

Thaxted Astronomical Society

News

Features

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Pluto's Vast Ocean

<https://www.dailymail.co.uk/sciencetech/article-8446845/Pluto-vast-ocean-beneath-frozen-crust-harbour-alien-life-study-shows.html>

Pluto has a vast ocean beneath its frozen crust that has been there for 4.5 billion years and could be harbouring alien life, study shows

Daily Mail 22nd June 2020 >

- **Scientists said Pluto may have once been heated by asteroids hitting its surface**
- **This would have allowed a liquid ocean to form, which could have harboured life**
- **Ridges on the dwarf planet's surface provided evidence for a liquid ocean**
- **These suggest expansion activity - which happens when water freezes**

Pluto harbours a vast ocean beneath its frozen crust that has been there for 4.5 billion years - 500 million years longer than Earth's seas - a study has found.

Pluto is known today as a ball of frozen ice and rock orbiting the sun at a distance of 3.7 billion miles.

But a new study suggests that it may have been hot when it first formed, allowing liquid water to form on its surface and potentially providing the conditions needed to support alien life.

This differs from the traditional view that it originated as a ball of frozen ice and rock, which gradually melted enough to form a subsurface ocean due to heat released by the decay of radioactive elements in the rock.

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Scientists compared thermal model simulations of the evolution of its interior to pictures of its surface taken by NASA's New Horizons spacecraft.

They identified ridges and troughs more than a mile deep on the dwarf planet, suggesting stresses from movements inside its shell caused by water expanding when it freezes.

The study suggests other planets and dwarf planets in the Kuiper Belt - like Haumea and Makemake - may have also once been warm and capable of harbouring alien life

The study, published in Nature Geoscience, suggests that much of Pluto's early heat came from asteroids and other space rocks smashing into the dwarf planet and melding with its core.

This 'warm phase' only lasted around 30,000 years - as a long gap between asteroid impacts would have meant it never got hot enough to create water.

Heat was also generated by the decay of radioactive elements in rocks.

If Pluto formed in just 30,000 years, as the study suggests, any liquid ocean would also have developed very early on while the planet was still hot.

This could have been as early as 4.5 billion years ago, researchers claim.

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In comparison, Earth's oceans formed 3.8 billion years ago - when the planet was already 700 million years old.

Astronomer Carver Bierson, from California University in Santa Cruz said: 'Even in this cold environment so far from the Sun, all these worlds might have formed fast and hot - with liquid oceans

'If it started cold and the ice melted internally, Pluto would have contracted and we should see compression features on its surface.

'If it started hot it should have expanded as the ocean froze and we should see extension features on the surface.

'We see lots of evidence of expansion, but we don't see any evidence of compression, so the observations are more consistent with Pluto starting with a liquid ocean.'

The scientists claim the 'hot start' scenario makes it more likely that life may have existed on Pluto, as it would have given the water more time to react with the rocks below.

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'We are pretty sure water is one of the ingredients of life,' Mr Bierson said.

'Having that water around longer will allow it to react with the rocky core beneath - providing more chemicals to work with.'

As Pluto's neighbours Eris, Makemake and Haumea likely had a similar formation history, the study also suggests they could harbour oceans.

'They may have also formed with oceans buried under ice sheets,' Mr Bierson said.

'We don't know if those oceans would still be around today or if they totally re-froze.

'But, by going to those icy worlds we could get a more complete understanding about how they evolved - and their unique stories.'

Scientists have long argued that Earth is the only habitable planet in the solar system, as it orbits in a region dubbed the 'Goldilocks zone' where it is neither too hot nor too cold.

