



SCIENCE & TECHNOLOGY

Pluto May Have Started Out Very Hot

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Pluto is a cold little world far from us in the outer reaches of our **solar** system. But researchers believe Pluto may have been born as a much warmer place. They say it may even have sheltered a subsurface or underground ocean – one that still exists today.

A report on Pluto appeared earlier this month in the scientific **journal** *Nature Geosciences*. The lead **author** was Carver Bierson, a planetary scientist at the University of California Santa Cruz.

In the report, researchers pointed to evidence for a “hot start” situation at Pluto’s beginning, some 4.5 billion years ago. Their study was based on images of the **dwarf** planet’s surface as well as computer models of the subsurface.

“When Pluto was forming, new material would have been coming in and **impacting** its surface,” Bierson said. “Each impact is like an explosion that would warm the nearby area.”

Bierson explained that if Pluto had formed slowly, the surface would have cooled between each impact and generally stayed very cold. But if Pluto had formed quickly, the surface may not have had time to cool down.

“If Pluto formed in less than 30,000 years,” he said, “the heat from these impacts could have been **sufficient** to lead to an early ocean.”

Pluto may have an icy outer shell hundreds of kilometers thick atop an ocean of water, possibly mixed with salts and ammonia. A solid rocky **core** could lie below, Bierson said.

The researchers believe that parts of the ocean would gradually freeze over time. Water expands as it freezes, and cracks on Pluto's surface may be evidence of this. At present, Pluto's surface temperature is about minus 230 degrees Celsius.

A subsurface ocean could make Pluto a possible, although unlikely, candidate for having living organisms.

Bierson said it was possible that contact between water and the rocky core could have created certain chemical **ingredients**.

"Are those the right ingredients for life?" Bierson asked. "We don't know. We need to learn more about how life forms, or how life could form, to find these answers."

I'm John Russell.

Will Dunham reported on this story for the Reuters news agency. John Russell adapted his report for VOA Learning English. George Grow was the editor.

Words in This Story

solar – *adj.* related to the sun

journal – *n.* a magazine that reports on things of special interest to a group of people

author – *n.* writer

dwarf – *adj.* related to or involving something that is much smaller than the usual size

impact – *v.* formal to hit (something) with great force

sufficient – *adj.* somewhat formal having or providing as much as is needed

core – *n.* the central or most important part of something

ingredient – *n.* a part or piece of something

