Goldschmidt 2021 Abstract
https://doi.org/10.7185/gold2021.4869

# The Role of Glaciogenic Sediments in the Supply of Nutrient Silicon to High-latitude Fjords and Ocean

**HONG CHIN NG**[1], JON HAWKINGS[2] AND KATHARINE R. HENDRY[1]

[1]School of Earth Sciences, University of Bristol

[2]Florida State University

Presenting Author: hn9381@bristol.ac.uk

Marine sediments are a fundamental component of the global silicon (Si) cycle. Reactive silica phases deposited in the sediments are subject to early diagenesis and undergo dissolution, or get incorporated into less soluble minerals prior to burial. Elevated levels of dissolved Si typically found in sediment pore water maintain a return flux of the nutrient to the overlying water column, which can contribute to sustaining the growth of siliceous organisms such as diatoms and sponges. Early diagenesis and benthic flux of Si in the high latitudes are understudied, which impedes our ability to evaluate changing nutrient cycling and marine ecosystem response in the polar region. Here, we present studies on benthic Si cycling and flux from glaciated Patagonian fjords and the Greenland coastal margin, which include stable isotope analysis, to help elucidate the diagenetic processes involved in these rapidly changing regions, and their impact on nutrient cycling in the overlying water column.

Pore water stable isotope data suggest a tight coupling of benthic Si and Fe cycles in the Patagonian fjords, which involves adsorption of Si onto Fe oxyhydroxide minerals, the latter a product of intense Fe cycling in sediments. The tight coupling of Si and Fe contributes to enhanced burial of Si in the fjord sediments, suppressing the return (benthic) flux of Si to the overlying water column. In contrast, coupled benthic Si and Fe cycling is not apparent at the coastal Greenland sites. Instead, pore water and core incubation data show elevated levels of benthic Si fluxes at the coastal Greenland sites. Stable isotope analysis indicates that such elevated benthic fluxes are sustained by rapid dissolution of certain reactive Si phases, which mainly include the biogenic silica remains of diatoms and lightly silicified sponges. Our studies reveal a significant variation in the magnitude of benthic Si flux across different marine settings in the polar regions, which has important implications for our understanding of the changing high-latitude nutrient cycle.