Compositional and geochemical variations across the terrestrial-marine continuum of the large Baker-Martínez fjord system in Chilean Patagonia: Water column processes and sedimentary archive

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Southern Chile (~41°S–55°S) is a unique region for reconstructing natural climate variability at exceptionally high time-resolution throughout the present Holocene and back into the last glacial. The fjord zone in Chilean Patagonia (41-55°S) is a large estuary where high freshwater and detrital inputs from Patagonian rivers and calving glaciers result in a water column that is typically highly stratified with abundant suspended solids. Here we evaluated the spatial distribution of sedimentological and organic geochemical proxies and diatoms on surface sediments in the Baker-Martinez fjord system in the Patagonian Ice Field area to test their application for paleoclimate and paleoenvironmental reconstructions.

Results show that signals of water column processes recorded in sediments are predominantly driven by the input of lithogenic particles and terrestrial organic carbon by river and calving glaciers. The fraction of terrestrial organic carbon calculated from bulk $\delta^{13}C$ and the freshwater diatom assemblage are by far the most promising proxies to reconstruct changes in terrestrial input through time using fjord sediment cores compared to other proxies. This study sets a baseline for future sediment-based research in the Baker-Martinez fjord system and, since it covers the entire continuum of terrestrial to marine conditions it is applicable to Patagonian fjords in general. Overall, it supports the use of fjord sediment archives for paleoclimate and paleoenvironmental reconstructions.

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