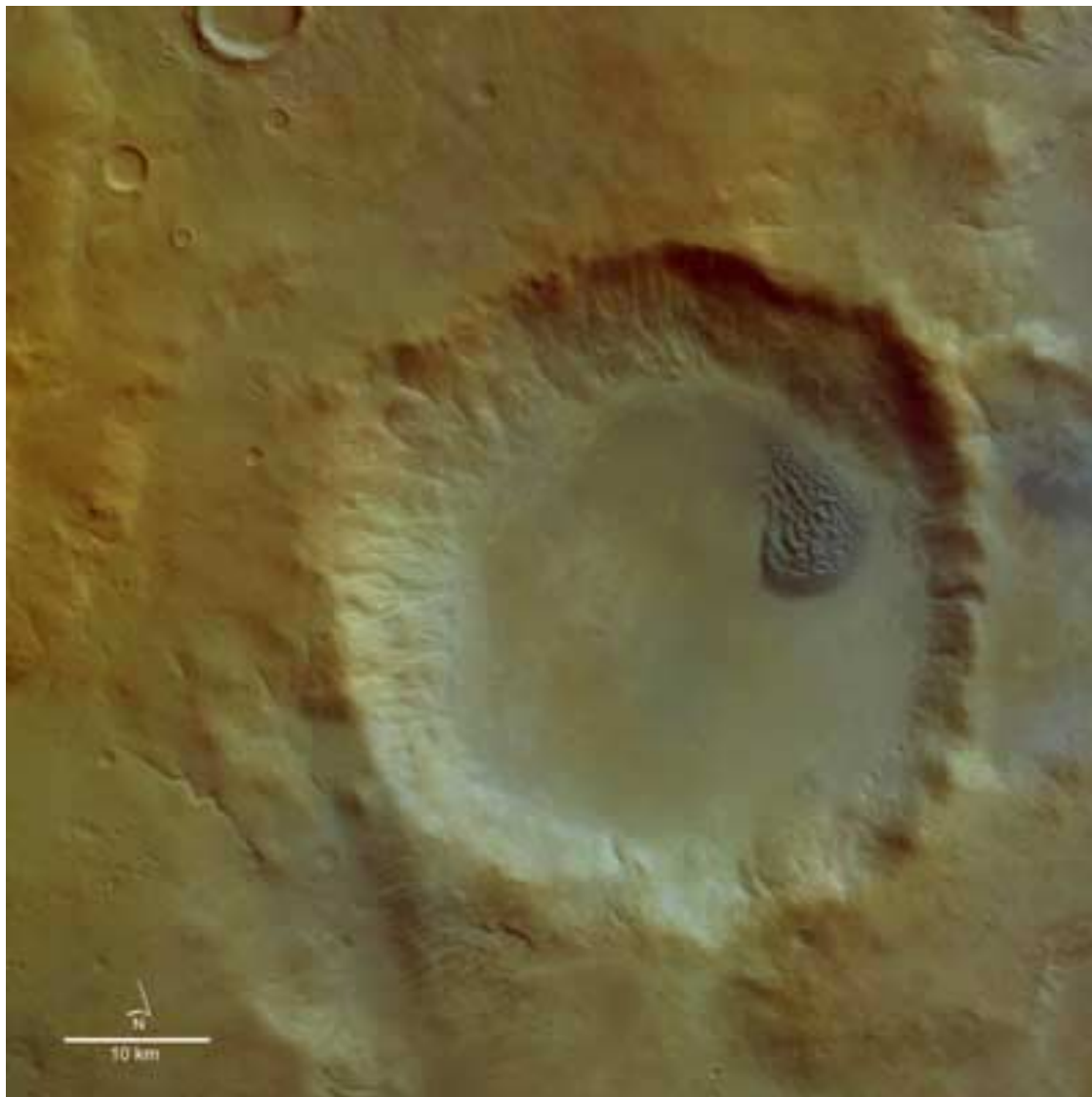


IMPACT CRATERS

CRATER DUNES IN ARGYRE PLANITIA

Colour View



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Images taken: in May 2004, during orbit 427. The image resolution is approximately 16.2 metres per pixel. North is on the top.

Localisation: the images are centred at Mars longitude 303° East and latitude 43° South.

They show a Martian crater with a dune field on its floor.

This dune field is located in the North-Western part of the ARGYRE PLANITIA crater basin.

« 3D » View



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The crater is about 45 kilometres wide and 2 kilometres (2000 metres) deep. In the North-Eastern part of this crater, the complex dune field is 7 kilometres wide by 12 kilometres long (area of 84 km²).

In arid zones on Earth (Sahara, Gobi desert), these features are called ‘barchanes’, which are dunes having an asymmetrical profile, with a gentle slope on the wind-facing side and a steep slope on the lee-side.

The dune field shown here suggests an easterly wind direction with its steeper western part.

