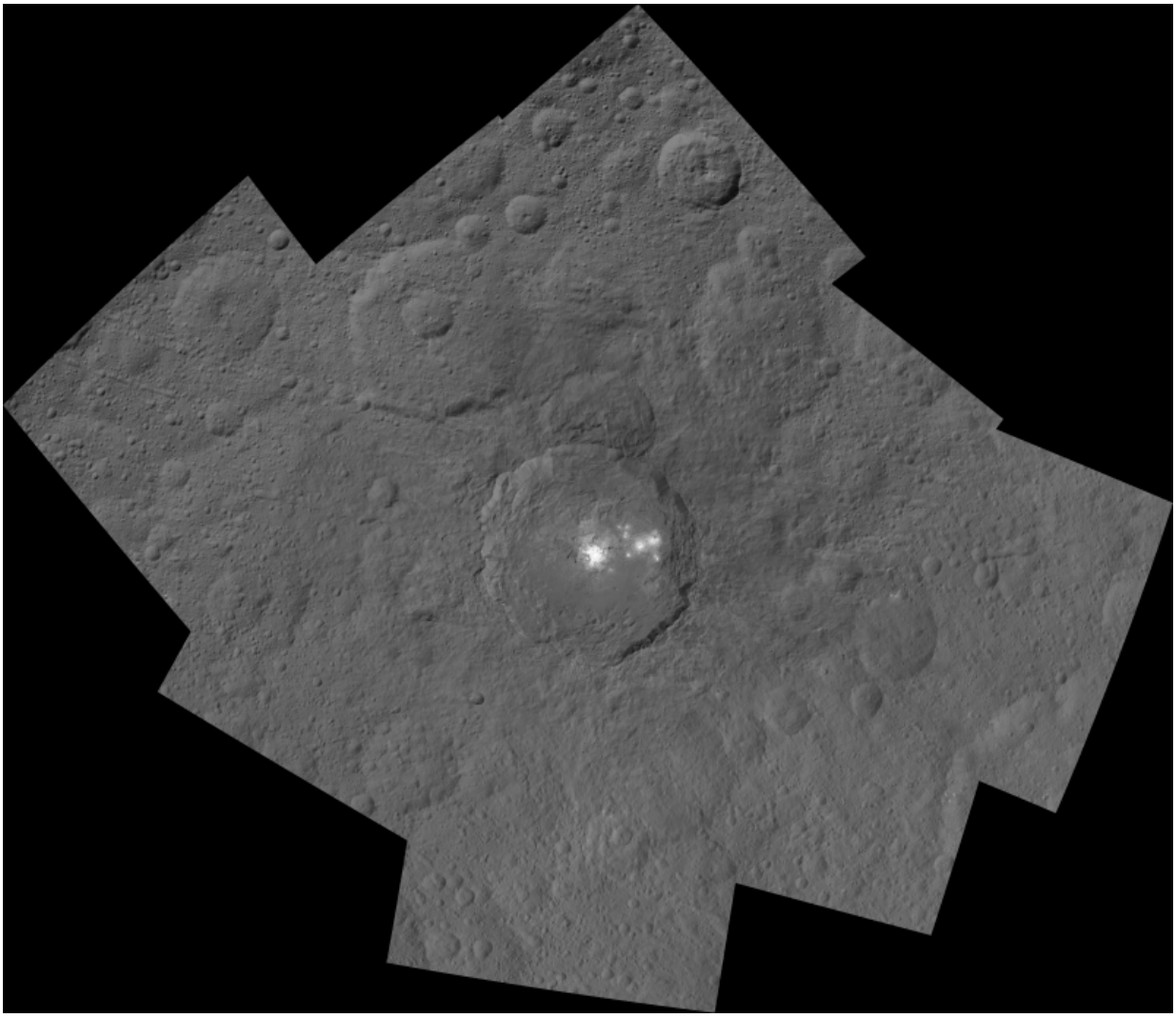
Dawn starts steep descent to most dazzling orbit of Ceres

October 30 2015, by Ken Kremer



This mosaic shows Ceres' Occator crater and surrounding terrain from an altitude of 915 miles (1,470 kilometers), as seen by NASA's Dawn spacecraft. Occator is about 60 miles (90 kilometers) across and 2 miles (4 kilometers) deep.

