



ART & THE COSMIC CONNECTION

NASA Space & Earth Images

Print these images and ask students to select one they would like to draw.

Students should feel free to interpret their image by cropping it or altering the colors. Encourage students to pay attention to the elements of art as they draw and think about the stories the surface features are revealing.

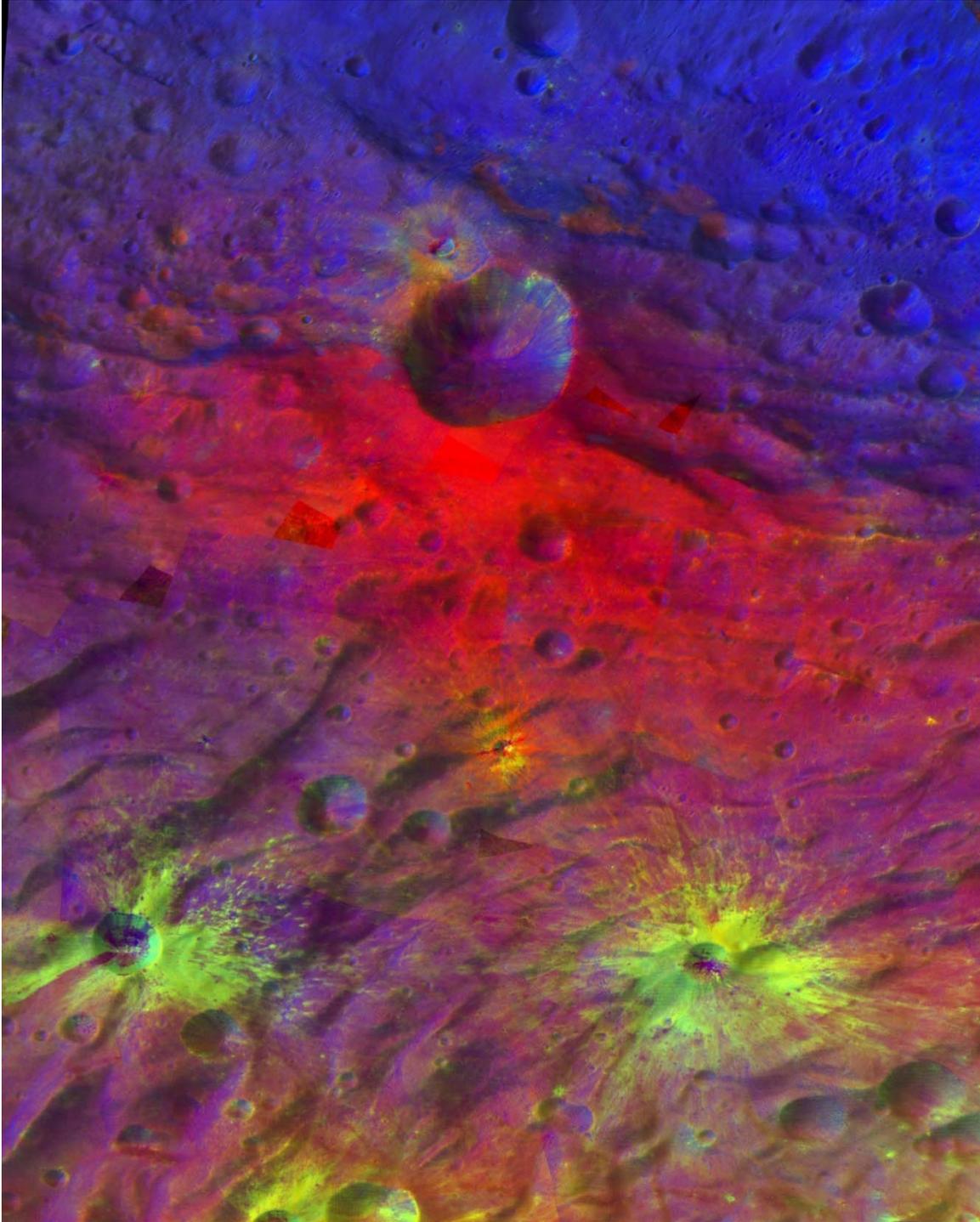
(Laminating or putting the printed images in sheet protectors will help them to last for multiple uses.)



The Color of the Moon

Earth's Moon is normally seen in subtle shades of grey or yellow. This dramatic image uses small color variations to exaggerate the real differences in the chemical makeup of the lunar surface.

Credit: Johannes Schedler (Panther Observatory)



False Color image of Oppia Crater on giant asteroid Vesta

This is a composite image that has been wrapped on a topographical model to illustrate depth.

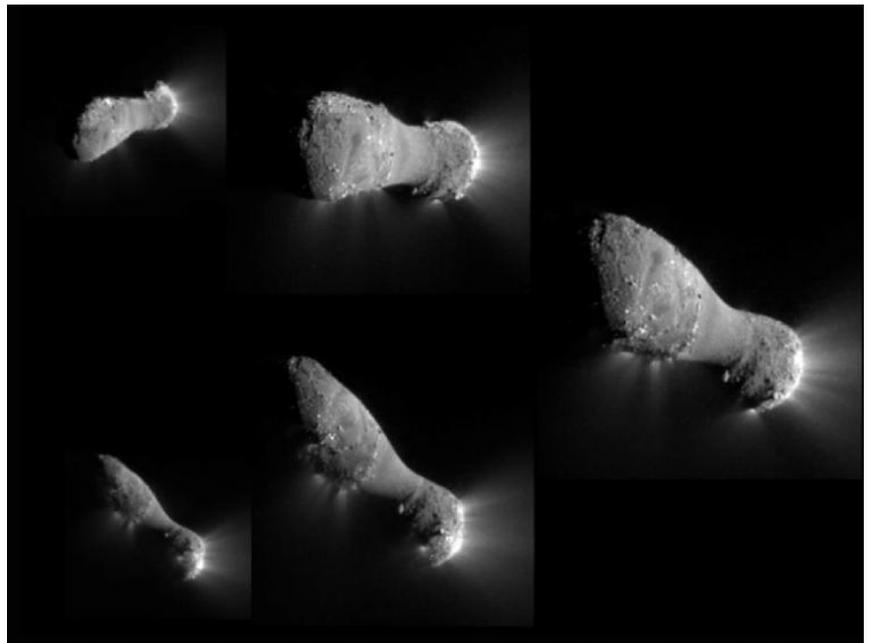
Credit: NASA/JPL-Caltech/UCLA/MS/IDA



Comet Hartley

The comet's nucleus can be seen in glorious detail in this set of images from NASA's EPOXI mission.

Credit: NASA/JPL-Caltech/UMD

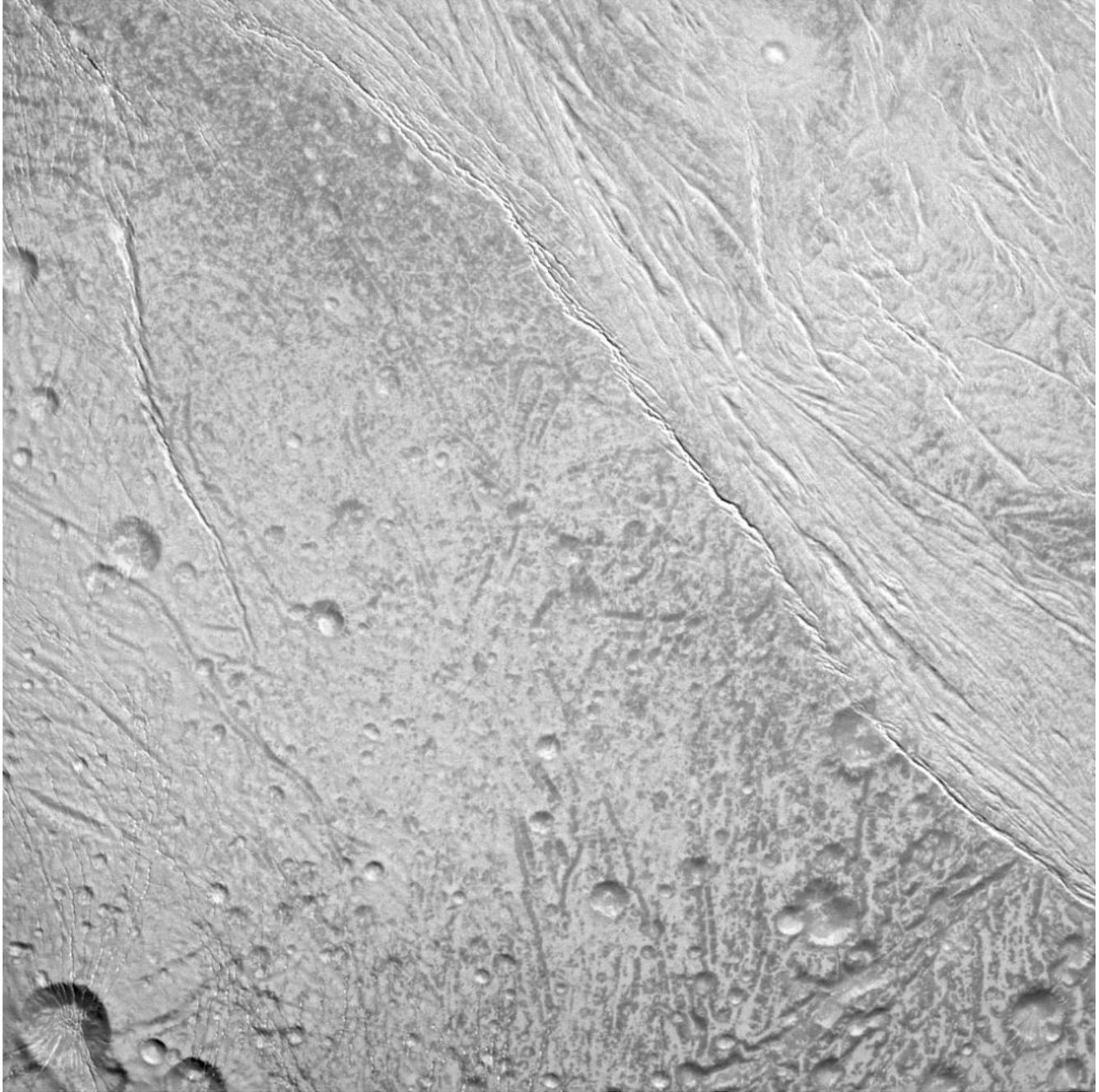




Comet Tempel 1

The Deep Impact mission's flyby spacecraft captured this image 67 seconds after the impactor slammed into the comet.

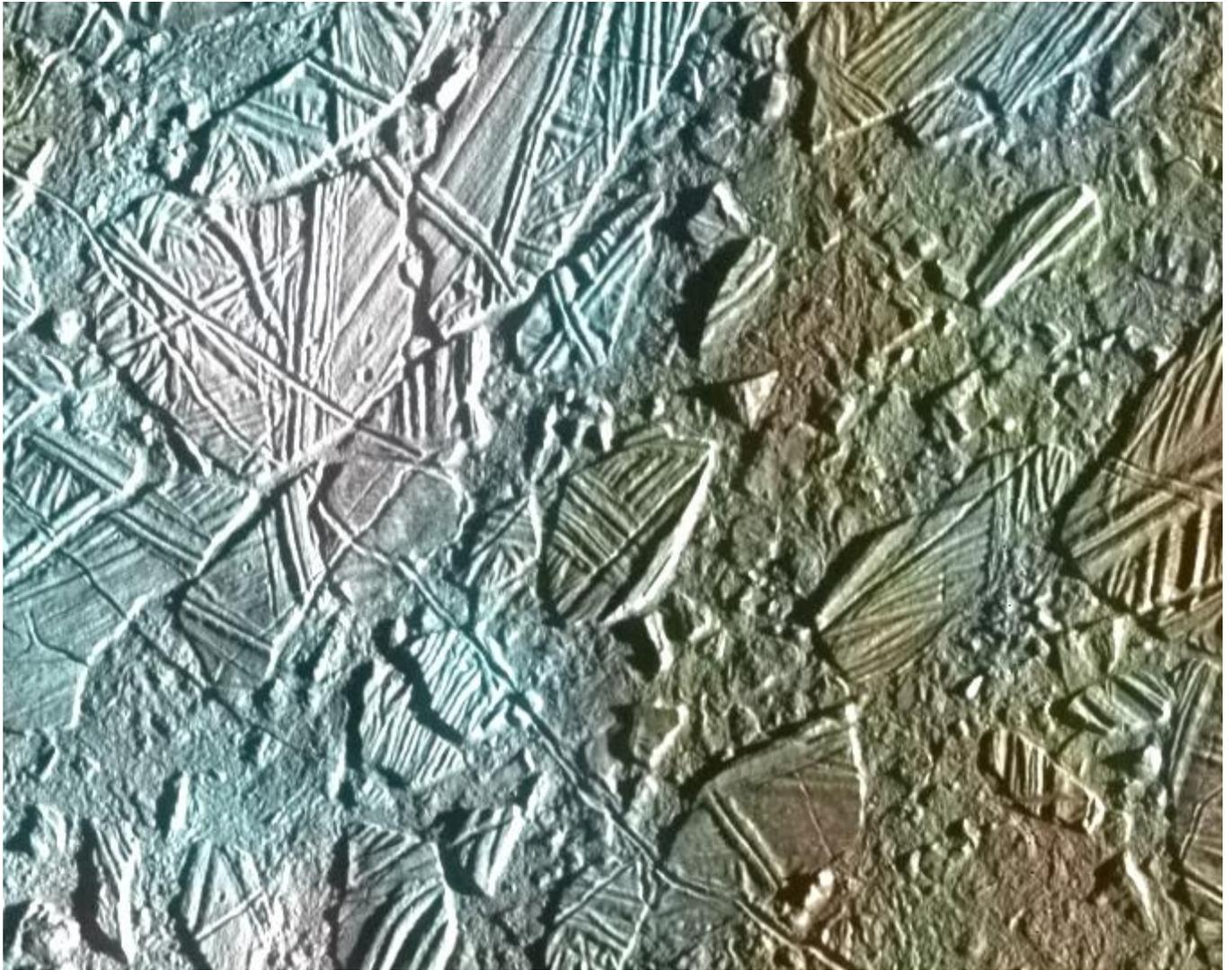
Credit: NASA/JPL-Caltech/UMD



Enceladus' Icy Surface

The cryovolcanoes (jetting ices) on Saturn's moon Enceladus are responsible for the largest of Saturn's rings!

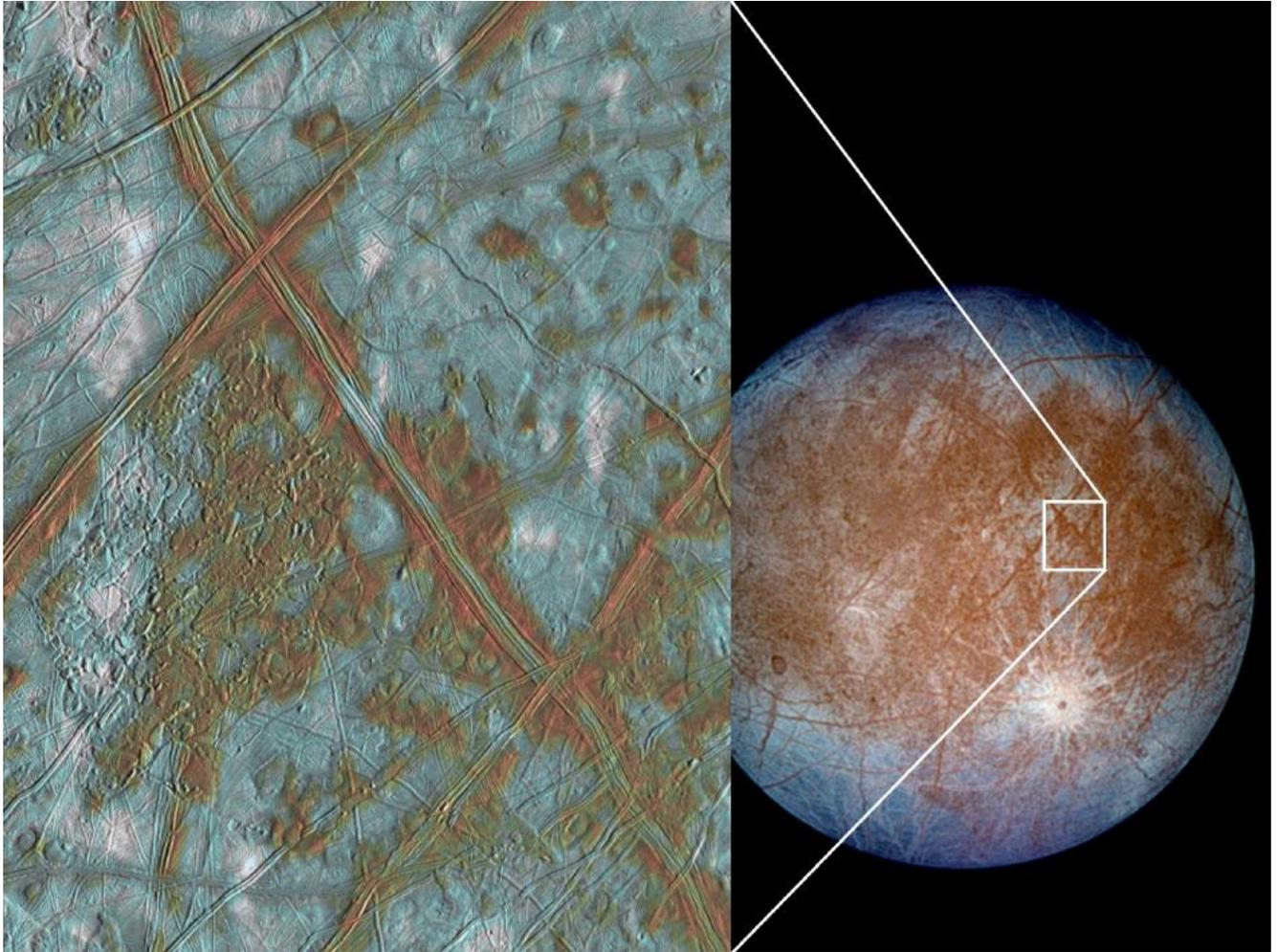
Credit: NASA/JPL-Caltech



Jupiter's Moon Europa: Chaos

The cracks and fault lines and fissures on the icy surface of Europa resemble activity we observe on our own North and South poles.

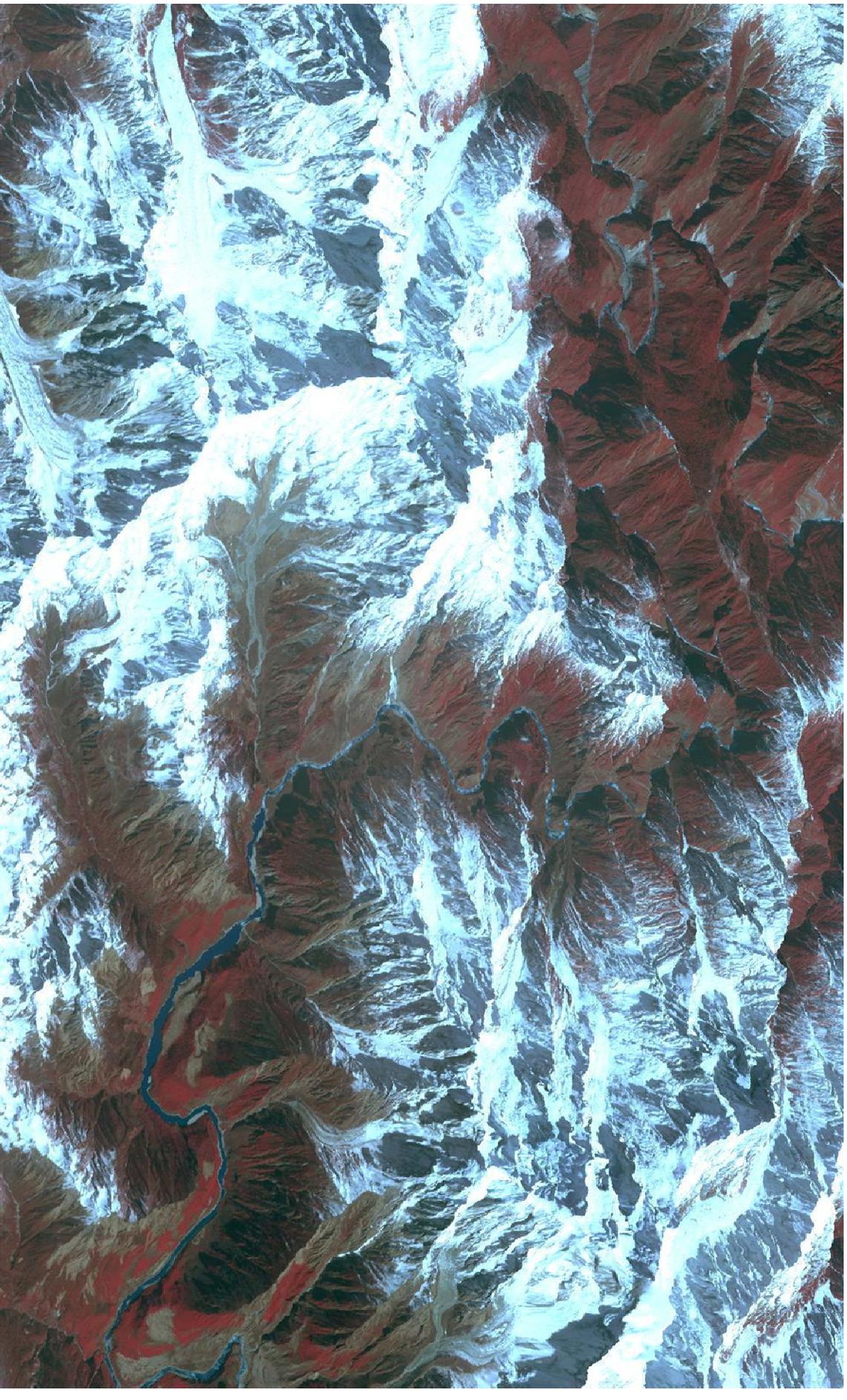
Credit: NASA/JPL-Caltech



Jupiter's Moon, Europa

Faults in the moon's icy surface.

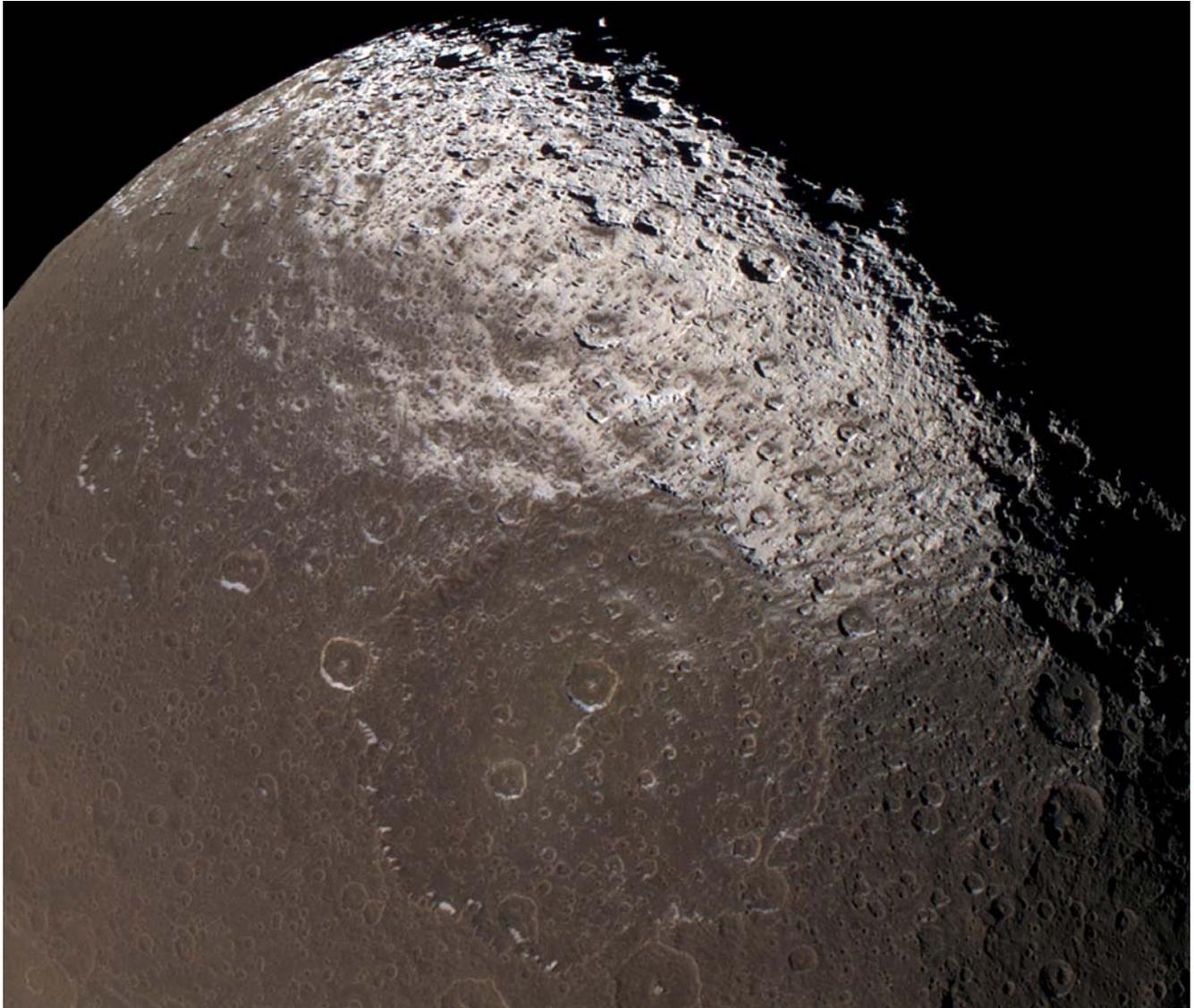
Credit: NASA/JPL-Caltech



Yarlung Zangpo Grand Canyon, Tibet

Astronomers and geologists look at topographical features (craters, volcanoes, mountains, patterns left by water) on Earth to help them understand distant planets, moons, comets and asteroids. This image was captured by the ASTER instrument on the Terra satellite.