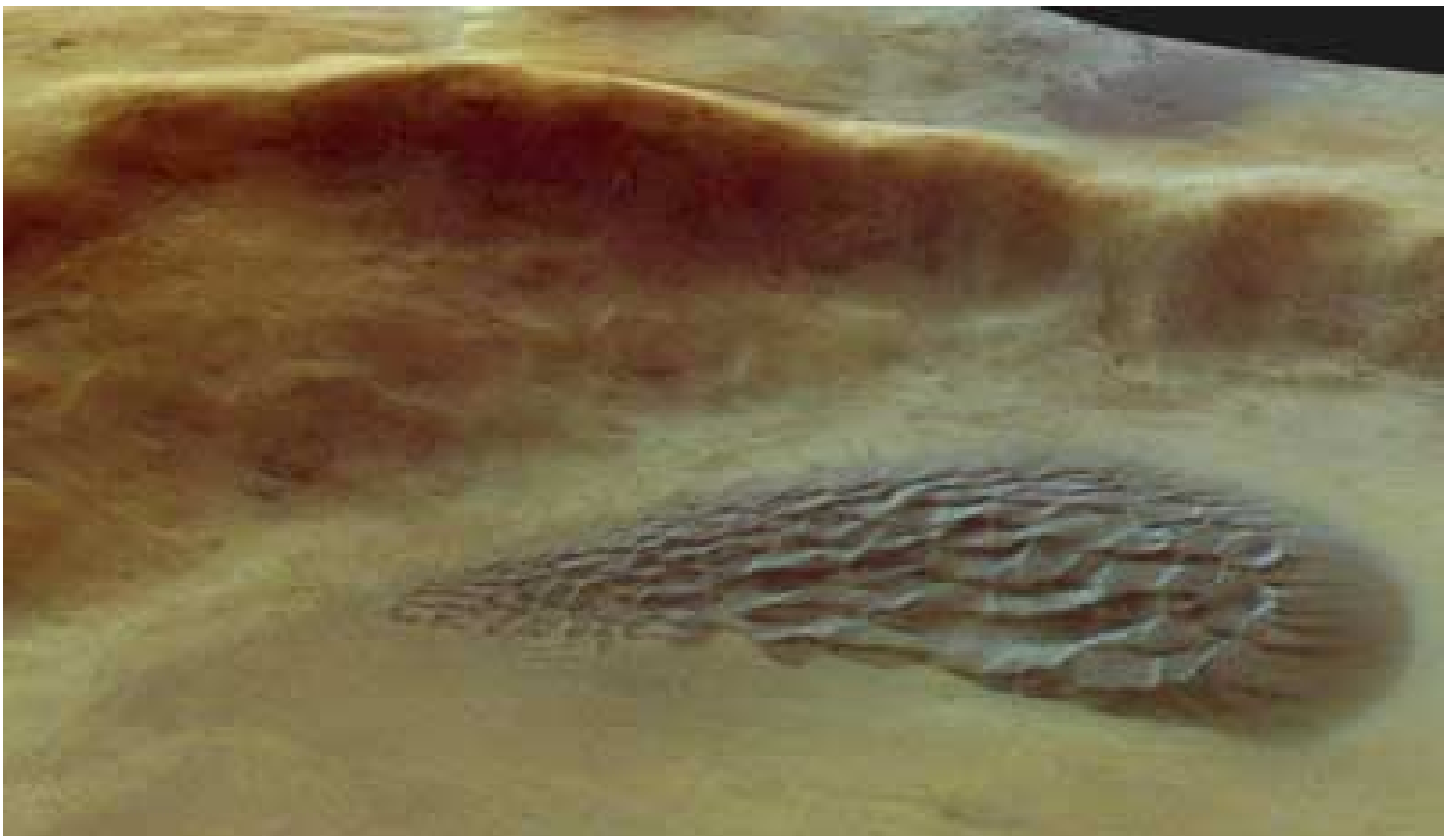
The composition of the dune material is not certain, but the dark sands could be of basaltic origin.

Perspective View



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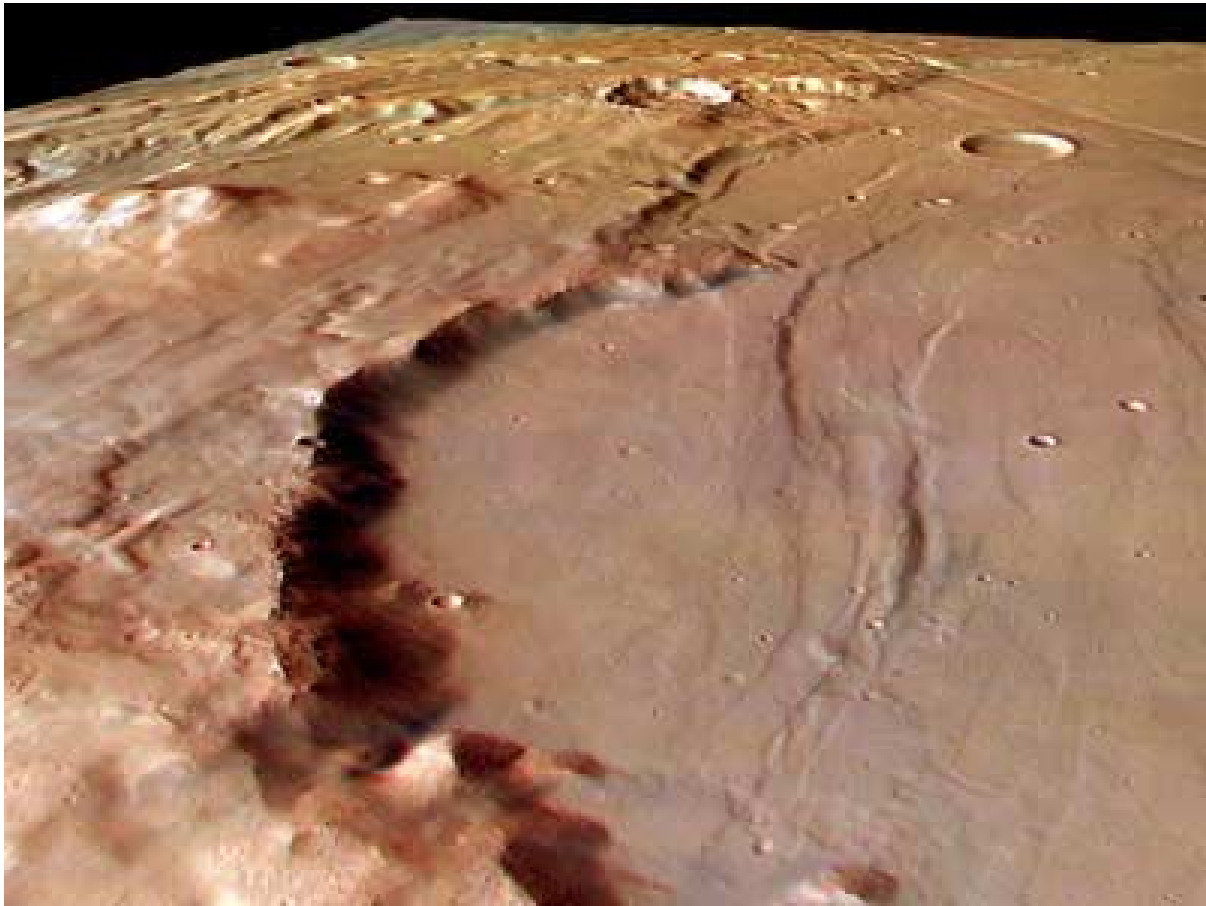
Close-Up View



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SOLIS PLANUM, THAUMASIA REGION