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

The most dazzling views ever seen of dwarf planet Ceres and its mysterious bright spots are what's on tap by year's end as NASA's amazing Dawn spacecraft starts a gradual but steep descent over the next two months to its lowest and final orbit around the bizarre icy body.

Engineers at NASA's Jet Propulsion Laboratory (JPL) successfully fired up the probes exotic ion propulsion system to begin lowering Dawn's orbital altitude to less than a quarter of what it has been for the past two months of intense mapping operations.

On Oct. 23, Dawn began a seven-week-long dive that uses ion thruster #2 to reduce the spacecrafts vantage point from 915 miles (1,470 kilometers) at the High Altitude Mapping Orbit (HAMO) down to less than 235 miles (380 kilometers) above Ceres at the Low Altitude Mapping Orbit (LAMO).

Dawn is slated to arrive at LAMO by mid-December, just in time to begin delivering the long awaiting Christmas treats.

Ceres has absolutely tantalized researchers far beyond their wildest expectations.

When Dawn arrives at LAMO it will be the culmination of an eight year interplanetary voyage that began with a blastoff on September 27, 2007 by a United Launch Alliance (ULA) Delta II Heavy rocket from Space Launch Complex-17B (SLC-17B) at Cape Canaveral Air Force Station, Florida.

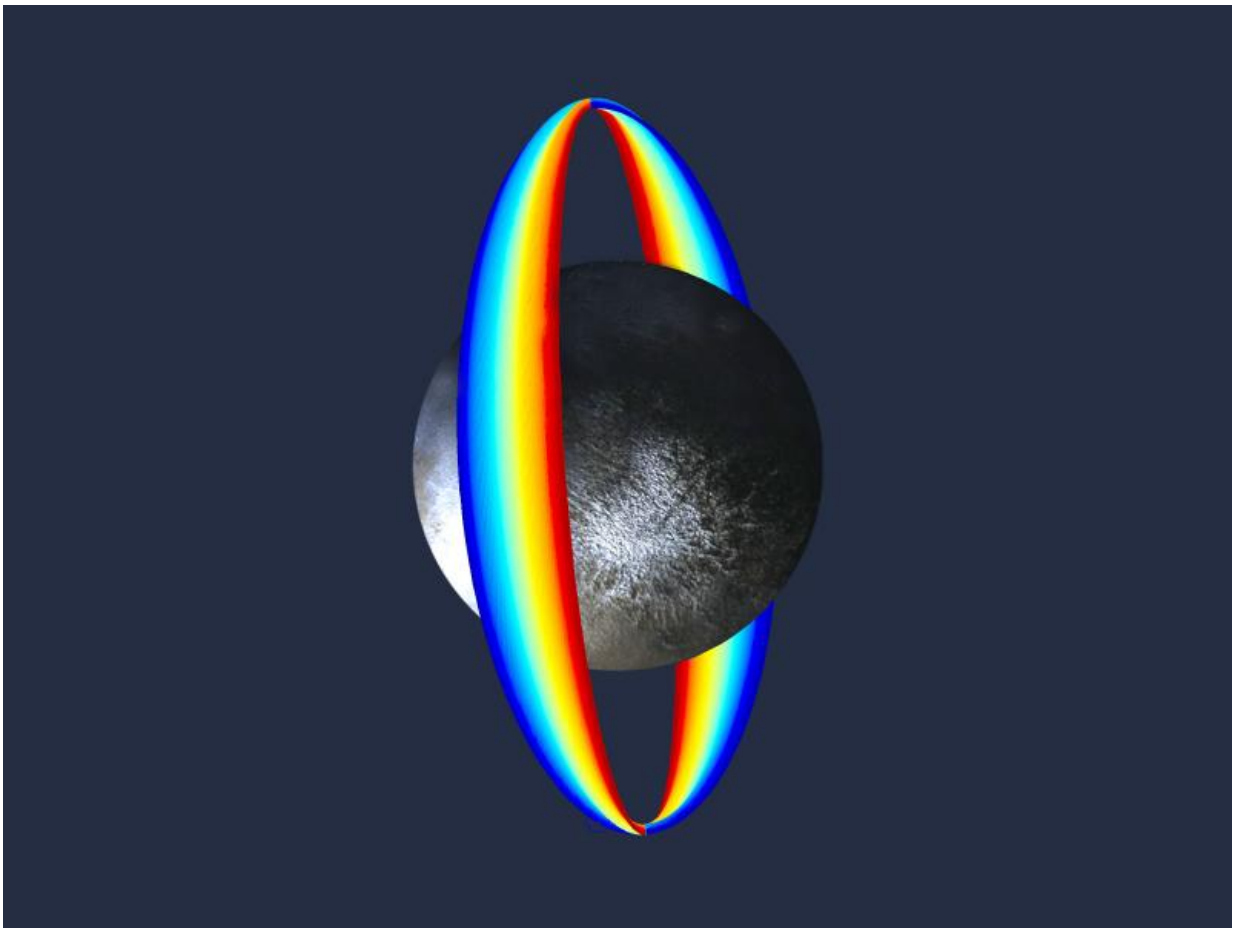
LAMO marks Dawn's fourth, lowest and final science orbit at Ceres