Credit: NASA/GSFC/METI/ERSDAC/JAROS and U.S./Japan ASTER Science Team



Saturn's moon, Iapetus

Brown is the actual color of the surface of this intriguing moon, while the black areas are in shadow. Iapetus has extreme values, among the brightest and darkest surfaces in the solar system.

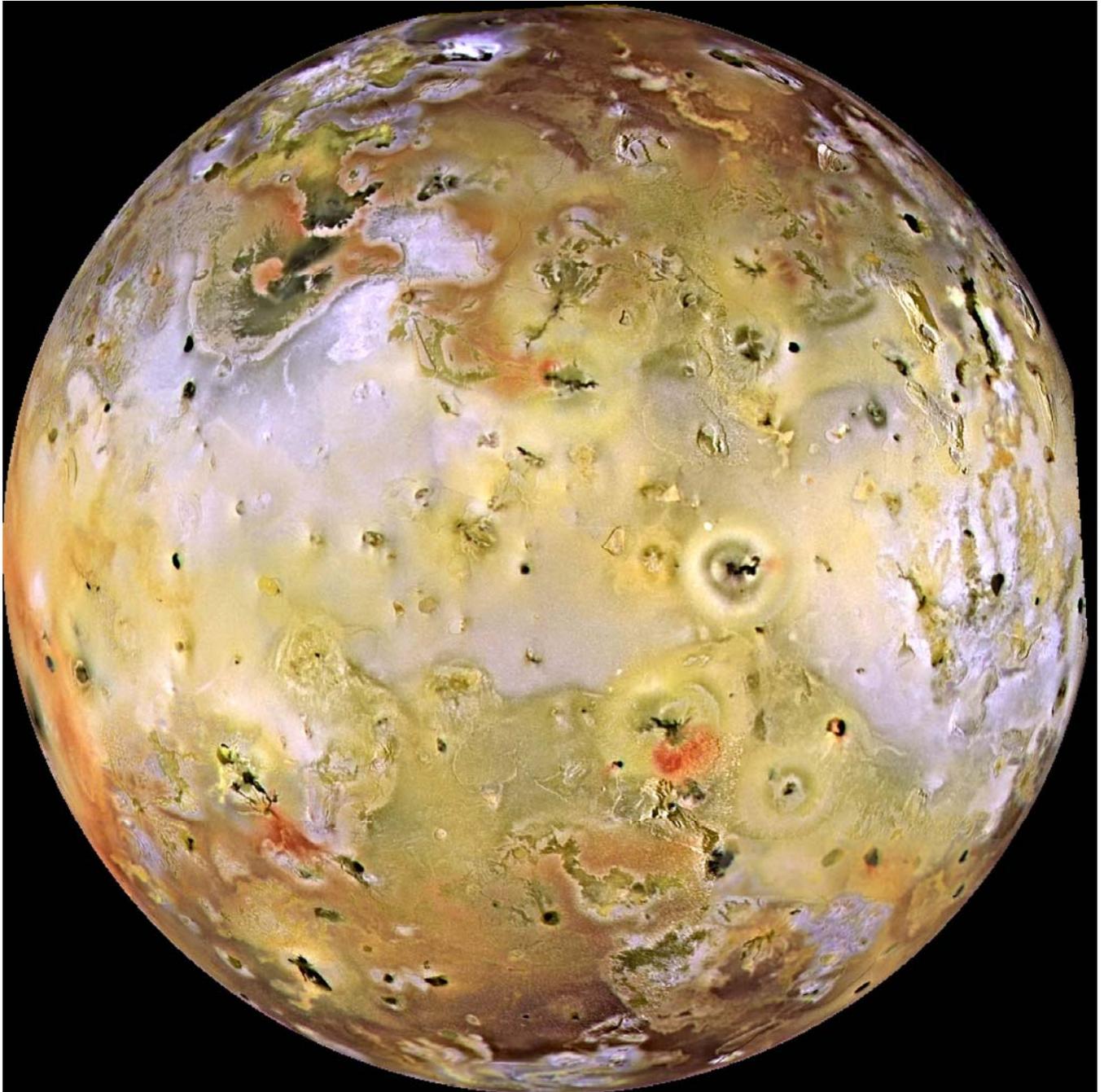
Credit: NASA/JPL-Caltech



Jupiter's moon, Io

Io is the most volcanic solar system body. Io's volcanoes continually resurface it, so that any impact craters have disappeared.

Credit: NASA/JPL-Caltech



Jupiter's Moon, Io

The most volcanic solar system body, Io is so close to Jupiter that the land is pulled 15 meters daily, like our Earth's ocean tides! This is a true color image.

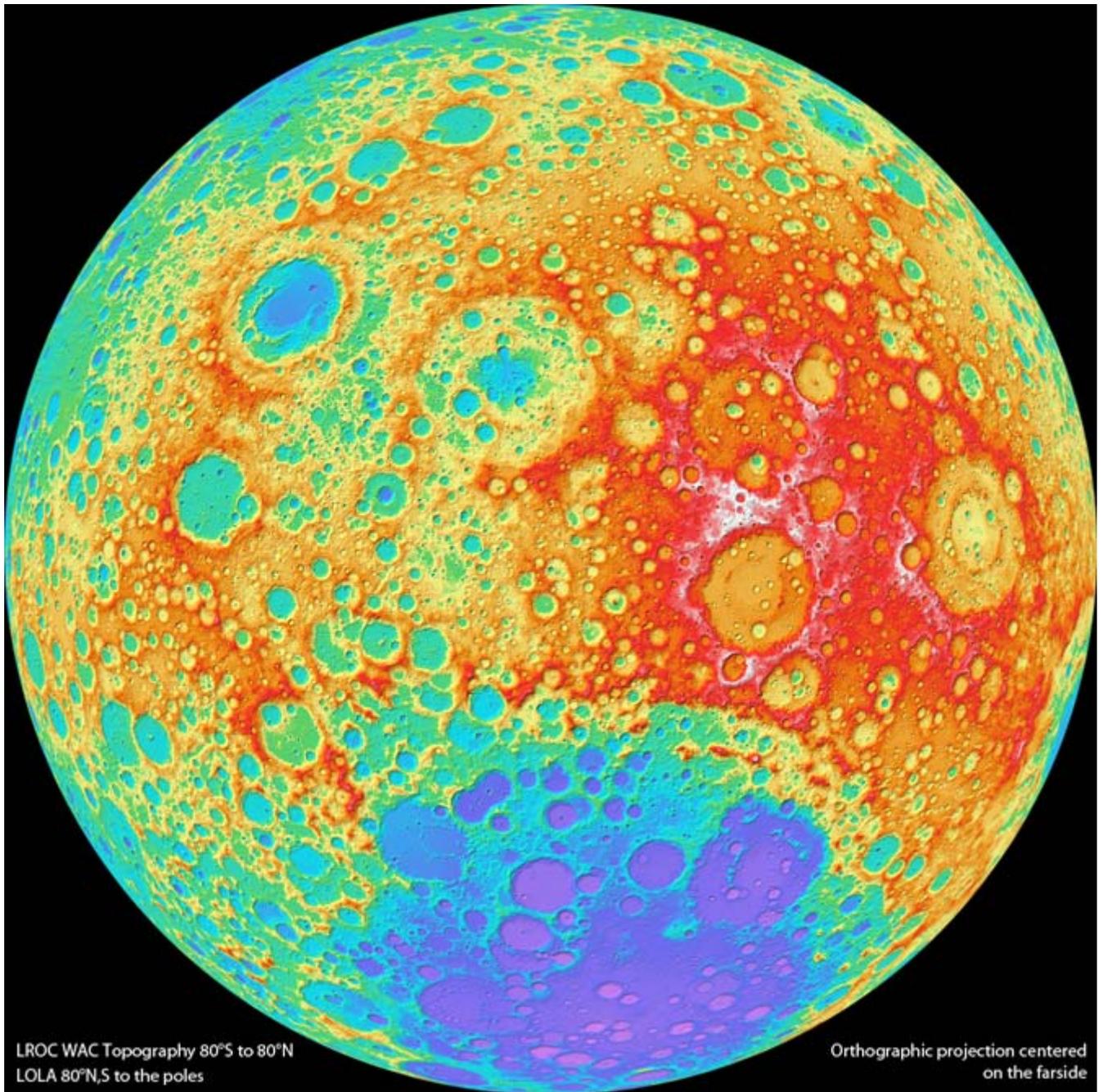
Credit: NASA/JPL-Caltech



Mercury's vast crater, Kalidasa

Taken by the MESSENGER spacecraft... check out the crater in the crater!

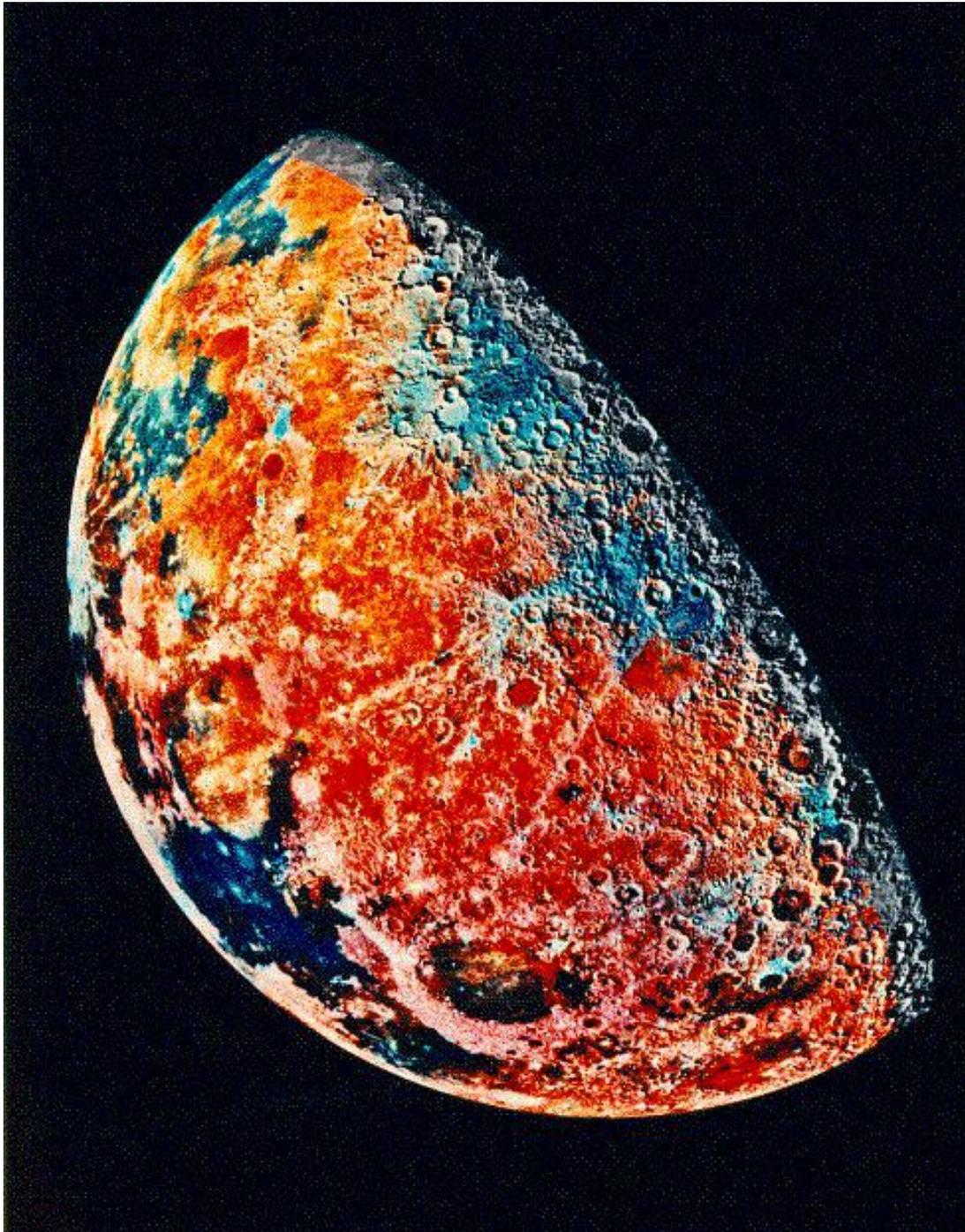
Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Arizona State University/Carnegie Institution of Washington



Far Side of the Moon

Thanks to Lunar Reconnaissance Orbiter, this is the highest resolution composite topographical map of the Moon.

Credit: NASA/JPL/University of Arizona



Earth's Moon

This false-color mosaic was constructed from 53 images taken by the Galileo spacecraft. It shows compositional variations in the northern hemisphere.

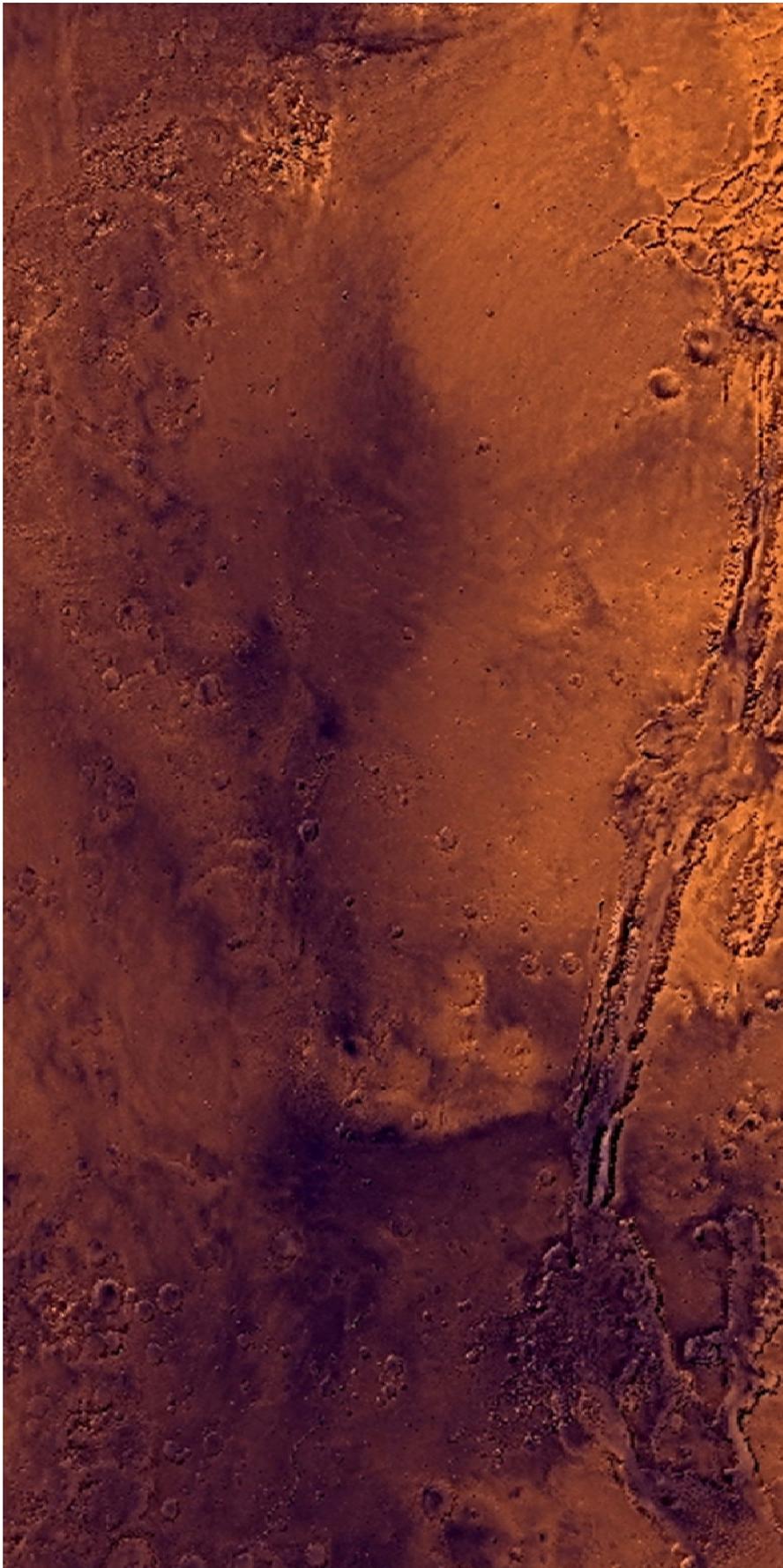
Credit: NASA/JPL-Caltech



Mars

Twelve orbits a day provided the Mars Global Surveyor wide angle cameras a global snapshot of Martian weather patterns. Bluish-white water ice clouds hang above the Tharsis volcanoes.

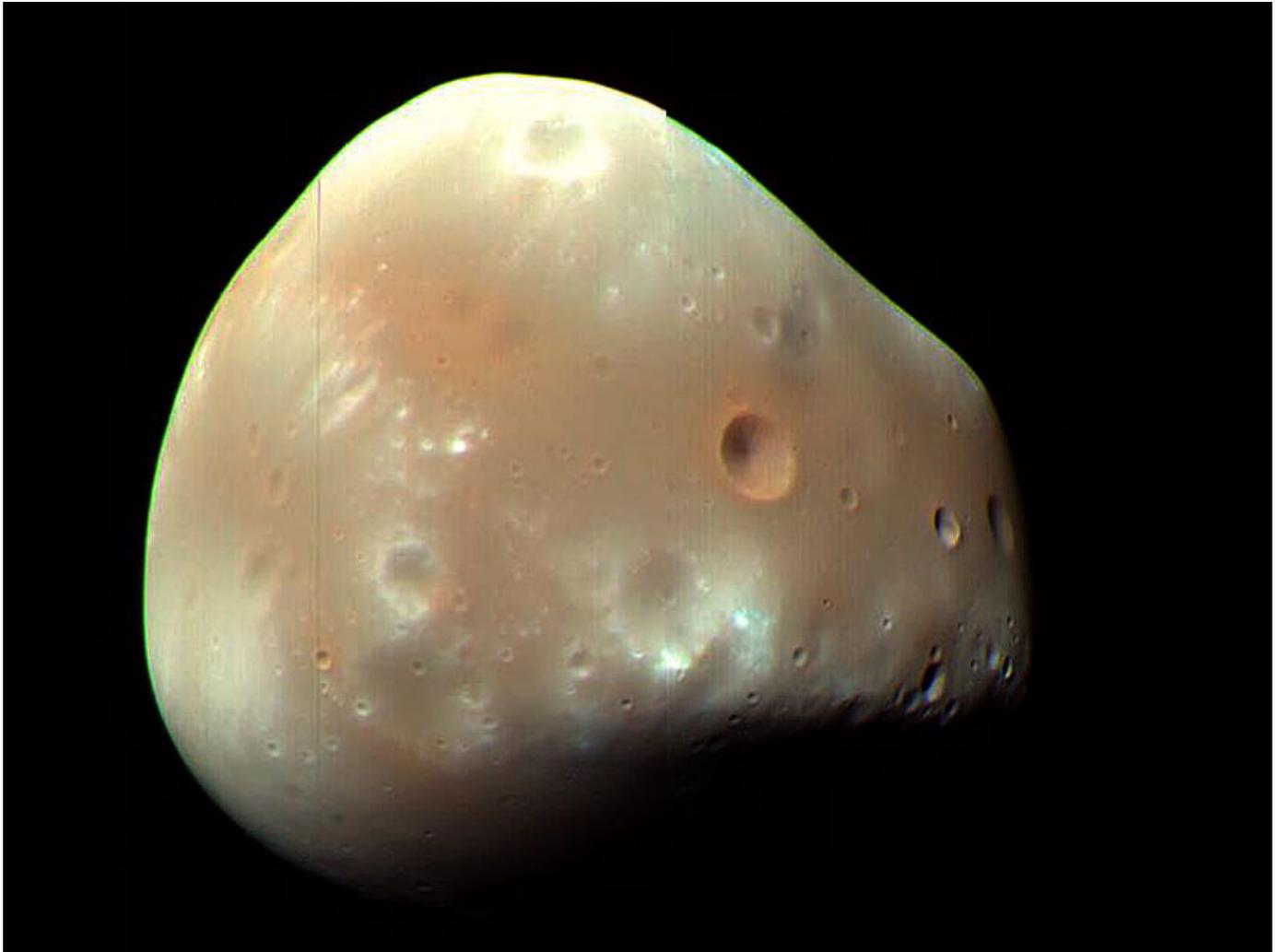
Credit: NASA/JPL-Caltech/MSSS



Mars: Merged Color Image

This mosaic of the Coprates region of Mars shows moderately cratered and faulted highland ridged plains cut by the prominent, vast Valles Marineris canyon. This image was captured by Viking spacecraft using a combination of filters.