Perspective View, Looking South – East



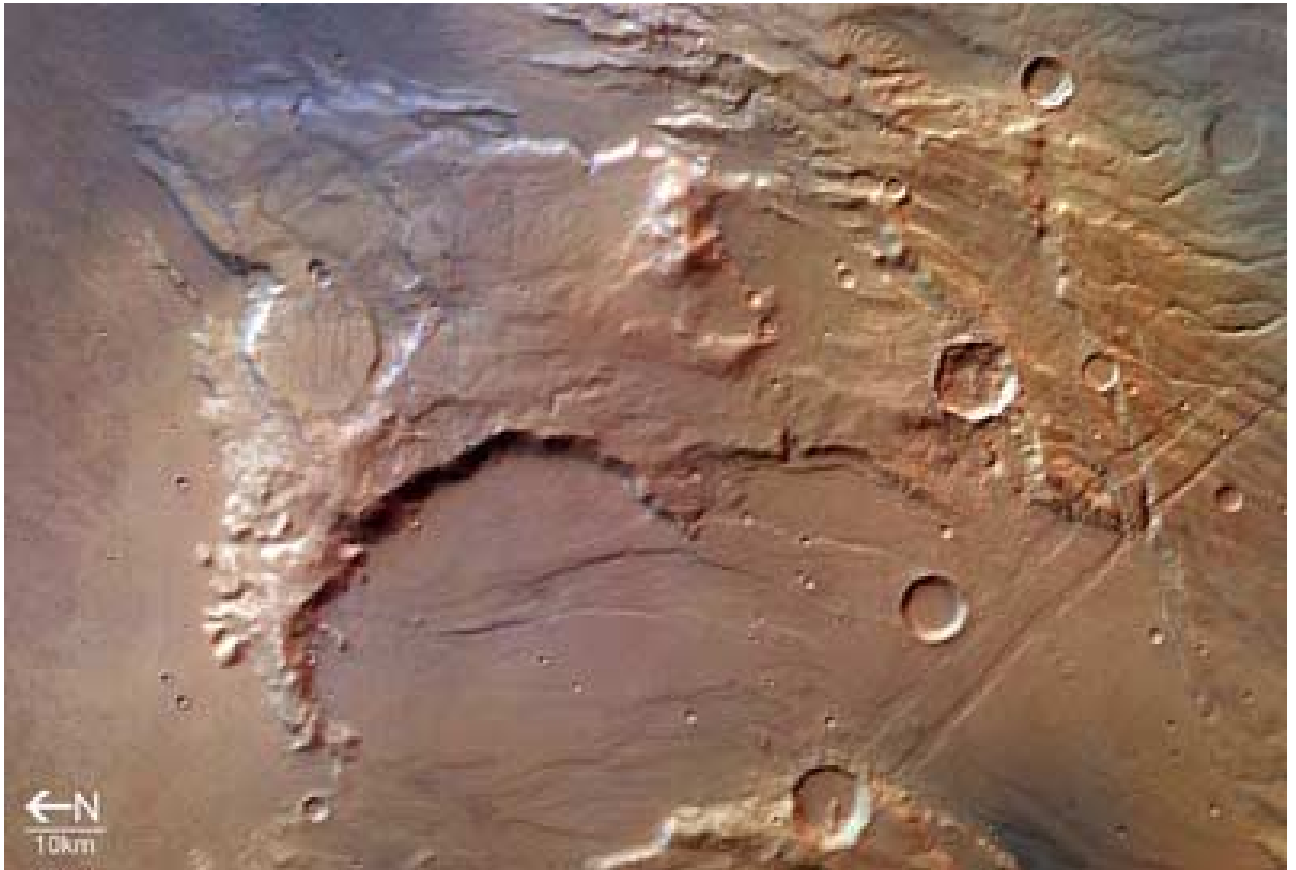
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Images taken: in May 2004, during orbit 431 - ground resolution of approximately 48 metres per pixel.

Localisation: south of SOLIS PLANUM at longitude 271° East and latitude of about 33° South.

They show part of a heavily eroded impact crater at SOLIS PLANUM, in the THAUMASIA region of Mars. North is on the left of the next two images.

Colour View



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The larger eroded impact crater in the lower left of this image has a diameter of about 53 kilometres and its eastern crater rim is about 800 metres high.

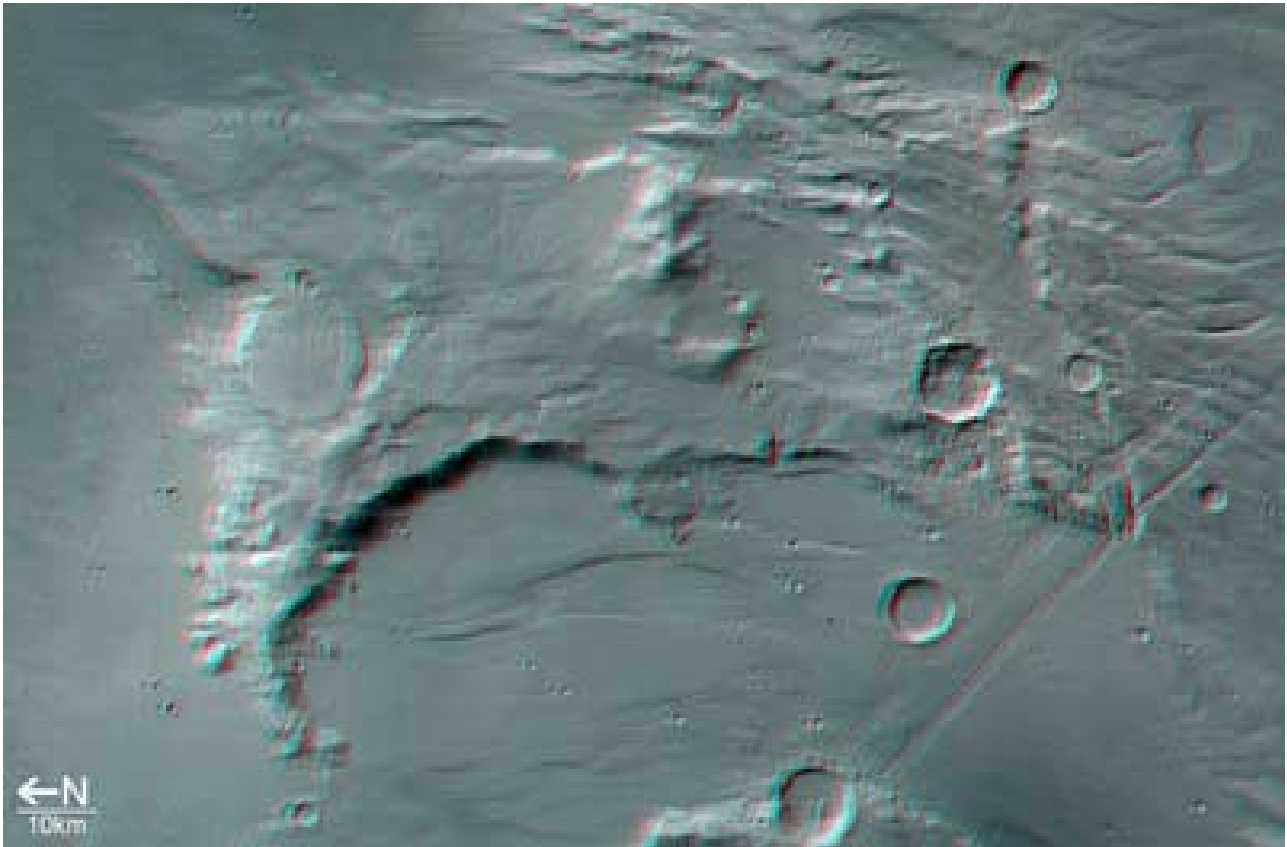
The blue/white tint in the eastern (top left) part of the scene indicates a near-surface haze or clouds.