where the highest resolution observations will be gathered and images from the framing camera will achieve a resolution of 120 feet (35 meters) per pixel.

At LAMO, researchers hope to finally resolve the enduring mystery of the nature of the bright spots that have intrigued science and the general public since they were first glimpsed clearly early this year as Dawn was on its final approach to Ceres.

Dawn arrived in orbit this past spring on March 6, 2015.

The science team has just released a new mosaic of the brightest spots on Ceres found at Occator crater and the surrounding terrain – see above.



Dawn's low altitude mapping orbit LAMO. This shows how the orbit naturally shifts slightly (relative to the sun) during the three months of LAMO, starting in blue and ending in red. The spacecraft completes each revolution in 5.5 hours, and Ceres rotates in 9.1 hours, so Dawn will be able to view the entire surface. Credit: NASA/JPL

The images were taken from the HAMO altitude of 915 miles (1,470 kilometers) during the first of six mapping cycles. They have a resolution of 450 feet (140 meters) per pixel.

Occator measures about 60 miles (90 kilometers) across and 2 miles (4 kilometers) deep.

Because the spots are so bright they are generally overexposed. Therefore the team took two sets of images, with shorter and longer exposure times, to maximize the details of the interior of Occator.

"This view uses a composite of two images of Occator: one using a short exposure that captures the detail in the bright spots, and one where the background surface is captured at normal exposure."

