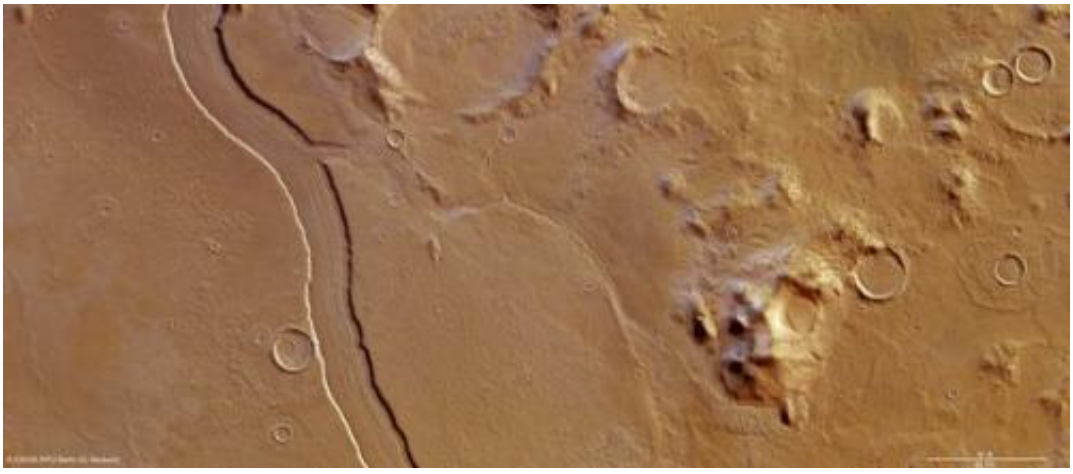
Reull Vallis: A river ran through it

January 17 2013



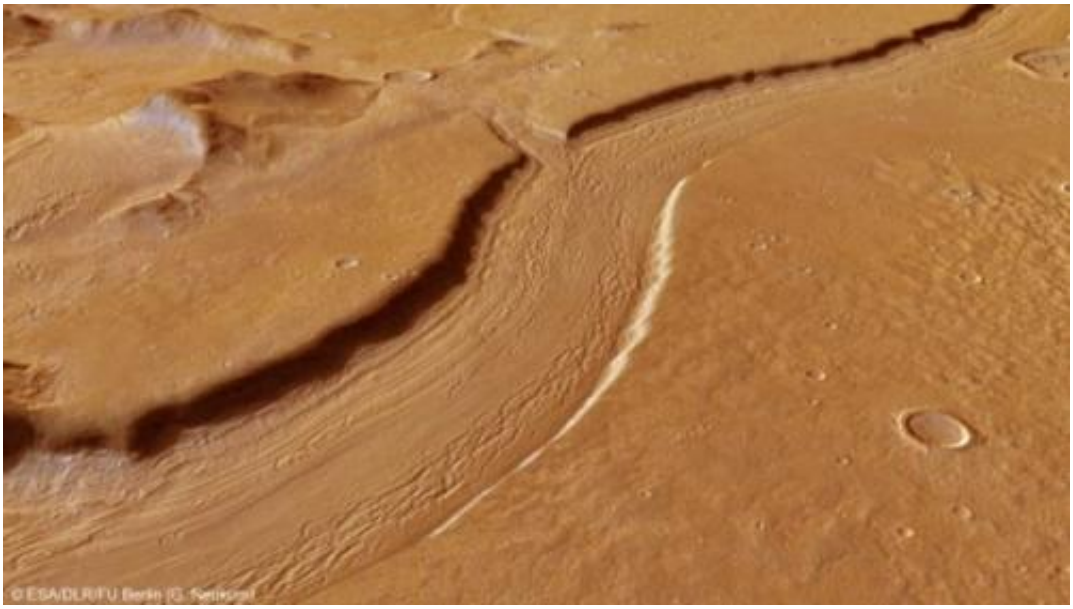
High-Resolution Stereo Camera (HRSC) nadir and colour channel data taken during revolution 10657 on 14 May 2012 by ESA's Mars Express have been combined to form a natural-colour view of Reull Vallis. Centred at around 41°S and 107°E, the image has a ground resolution of about 16 m per pixel. The river-like channel is believed to have been formed by flowing water, which at some distant epoch cut through highland terrain and successively formed smooth plains. With a width of close to 7 km and a depth of around 300 m, the valley floor shows clear linear features believed to be ice-rich, and formed by debris and ice in a manner not dissimilar to the formation of glacial valleys on Earth. Credit: ESA/DLR/FU Berlin (G. Neukum)

