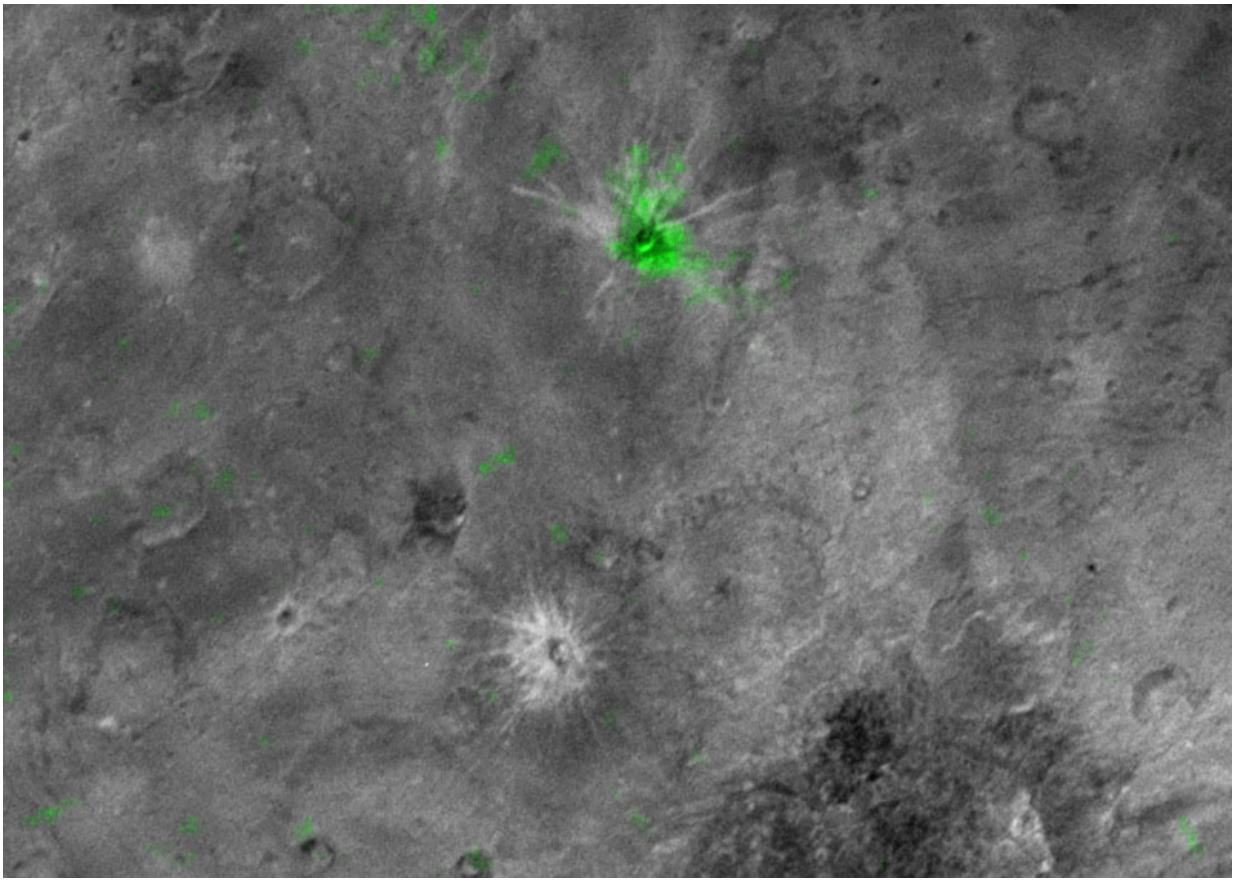
Image: The youngest crater on Charon?

October 30 2015, by Tricia Talbert



Charon's Young Ammonia Crater. The informally named Organa crater (shown in green) is rich in frozen ammonia and – so far – appears to be unique on Pluto's largest moon. Credit: NASA/JHUAPL/SwRI