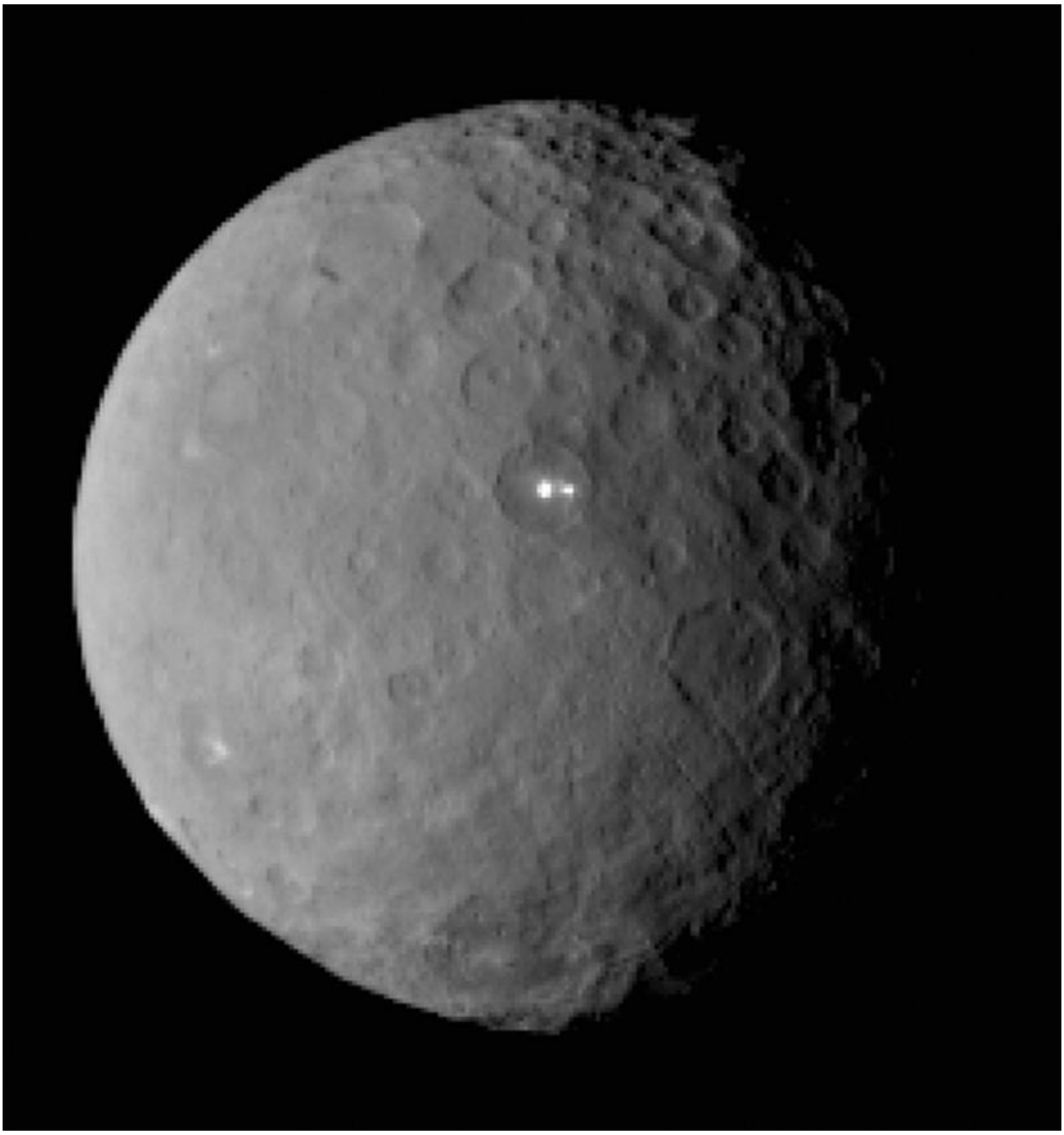
The bright spots at Occator crater remain the biggest Cerean mystery.

So far the imagery and other science data may point to evaporation of salty water from the interior as the source of the bright spots.

"Occasional water leakage on to the surface could leave salt there as the water would sublime," Prof. Chris Russell, Dawn principal investigator told Universe Today exclusively.

"The big picture that is emerging is that Ceres fills a unique niche."

"Ceres fills a unique niche between the cold icy bodies of the outer solar system, with their rock hard icy surfaces, and the water planets Mars and Earth that can support ice and water on their surfaces," Russell, of the University of California, Los Angeles, told me.



