Did the snowball Earth give complex life a boost?

Life is complex

But when new minerals made their way to the water, what did they actually do? Cycle throughout the bottom of the ocean, delivering new elements to previously barren locations and providing energy for microbial life. At the end of the Cryogenic, these early lifeforms appear to have gotten gradually more complex, paving the way for the first known multicellular life in the ensuing Ediacaran.

“Any time there’s a really radical environmental shift, we know that’s an interesting time for evolution,” says Chris Kempes, a theoretical biophysicist at the Sante Fe Institute who was not involved in the research. For example, when temperatures drop or less sunlight is available, organisms’ speed and metabolic rates generally slow down, creating new pressures on life, Kempes’ research has found. Halverson thinks the extreme habitats that life had to endure during the snowballs played more of a role in shaping evolution than the nutrient flushes from glaciers.

Even so, studies like Kirkland’s that try to understand how nutrients and energy availability changed throughout history are “the key to understanding when and why there are major evolutionary transitions,” Kempes says.

To determine what other minerals may have been key players in the ancient oceans, Kirkland hopes to look at rocks called apatites, which contain oxygen and other elements like

strontium and phosphorus. However, these break down much easier than zircon-rich rocks, meaning they are less stable through long stretches of time.

Though the global changes of the Cryogenic happened eons ago, Kirkland sees parallels with the wide-scale climate changes of today. “The atmosphere, the land, and the oceans are all interconnected,” he says. “Understanding these [ancient] cycles gives us information about how more modern cycles on the planet may work.”

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https://arstechnica.com/science/2025/02/bulldozing-glaciers-may-have-spurred-evolution-in-the-ocean/