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Organic carbon in glacial fjords of Chilean Patagonia

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The Southern Ice Field in Chilean Patagonia is the largest (13,000 km^2) temperate ice mass in the Southern hemisphere, yearly transporting ca. 40 km^3 of freshwater to fjords. This volume of fresh and cold water likely affects adjacent marine ecosystems by changing circulation, productivity, food web dynamics, and the abundance and distribution of planktonic and benthic organisms. We hypothesize that freshwater-driven availability of inorganic nutrient and transport of organic and inorganic suspended matter, as well as microbes, become a controlling factor for productivity in the fjord associated with the Baker river and Jorge Montt glacier. Both appear to be sources of silicic acid, but not of nitrate and particulate organic carbon, especially during summer, when surface PAR and glacier thawing are maximal. In contrast to Baker River, the Jorge Montt glacier is also a source of dissolved organic carbon towards a proglacial fjord and the Baker Channel, indicating that a thorough chemical description of sources (tidewater glacier and glacial river) is needed. Nitrate in fiord waters reaches ca. 15 μM at 25 m depth with no evidence of mixing up during summer. Stable isotope composition of particulate organic nitrogen reaches values as low as 3 per mil in low-salinity waters near both glacier and river. Nitrogen fixation could be depleting δ^{15}N in organic matter, as suggested by the detection at surface waters of *nif*H genes belonging to diazotrophs near the Montt glacier. As diazotrophs have also been detected in other cold marine waters (e.g. Baltic Sea, Arctic Ocean) as well as glaciers and polar terrestrial waters, there is certainly a potential for both marine and freshwater microbes to contribute and have a significant impact on the Patagonian N and C budgets. Assessing the impact of freshwater on C and N fluxes and the microbial community structure in Patagonian waters will allow understanding future scenarios of rapid glacier melting.

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