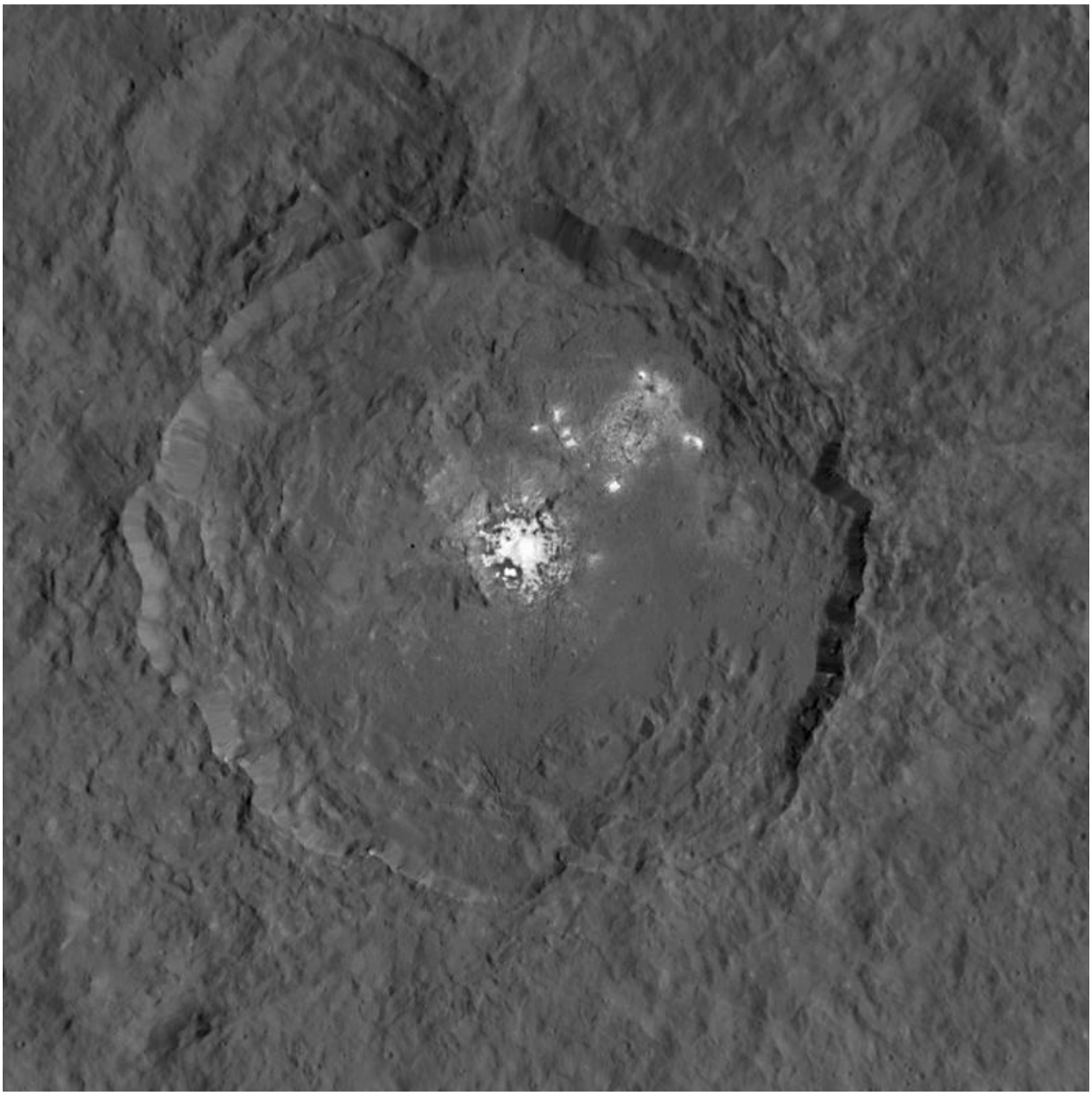
This image was taken by NASA's Dawn spacecraft of dwarf planet Ceres on Feb. 19 from a distance of nearly 29,000 miles (46,000 km). It shows that the brightest spot on Ceres has a dimmer companion, which apparently lies in the same basin. See below for the wide view. Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA

Dawn has peeled back Ceres secrets as the spacecraft orbits lower and lower. Detailed measurements gathered to date have yielded global mineral and topographic maps from HAMO with the best resolution ever as the science team painstakingly stitched together the probes spectral and imaging products.