To the south (right), tectonic ‘graben’ structures can be seen running in three different directions (North-west, North-east and East-north-east), which show three different phases of development.

A graben is a down-dropped block of the crust resulting from extension, or pulling, of the crust. They are often seen together with features called ‘horsts’, which are upthrown blocks lying between two steep-angled fault blocks. In one step of the evolution of the Martian crust, grabens were formed in the North-west direction, in a second step, other grabens formed in the North-east direction and, during a third step, grabens formed in the East-north-east direction.

Some of the grabens shown here are about five kilometres wide.

« 3D » Anaglyph View



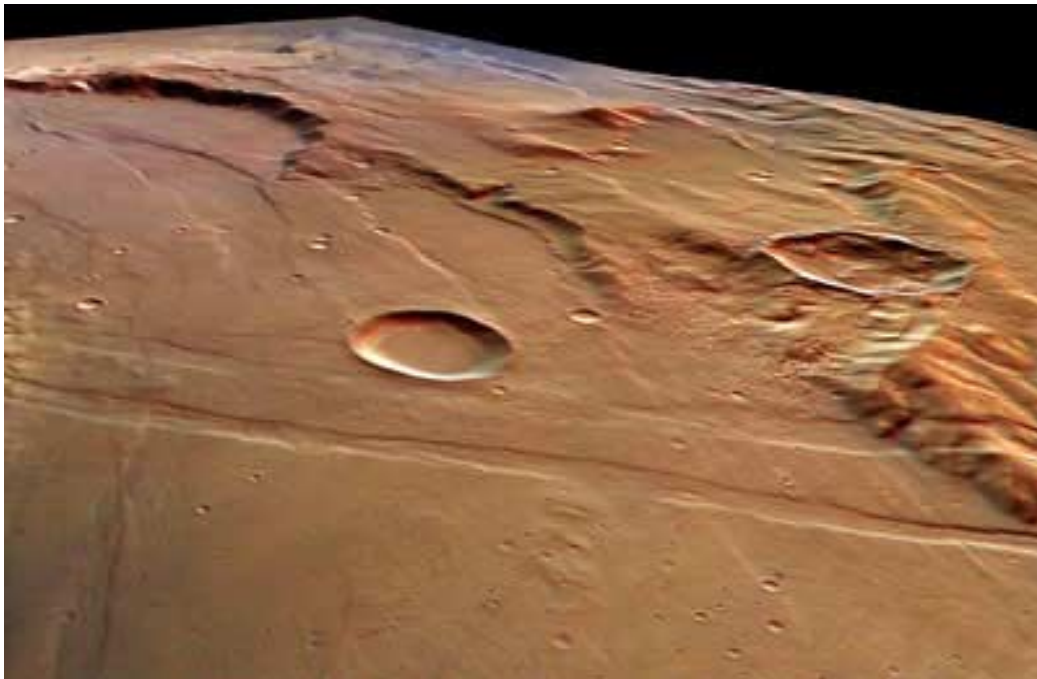
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The northern end of the higher region, or upper left in this image, contains an almost circular plateau, which is 15 kilometres across.

It may be an old impact crater, filled by sediments, which developed a harder consistency than the surrounding material over the course of time.

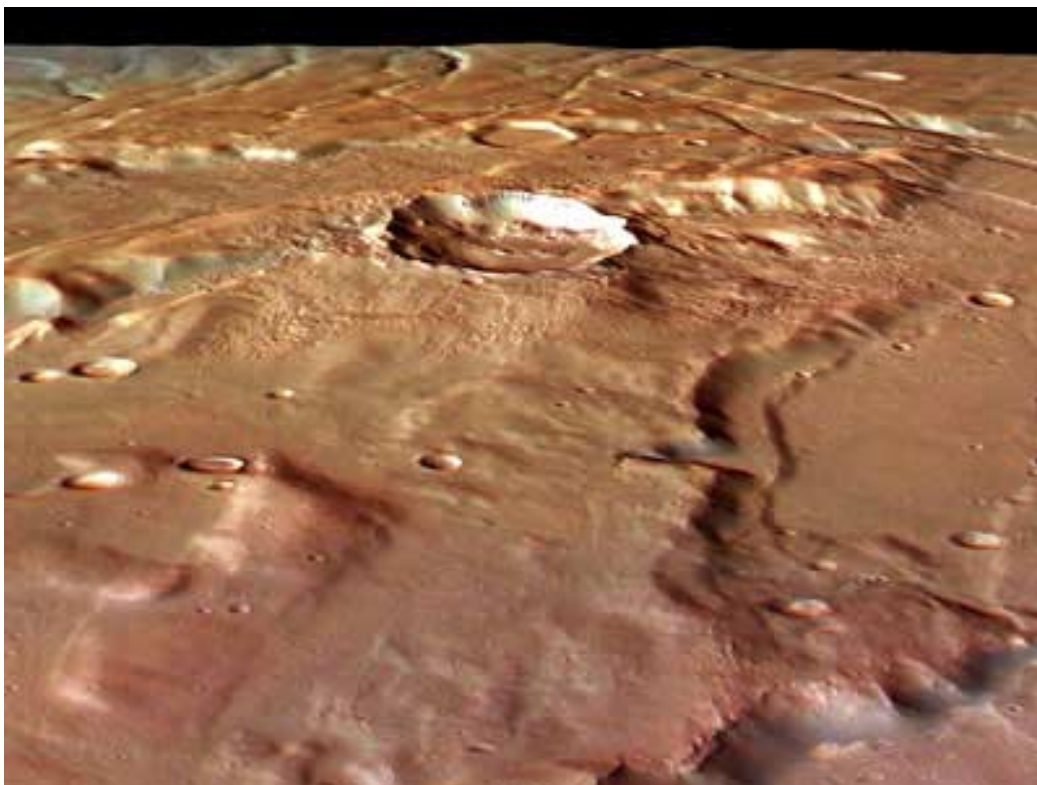
Later, the more easily eroded material was removed and the harder inner filling remained. This phenomenon is called 'inverted relief'.

