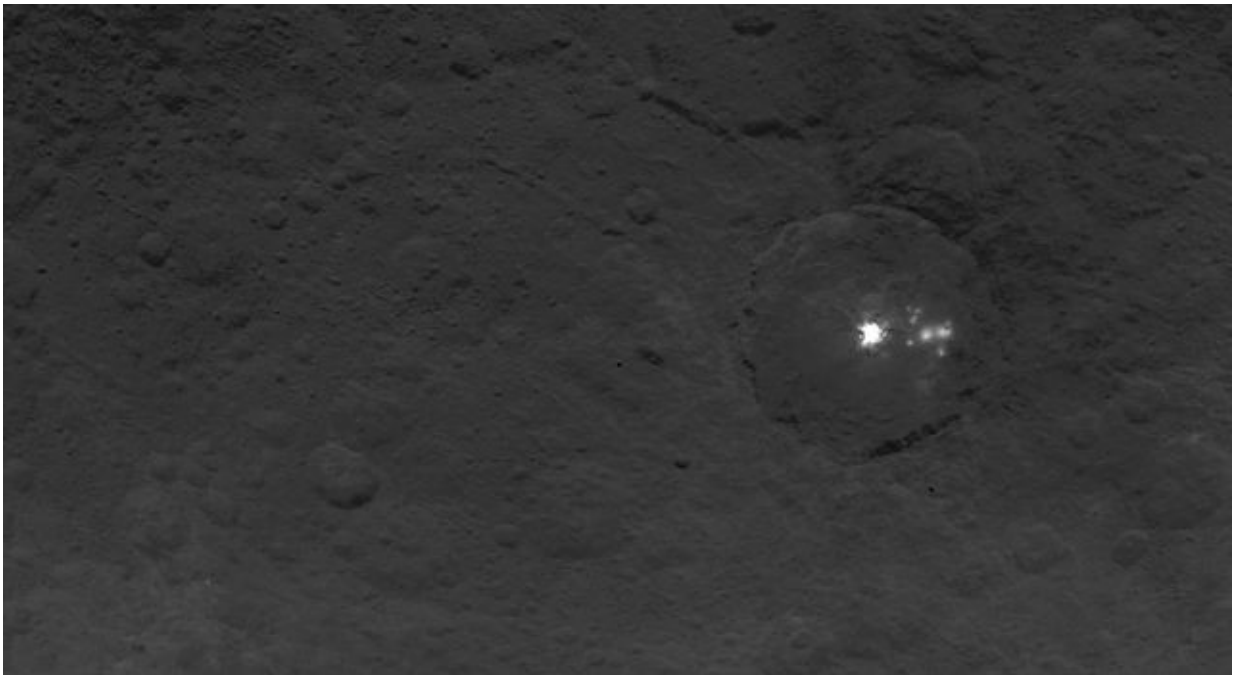


Dwarf planet Ceres offers big surprises for scientists

July 5 2015, by Amina Khan, Los Angeles Times



Credit: NASA

The closer we get to Ceres, the more perplexing the dwarf planet grows. NASA's Dawn spacecraft has found several more bright spots as well as a pyramid-like peak jutting out of the frigid world's surface.

The discovery is painting an increasingly complex portrait of one of the biggest "fossils" from the early solar system.

"I expected to be surprised because we knew so little about Ceres," Christopher Russell, Dawn's principal investigator and a planetary scientist at the University of California, Los Angeles, said in an email. "I never expected bright spots and a pyramid to be the surprises."

Ceres is one of five dwarf planets in the solar system and the largest member of the asteroid belt, the vast ring of rocky debris that stretches between the orbits of Mars and Jupiter.

Asteroids are the building blocks of planets that never came to be, and scientists hoped that by studying two of the largest protoplanets in the belt - first the lumpy asteroid Vesta, and now the dwarf planet Ceres - the Dawn mission could learn more about the early development of our [solar system](#).

By the time the spacecraft arrived at Ceres in March, speculation had already grown about the nature of the dwarf planet's surface. Many researchers had suspected that Ceres, which seemed to be rich in water ice, would have fairly smooth, young terrain.

Instead, as the spacecraft grew ever closer in the home stretch of its 7½-year journey, it began sending back images of a much rougher, cratered surface than expected. Even stranger: a mysterious bright spot (previously observed by NASA's Hubble Space Telescope) that seemed to shine like a beacon from the surface.

That bright spot resolved into two bright spots as the spacecraft got closer, and new images show that the dimmer companion is actually not one, but at least eight smaller spots.

What are those shiny areas? It's still unclear, Russell said. It's possible they are salt or [water ice](#), though scientists can't say for sure.

"We should get the answer when we pass over the bright spot again," Russell said. "We do see the contour of the ground, and it seems that it is not a hill but possibly a dip in the surface that is bright, but we need to complete the survey orbits in order to accurately obtain the topography of the area."

For the moment, even knowing that the dimmer of the two bright spots is actually multiple spots gives researchers valuable information, he said.

"This means that the process that made the big bright spot can work on a smaller scale," he said. "The distribution of these bright spots is something we must seriously consider in solving this puzzle. The solution should tell us much about the unseen subsurface of Ceres."

Dawn has discovered another surprising feature on the surface: a roughly 3-mile-high mountain that juts out of the ground alone.

"We do not know yet what made this peak on Ceres, let alone made it the observed shape," Russell said. "This is another total surprise to the team. However, there are processes on Earth that can grow mounds out of groundwater in Arctic terrains on Earth. But these are much smaller structures.

"We see only one of these on Ceres.... Its uniqueness makes our understanding more difficult," he added.

The pyramid-like mountain isn't associated with any bright spots, but bright streaks run top to bottom on some of the slopes, he said.

"It is possible that the bright material is the same as the bright material causing the bright spots," he added. "We will need better resolution to determine this."

Dawn has been circling Ceres in an orbit about 2,700 miles above the surface; in August it will dip down to an altitude of 900 miles, getting an even clearer view of the mysterious [dwarf planet](#).

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Citation: Dwarf planet Ceres offers big surprises for scientists (2015, July 5) retrieved 2 May 2024 from <https://phys.org/news/2015-07-dwarf-planet-ceres-big-scientists.html>

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