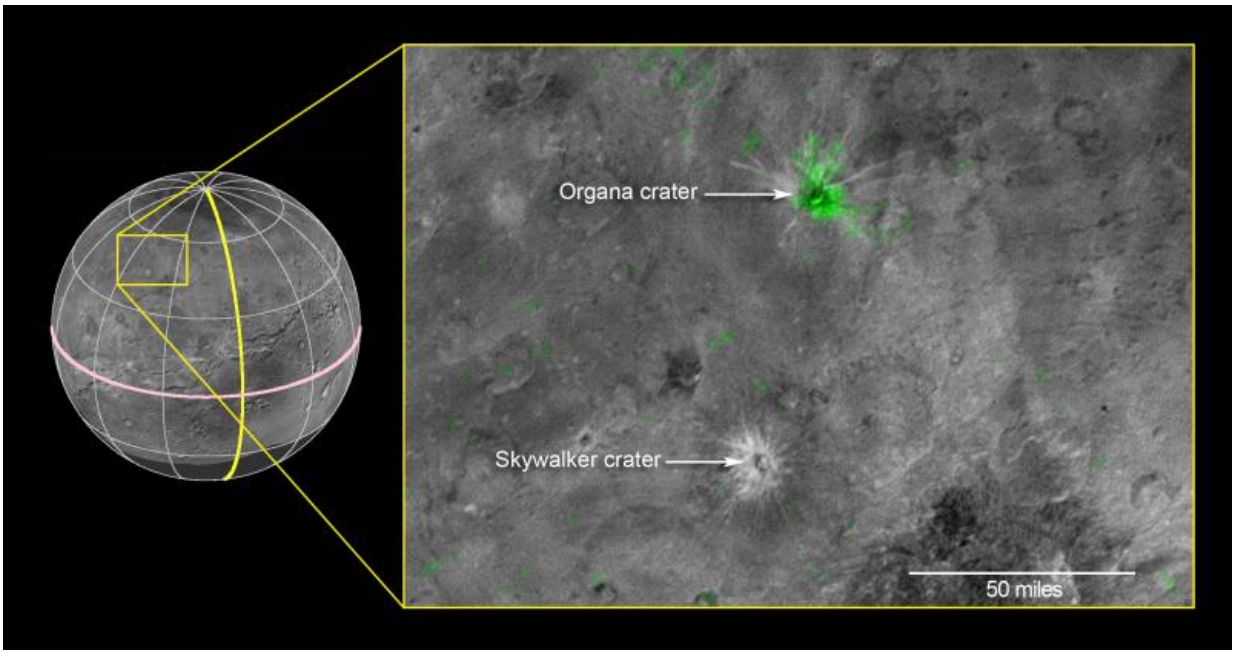
New Horizons scientists have discovered a striking contrast between one of the fresh craters on Pluto's largest moon Charon and a neighboring

crater dotting the moon's Pluto-facing hemisphere.

The crater, informally named Organa, caught scientists' attention as they were studying the highest-resolution infrared compositional scan of Charon. Organa and portions of the surrounding material ejected from it show infrared absorption at wavelengths of about 2.2 microns, indicating that the crater is rich in frozen ammonia – and, from what scientists have seen so far, unique on Pluto's largest moon. The infrared spectrum of nearby Skywalker crater, for example, is similar to the rest of Charon's craters and surface, with features dominated by ordinary water ice.

Using telescopes, scientists first observed ammonia absorption on Charon in 2000, but the concentrations of ammonia around this crater are unprecedented.

"Why are these two similar-looking and similar-sized craters, so near to each other, so compositionally distinct?" asked Will Grundy, New Horizons Composition team lead from Lowell Observatory in Flagstaff, Arizona. "We have various ideas when it comes to the ammonia in Organa. The crater could be younger, or perhaps the impact that created it hit a pocket of ammonia-rich subsurface ice. Alternatively, maybe Organa's impactor delivered its own ammonia."



This composite image is based on observations from the New Horizons Ralph/LEISA instrument made at 10:25 UT (6:25 a.m. EDT) on July 14, 2015, when New Horizons was 50,000 miles (81,000 kilometers) from Charon. The spatial resolution is 3 miles (5 kilometers) per pixel. The LEISA data were downlinked Oct. 1-4, 2015, and processed into a map of Charon's 2.2 micron ammonia-ice absorption band. Long Range Reconnaissance Imager (LORRI) panchromatic images used as the background in this composite were taken about 8:33 UT (4:33 a.m. EDT) July 14 at a resolution of 0.6 miles (0.9 kilometers) per pixel and downlinked Oct. 5-6. The ammonia absorption map from LEISA is shown in green on the LORRI image. The region covered by the yellow box is 174 miles across (280 kilometers). Credit: NASA/JHUAPL/SwRI

Both craters are about the same size – roughly 5 kilometers [3 miles] in diameter – with similar appearances, including bright wisps or rays of ejected material, or ejecta. One apparent difference is that Organa has a central region of darker ejecta, though from the map created with data from New Horizons' Ralph/LEISA instrument, it appears that the ammonia-rich material extends beyond this dark area.

"This is a fantastic discovery," said Bill McKinnon, deputy lead for the New Horizons Geology, Geophysics and Imaging team from Washington University in St. Louis. "Concentrated ammonia is a powerful antifreeze on icy worlds, and if the ammonia really is from Charon's interior, it could help explain the formation of Charon's surface by cryovolcanism, via the eruption of cold, ammonia-water magmas."

Provided by NASA