Perspective View, Looking North – East



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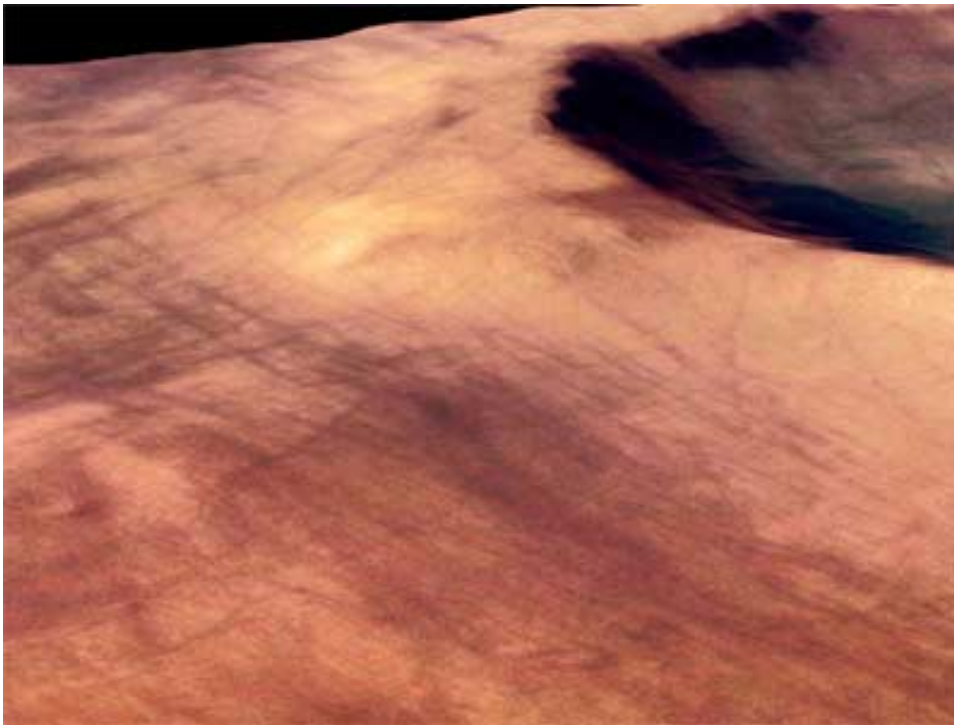
Close-Up Perspective View, Looking South – East



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PROMETHEI TERRA, SOUTHERN HIGHLANDS

Martian 'Dust Devil' Tracks



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These images, taken in May 2004 during orbit 368, show a part of the southern highlands of Mars, called PROMETHEI TERRA – resolution of 14 metres.

Localisation: longitude 118° East – latitude 42° South

Impact Crater



The images show an area in the PROMETHEI TERRA region, east of the HELLAS PLANITIA impact basin.

The smooth surface is caused by a layer of dust or volcanic ash that is up to several tens of metres thick.

This layer has covered all landforms, and even young impact craters have lost their contours due to in-fill and collapse of their fragile crater walls. This layer has been removed by the wind at some ridges and crater walls.

Although the above close-up image was taken at high resolution and shows very fine detail like the dunes seen in the close-up image at right, this dust covering layer leads to a slightly fuzzy appearance

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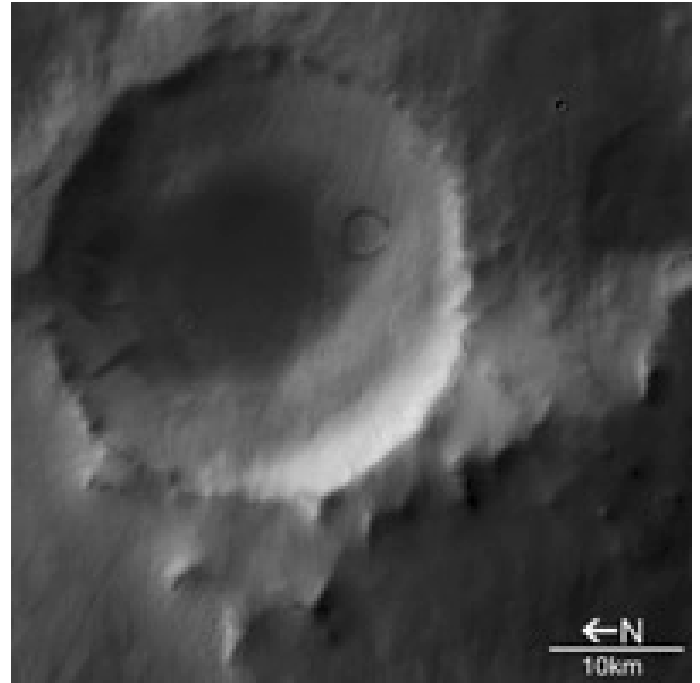
Close-Up View

The large impact crater in the southern part of the image is 32 kilometres wide and up to 1200 metres deep.

The dark crater floor is most likely the result of 'deflation', the geological term for the lifting and removal of loose material.

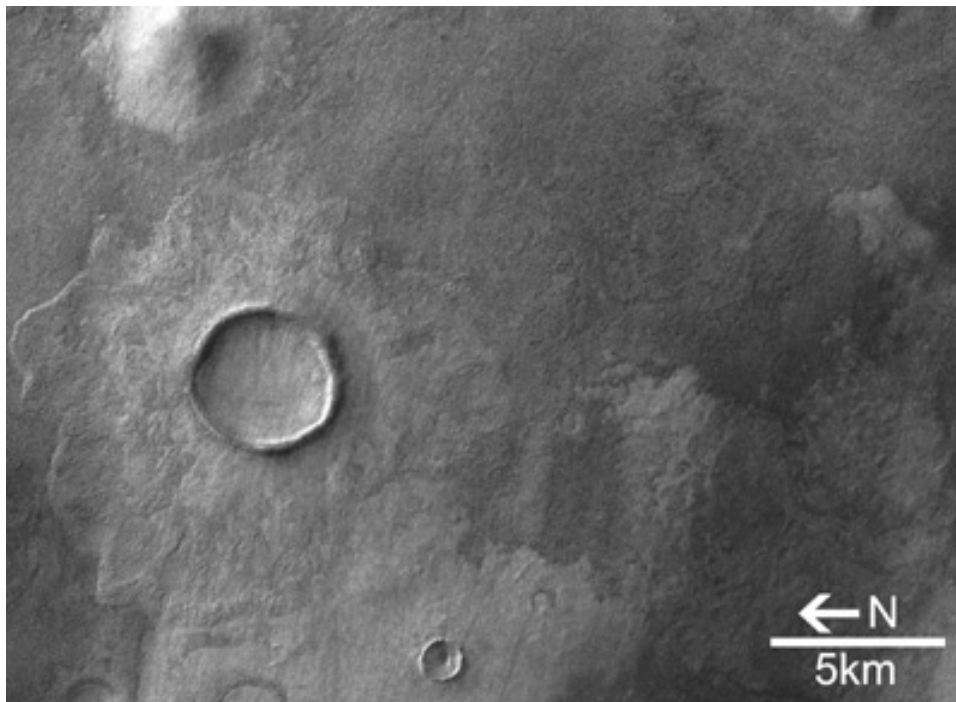
The dust removed here has accumulated in the southern part of the crater, forming a thick layer. The numerous dark tracks to the north-western and west are 'dust devil' tracks.