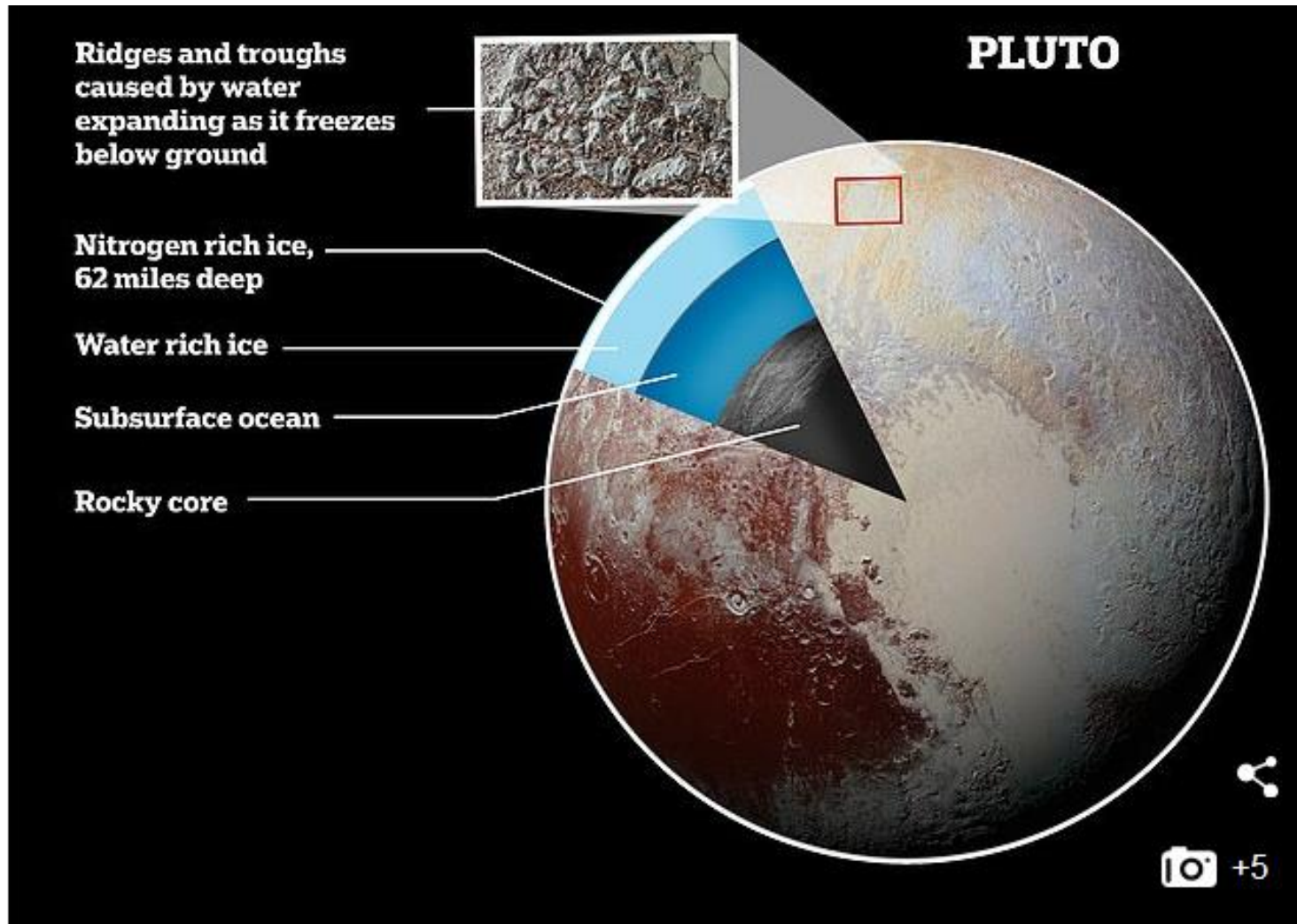
It was first suggested Pluto had an underground ocean in 2016, after a Texas-sized area on its surface called Sputnik Planitia was studied by NASA.

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Pluto's subsurface ocean is located below hundreds of miles of ice and rock



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The scientists identified the ridges and troughs, shown by arrows, by studying images of Pluto sent to Earth by NASA's New Horizons spacecraft



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Why is Pluto not a planet, but a dwarf planet?

In 2006, the International Astronomical Union, a global group of astronomy experts, established a definition of a planet that required it to 'clear' its orbit, or in other words, be the largest gravitational force in its orbit.

Since Neptune's gravity influences its neighbouring planet Pluto, and Pluto shares its orbit with frozen gases and objects in the Kuiper belt, that meant Pluto was out of planet status.

Pluto was relegated from its definition as a planet to a dwarf planet, which, despite its name, is not a 'planet' as defined by the IAU.

The main difference between 'dwarf planet' and 'planet' is that the latter does not dominate its region of space.

Before 2006, there was never a formal definition for what constituted a planet.

Scientists argue that this means Pluto's demotion is unjust and unreasonable.

'Just so you know, in my view, Pluto is a planet,' said NASA administrator Jim Bridenstine.