And the best is yet to come at LAMO.

At HAMO, Dawn' instruments, including the Framing Camera and Visible and Infrared Spectrometer (VIR) were aimed at slightly different angles in each mapping cycle allowing the team to generate stereo views and construct 3-D maps.

"The emphasis during HAMO is to get good stereo data on the elevations of the surface topography and to get good high resolution clear and color data with the framing camera," Russell explained.

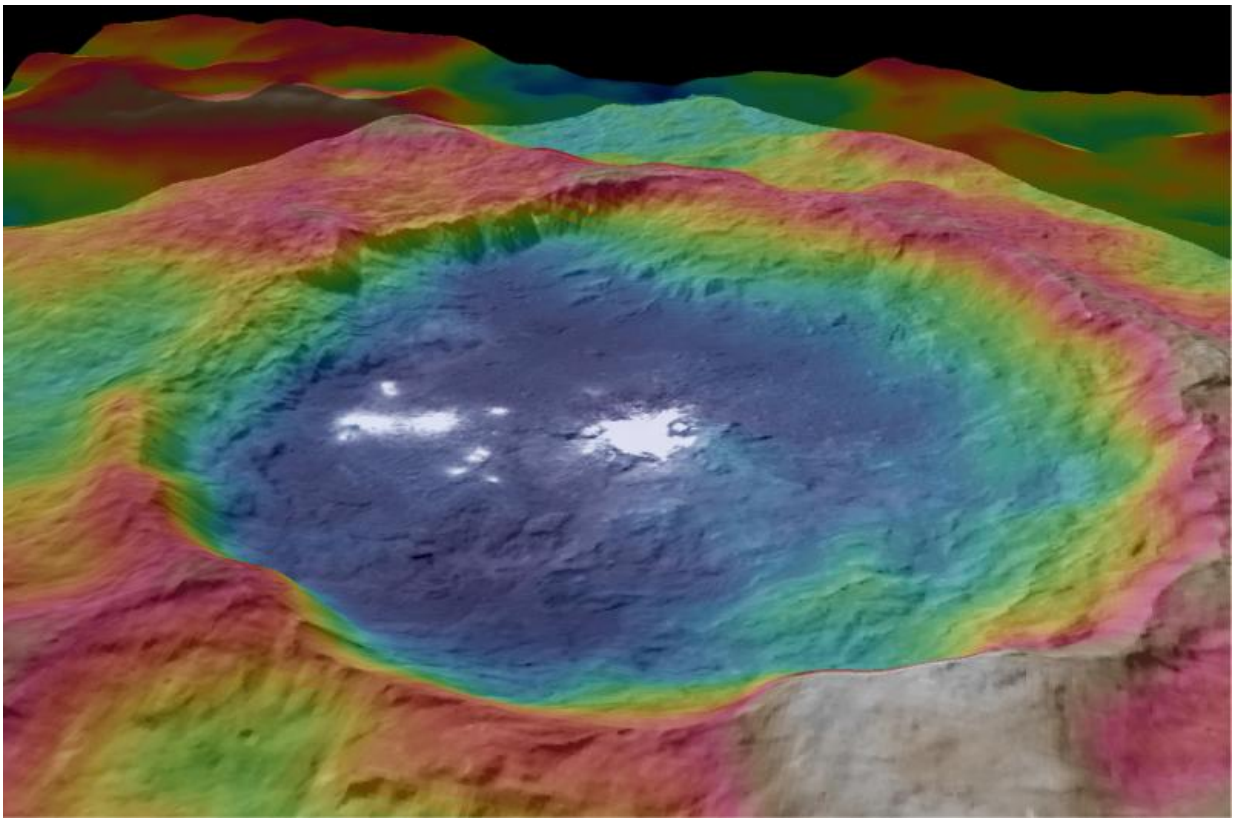


This image, made using images taken by NASA's Dawn spacecraft during the mission's High Altitude Mapping Orbit (HAMO) phase, shows Occator crater on Ceres, home to a collection of intriguing bright spots. Credits: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA

Dawn is Earth's first probe in human history to explore any dwarf planet,

the first to explore Ceres up close and the first to orbit two celestial bodies.

