

CLIMATE: MELTING GLACIERS ADDING DISSOLVED CARBON TO WORLD'S OCEANS



As if rising sea levels aren't enough to worry about, U.S. Geological Survey scientists say melting glaciers may also adding significant amounts of carbon to the oceans, where it's readily available to microscopic organisms at the base of the food chain.

By 2050, that carbon could total as much as 17 million tons, equal to about half of the annual flux of dissolved organic carbon from the Amazon River, the researchers reported in the journal *Nature Geoscience*, cautioning that their calculations are subject to revision.

The study aimed to better understand the role glaciers play in the global carbon cycle, especially as climate warming continues to reduce glacier ice stores and release ice-locked organic carbon into downstream freshwater and marine ecosystems.

"This research makes it clear that glaciers represent a substantial reservoir of organic carbon," said Eran Hood, the lead author on the paper and a scientist with the University of Alaska Southeast (Juneau). "As a result, the loss of glacier mass worldwide, along with the corresponding release of carbon, will affect high-latitude marine ecosystems, particularly those surrounding the major ice sheets that now receive fairly limited land-to-ocean fluxes of organic carbon."

Polar ice sheets and mountain glaciers cover roughly 11 percent of the Earth's land surface and contain about 70 percent of Earth's fresh water. They also store and release organic carbon to downstream environments as they melt. Because this glacier-derived organic carbon is readily metabolized by microorganisms, it can affect productivity in aquatic ecosystems.

"This research demonstrates that the impacts of glacier change reach beyond sea level rise," said U.S. Geological Survey research glaciologist and co-author of the research Shad O'Neel. "Changes in organic carbon release from glaciers have implications for aquatic ecosystems because this material is readily consumed by microbes at the bottom of the food chain."

Due to climate change, glacier mass losses are expected to accelerate, leading to a cumulative loss of nearly 17 million tons of glacial dissolved organic carbon by 2050 — equivalent to about half of the annual flux of dissolved organic carbon from the Amazon River.

These estimates are the first of their kind, and thus have high uncertainty, the scientists wrote, noting that refining estimates of organic carbon loss from glaciers is critical for improving the understanding of the impacts of glacier change. The U.S. Department of the Interior Alaska Climate Science Center and USGS Alaska Science Center plan to continue this work in 2015 and beyond with new efforts aimed at studying the biophysical implications of glacier change

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