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Spatial Analysis of the Benthic Flux of Silicon Across Fjords Along the West Antarctic Peninsula

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The release of silicon (Si) across the sediment – water interface during early diagenesis serves as an important source of Si into the marine ecosystems, supporting primary production and driving the marine carbon cycle. In particular, the shelf regions of the West Antarctic Peninsula (WAP) are key areas for the marine Si cycle as the dominant phytoplankton group is diatoms. High diatom productivity during the austral summer leads to

extensive siliceous sediment deposits that resupplies the water column with Si modifying the deep waters that upwell onto the shelf. The extent to which Si and other essential nutrients reach the ocean is regulated by the benthic cycling within fjord systems along the WAP. To understand the fate of Si and the potential impacts on nutrient cycling within fjords with ongoing glacial retreat, we have analysed three fjord systems along the WAP. We present geochemical data from Marian Cove, Borgen Bay and Sheldon Cove. Sediment porewater was sampled in each fjord at sites proximal and distal to the glacier and analysed for their silicon isotopic composition (^{30}Si) and dissolved silicon concentration. The ^{30}Si signatures show a distinct difference within each fjord, with heavier ^{30}Si compositions proximal to the glacier. This is likely due to extensive reverse weathering and precipitation of iron oxyhydroxides being fed by a higher sediment load compared to the distal locations, where the lighter ^{30}Si signal is governed by the dissolution of biogenic and/or abiogenic amorphous Si. Our findings demonstrate the presence of active benthic recycling of Si in these environments and gives insight into how glacial retreat could impact the supply of Si in fjords.