Ceres is a Texas-sized world, ranks as the largest object in the main asteroid belt between Mars and Jupiter, and may have a subsurface ocean of liquid water that could be hospitable to life.

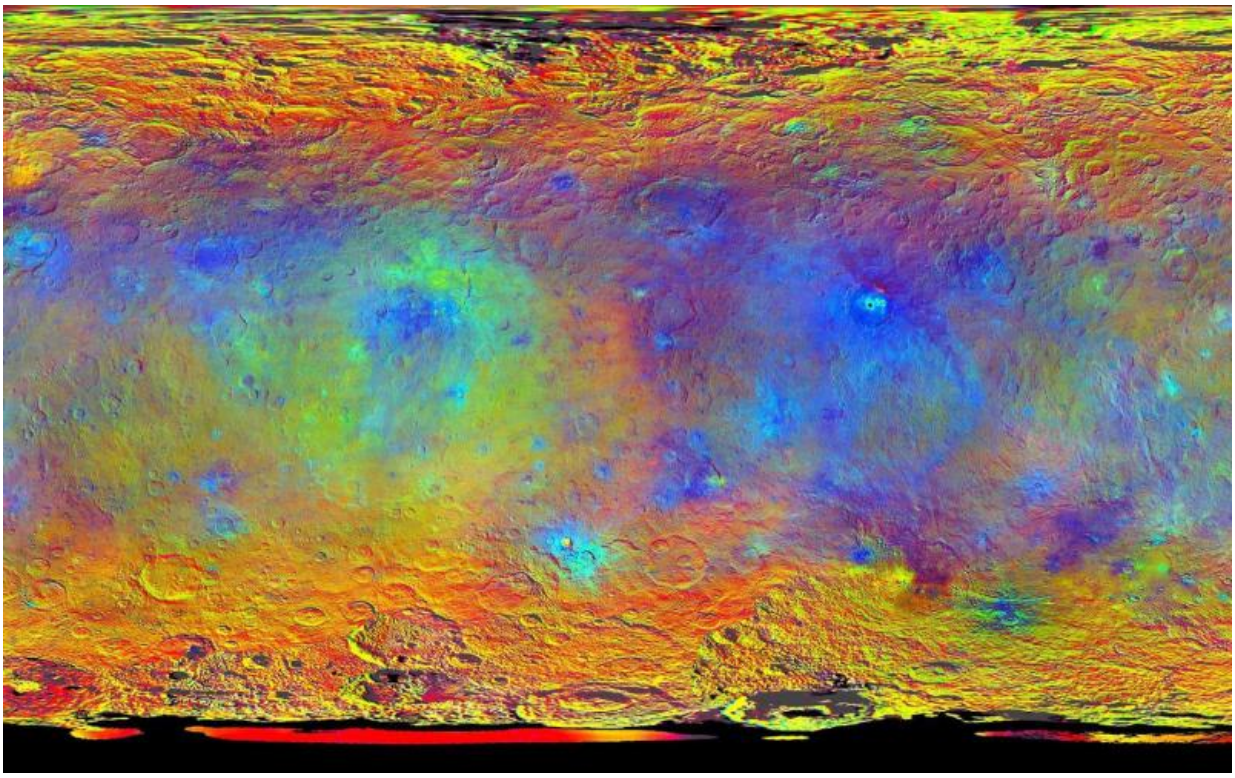


This view from NASA's Dawn spacecraft is a color-coded topographic map of Occator crater on Ceres. Blue is the lowest elevation, and brown is the highest. The crater, which is home to the brightest spots on Ceres, is approximately 56 miles (90 kilometers wide). Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA

