GRaND seeks subsurface water ice on Ceres

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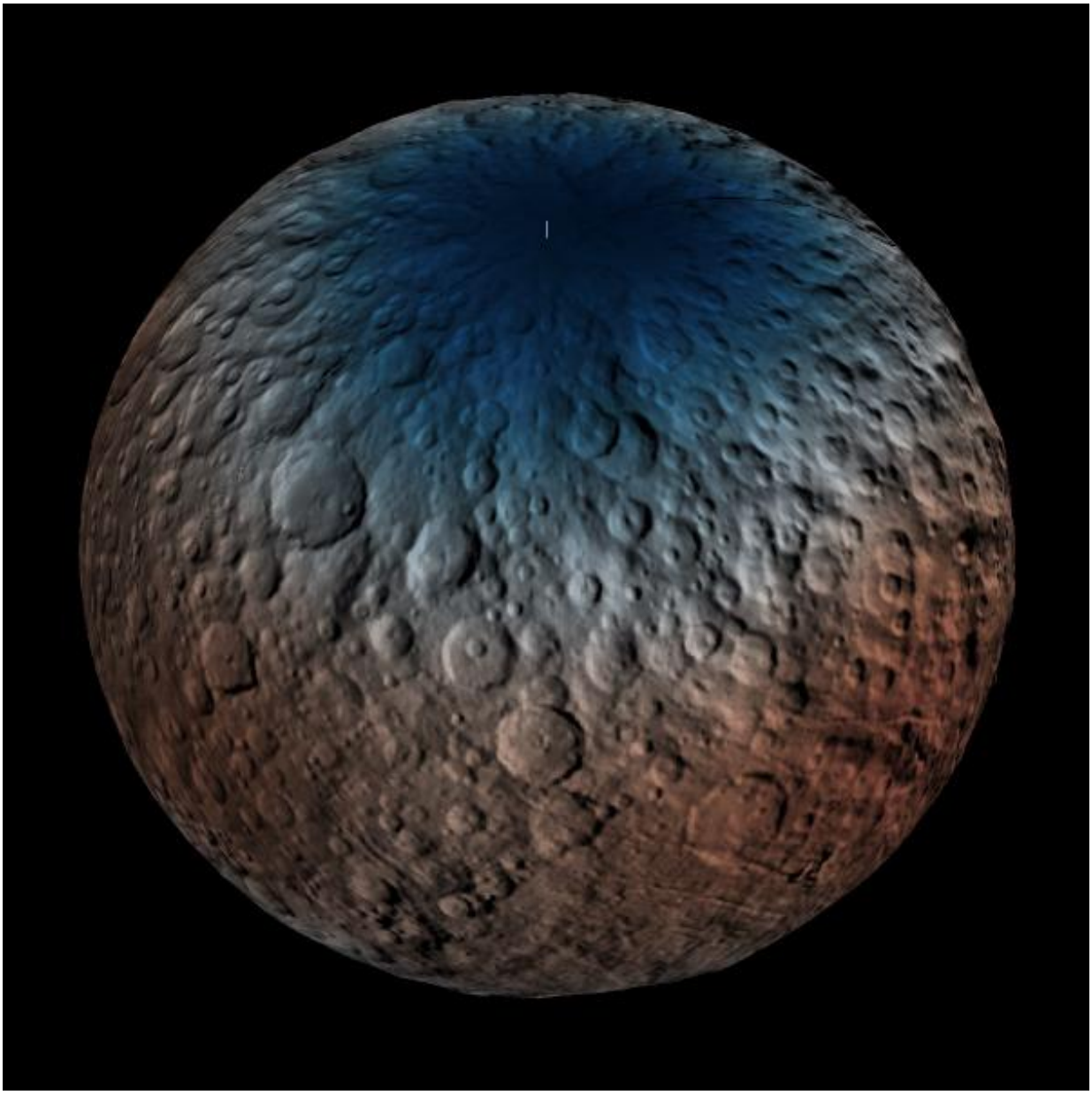

This map of neutron counting data at Ceres was acquired by Dawn's gamma ray

and neutron detector (GRaND) instrument. The data comes from Dawn's low-altitude mapping orbit at Ceres, which is at a distance of 240 miles (385 kilometers) from the dwarf planet. The color scale of this map is from blue (lowest) to red (highest). This data, based on number of neutrons detected per second, reflects the concentration of hydrogen in the upper yard (meter) of regolith. Counts decrease with increasing hydrogen concentration. A portion of the northern hemisphere of Ceres is shown. The pole is marked with a white line. The longitude is centered on Occator Crater. Lower neutron counts near the pole suggest the presence of water ice within about a yard (meter) of the surface at high latitudes.

The Gamma Ray and Neutron Detector (GRaND) aboard NASA's Dawn spacecraft is mapping the elemental composition of Ceres in a low altitude orbit, about 240 miles (385 kilometers) above the surface of the dwarf planet.

"GRaND is in excellent health and operations have gone smoothly during the Ceres encounter, enabling us to acquire a high quality data set," said PSI Senior Scientist Thomas Prettyman, Dawn mission co-investigator and lead for GRaND.

Neutrons and gamma rays produced by cosmic ray interactions with surface materials provide a fingerprint of Ceres' chemical makeup. The data will be analyzed to determine the concentration of chemical elements within the topmost 3 feet (1 meter) of Ceres' surface.

Data relevant to the possibility of subsurface ice are emerging from GRaND, which began acquisition of its primary data set in December. In Dawn's lowest-altitude orbit, the instrument has detected fewer neutrons near the poles of Ceres than at the equator, which indicates increased hydrogen concentration at high latitudes. As hydrogen is a principal constituent of water, water ice could be present close to the surface in

polar regions.

"Our analyses will test a longstanding prediction that water ice can survive just beneath Ceres' cold, high latitude surface for billions of years," Prettyman said.

High-energy cosmic rays produce neutrons and gamma rays when they interact with materials in the outermost layer of the cerean surface. In addition, gamma rays are made by the decay of radioelements, such as potassium and thorium, found in rocks and soil. A portion of the radiation escapes into space. In low altitude orbit, GRaND can detect radiation originating from Ceres. The spectrum of gamma rays and neutrons measured by GRaND provides information about surface elemental composition. The chemical data contain clues about Ceres' origins and evolution.

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