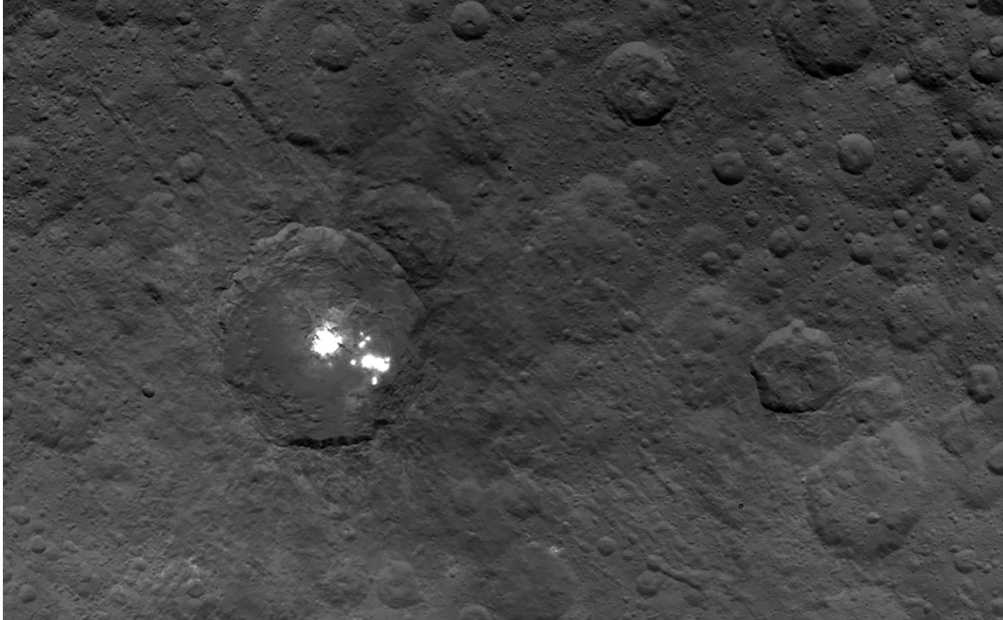


# Mystery haze appears above Ceres's bright spots

Discovery bolsters idea that intriguing marks are made of ice, not salt.

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

Bright spots in Ceres's Occator crater have intrigued scientists for months.

Ceres, the biggest asteroid in the Solar System, has a haze that appears occasionally in a crater above some of its [mysterious white spots](#).

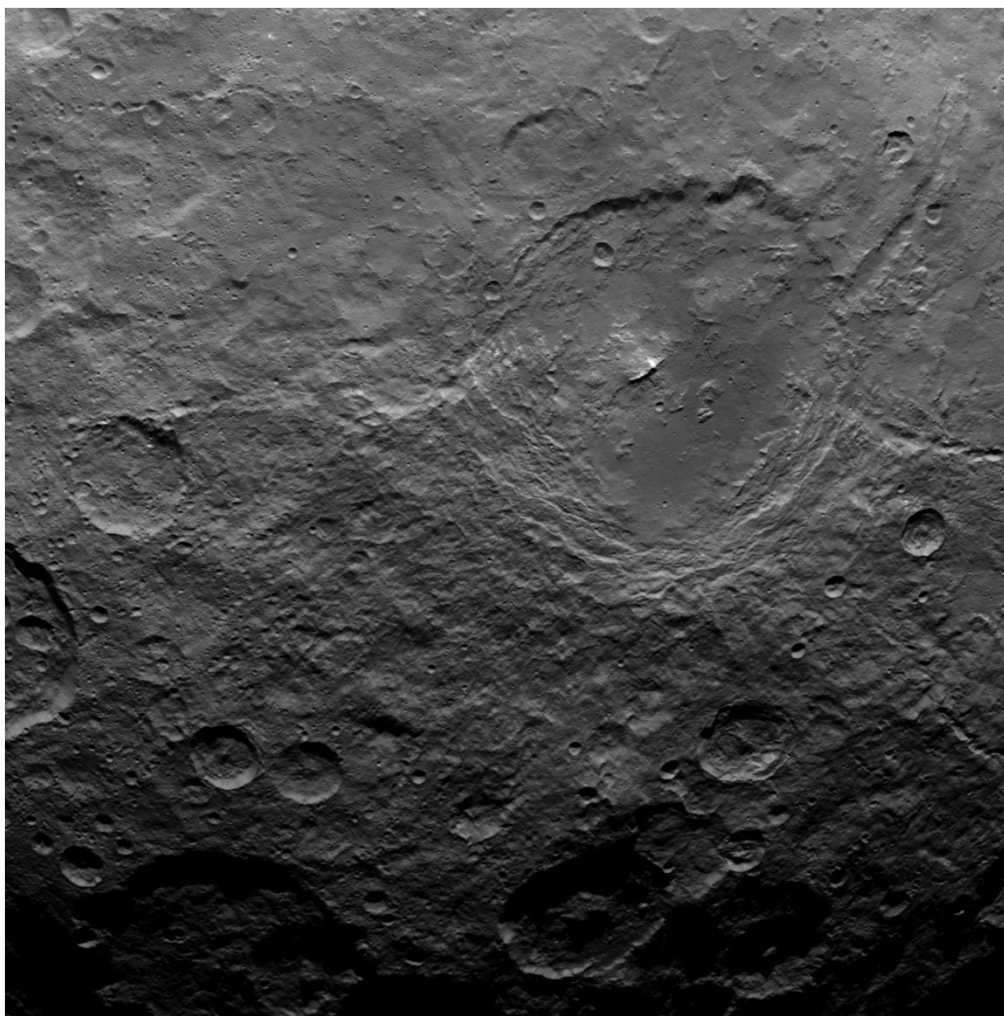
The phenomenon, observed by NASA's Dawn spacecraft, suggests that the bright spots "could be providing some atmosphere in this particular region of Ceres", says Christopher Russell, a planetary scientist at the University of California, Los Angeles.

