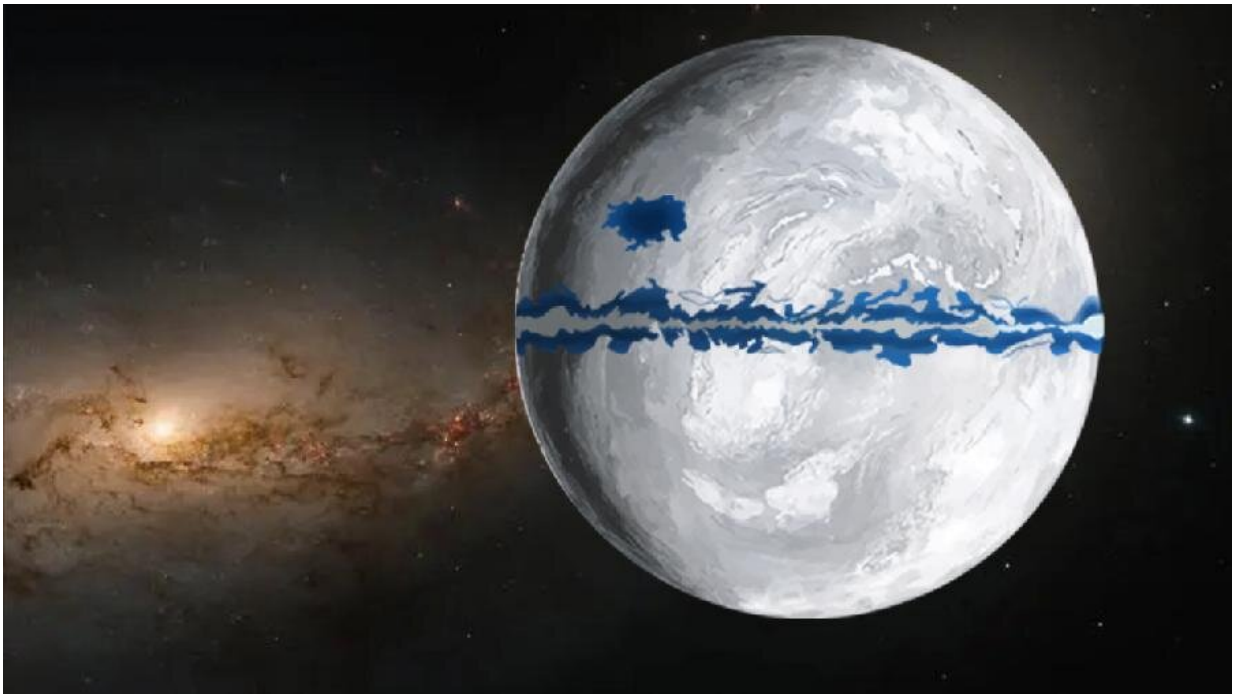


'Snowball Earth' might have been rather slushy: Study

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New Snowball Earth model with open waters existed in both low- and mid-latitude oceans. Credit: Dr Huyue Song

Millions of years ago, the Earth was so cold that most of its surface was covered in ice. But that hard freeze might have been slushier than once thought.

The longstanding "Snowball Earth" theory imagines our world as seen

from space, a perfect sphere with ice covering land and sea alike.

It draws on clues including deposits made by glaciers near the Equator. For ice to have extended that far from the poles suggests much of our planet was once frozen.

But there has long been speculation about just how complete the cover was, with some convinced that areas of slush or [open ocean](#) remained, allowing oxygen to penetrate and creating incubators for life.

New research published Tuesday in the journal *Nature Communications* adds weight to that theory, and suggests these oases in the tundra might have existed much further north than previously suspected.

The evidence comes from a thin layer of black shale that would have been under the sea during the Marinoan ice age, which began around 650 million years ago.

The shale in the Nantuo Formation in southern China acts as a sort of archive for the conditions in oceans at the time.

By analyzing levels of elements such as iron, and the presence of nitrogen, scientists can infer whether oxygen was penetrating the ocean and nitrogen was being produced by lifeforms.

"We found evidence of ice-free conditions at mid-northern paleolatitudes (locations before [continental drift](#))," Huyue Song, who helped lead the research, told AFP.

"Until now, ice-free areas had been identified only in peri-equatorial regions."

Instead of a "narrow ice-free belt" across the middle of the Earth,

"patchy ice-free areas may have existed much more widely," added Song, a professor at the China University of Geosciences, Wuhan.

The findings build on other research at sites ranging from Australia to Brazil that suggest life was able to cling on in pockets while most of Earth was in deep freeze.

These incubators may even have helped spur "a rapid rebound of the biosphere" at the end of the ice age, the research published Tuesday argues.

The work took four years in total, and involved collecting samples at a remote site in the Shennongjia region of Hubei province, some 500 kilometers from Song's base in Wuhan.

Song believes the findings will help scientists better understand both how our planet's climate works, and how life evolved and survived on Earth through the ages.

And while Earth's ice ages might seem like [ancient history](#), Song argues they could have useful lessons for a planet now experiencing new severe climate change.

"It provides insight into how life survived extreme climate events—a topic that will become of increasing relevance as modern climate change intensifies," he said.

More information: Huyue Song, Mid-latitudinal habitable environment for marine eukaryotes during the waning stage of the Marinoan snowball glaciation, *Nature Communications* (2023). [DOI: 10.1038/s41467-023-37172-x](https://doi.org/10.1038/s41467-023-37172-x).
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