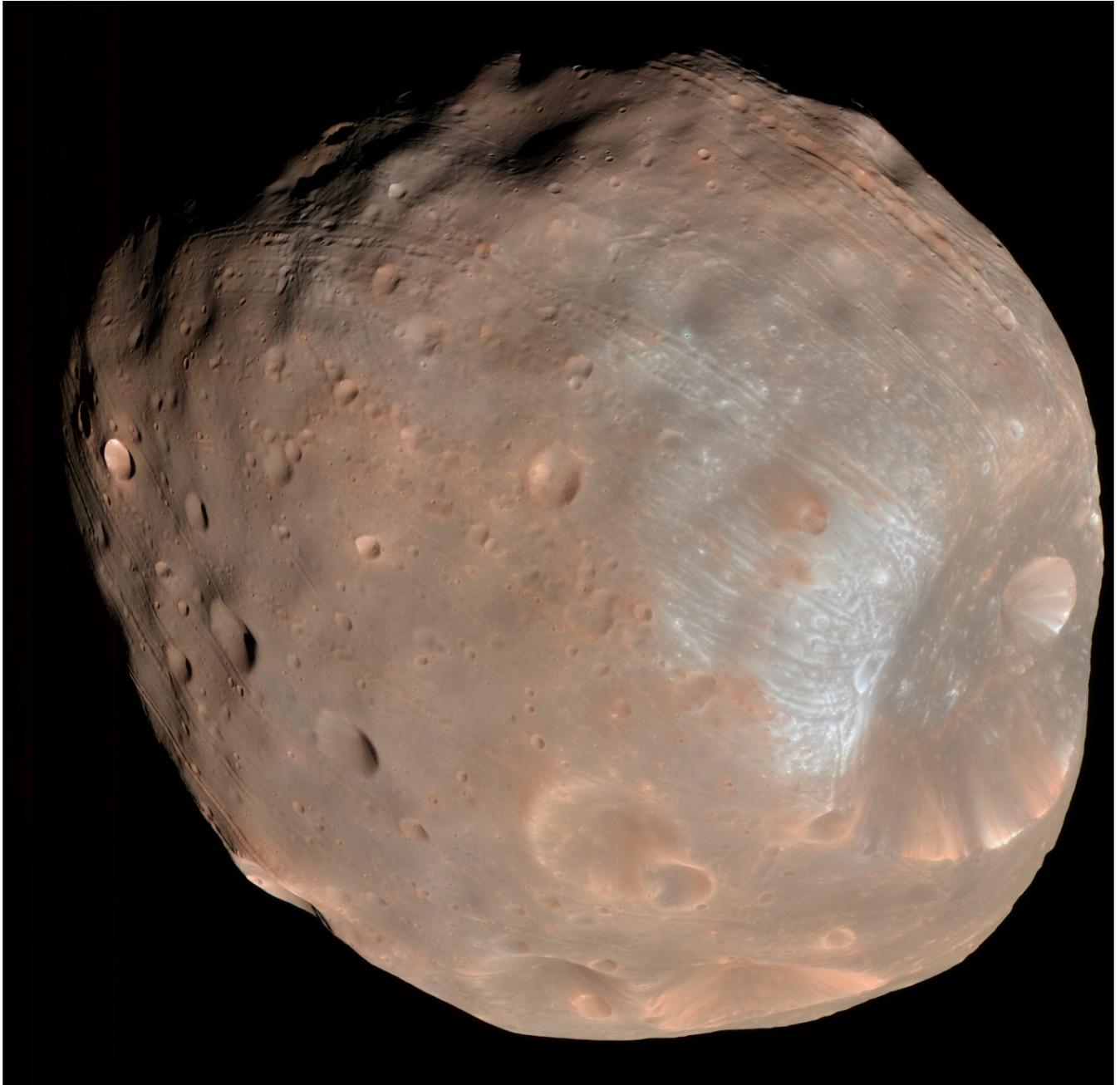
*Credit: NASA/JPL-Caltech/
USGS*



Mars' Moon, Deimos

Did Mars' gravity capture it from the main asteroid belt?

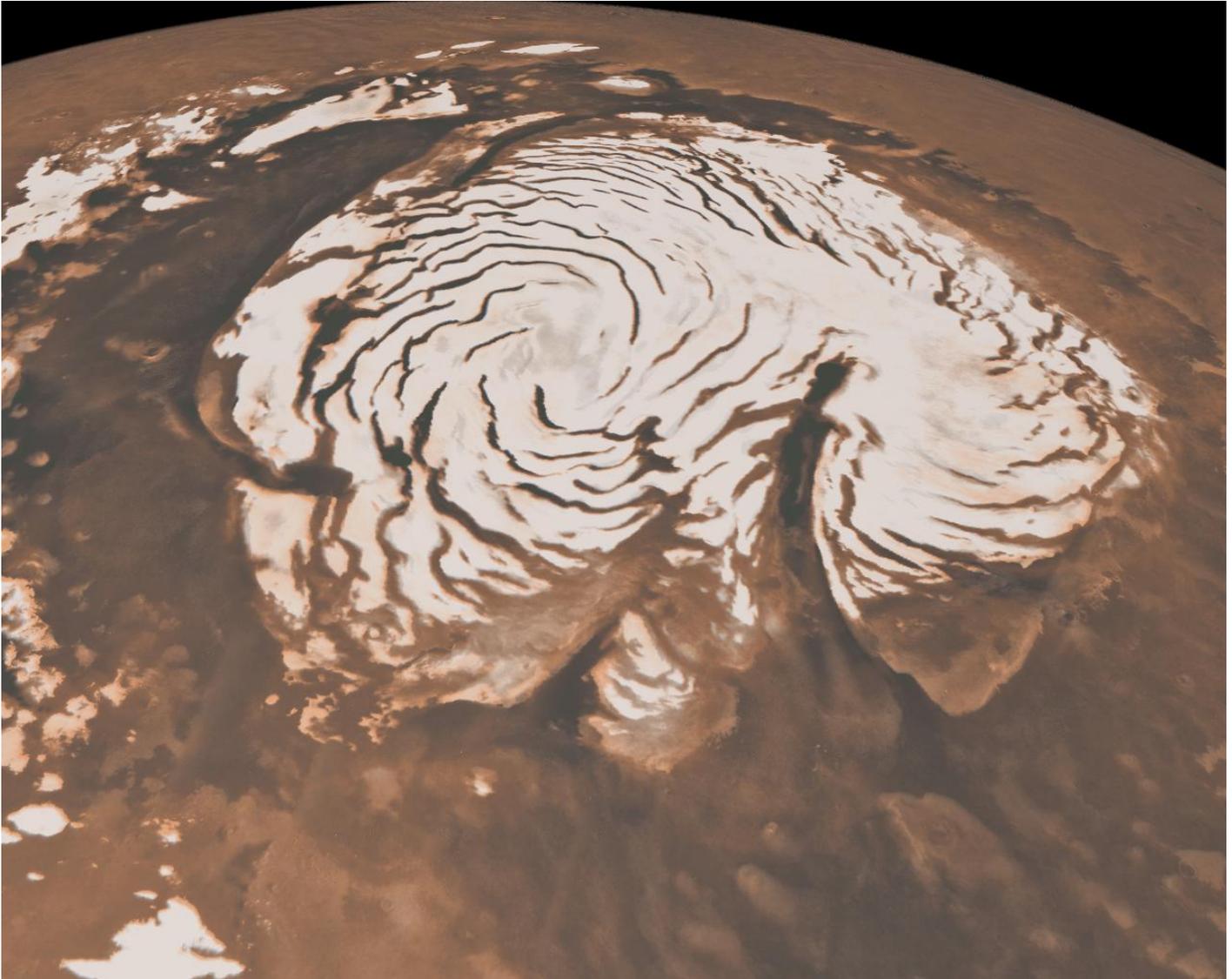
Credit: NASA/JPL-Caltech/HiRISE/U of Arizona (LPL)



Mars' Moon, Phobos

Did Mars' gravity capture it from the main asteroid belt?

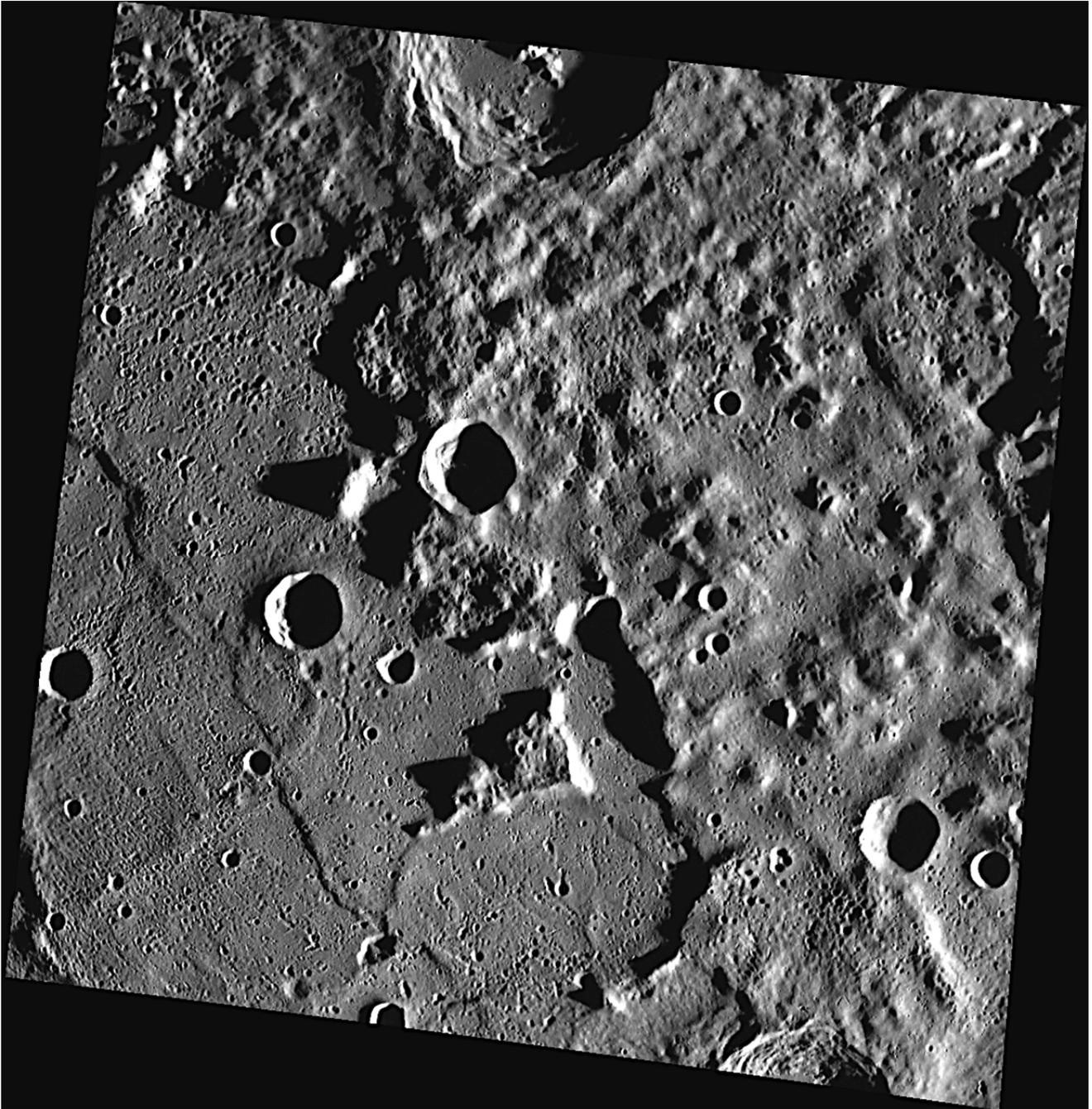
Credit: NASA/JPL-Caltech/HiRISE/U of Arizona (LPL)



Mars' North Pole

The two-mile-tall, Texas-sized ice cap at the north pole of Mars was a mystery for forty years until Mars Global Surveyor data helped scientists determine that the spiral troughs and giant canyon were formed by katabatic winds, which blow down from the top of the ice cap.

Credit: NASA/JPL-Caltech/MSSS



Mercury Up Close

The floor of Mercury's Caloris basin is filled with volcanic plains, while a ring of mountainous peaks is found along the basin's rim. Near the edge of the huge impact basin, "islands" of rough terrain are surrounded by smooth volcanic plains.

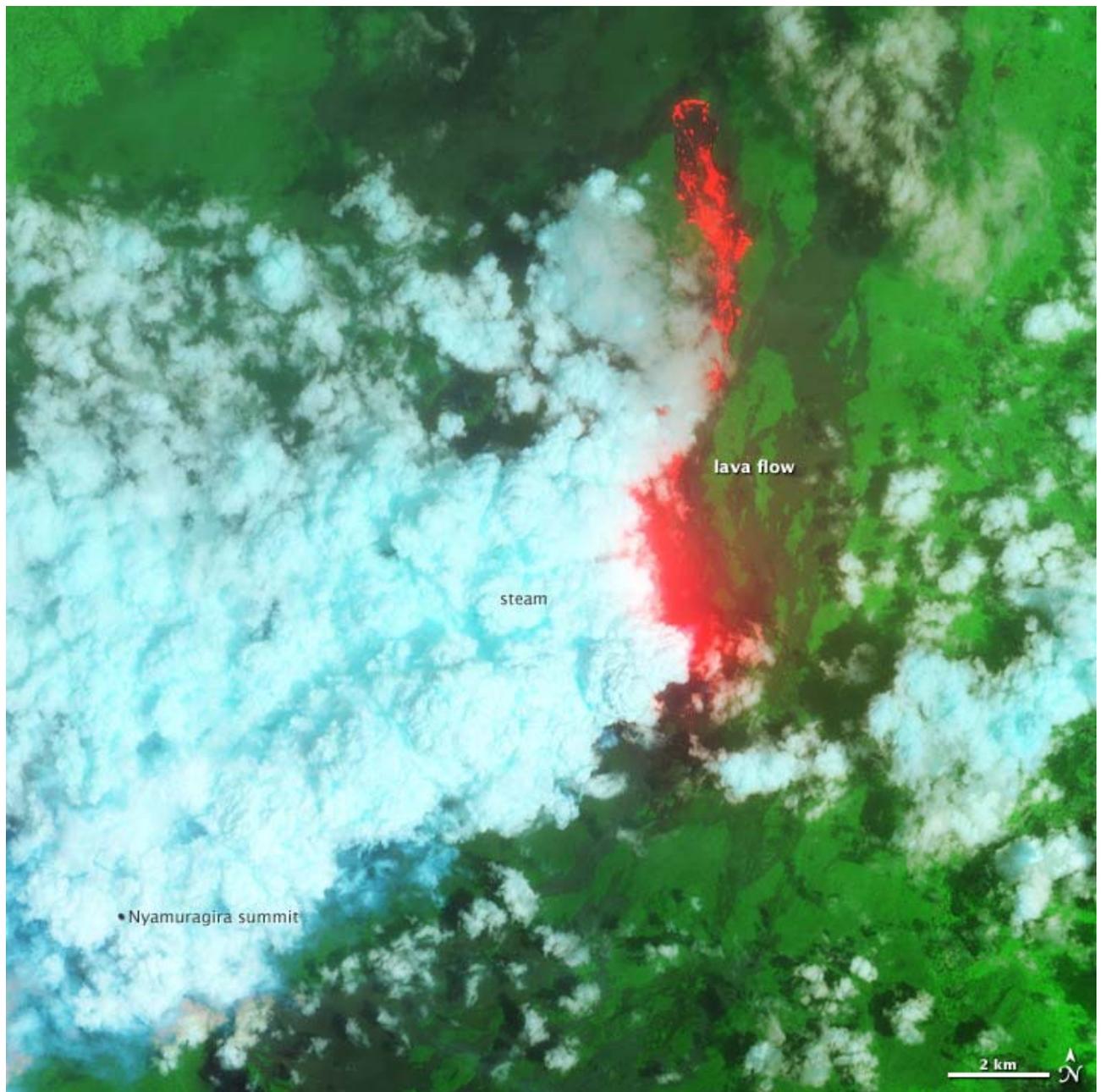
Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington



Mercury Crater Trails

What might cause the crater chains shown in this image, taken by the MESSENGER spacecraft? Scientists think these features form when ejecta from a primary impact is thrown outward. As chunks of ejecta fall back to the surface, they can form chains of secondary craters that often overlap.

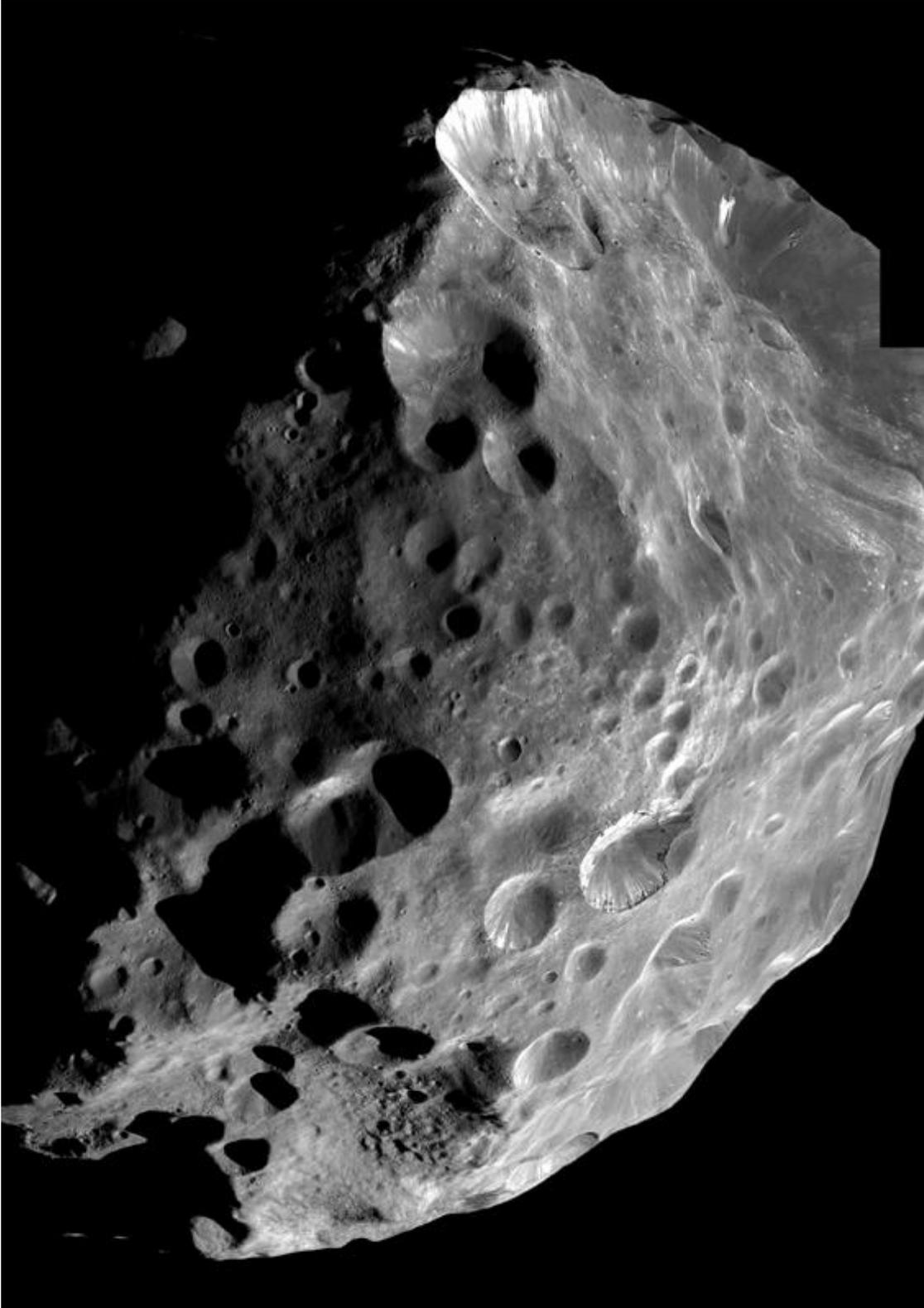
Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington



Nyamuragira Eruption, Africa

Nyamuragira is one of the world's most active volcanoes. It erupts roughly every two years, producing large fluid lava flows. This photo from NASA's Earth Observatory shows fresh lava in red.

Credit: NASA



Phobos

Mars' moon Phobos taken by the Cassini spacecraft on its way to Saturn.

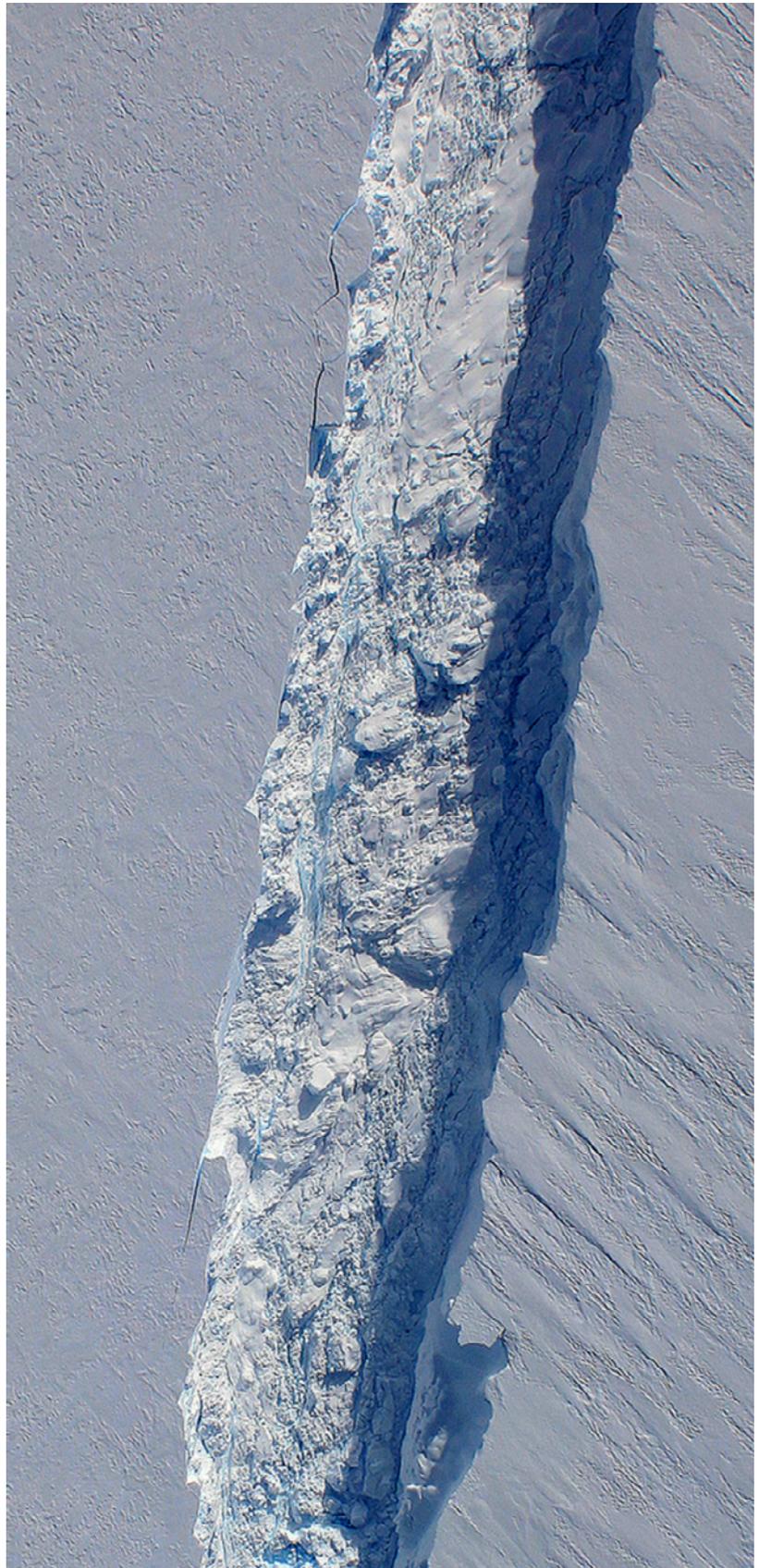
Credit: NASA/JPL-Caltech

Pine Island Glacier:
huge ice stream flowing into
Hudson Bay in northern
Canada.

Astronomers and geologists
look at topographical features
(craters, volcanoes, mountains,
patterns left by water, etc.) on
Earth to help them understand
patterns on distant planets,
comets, asteroids.

