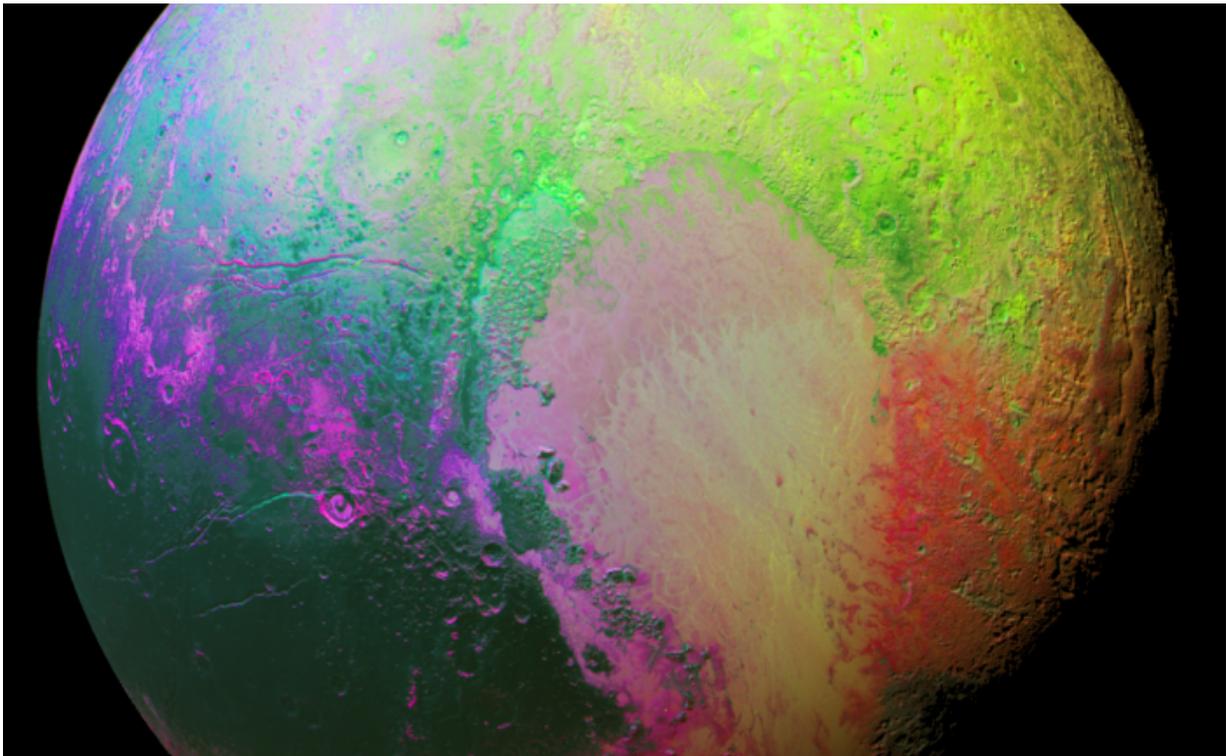


Ancient Pluto may have had lakes and rivers of nitrogen

March 23 2016, by Evan Gough



The New Horizons team used "principal component analysis" to get this false-color image that highlights the different regions of Pluto. Credit: NASA/New Horizons/JHAPL

The New Horizons probe revealed the surface features of Pluto in rich detail when it reached the dwarf planet in July 2015. Some of the features look like snapshots of rivers and lakes that are locked firmly in

place by Pluto's frigid temperatures. But now scientists studying the data coming back from New Horizons think that those frozen lakes and rivers could once have been liquid nitrogen.

Pluto has turned out to be a surprisingly active place. New Horizons has shown us what might be clouds in Pluto's atmosphere, mountains that might be ice volcanoes, and cliffs made of methane ice that melt away into the plains. If there were oceans and rivers of [liquid nitrogen](#) on the surface of Pluto, that would fit in with our evolving understanding of Pluto as a much more active planet than we thought.

Richard Binzel, a New Horizons team member from MIT, thinks that lakes of liquid nitrogen could have existed some 800 or 900 million years ago. It all stems from Pluto's axial tilt, which at 120 degrees is much more pronounced than Earth's relatively mild 23 degree tilt. And computer modelling suggests that this tilt could have even been more extreme many millions of years ago.

The result of this extreme tilt is that much more of Pluto's surface would have been exposed to sunlight. That may have warmed Pluto enough to allow liquid nitrogen to flow over the planet's surface. These kinds of changes to a planet's [axial tilt](#), (and precession and eccentricity) affect a planet's climate in what are called Milankovitch cycles. The same cycles are thought to have a similar effect on Earth's climate, though not as extreme as on Pluto.

According to Binzel, Pluto could be somewhere in between its temperature extremes, meaning that if Pluto will ever be warm enough for liquid nitrogen again, it could be hundreds of millions of years from now. "Right now, Pluto is between two extreme climate states," Binzel says.

Alan Stern is a planetary scientist at the Southwest Research Institute,

and New Horizons' Principal Investigator. He thinks that these long-cycle climate changes could have a very pronounced effect on Pluto, which has a nitrogen-rich atmosphere. In ancient times, Pluto's atmosphere could have been more dense than Mars'. "This opens up the possibility that liquid nitrogen may have once or even many times flowed on Pluto's surface," he said.

More data from New Horizons is still on its way. About half is yet to arrive. That data, and further analysis, might discredit the fledgling idea that Pluto had and will have again lakes of liquid nitrogen. "We are just beginning to understand the long-term climate of Pluto," said Binzel.

This week is the 47th Lunar and Planetary Science Conference (LPSC) in Houston. Members of the New Horizons team will be presenting almost 40 reports on Pluto and its system of moons at this conference. Stern's lecture, titled "The Exploration of Pluto," will be archived online at livestream.com/viewnow/LPSC2016.

Source: [Universe Today](#)

Citation: Ancient Pluto may have had lakes and rivers of nitrogen (2016, March 23) retrieved 24 April 2024 from <https://phys.org/news/2016-03-ancient-pluto-lakes-rivers-nitrogen.html>

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