These atmospheric 'eddies', like tornadoes on Earth, remove the uppermost dust layers, which have a slightly different colour to the now-exposed surface. The tracks can be more than 20 kilometres long and contrast prominently with the lighter-coloured surroundings.



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Black & White image

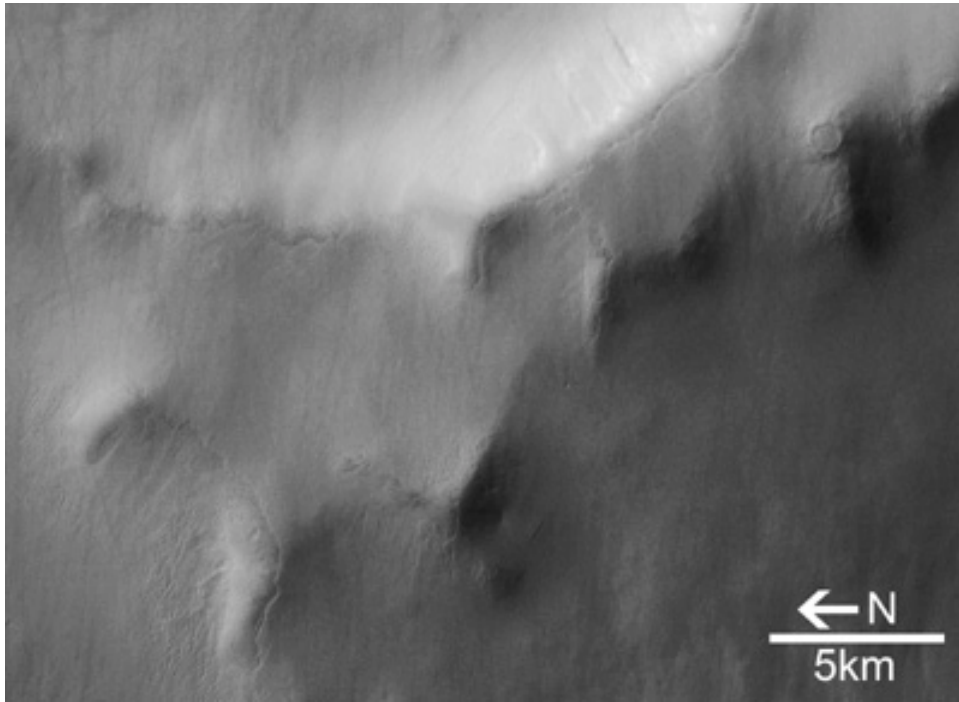


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Dust devil tracks provide short-lived evidence of the ongoing geological and atmospheric activity on Mars, which consists mainly of the transport of dust by wind.

Another sign for this 'aeolian' (wind-related) activity in the area is the existence of small dune fields that have formed in some of the depressions. They can be seen in the crater in the north and in its surroundings (see lower close-up view).

Marks of Dust Tempest



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The dust devils are not limited by geomorphological boundaries: for example, their tracks cross the crater rim. Dust devil tracks can also be seen on the thick dust layer in the southern part of the crater.

Due to the thickness of the dust layer, no darker material is exposed here. The dust devil tracks show two distinct directions of movement: East to West and South-east to North-west.

« 3d » Image (Anaglyph)



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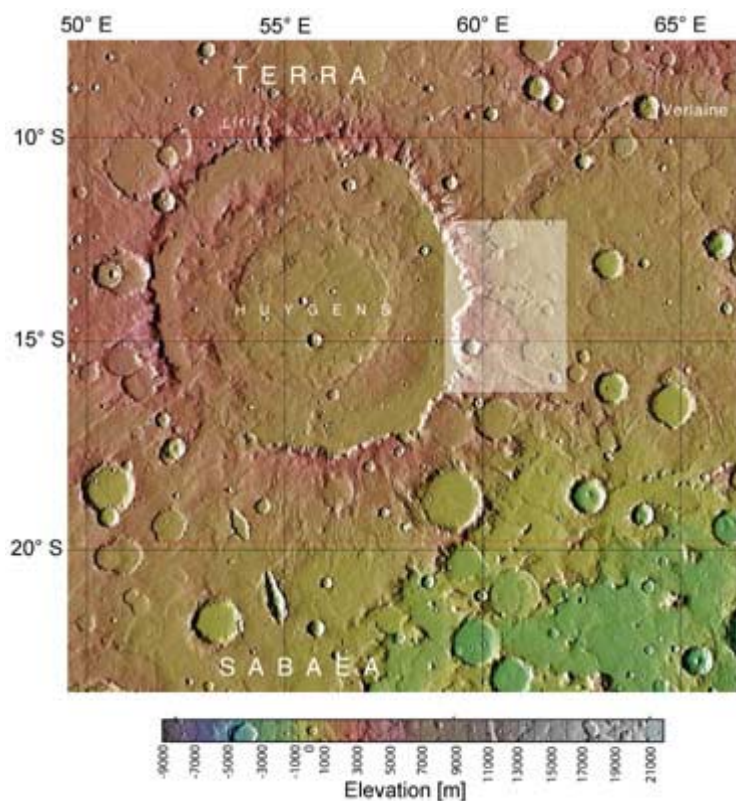
RIM OF CRATER HUYGENS

Colour View



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Localisation



Images taken during orbit 532 in June 2004 - East rim of the impact crater HUYGENS – resolution of approximately 70 metres per pixel.