*This section of the 260 km
glacier is about 80 m (260 ft)
wide and 29 km (18 miles) long*

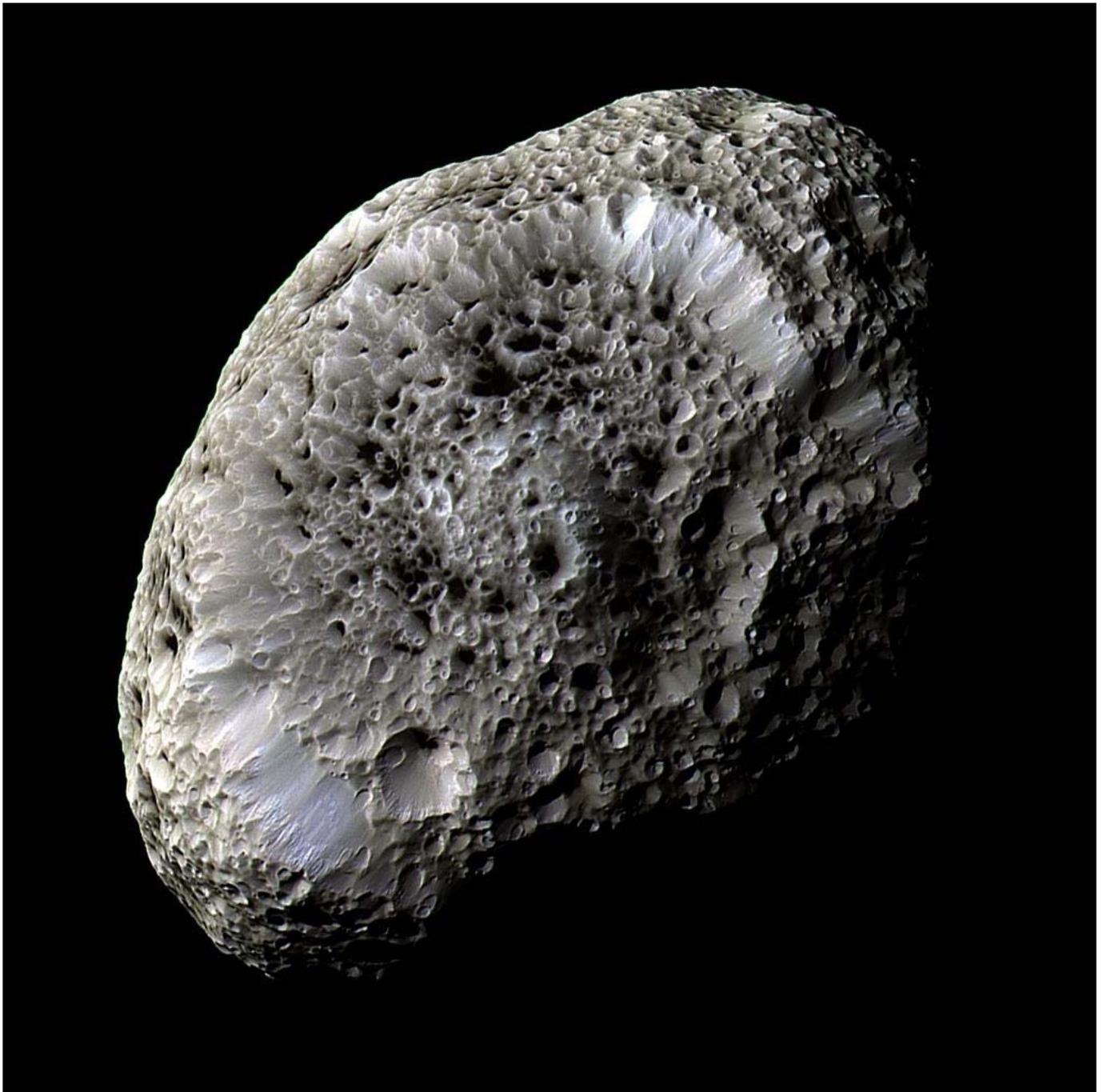
Credit: NASA



Saturn's Odd Moon, Hyperion

Check out the unusual surface topography of Hyperion. Can you think of something that looks like that on Earth? Why might its craters look like that?

Credit: NASA/JPL-Caltech

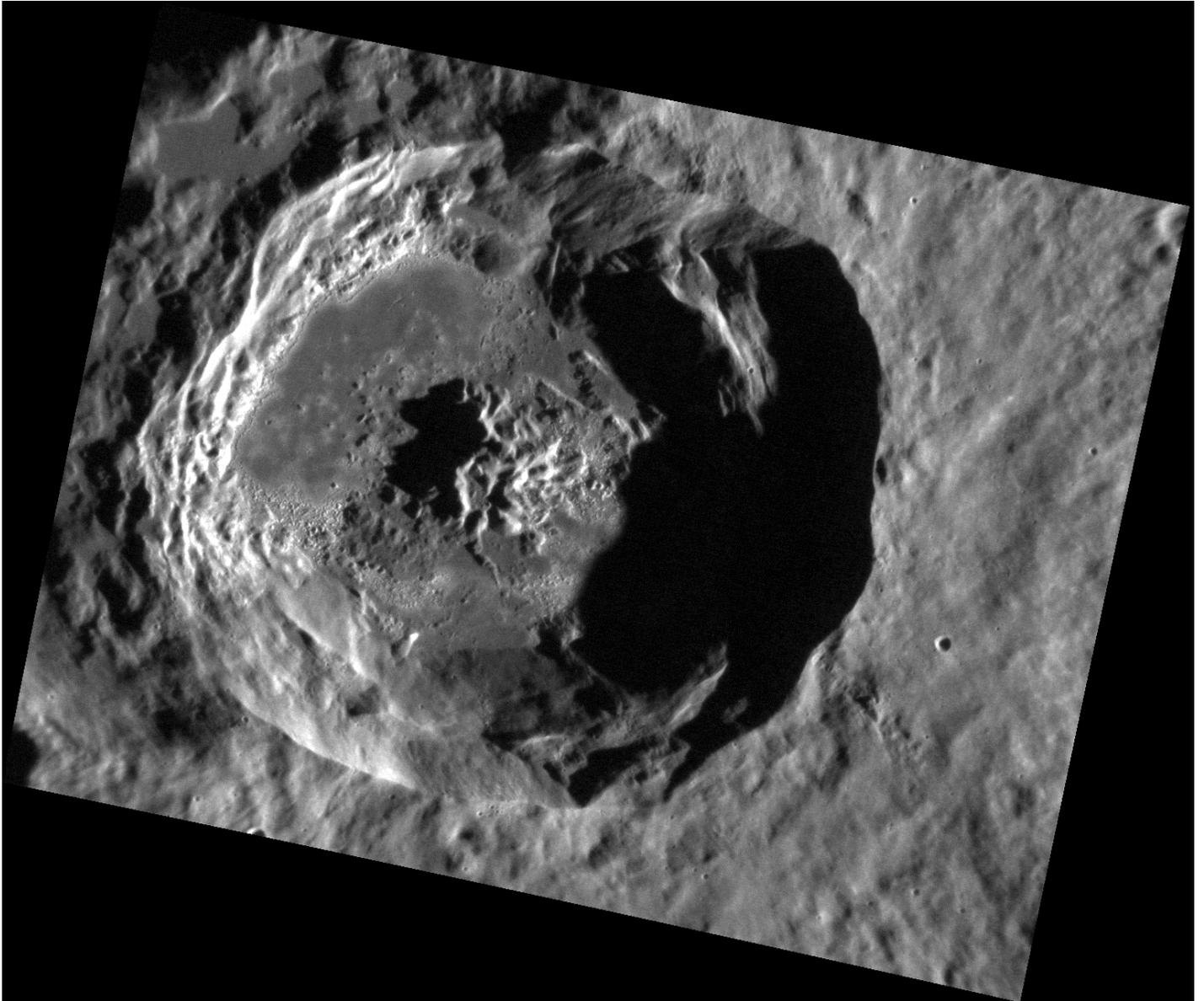


Storms over the Gulf of Mexico and the Atlantic, 11/22/11

Astronomers and geologists look at topographical features (craters, volcanoes, mountains, patterns left by water, etc.) on Earth to help them understand patterns on distant planets, comets, asteroids.

Credit: NASA

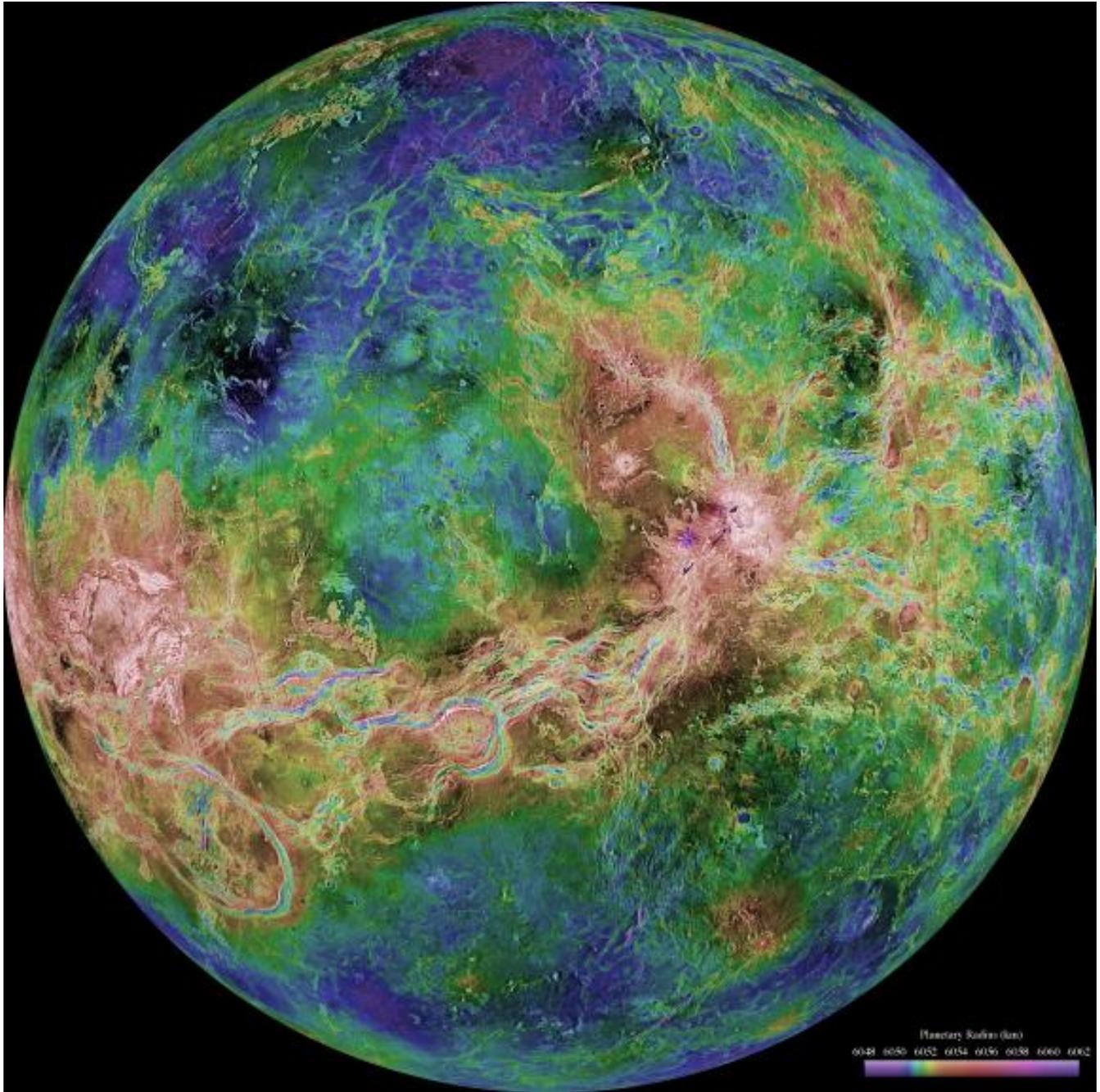




Mercury: Unnamed Hollows

MESSENGER took this image... is it a depression or a dome? Don't let your eyes deceive you!

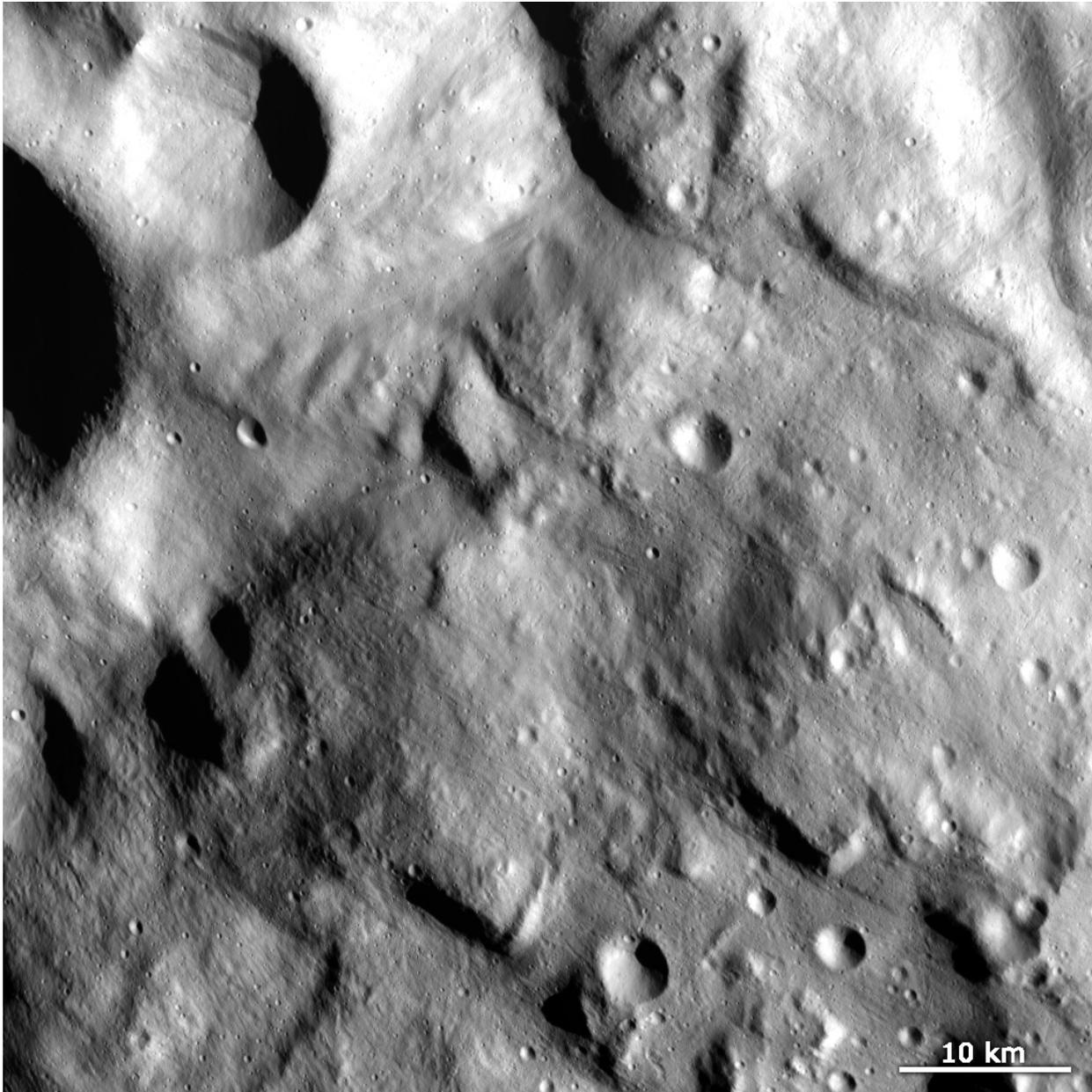
Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington



Venus Colorized

Scientists use color to emphasize variations such as mineral composition, temperature variation, and topography.

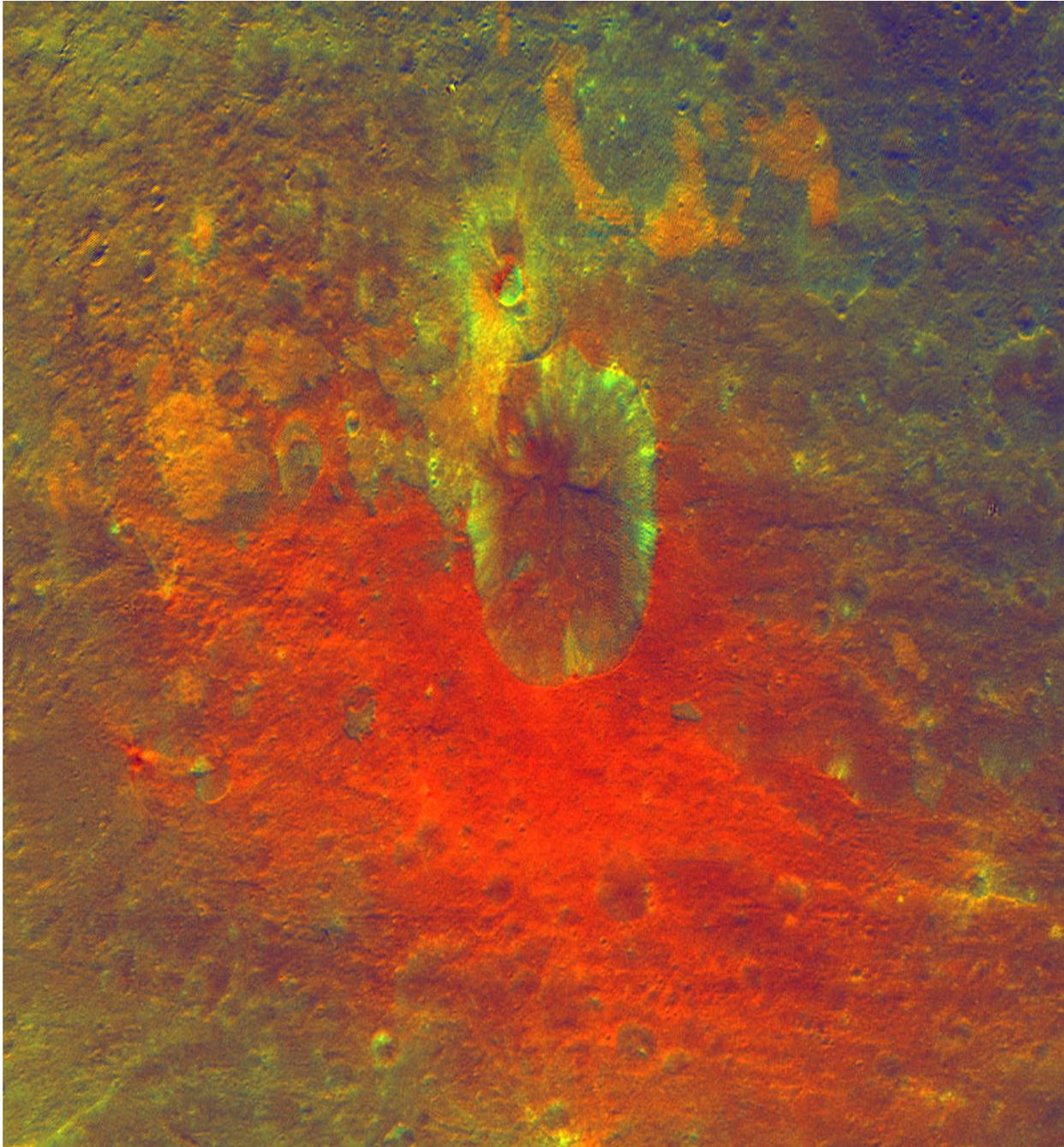
Credit: NASA/JPL-Caltech



Vesta Close Up

The Dawn spacecraft took this detailed image of giant asteroid Vesta during its year-long orbit.

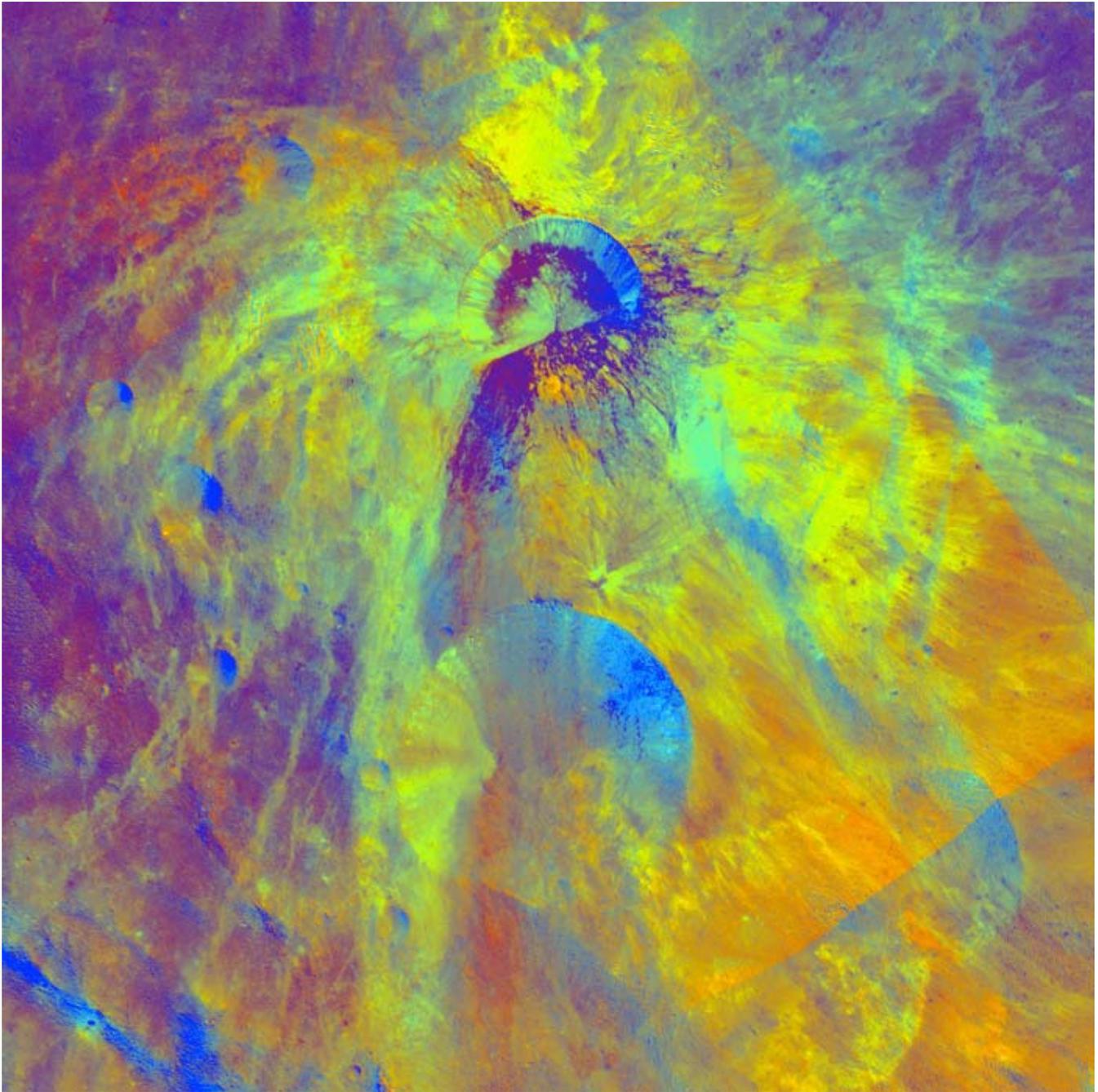
Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Vesta: False Color Crater

Scientists use color to emphasize variations such as mineral composition, temperature variation, and topography. This image highlights the ejecta left from the impact of the crater.