(Phys.org)—ESA's Mars Express imaged the striking upper part of the Reull Vallis region of Mars with its high-resolution stereo camera last year.

Reull Vallis, the river-like structure in these images, is believed to have formed when running water flowed in the distant martian past, cutting a steep-sided channel through the Promethei Terra Highlands before running on towards the floor of the vast Hellas basin.

This sinuous structure, which stretches for almost 1500 km across the martian landscape, is flanked by numerous tributaries, one of which can be clearly seen cutting in to the main valley towards the upper (north) side.

The new Mars Express images show a region of Reull Vallis at a point where the channel is almost 7 km wide and 300 m deep.

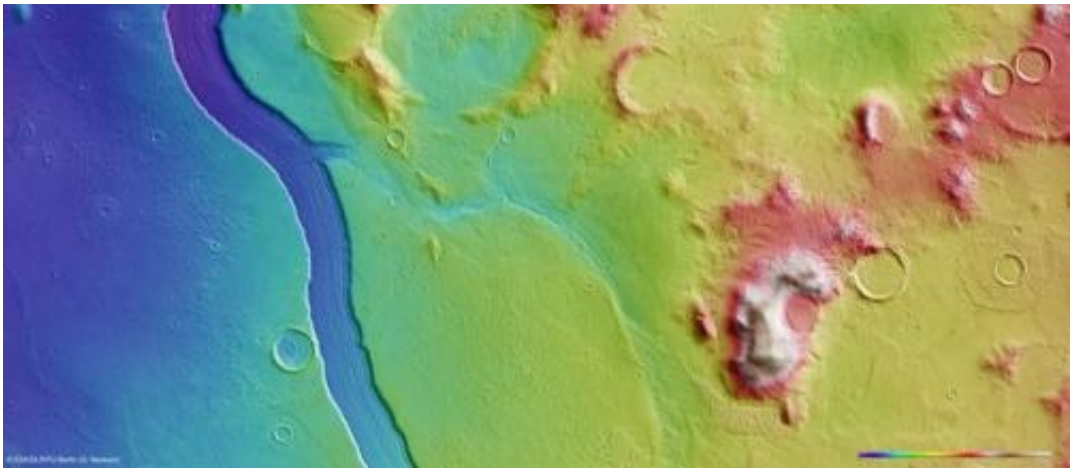


This computer-generated perspective view of Reull Vallis was created using data obtained from the High-Resolution Stereo Camera (HRSC) on ESA's Mars Express. Centred at around 41°S and 107°E, the image has a ground resolution of about 16 m per pixel. This perspective view shows a small tributary channel which, in the wider context view, is seen to later merge back into the main channel. Strong linear features are clearly seen on the valley floor in this view, evidence of ice and loose debris scraping away the floor in a glacial-like manner.

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

The sides of Reull Vallis are particularly sharp and steep in these images, with parallel longitudinal features covering the floor of the channel itself. These structures are believed to be caused by the passage of loose debris and ice during the 'Amazonian' period (which continues to this day) due to glacial flow along the channel.