[Dawn has been orbiting Ceres](#) since March. Russell, the mission's principal investigator, described its initial findings during an exploration meeting at NASA's Ames Research Center in Moffett Field, California, on 21 July.

Haze on Ceres would be the first ever observed directly in the asteroid belt. In 2014, researchers using the European Space Agency's Herschel Space Observatory reported seeing water vapour spraying off Ceres, which suggested that it was geologically active<sup>1</sup>. At least one-quarter of Ceres's mass is water, a much greater proportion than seen in most asteroids.

Bright spots pepper Ceres's surface, but the haze has so far been seen in only one location — a crater named Occator, which has a large bright area at its centre and several smaller spots nearby. Mission scientists have been trying to work out [whether the bright spots are made of ice](#), evaporated salts or other minerals, or something else entirely.

Some team members had been leaning towards the salt explanation, but the discovery of haze suggests the presence of sublimating ice. "At noontime, if you look at a glancing angle, you can see what seems to be haze," Russell says. "It comes back in a regular pattern." The haze covers about half of the crater and stops at the rim.



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Ceres's surface is pockmarked with craters and the occasional patch of highly reflective material.

### Eyes on the prize

The Dawn spacecraft carries an infrared spectrometer that should be able to discriminate easily between ice or salt. But the instrument, which is mapping Ceres's surface, has not had a chance to study the spots properly yet. It has been out of commission for small periods of time, leaving blank spots in the map, Russell says. The same spectrometer experienced problems back when [Dawn was orbiting a different asteroid, Vesta](#), in 2011–12.

Dawn has also found that Ceres is slightly smaller than expected, making it roughly 4% more dense than scientists had thought, Russell reports. And the obliquity, or tilt, of its axis is the reverse of what scientists had anticipated: "Summer is winter and winter is summer," he says.

Ceres's striking 5-kilometre-high mountain, informally dubbed the pyramid, may be made of ice like the mountains [seen last week on Pluto](#) by the New Horizons spacecraft, Russell adds.

At nearly 1,000 kilometres across, Ceres is designated as a dwarf planet. Understanding it could improve scientists' understanding of the relationships between all the objects in the Solar System. "Ceres is so big compared to all the other asteroids that it's really different," says Andrew Rivkin, a planetary scientist at the Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland. "It's sort of the penultimate step before a planet."

Following a brief interruption in normal operations on 30 June, Dawn is now spiralling closer to Ceres. It is less than 4,000 kilometres above the asteroid's surface, aiming for less than 1,500 kilometres in August.

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### References



Nature special: [Pluto and Ceres](#)

1. Küppers, M. *et al. Nature* **505**, 525–527 (2014).