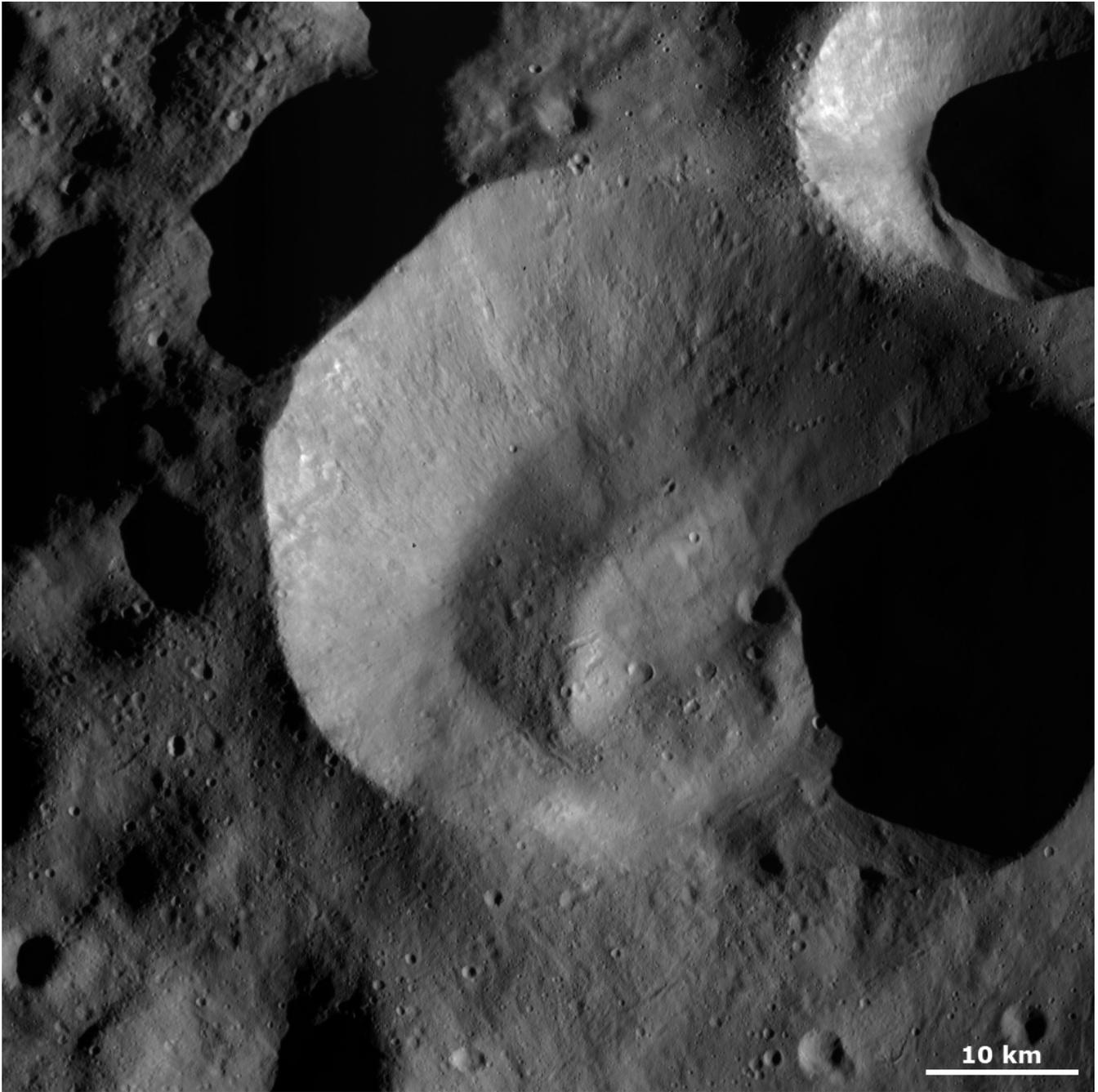
Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Antonia Crater on Vesta

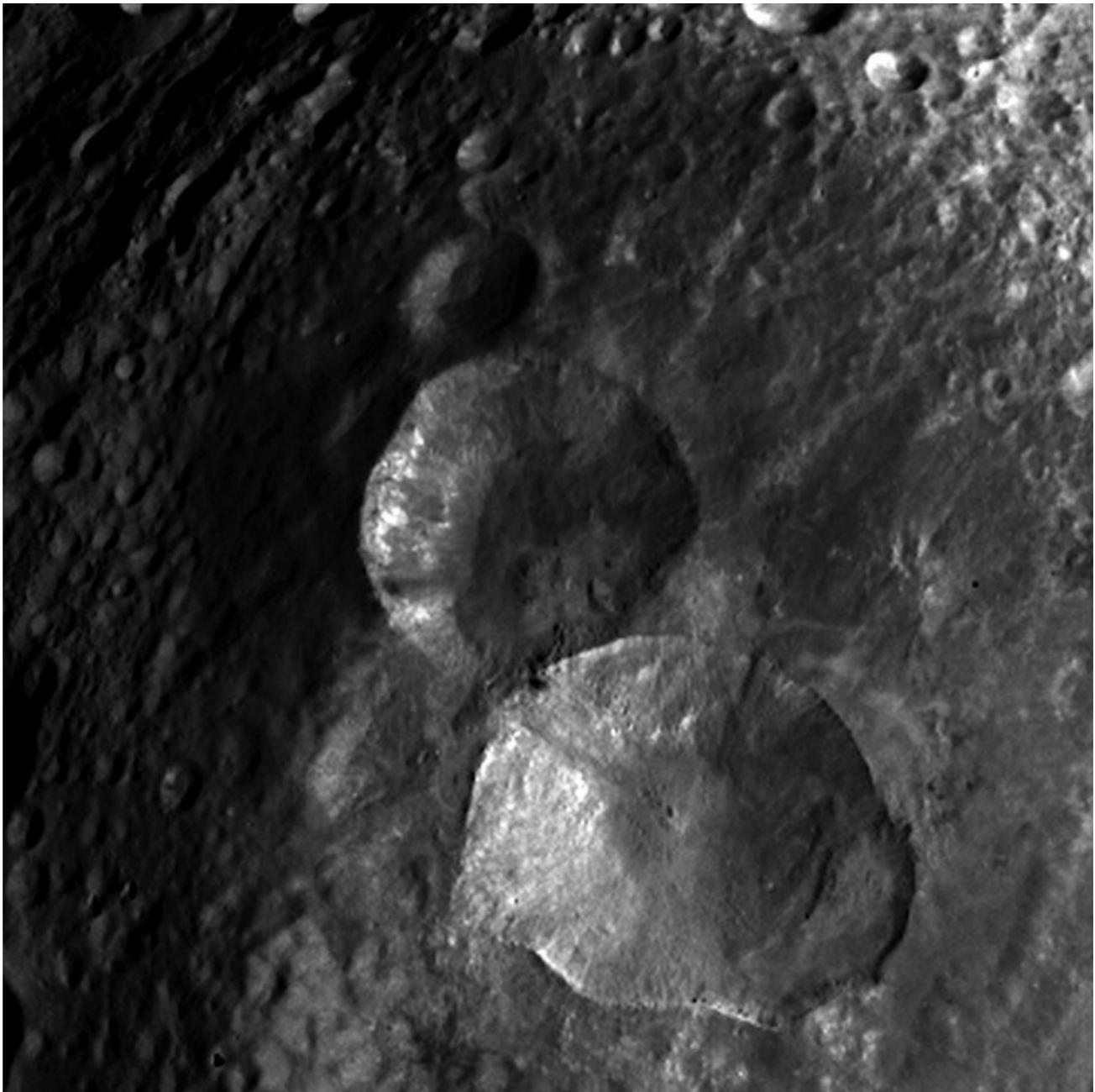
Scientists use color to emphasize variations. This image, taken by the Dawn mission's framing camera, uses red, blue and green filters to show the spectacular spectral diversity of the crater and the area around it.

Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



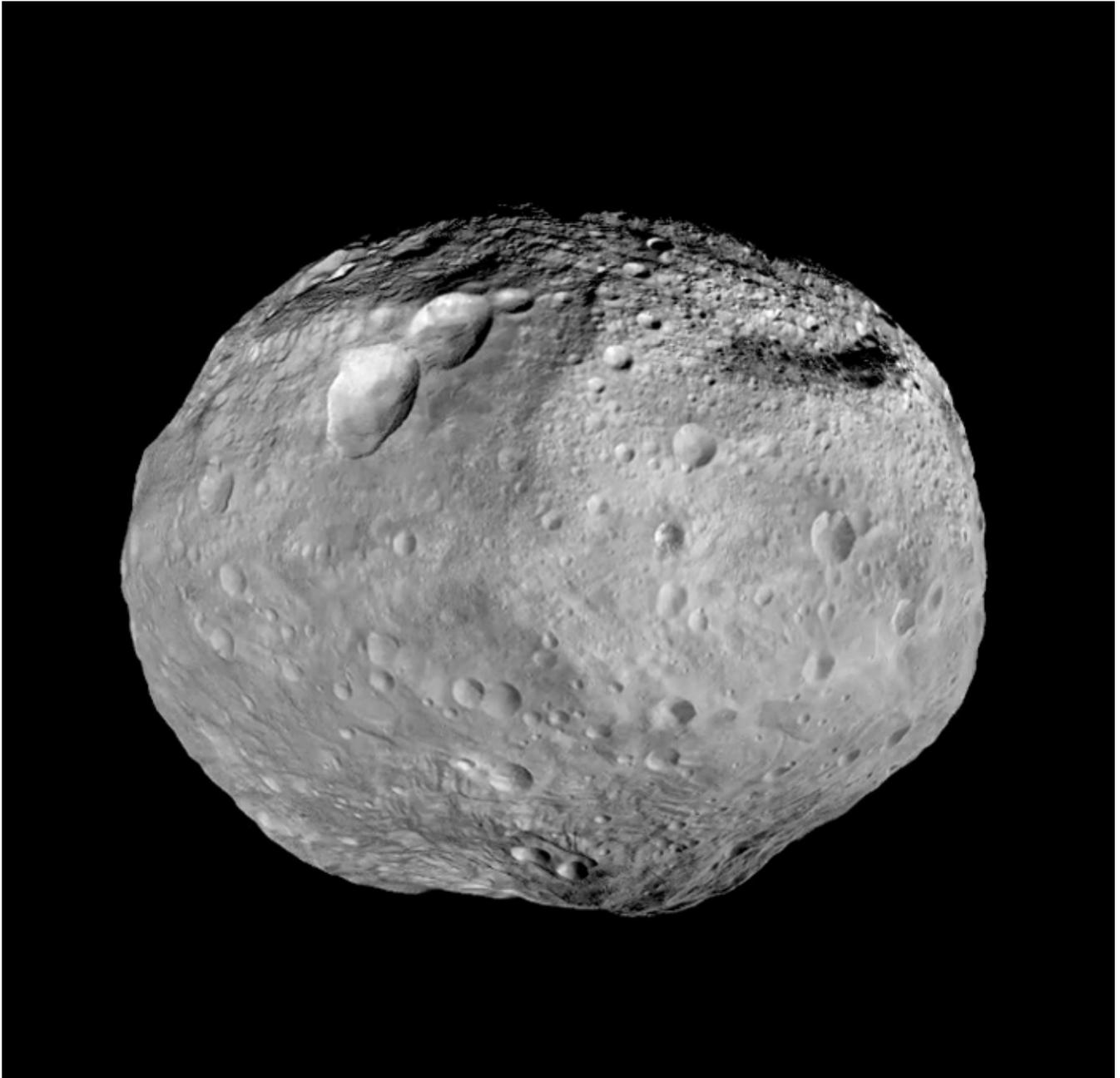
Caparronia Crater on giant asteroid Vesta

Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



“Snowman” craters on giant asteroid Vesta

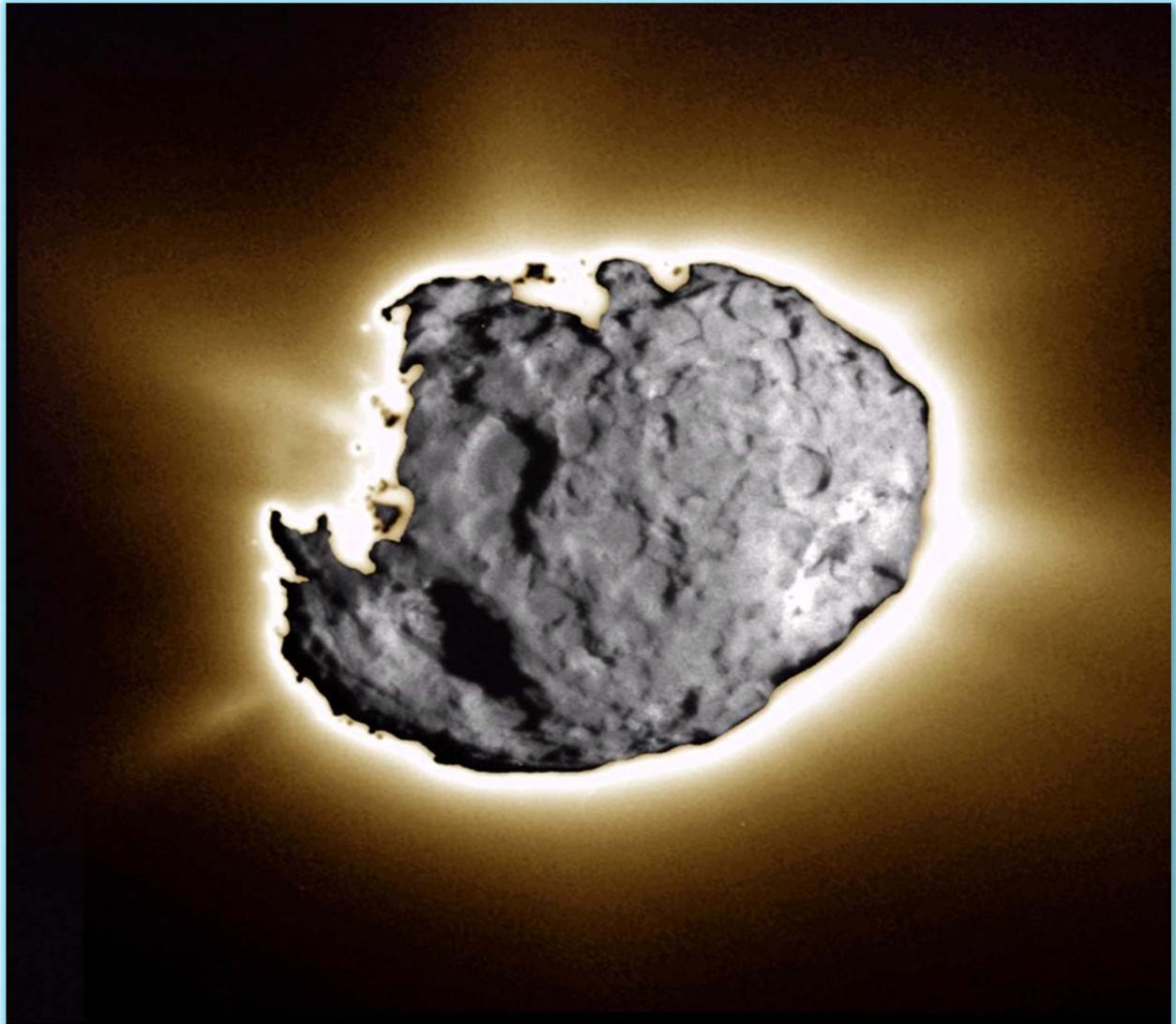
Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Global View of Vesta

This beautiful mosaic combines some of the best views that the Dawn spacecraft captured of the giant asteroid. The mountain at the south pole is more than twice the height of Mount Everest.

Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Comet Wild 2

Nucleus of comet Wild 2 imaged during the Stardust mission flyby to collect samples of comet dust and return them to Earth.

Credit: NASA/JPL-Caltech/University of Washington



Yukon Delta, Alaska

Astronomers and geologists look at topographical features (craters, volcanoes, mountains, patterns left by water, etc.) on Earth to help them understand patterns on distant planets, comets, asteroids.

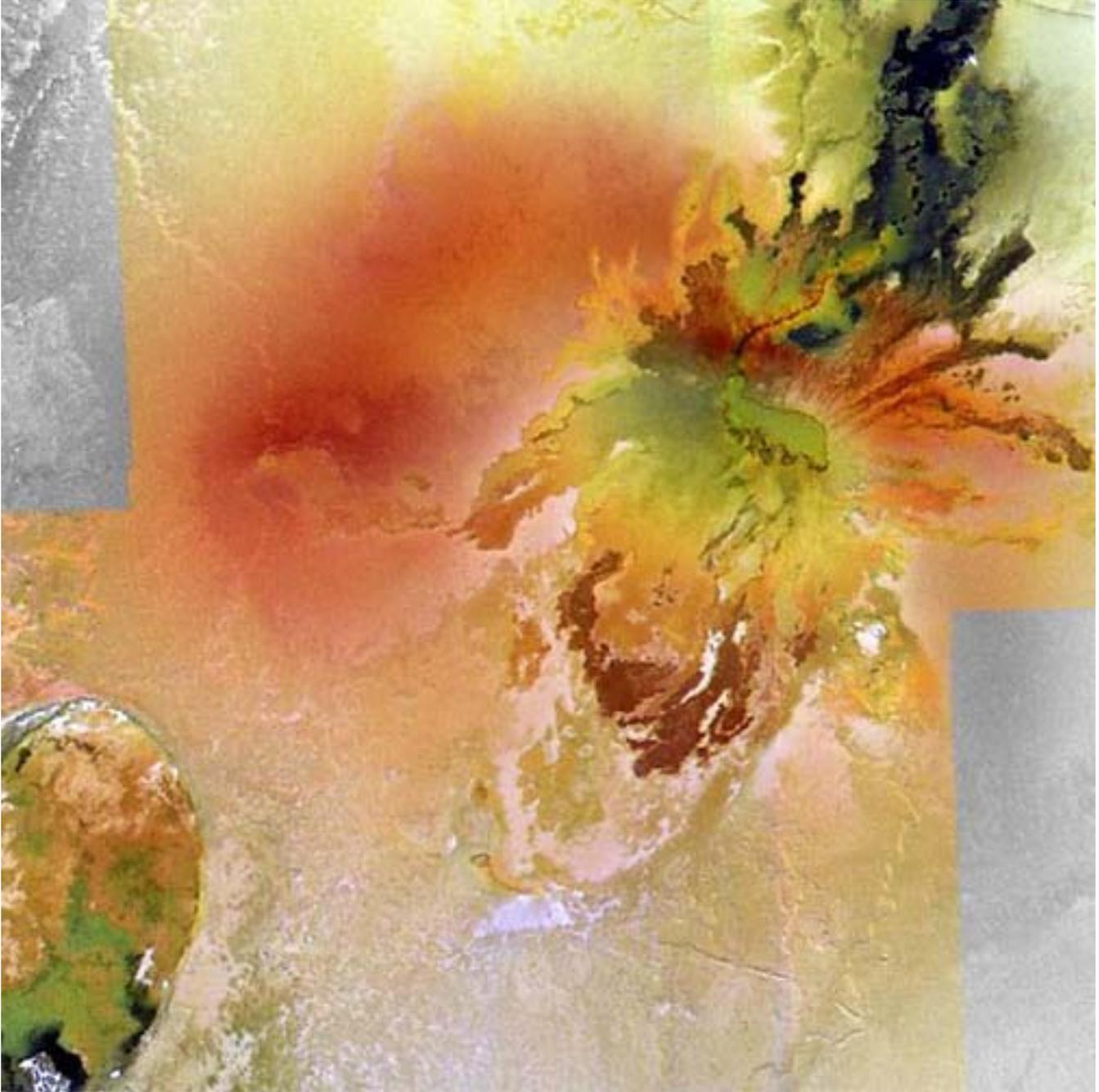
Credit: NASA



Jupiter's moon, Ganymede

This Galileo image reveals frosty polar caps in addition to the two predominant terrains on Ganymede: bright, grooved terrain and older, dark furrowed areas. Many large craters are visible as well.

Credit: NASA/JPL-sDLR



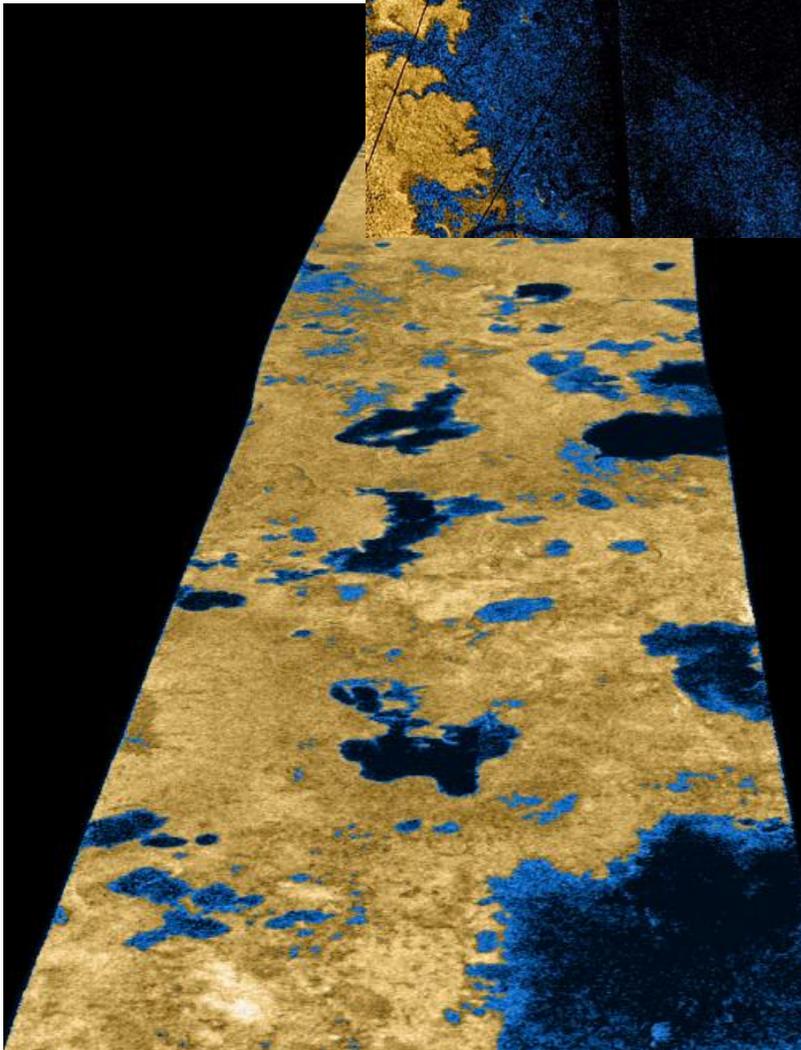
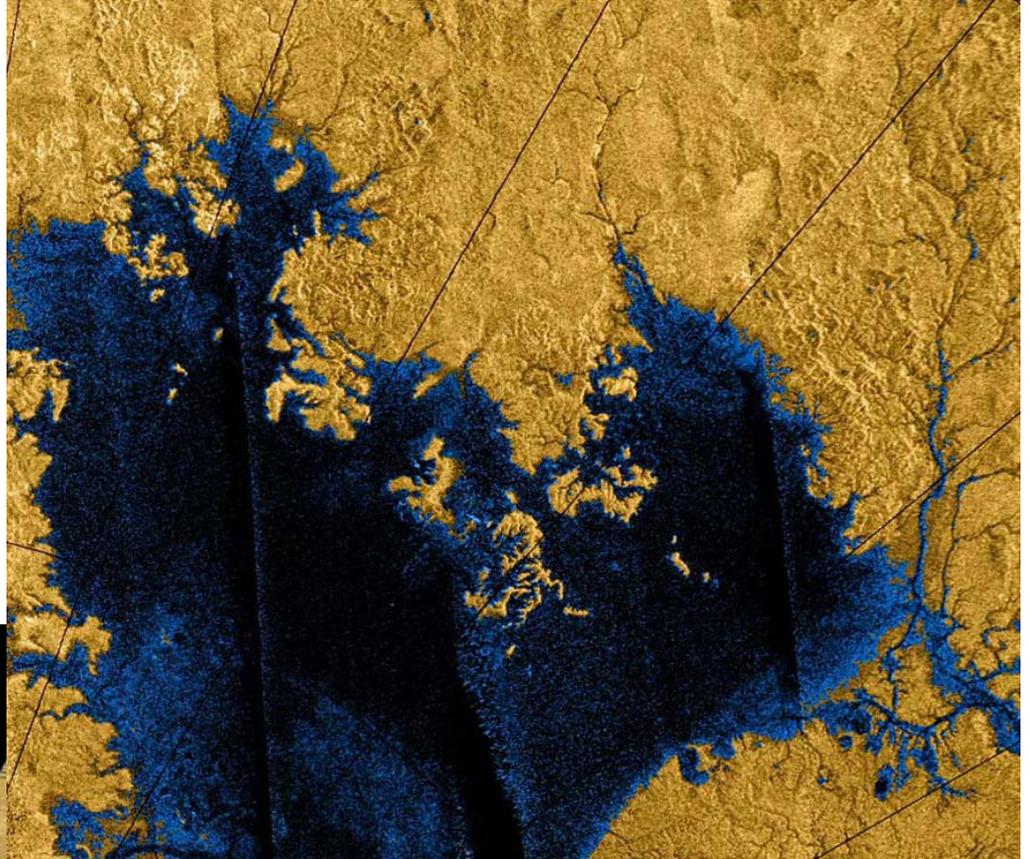
Close-up: Active Volcano Culann Patera on Jupiter's moon, Io

Credit: NASA/JPL/University of Arizona



Active Volcano Culann Patera on Jupiter's moon, Io

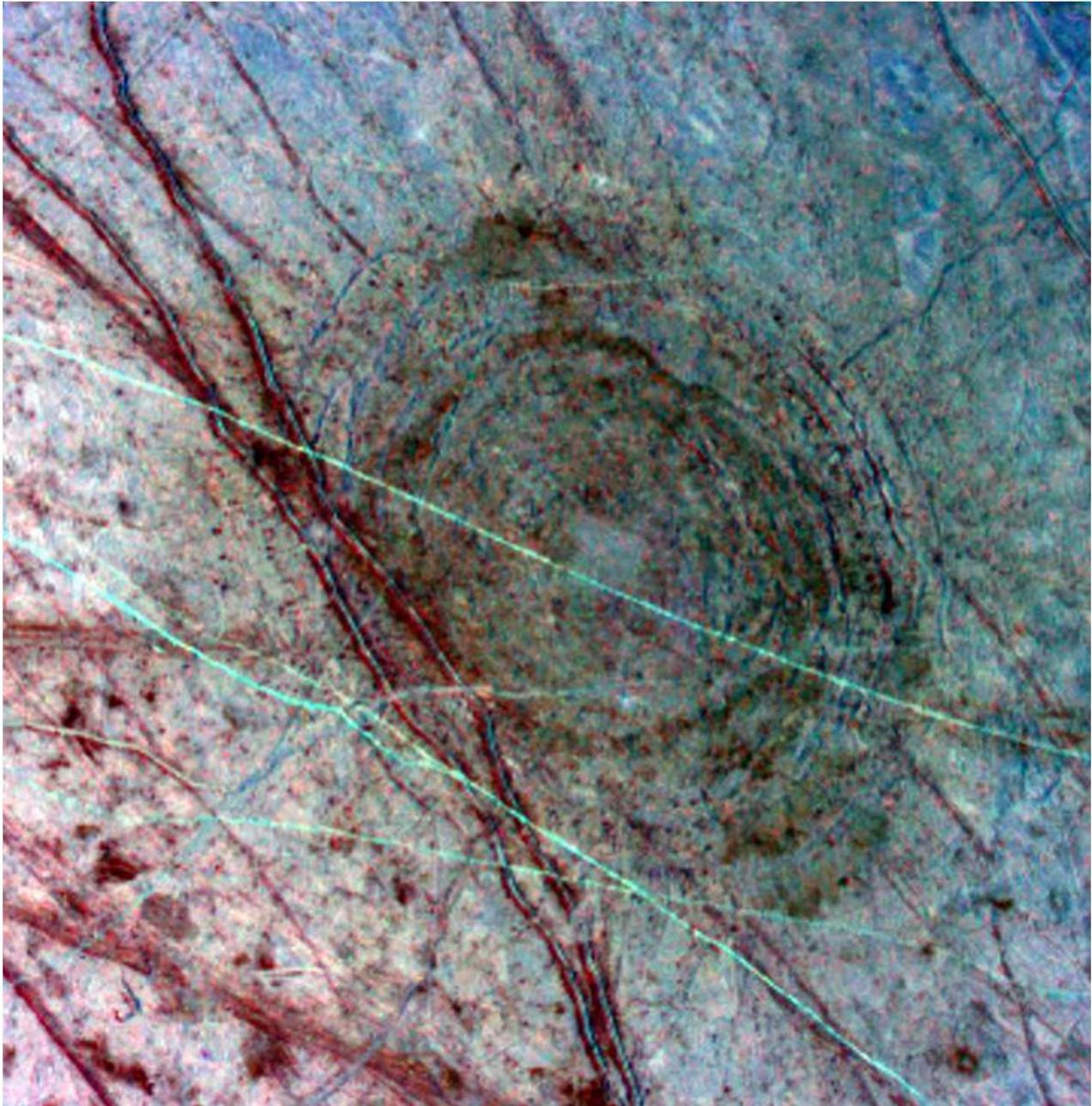
Credit: NASA/JPL/University of Arizona



Saturn's largest moon, Titan

Titan's oceans are not
made out of water,
but of liquid methane!