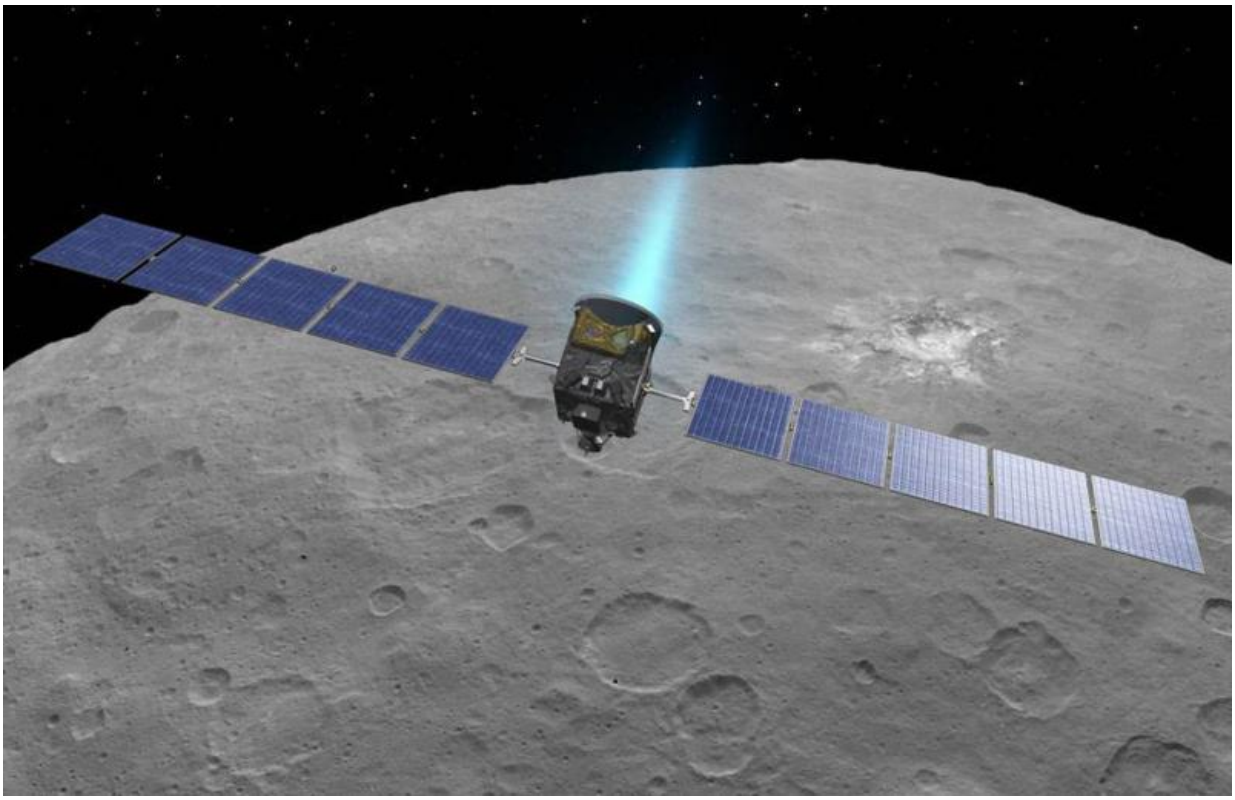
The mission is expected to last until at least March 2016, and possibly

longer, depending upon fuel reserves.

"It will end some time between March and December," Dr. Marc Rayman, Dawn's chief engineer and mission director based at NASA's Jet Propulsion Laboratory, Pasadena, California, told Universe Today.



This map-projected view of Ceres was created from images taken by NASA's Dawn spacecraft during its high-altitude mapping orbit, in August and September, 2015. This color coded map can provide valuable insights into the mineral composition of the surface, as well as the relative ages of surface features. Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA



An artist's conception shows NASA's Dawn spacecraft flying above Ceres. This view incorporates actual imagery from the Dawn mission. Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA

Source: Universe Today