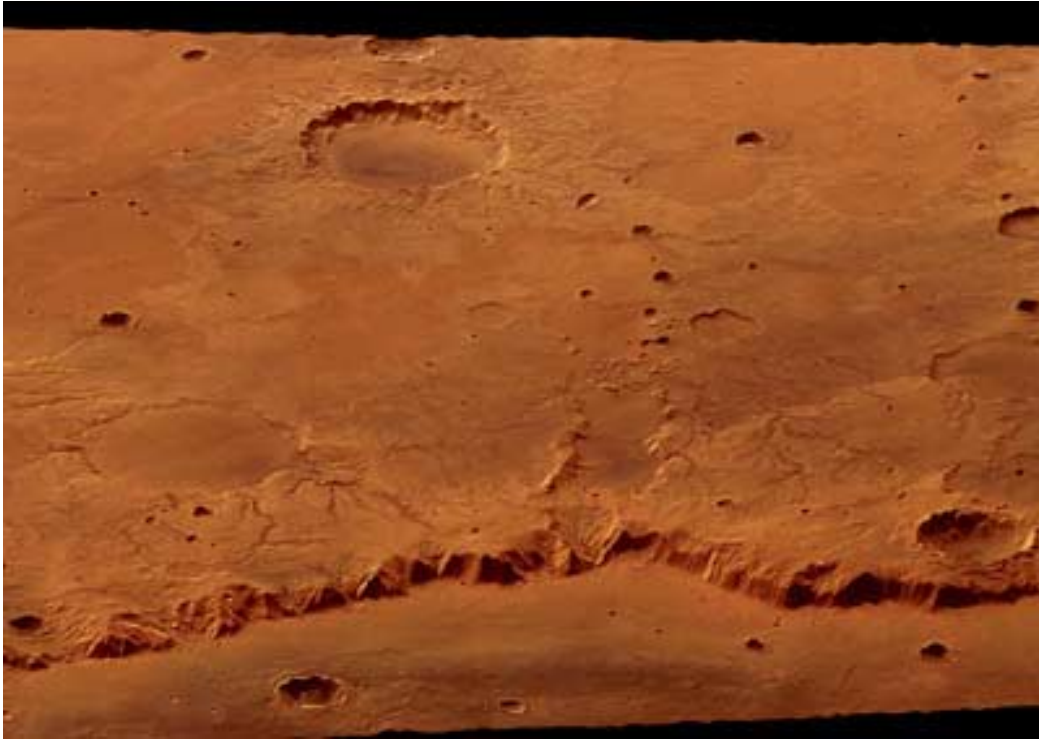
Localisation: the centre of the images corresponds to the following coordinates: Longitude 61° East – Latitude 14° South

This map extract shown here shows that the mean altitude is around 2 to 3000 metres (brown colour).

HUYGENS is an impact structure, about 450 kilometres wide, located in the heavily cratered southern highlands of Mars. Crater counts of the rim unit of the impact basin indicate that it is almost 4000 million years old.

This implies that this basin was formed in the early history of the planet and indicates a period of heavy bombardment in roughly the first 500 million years of the planet's lifetime.

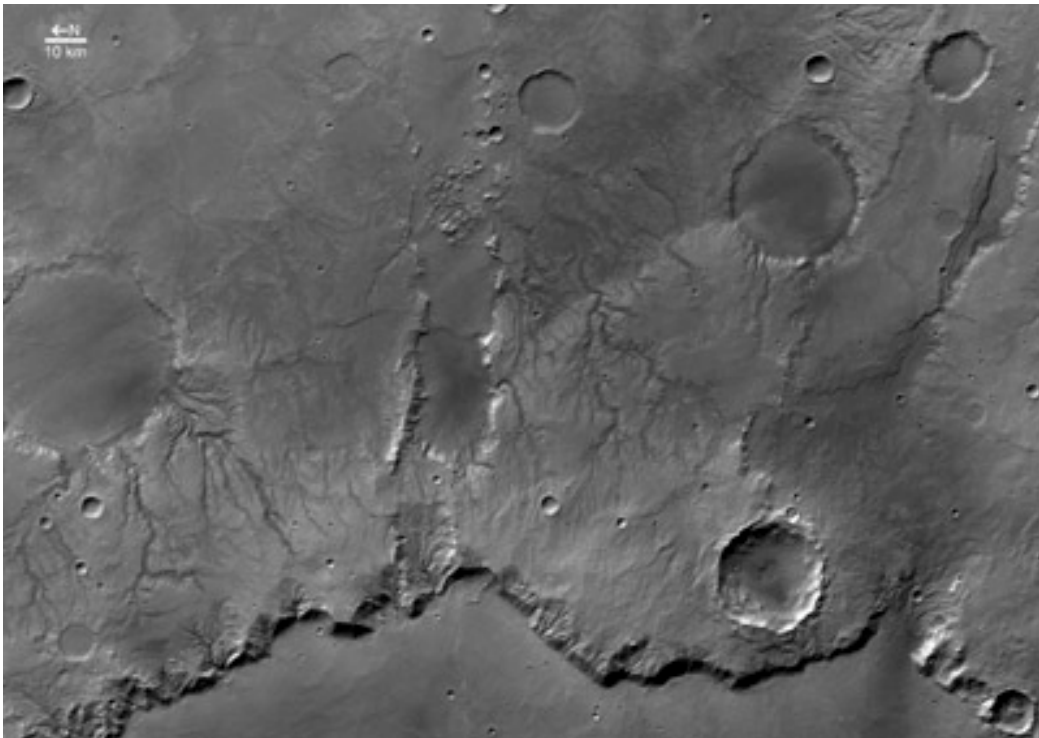
Perspective View



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The basin shows an inner ring that has been subsequently filled by sediments transported into the crater. These images show part of the eastern rim of the crater. The rim is heavily eroded and shows a 'dendritic' pattern. This observation suggests surface water run-off.

Black & White View



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« 3D » View



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Perspective View Looking North



Dendritic systems are the most common form of drainage system found on Earth.

They consist of a main ‘river’ valley with tributaries with their own tributaries.

From above, they look like a tree or a river delta in reverse.

The valley system is blanketed by dark material, which was either transported by a fluid running through the channels or by wind-driven (‘aeolian’) processes.

Part of the area has been covered by slightly redder material, which implies a different chemical composition.

