway to the southern tip of Sicily.

There's another big difference between the two: while the Grand Canyon was formed as the Colorado River eroded away rock, Valles Marineris is thought to have formed through the drifting apart of tectonic plates.

The image shows two trenches (or chasma) that form part of western Valles Marineris. On the left (south), is the 840 km-long Ius Chasma, and on the right (north) is the 805 km-long Tithonium Chasma. While these [high-resolution images](#) show incredible surface detail, it is only when we look at an elevation map that we realize how spectacularly deep the chasmata are—up to 7 km! At 4809 m, the Alps' tallest mountain Mont Blanc would be dwarfed if it was put inside Tithonium Chasma.



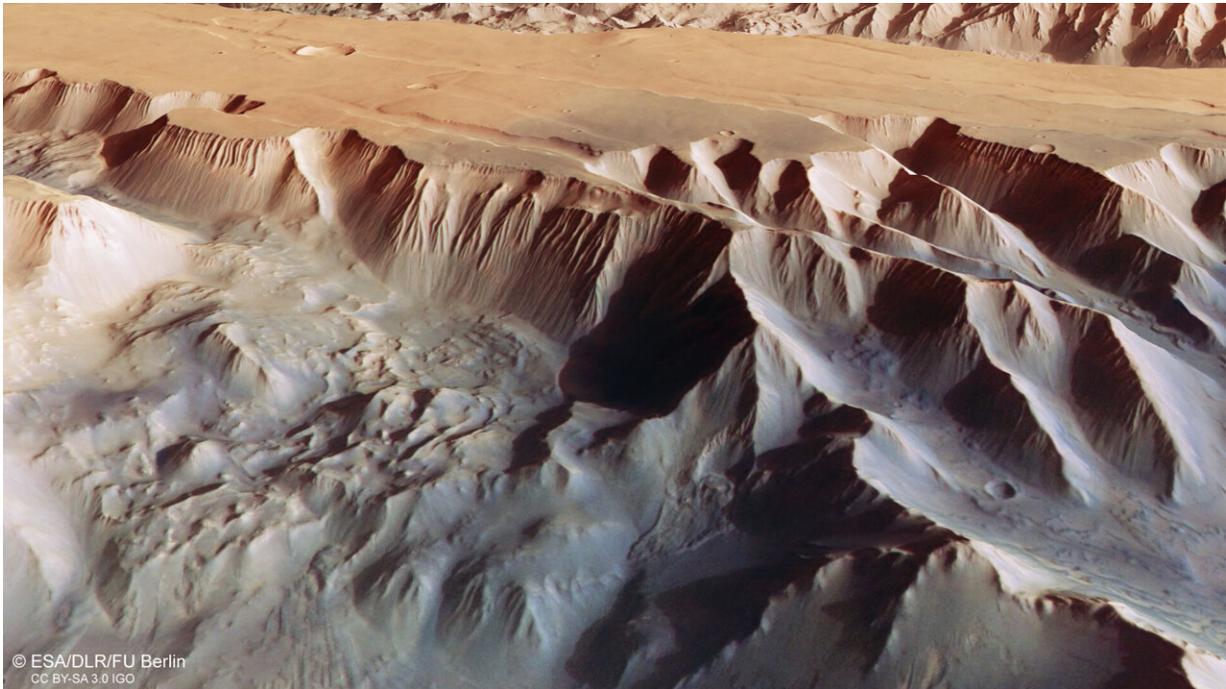
This image from ESA’s Mars Express shows Ius and Tithonium Chasmata, which form part of Mars’ Valles Marineris canyon structure. The area outlined by the bold white box indicates the area imaged by the Mars Express High Resolution Stereo Camera on 21 April 2022 during orbit 23123. Credit:

NASA/MGS/MOLA Science Team

At the top of Tithonium Chasma, a patch of dark sand brings color contrast to the image. This sand may have come from the nearby Tharsis volcanic region.

Next to the dark sand dunes are two light-toned mounds (one cut in half by the upper image border). These "mounds" are more like mountains, rising more than 3000 meters in height. Their surfaces have been strongly eroded by Mars' strong winds, indicating that they are made of a weaker material than the surrounding rock.

Between the two mounds we see a series of smaller bumps, as shown in the second perspective view. Investigations by Mars Express have found water-bearing sulfate minerals in this region. This suggests that these bumps may have formed when liquid that once filled the chasma evaporated, although this theory is still hotly debated.



This oblique perspective view of Tithonium Chasmata, which forms part of Mars' Valles Marineris canyon structure, was generated from the digital terrain model and the nadir and colour channels of the High Resolution Stereo Camera on ESA's Mars Express. Credit: ESA/DLR/FU Berlin, CC BY-SA 3.0 IGO



This oblique perspective view of Tithonium Chasmata, which forms part of Mars' Valles Marineris canyon structure, was generated from the digital terrain model and the nadir and colour channels of the High Resolution Stereo Camera on ESA's Mars Express. Credit: ESA/DLR/FU Berlin, CC BY-SA 3.0 IGO

To the lower right of the mound that we see fully (upper right in the second perspective view), we can see parallel lines and debris piles that indicate a recent landslide. This is also visible as a large purple area in the topography image below. The landslide was caused by the collapse of the canyon wall on the right, and is likely to have occurred relatively recently because it has not been strongly eroded.

The gnarly floor of Ius Chasma is equally fascinating. As [tectonic plates](#) pulled apart, they appear to have caused jagged triangles of rock to form that look like a row of shark teeth. Over time, these rock formations have collapsed and eroded.

Exploring Mars

Mars Express has been orbiting the Red Planet since 2003, imaging Mars' surface, mapping its minerals, identifying the composition and circulation of its tenuous atmosphere, probing beneath its crust, and exploring how various phenomena interact in the Martian environment.

The mission's High Resolution Stereo Camera (HRSC), responsible for these new images, has revealed much about Mars' diverse surface features, with recent images showing everything from wind-sculpted ridges and grooves through [impact craters](#) and channels that once carried [liquid water](#) to volcanoes, tectonic faults, [river channels](#) and ancient lava pools.

Provided by European Space Agency

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