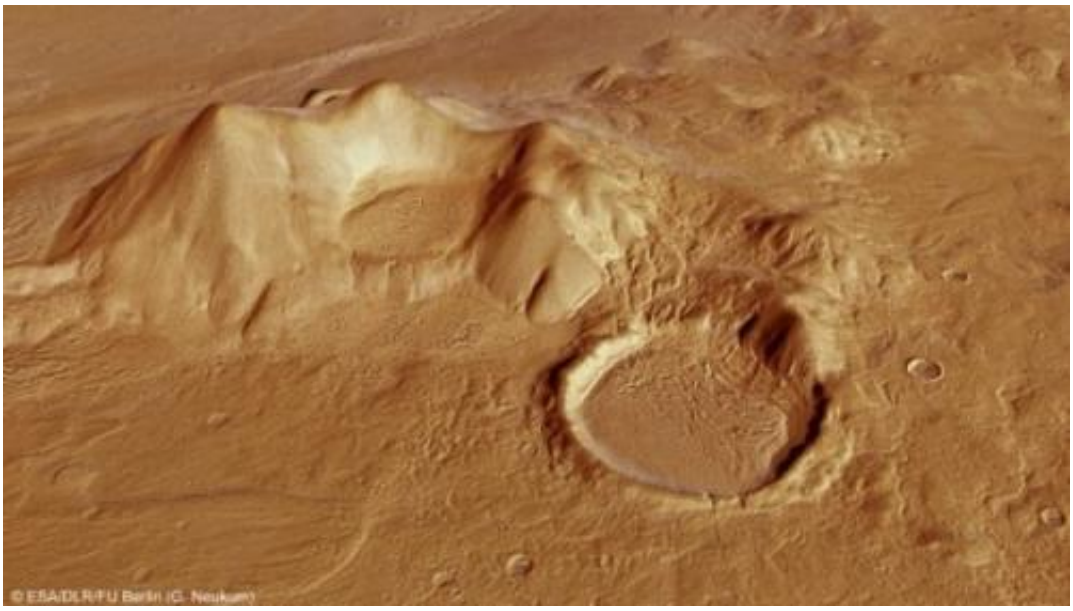
The structures were formed long after it was originally carved by liquid water during the Hesperian period, which is believed to have ended between 3.5 billion and 1.8 billion years ago.



This colour-coded overhead view is based on an ESA Mars Express HRSC digital terrain model of the Reull Vallis region, from which the topography of the landscape can be derived. The colour coding shows the depth of the main channel, coloured in blue, which contrasts clearly against the Promethei Terra Highlands and their smooth, soft and rounded mountain tops. Centred at around 41°S and 107°E, the image has a ground resolution of about 16 m per pixel. The image was taken during revolution 10657 on 14 May 2012. Credit: ESA/DLR/FU Berlin (G. Neukum)

Similar lineated structures, believed to be rich in ice, can also be found in many of the surrounding craters.

In the wider context image, the tributary intersecting the main channel appears to be part of a forking of the main valley into two distinct branches further upstream before merging back into a single main valley.



This computer-generated perspective view of part of the Promethei Terra highlands adjacent to Reull Vallis was created using data obtained from the High-Resolution Stereo Camera (HRSC) on ESA's Mars Express. Centred at around 41°S and 107°E, the image has a ground resolution of about 16 m per pixel. The image shows a rounded and smooth-topped mountain with a large impact crater in the foreground. The crater is largely filled in with sediments and shows step-like structures towards the right side, possibly indicative of sublimation or evaporation of water ice at different times and at different depths within the crater. Credit: ESA/DLR/FU Berlin (G. Neukum)

The right (northern) part of the main image is dominated by the Promethei Terra Highlands with their high and soft-rounded mountains shown in these images, rising around 2500 m above the surrounding flat plains.

The perspective view below shows one of these mountains with nearby sediment-filled impact craters.

This region shows a striking resemblance to the morphology found in regions on Earth affected by glaciation. For example, we can see circular step-like structures on the inner walls of the sediment-filled crater in the foreground of the second perspective view. Planetary scientists think that these may represent former high water or glacial levels, before ice and water sublimated or evaporated away in stages at various times.

The morphology of Reull Vallis suggests it has experienced a diverse and complex history, with analogies seen in glacial activity on Earth. These analogies are giving planetary geologists tantalising glimpses of a past on the Red Planet not too dissimilar to events on our own world today.

Provided by European Space Agency

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