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CRATER HALE in ARGYRE BASIN

Colour View



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Localisation

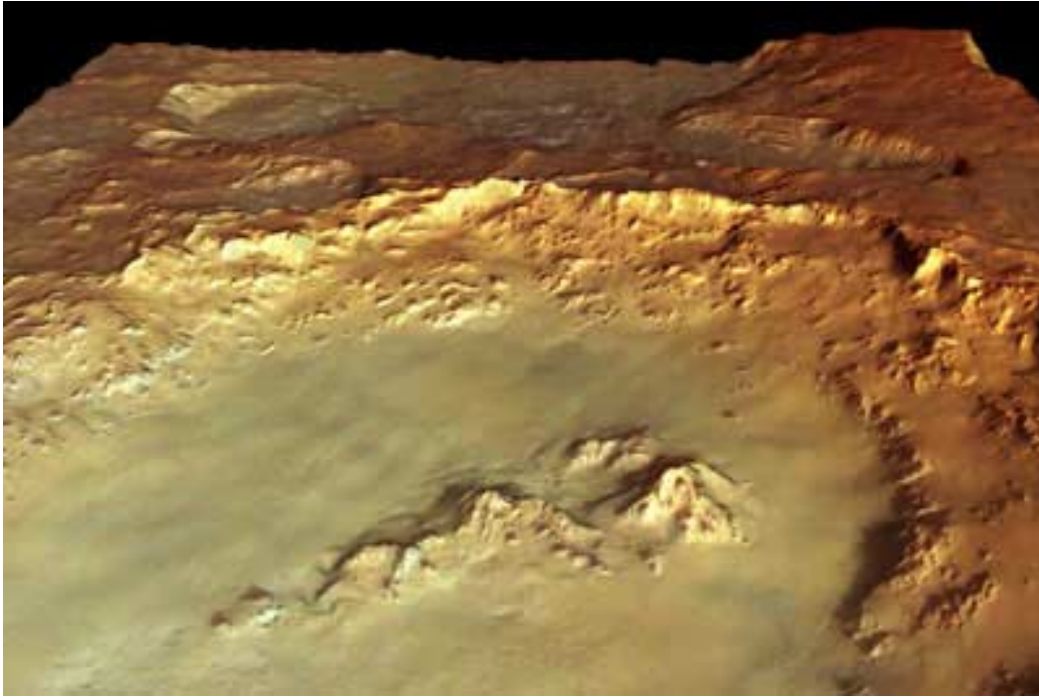


These images show CRATER HALE in the ARGYRE BASIN of the southern hemisphere of Mars.

The images show an area (light colour rectangle) close to the northern rim of the ARGYRE BASIN, located at latitude 36° South and longitude 324° East.

The image was taken with a ground resolution of about 40 metres per pixel during Mars Express orbit 533 in June 2004.

Perspective View Looking West

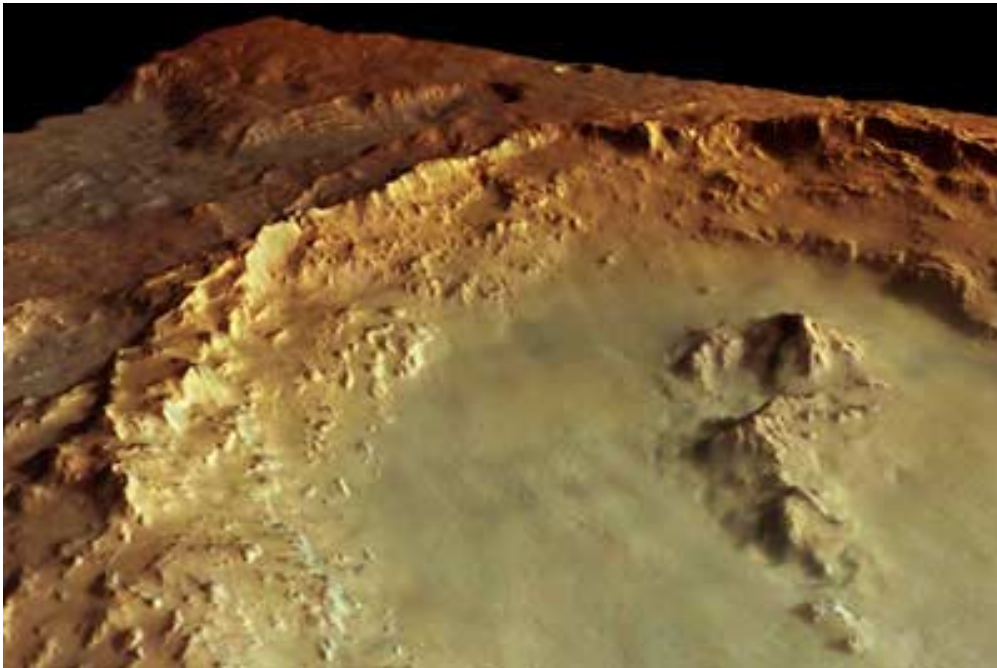


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Slight periodic colour and brightness variations in parts of the image indicate atmospheric waves in clouds.

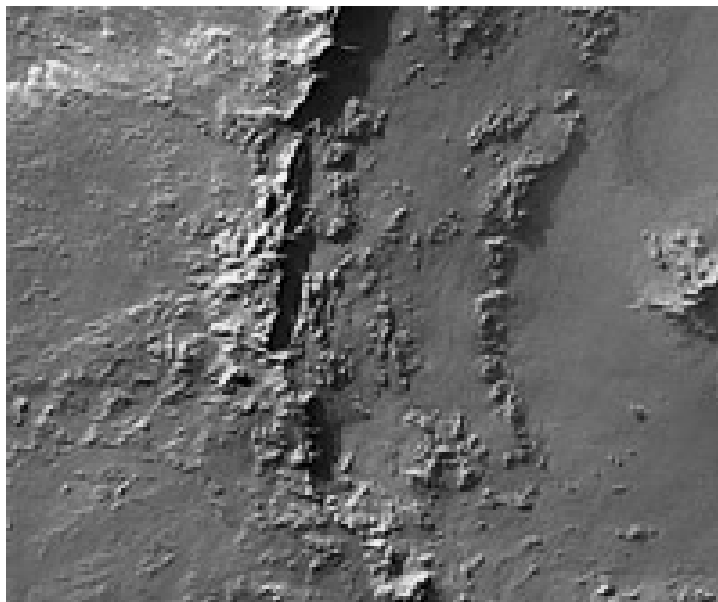
Crater HALE, with its terraced walls, central peak and a part of the inner ring is visible in the upper (eastern) part of the image.

Perspective View Looking North-West



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Close-Up View of the Walls



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The region has been eroded heavily by deposits caused by this impact, and subsequent processes.

On the southern rim of Hale, parts of the crater wall have moved downslope towards the crater's centre (see black and white detailed image).

Close-Up View of Surface



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At the bottom (western) part of the picture, as seen in this other detailed image with high resolution, the surface shows a network of fluvial channels which may have been caused by running water.

“3D” Image



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