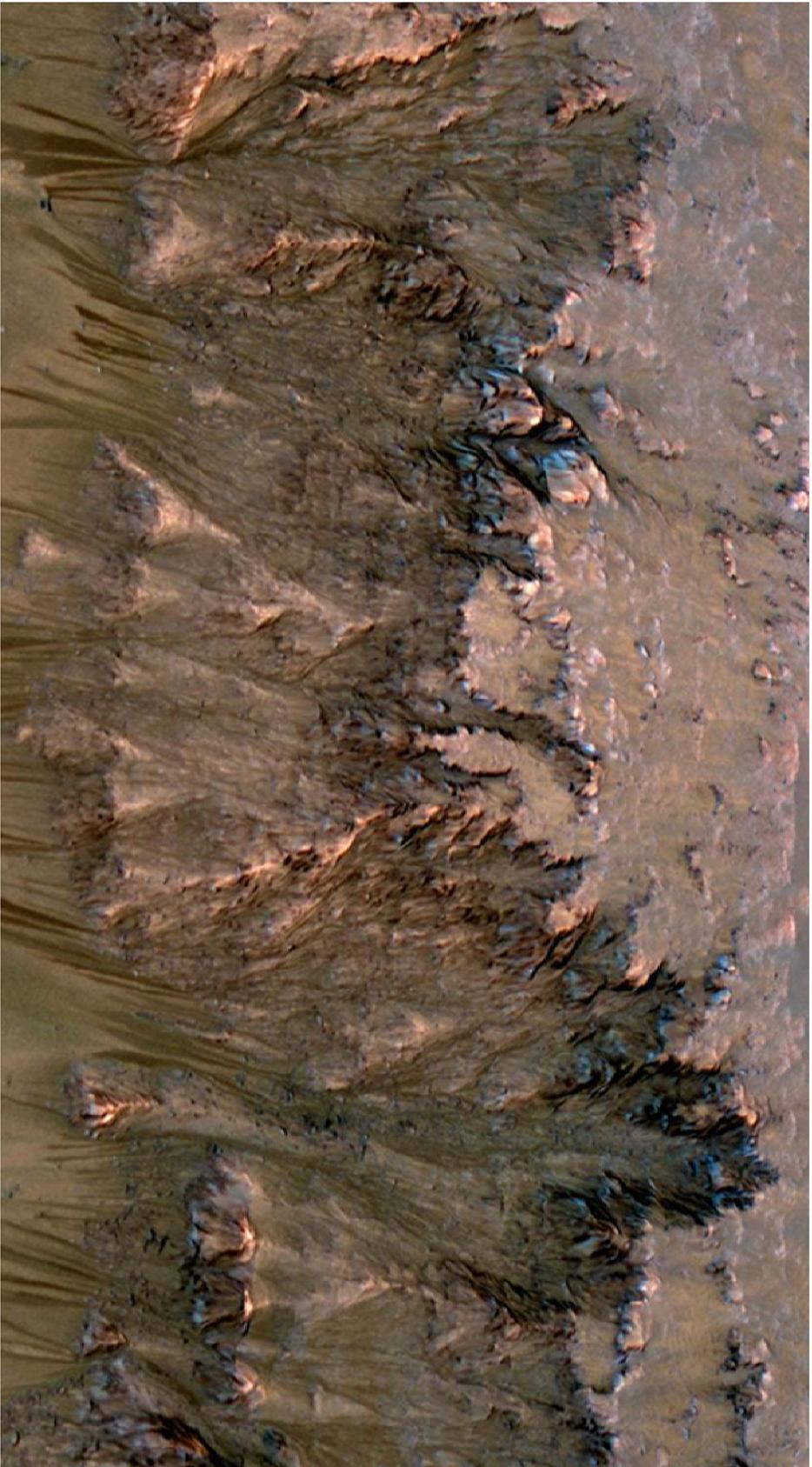
Credit: NASA/JPL-Caltech/USGS



Europa, moon of Jupiter

This is an impact feature called Tyre Macula on Europa's icy surface.

Credit: NASA/JPL/University of Arizona



Mars

Might there be seasonal water flowing on Mars today? These features that extend down the slope during warm seasons are called recurring slope lineae. They appear and grow on steep slopes during warm seasons and fade in cold seasons.

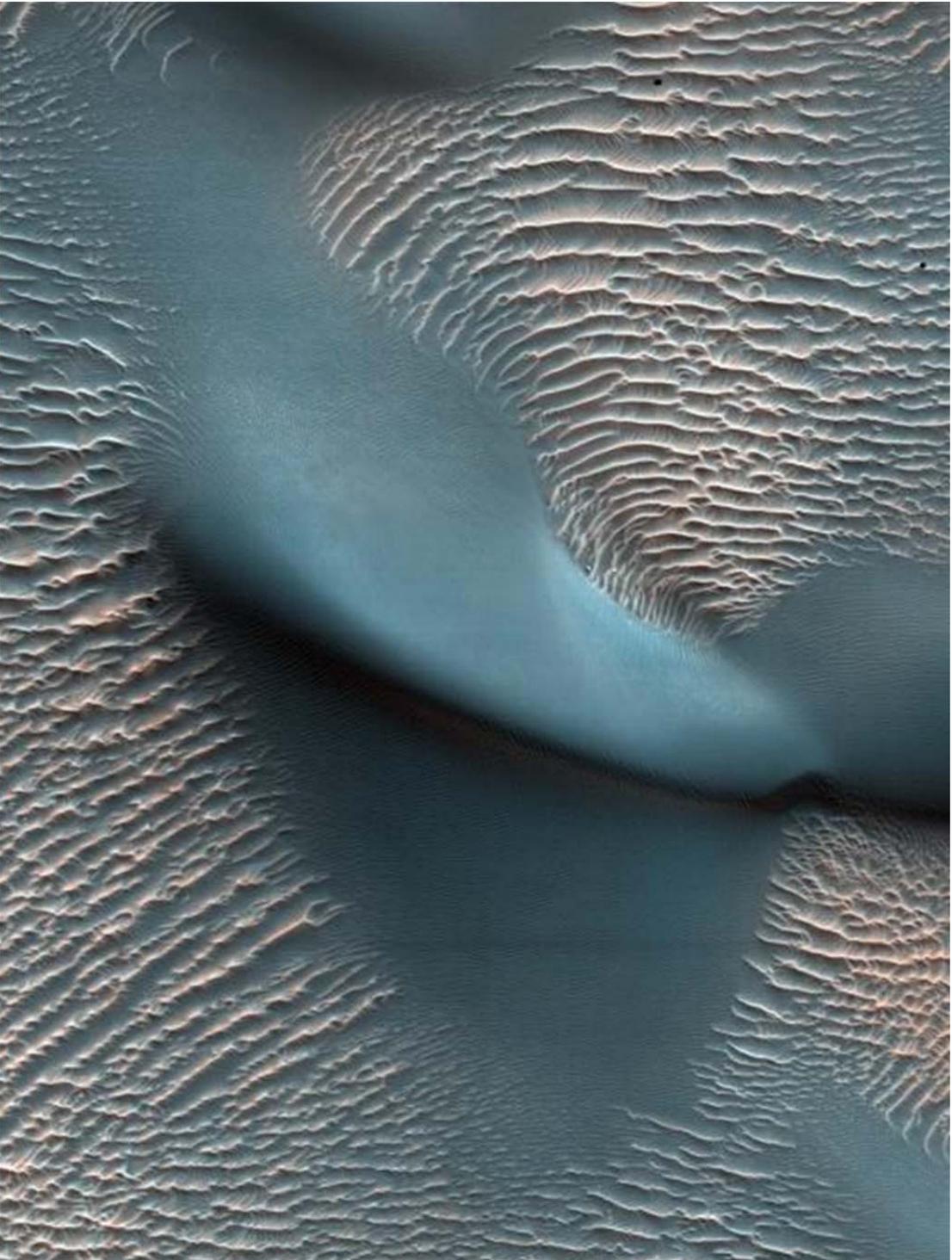
Credit: NASA/JPL-Caltech/University of Arizona



Gullies on Mars

These gully landforms are found in many craters in the mid-latitudes of Mars. Current gully activity appears to take place in winter and early spring, and may be caused by the seasonal carbon dioxide frost that is visible in gully alcoves in the winter.

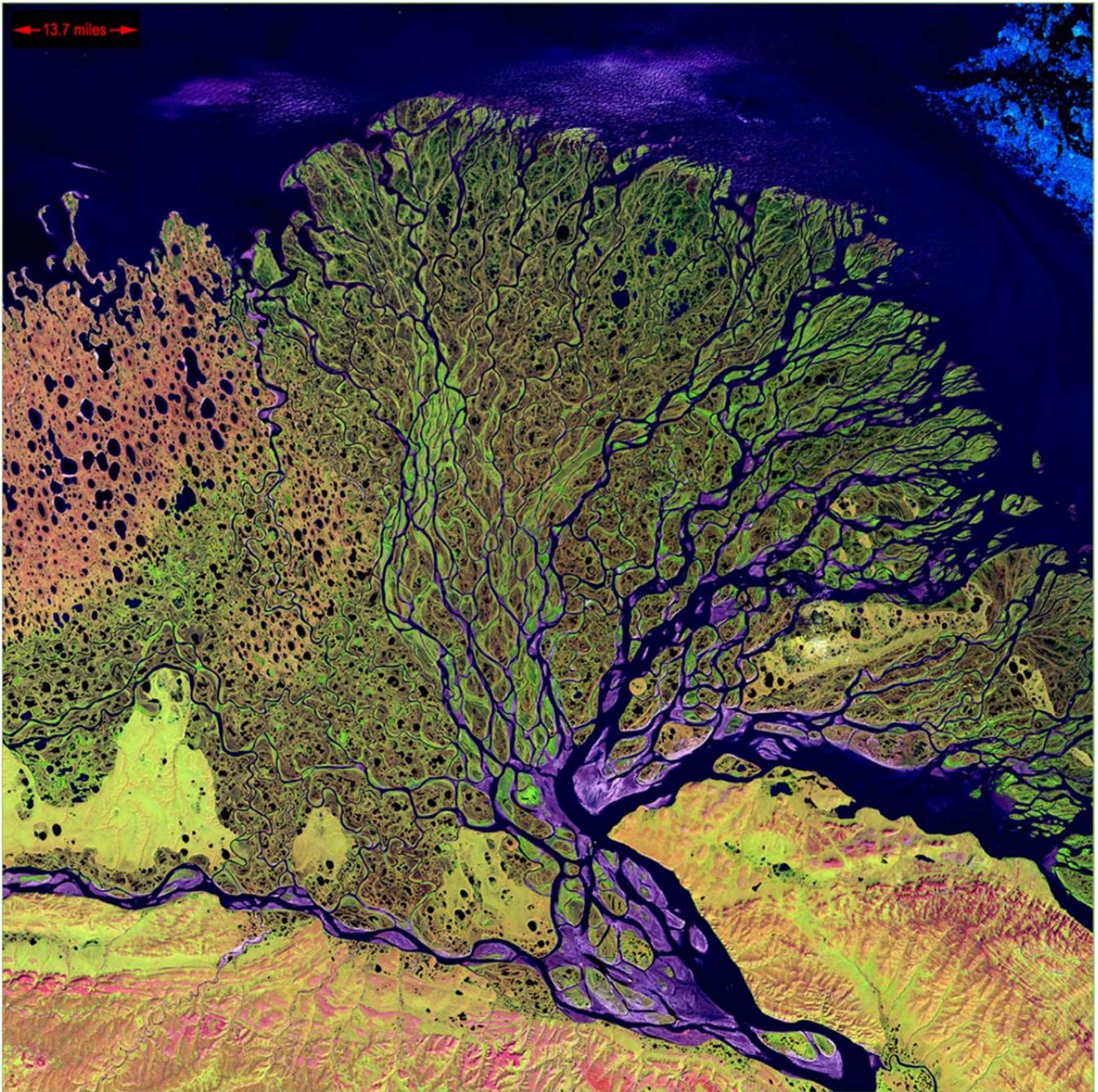
Credit: NASA/JPL-Caltech/University of Arizona



Sand Dunes on Mars

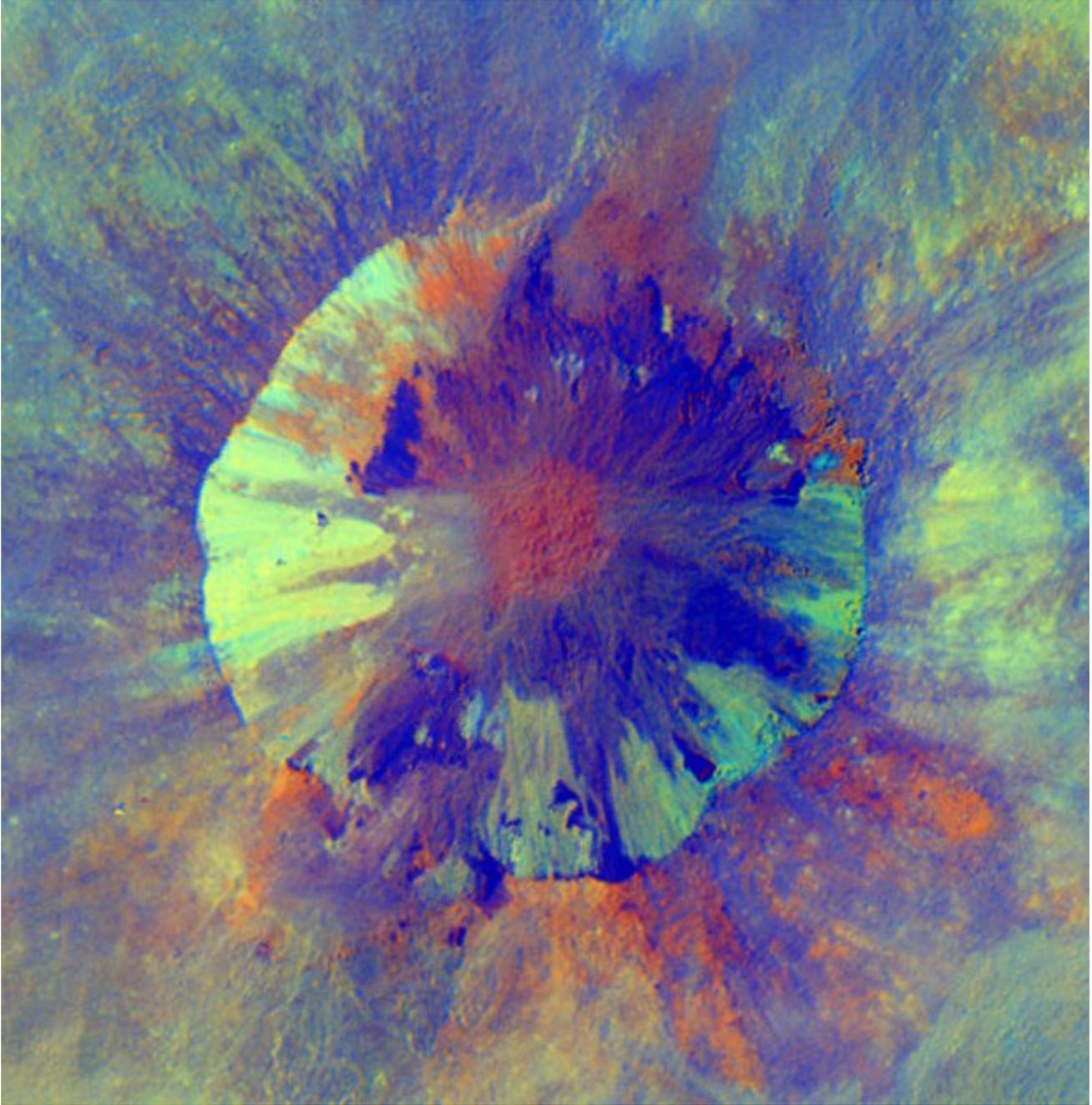
These bright, small ridges are ripples, composed of fine sand coated with coarser sand and granules.

Credit: NASA/JPL-Caltech/University of Arizona



Lena River Delta, Russia

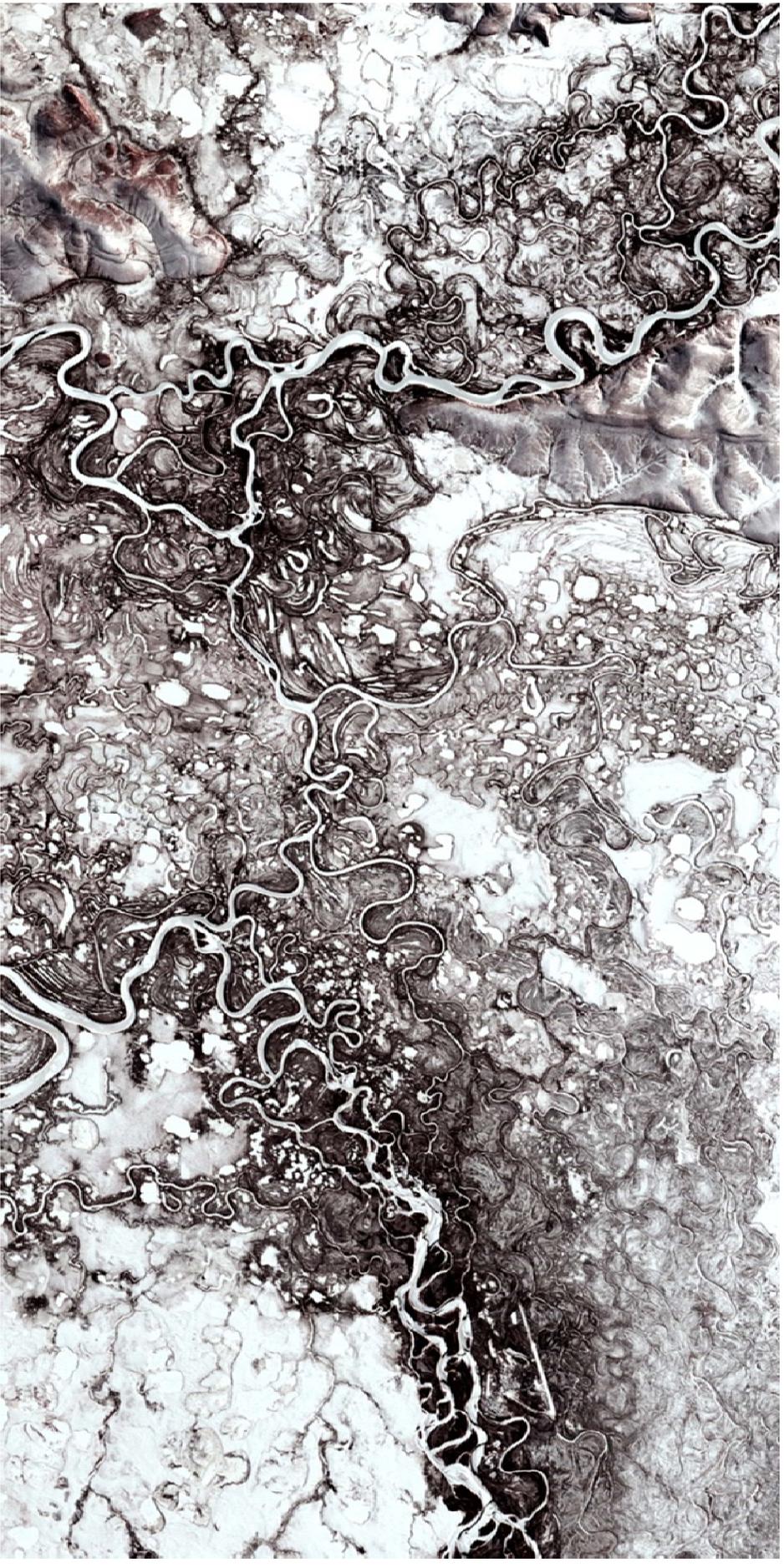
Credit: NASA Earth Observatory



Giant Asteroid Vesta

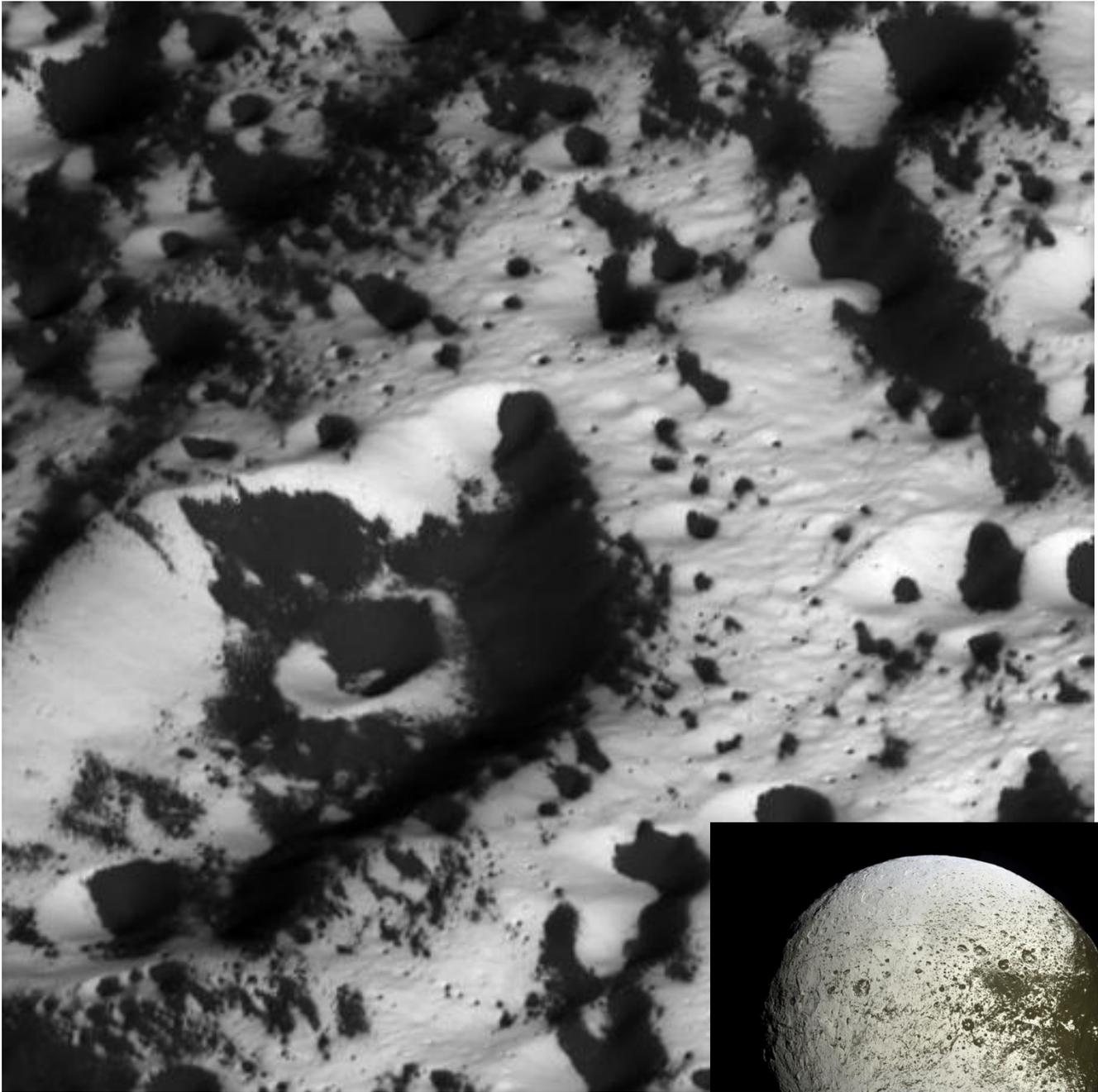
This enhanced-color view from NASA's Dawn mission shows an unusual "pitted terrain" on the floor of Cornelia crater.

Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Mayn River, Siberia, Earth

Credit: NASA/Landsat7



Light and Dark on Iapetus, Moon of Saturn

The most dramatic value extremes observed so far in the solar system are on Iapetus.

Credit: NASA/JPL/Space Science Institute



Crater Chains on Mercury

Taken by NASA's MESSENGER mission, what do you think happened here?

Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Carnegie Institution of Washington



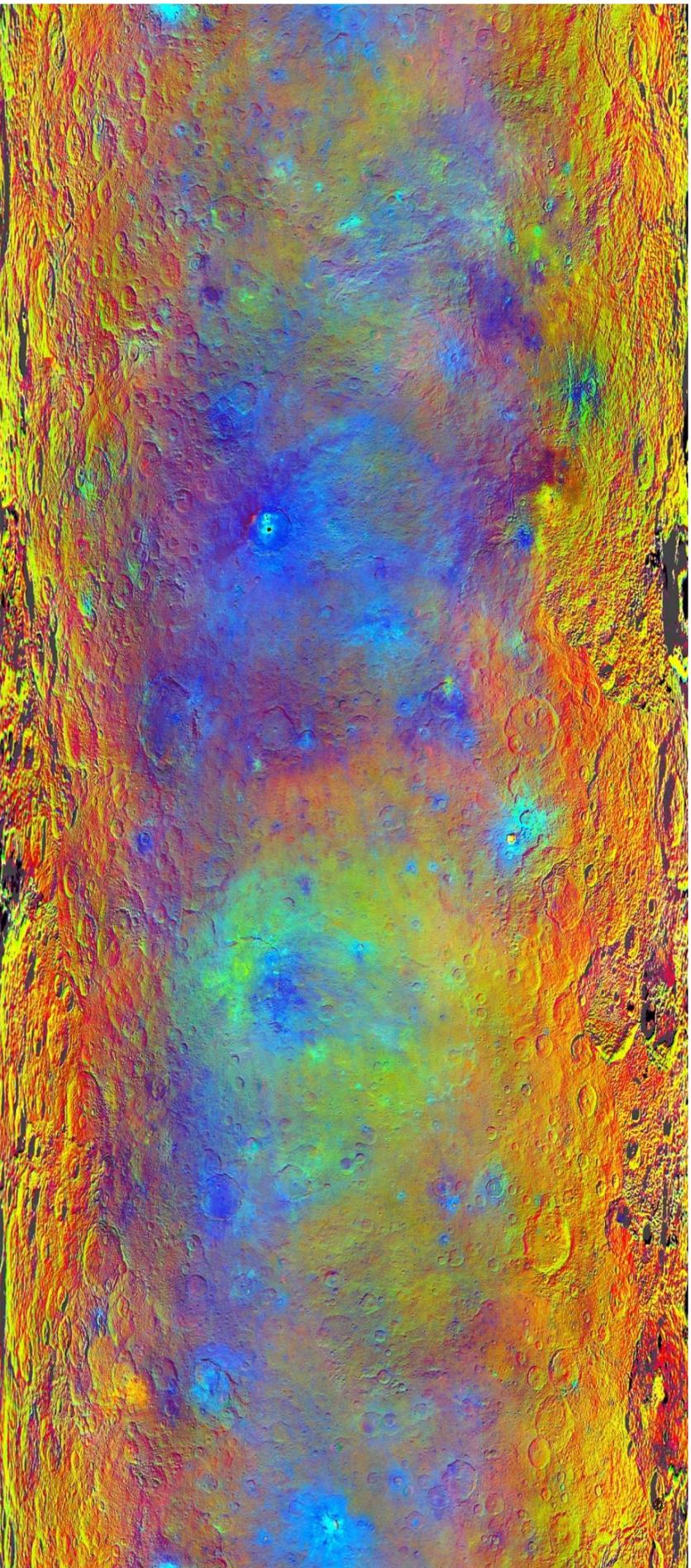
Earth from space: Astronomers and geologists look at topographical features (craters, volcanoes, mountains, patterns left by water, etc.) on Earth to help them understand patterns on distant planets, comets, asteroids. This image is in true color.



Earth's Moon

The colors added to this lunar image reveal the surface soil composition. Red areas generally correspond to the lunar highlands, while blue to orange shades indicate the ancient volcanic lava flow of a lunar sea. Blue areas contain more titanium. Small purple areas found near the center are deposits from volcanic eruptions.

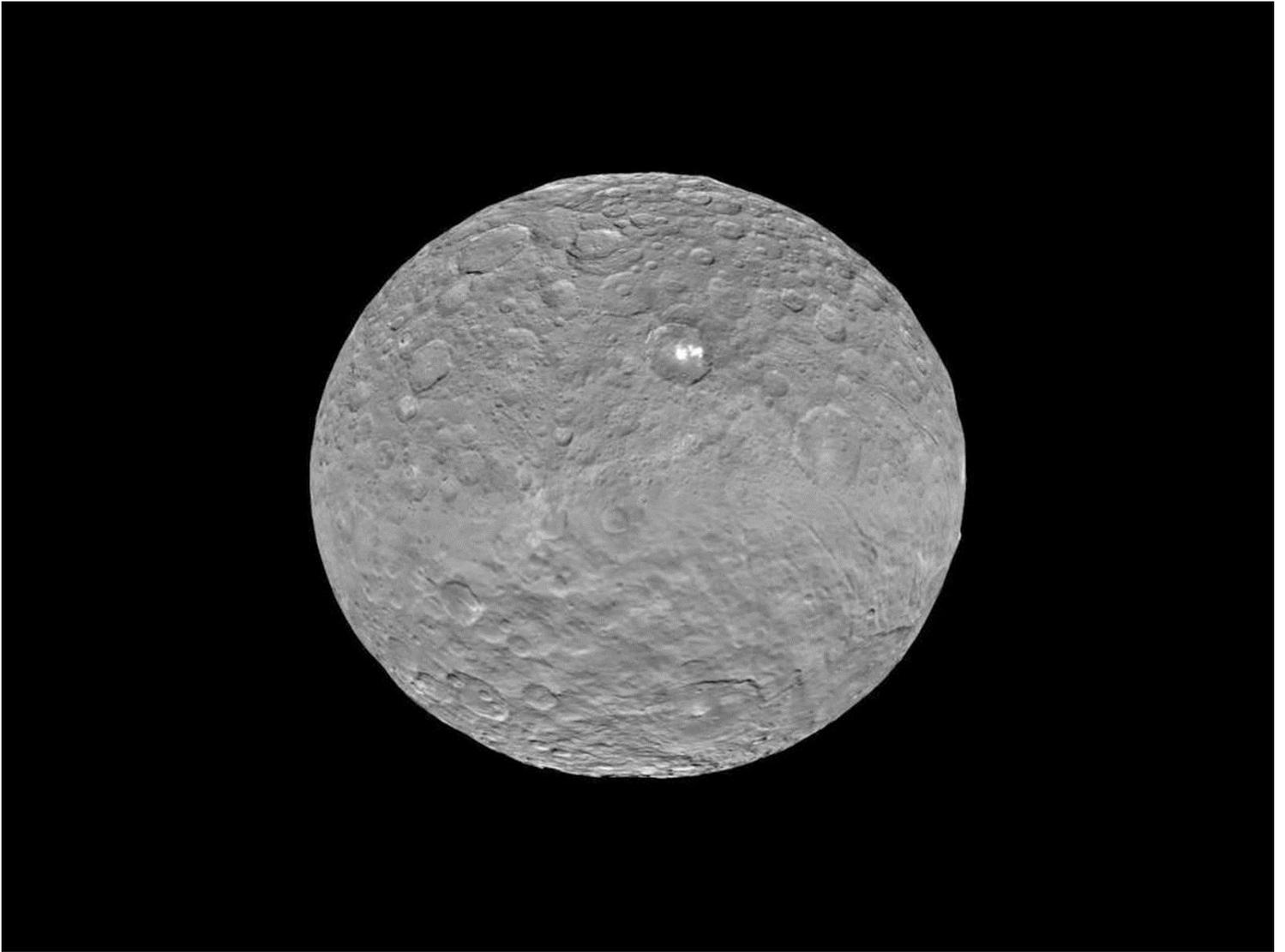
Credit: NASA/JPL-Caltech



Hints at Ceres' Composition

This map-projected view of dwarf planet Ceres was created from images taken by NASA's Dawn spacecraft during its high-altitude mapping orbit, in August and September, 2015. Scientists use special filters to highlight subtle color differences across Ceres, providing insight into the mineral composition of the surface.

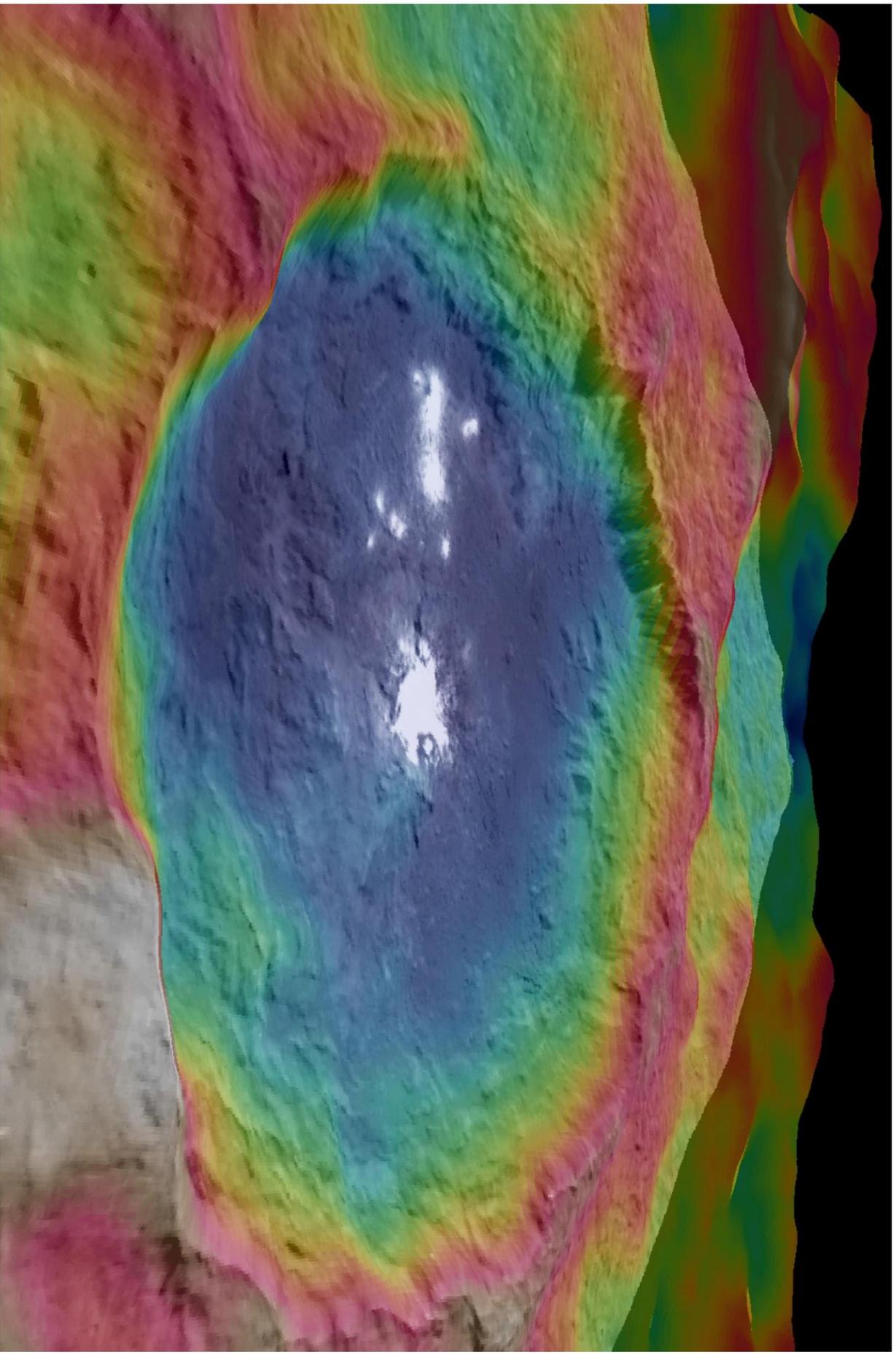
Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Global View of Ceres' Bright Spots

Dwarf planet Ceres is a mysterious world of rock and ice. The two bright spots seen in Occator crater reflect more sunlight than all the rest of the surface material.

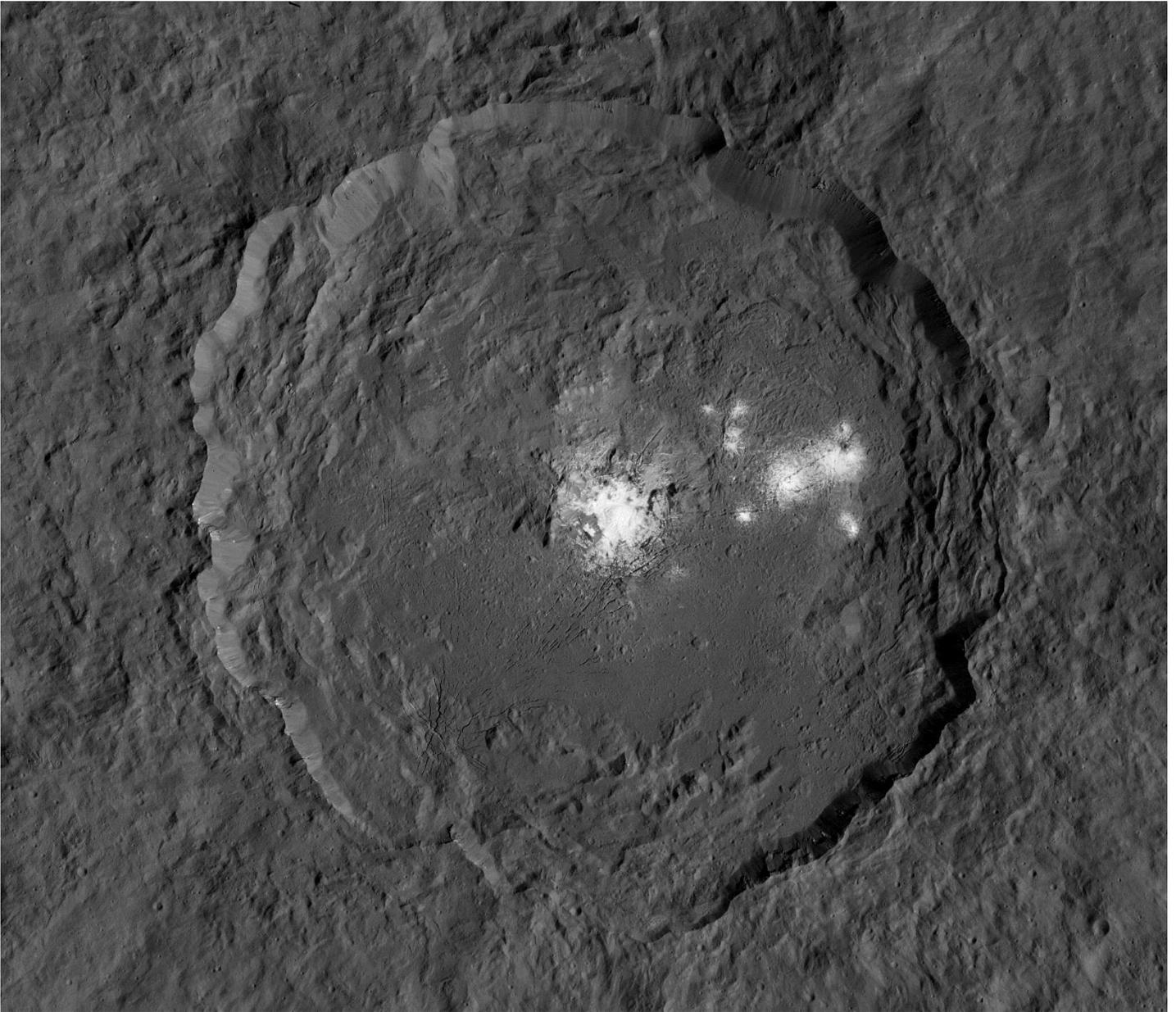
Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Occator Topography

This view of dwarf planet Ceres, from images taken by NASA's Dawn spacecraft, is a color-coded topographic map of Occator crater which is 56 miles wide and two miles deep. Blue is the lowest elevation and brown is the highest.

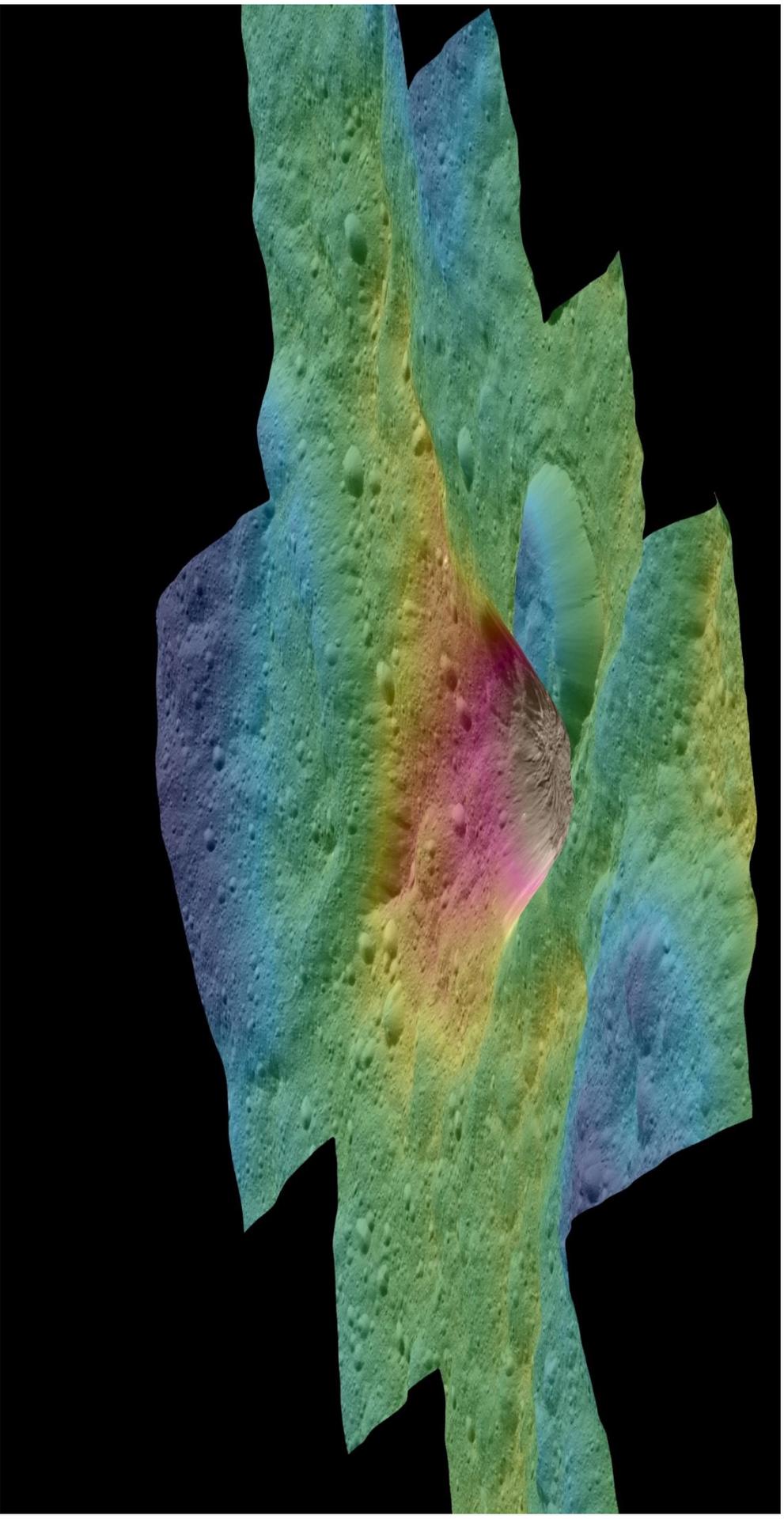
Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Dawn Takes a Closer Look at Occator

This view is a mosaic of images of Occator crater on dwarf planet Ceres, obtained by the Dawn spacecraft during the mission's Low Altitude Mapping Orbit phase.

Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Topographic View of Ceres Mountain

This view, made using images taken by NASA's Dawn spacecraft, features a tall conical mountain on Ceres, with elevations spanning a range of about 5.5 miles (9 kilometers) from the lowest places in this region to the highest terrains.

