

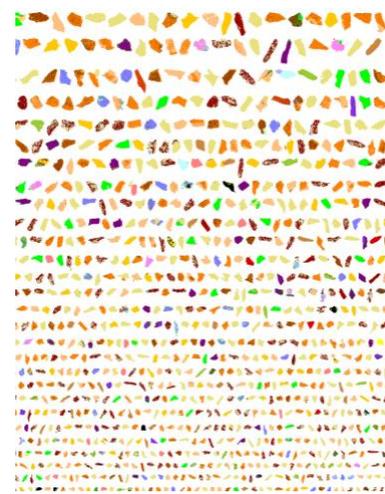
THE PRODUCTION OF SEDIMENT BY GLACIER EROSION



SFU GLACIOLOGY



The microstructure of grains (right) from a muddy glacial river (left) reveals how glaciers grind rock into some of the finest sediments found on Earth



HOW ARE SILT AND CLAY PRODUCED UNDER GLACIERS?

Silt is everywhere at the Earth's surface, primarily produced by glaciers as they crush and grind rock when moving across their beds. This fine-grained material is crucial for controlling rates of CO₂ consumption by chemical weathering, providing nutrient supply to downstream ecosystems, and leaves us with the beautiful gift of turquoise and emerald coloured lakes, like Lhù'ààn Mân. But there's a richness to glacier flour that we take for granted. What is glacier flour made of? How small is it? And how is it produced?

To answer these questions, Simon Fraser University (SFU) glaciologists Jeff Crompton and Gwenn Flowers partnered up with SFU's Brendan Dyck, who is an expert in the microstructure of minerals. They collected rock and river-borne sediment from 20 Glaciers in the St. Elias Mountains.

To understand how the rock is transformed to flour, they electrically fragmented the rock samples and compared them to the river sediment using a scanning electron microscope. They then developed software to automatically analyze over half a million grains.

Counter to expectation, they found that glaciers can produce exceedingly small sediment (less than 1 micrometer) by crushing and scraping minerals along pre-existing and developing networks of microfractures. Like the more familiar rounding of stream cobbles, these smallest of sediments were also shown to undergo rounding.

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