Tiny microbes give glaciers a dark twist

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Problem

Microbes thriving on ice play a major role in how quickly glaciers melt. These microbes are called “glacial ice algae”. They bloom on the ice surface and turn it dark. As a result the ice absorbs more sunlight and speed up melting. Due to global warming, longer summer melt season could lead to rapidly decreasing ice and cause sea-level rise. This phenomenon also leads to massive effect on the ocean ecosystem. However, what controls the growth of these algal blooms and also how they survive in these extreme conditions are poorly understood. Identifying microbial compounds is crucial for answering what drives bloom patterns and how the future of our glaciers and oceans will look like.

Recommendation

- Funding of research into glacier derived metabolites to understand and manage their role in accelerating ice melt.
- Tracking and quantifying the export of natural compounds from glaciers into downstream ecosystems.

Summary point

Glacier microbes hold the key to combating ice loss. Glacial microbial communities actively influence melting through blooms of pigmented algae darkening the ice surface. Identifying microbial derived natural products controlling bloom development offers a unique opportunity for science-based strategies to preserve glacial environments.

To survive extreme conditions like intense sunlight and freeze-thaw cycles, glacier microbes produce unique chemical compounds called metabolites. Some of these, like dark pigments from ice algae, reduce the ice’s reflectivity, causing more heat to be absorbed and speeding up melt. These changes are not isolated to the glacier surface. As glaciers melt, microbial cells and their metabolites flow downstream reaching rivers and oceans far beyond the ice. While the long-term impacts are still unknown, there is growing concern that this input could disrupt downstream food webs and water quality. Studying glacier microbe interactions, especially bloom formation and metabolite production, is essential to forecast the consequences of continued ice loss. Glacial microorganisms are indicators of change and may also hold clues for developing novel, nature-based solutions to mitigate key aspects of glacier melting.

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