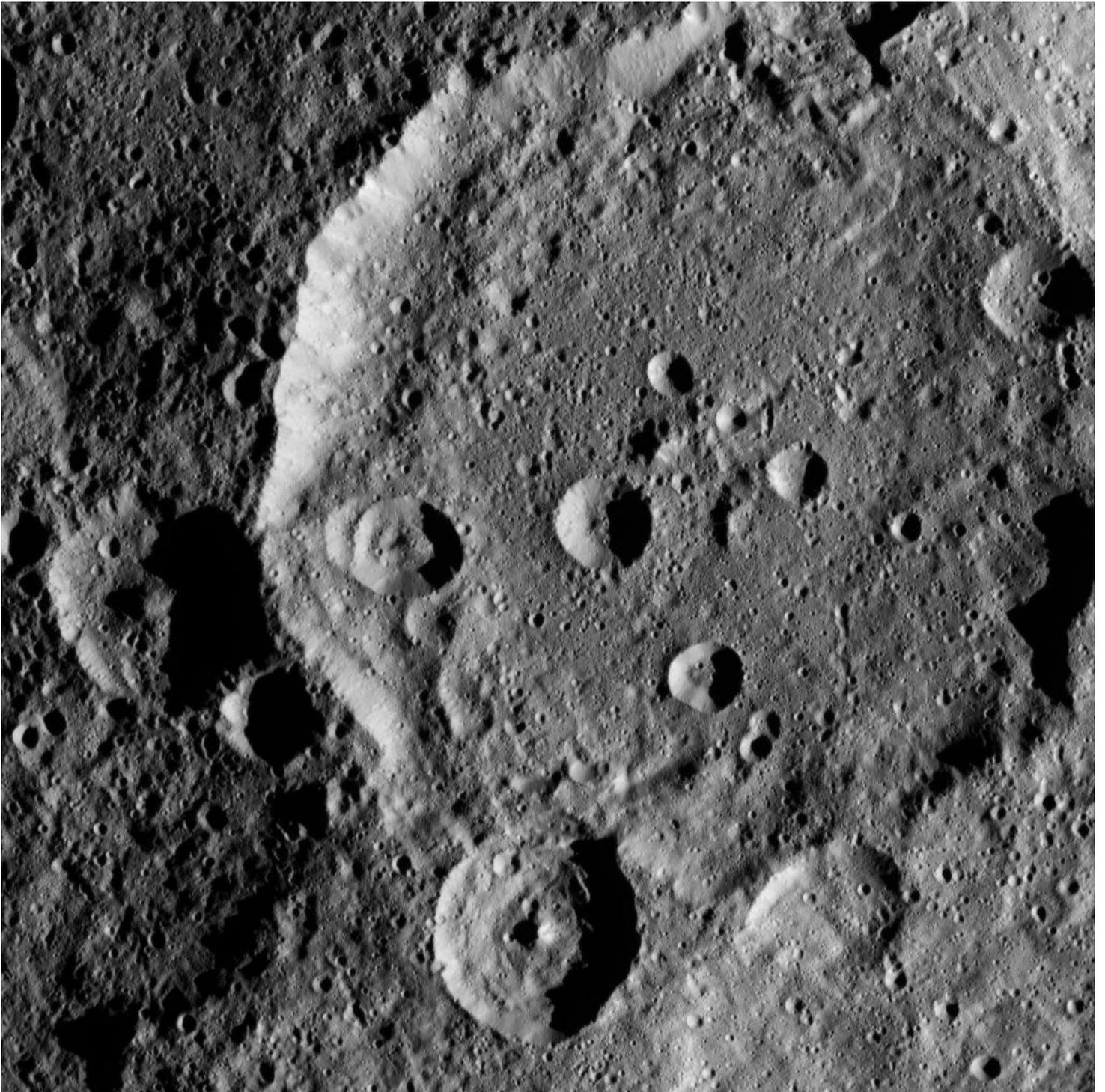
Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Dawn at Ceres

This image, taken by NASA's Dawn spacecraft, shows a portion of the northern hemisphere of dwarf planet Ceres from an altitude of 240 miles (385 kilometers) from the surface.

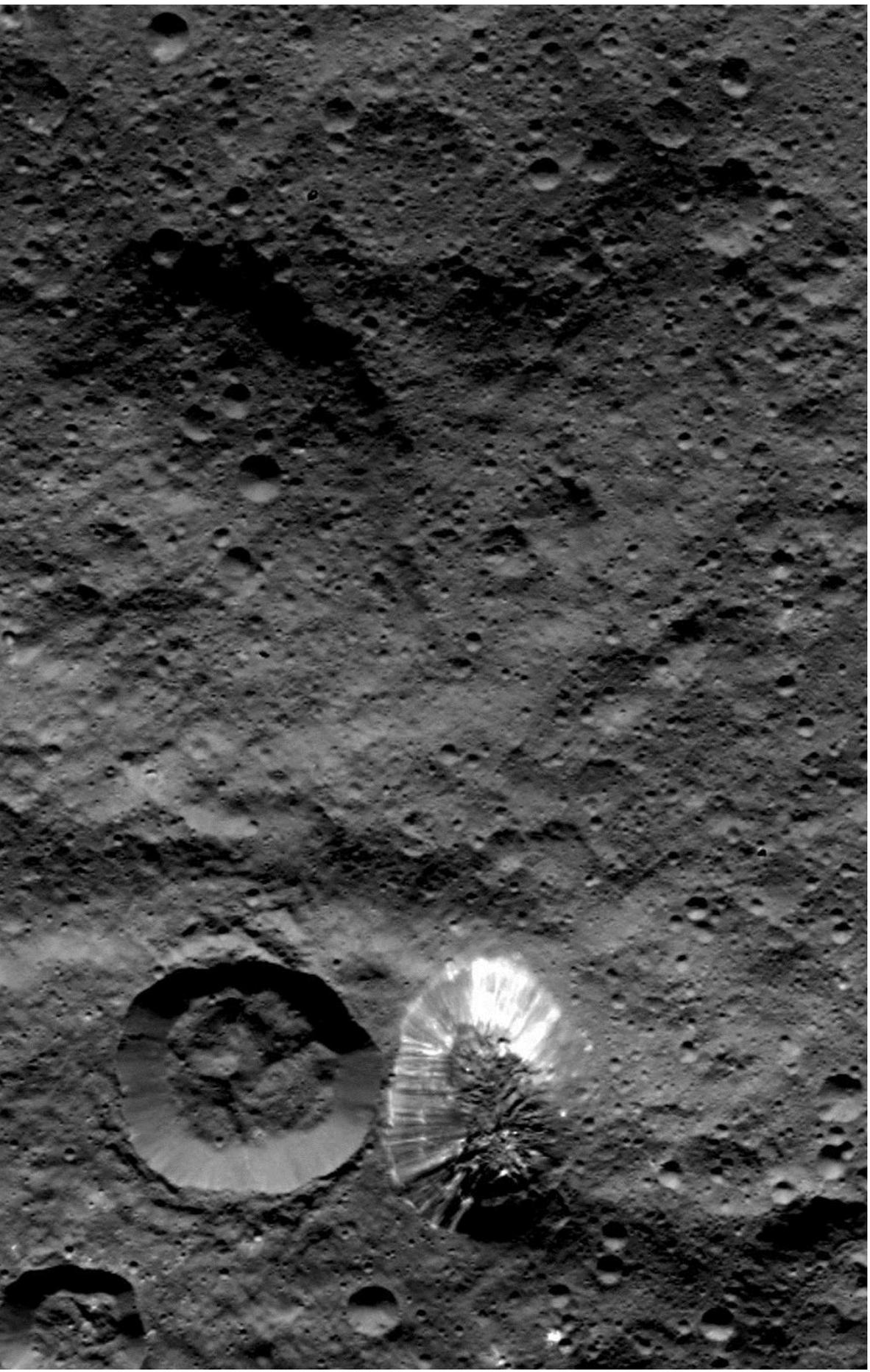
Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Dawn at Ceres

This image, taken by NASA's Dawn spacecraft, shows a portion of the southern hemisphere of dwarf planet Ceres from an altitude of 915 miles (1,470 kilometers).

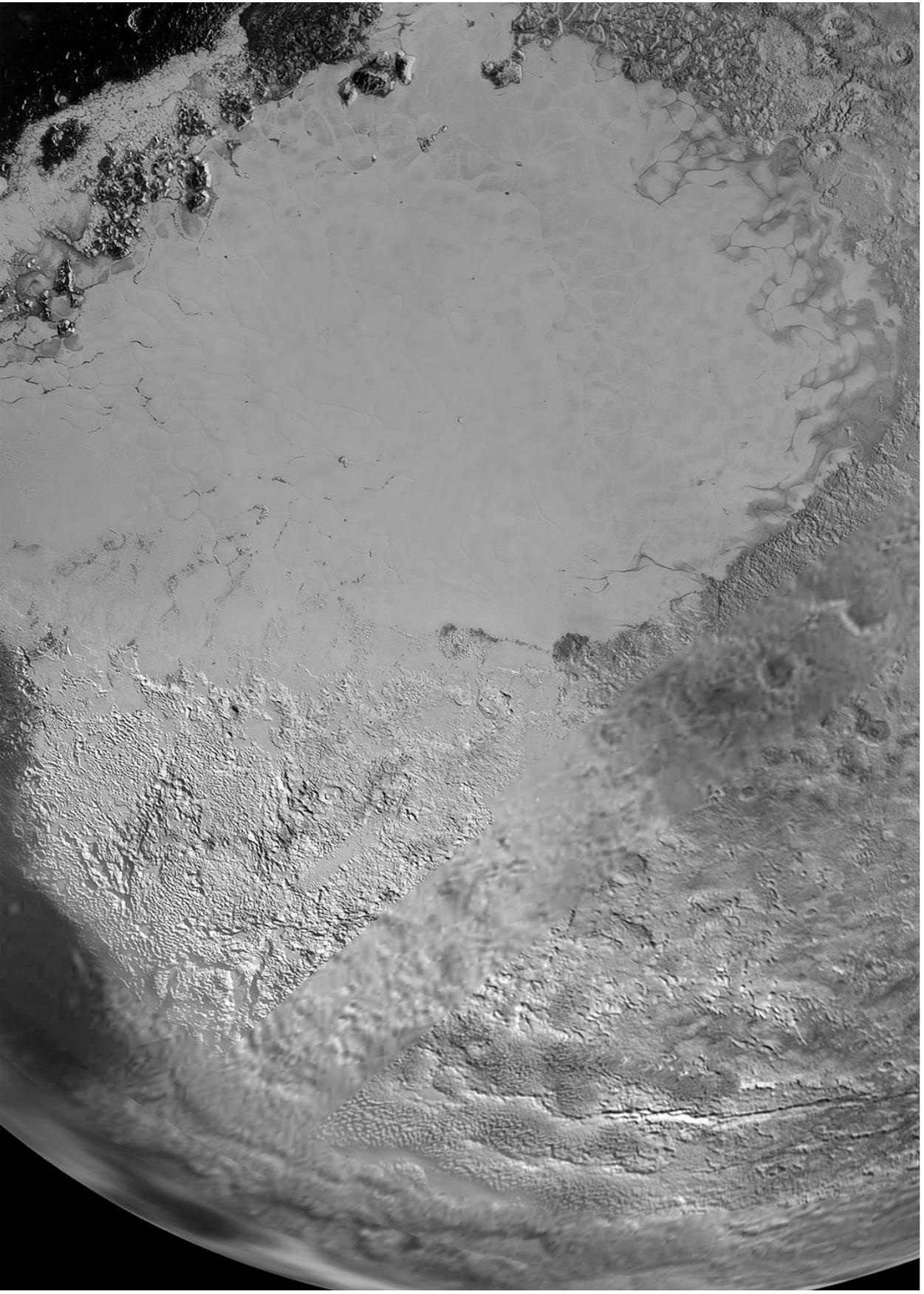
Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Lonely Mountain on Ceres: Ahuna Mons

Ahuna mons, at about 4 miles high, is among the highest features seen on dwarf planet Ceres. It is roughly the same elevation as Mount McKinley in Alaska's Denali National Park, the highest peak in North America.

Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



Sputnik Planum in Detail

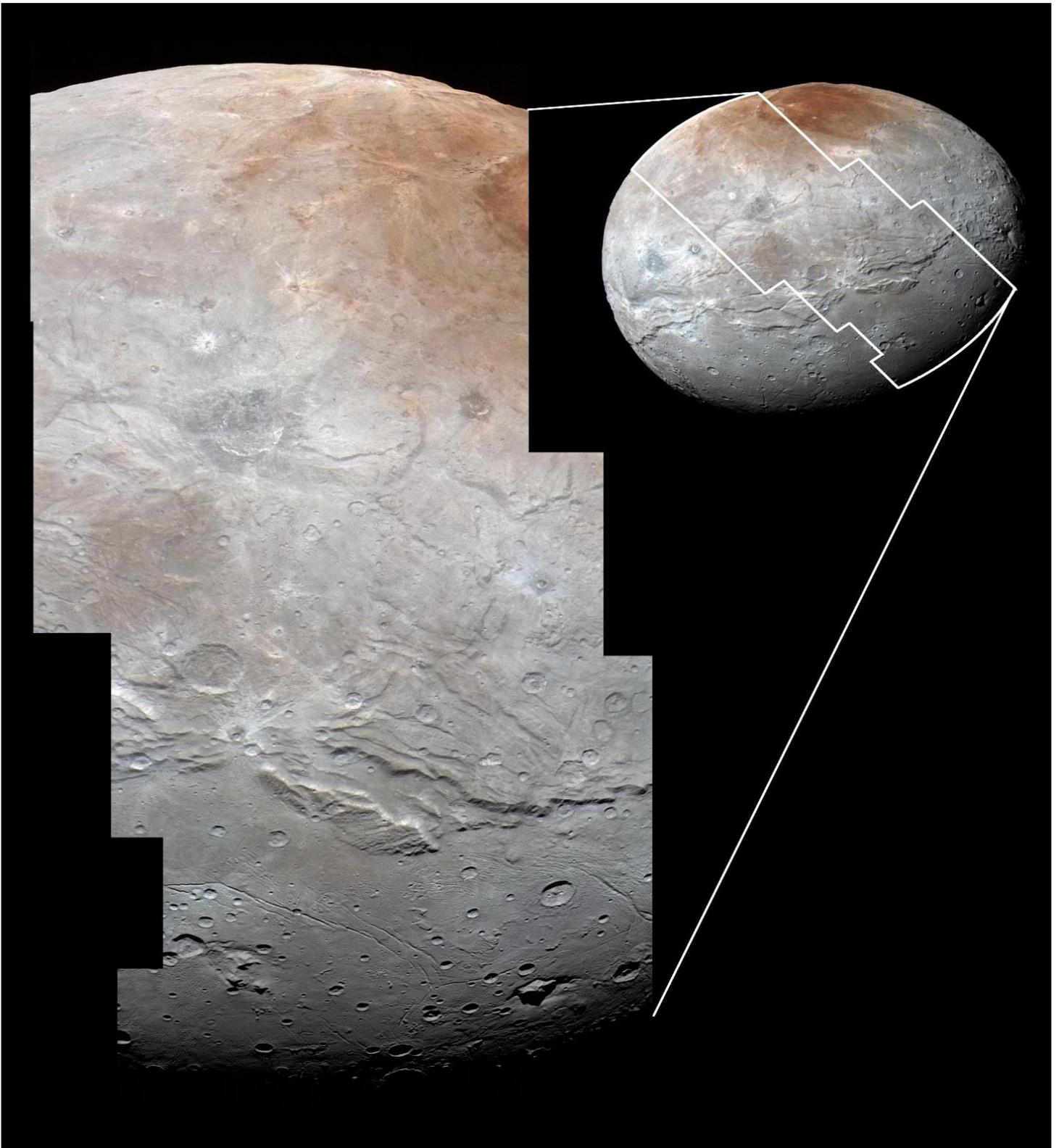
Sputnik Planum is the smooth, light-bulb shaped region on the left of this composite of New Horizons images of Pluto. The brilliantly white upland region to the right may be coated by nitrogen ice transported through the atmosphere from the surface of Sputnik Planum



Closer Look at Pluto's Majestic Mountains and Frozen Plains

15 minutes after its closest approach to Pluto on July 14, 2015, NASA's New Horizons spacecraft looked back toward the Sun and captured a near-sunset view of the Sputnik Planum on the right, the rugged Norgay Montes in the foreground (rising 11,000 ft), and the Hillary Montes on the skyline (rising 5,200 ft).

Credit: Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute



Charon in Detail

Cratered uplands at the top of Pluto's moon Charon are broken by a series of canyons and replaced on the bottom by rolling plains, informally named Vulcan Planum.

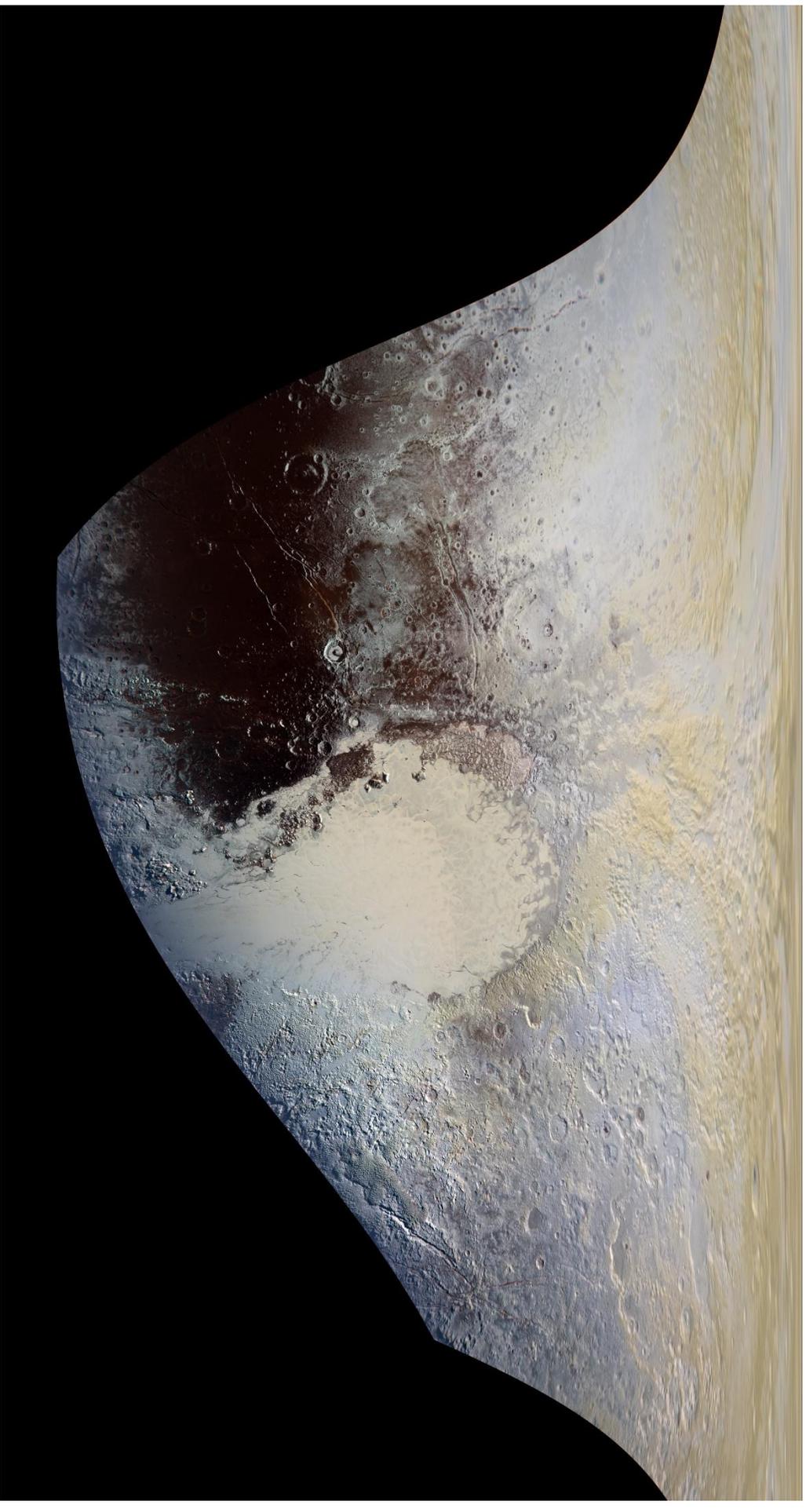
Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute



'Snakeskin' Terrain

This extended color image of Pluto's bizarrely textured mountains, informally named the Tartarus Dorsa, show intricate patterns of blue-gray ridges and reddish material in between.

Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute



Pluto in Extended Color

This cylindrical projection map of Pluto in enhanced, extended color reveals exquisite detail of the subtle differences in terrain. Colors used in this map are the blue, red, and near-infrared filter channels of the Ralph instrument.

Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute



Pluto in True Color

Four images from New Horizons' Long Range Reconnaissance Imager (LORRI) were combined with color data from the Ralph instrument to create this global view of Pluto.

Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute



Charon in Enhanced Color

NASA's New Horizons captured this high-resolution enhanced color view of Pluto's moon on July 14, 2015. The image combines blue, red, and infrared images taken by the Ralph instrument. The striking reddish feature in the north (top) polar region is informally named Mordor Macula. Charon is 754 mi (1,214 km) across.

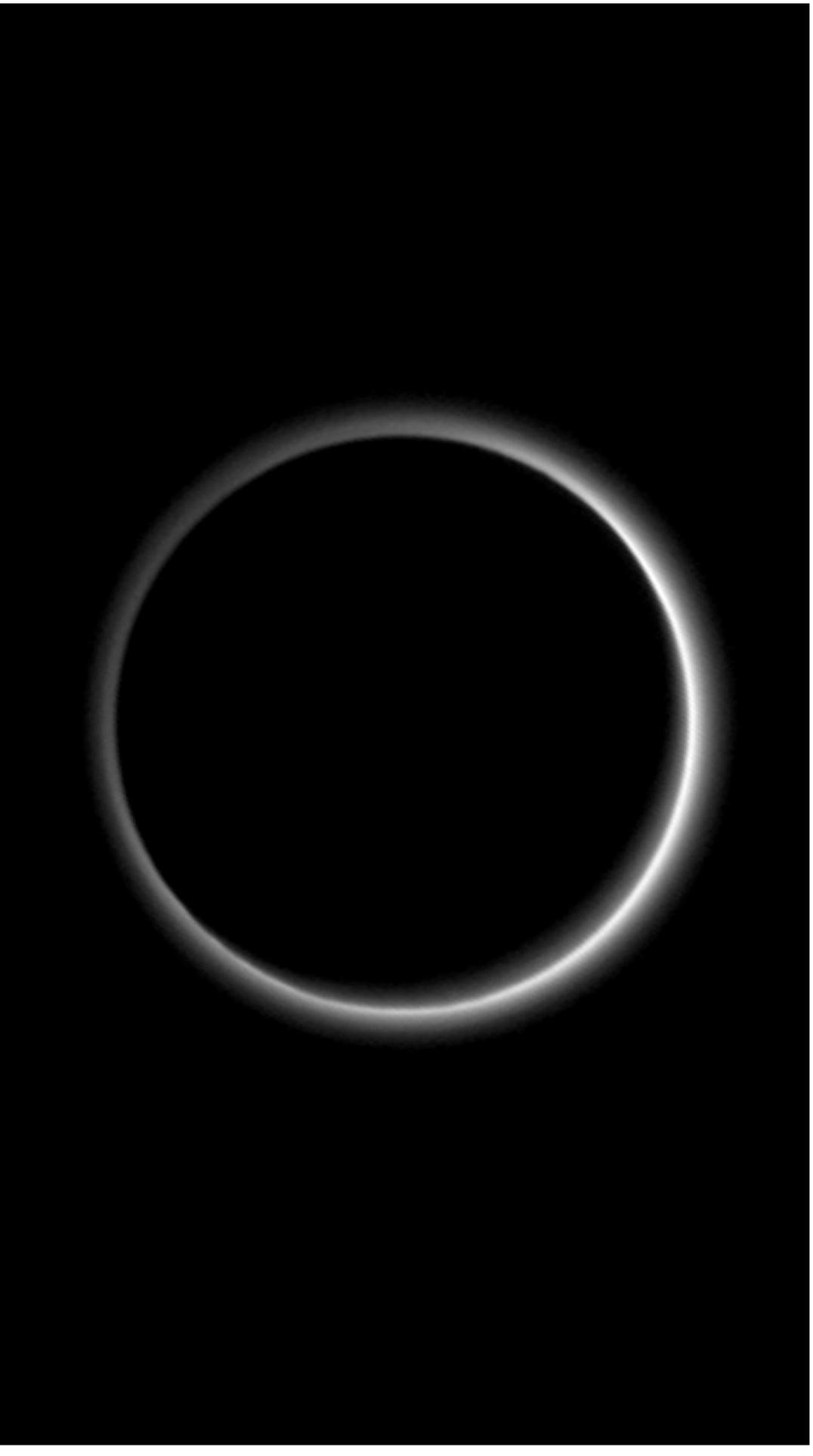
Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute



Charon and Pluto: Strikingly Different Worlds

This composite of enhanced color images of Pluto (lower right) and Pluto's moon Charon (upper left) highlights the similarities of Charon's polar red terrain and Pluto's equatorial red terrain. The relative sizes of Pluto and Charon are correct, but their true separation is not to scale.

Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute



Halo Haze Over Pluto

Backlit by the sun, atmospheric haze rings Pluto's silhouette like a luminous halo in the image taken by NASA's New Horizons spacecraft on July 15. This global portrait of the atmosphere was captured when the spacecraft was about 1.25 million miles (2 million kilometers) from Pluto.

Credit: NASA/Johns Hopkins University Applied Physics Laboratory/Southwest Research Institute