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"Cold storage" – Silicate Sequestration and Alteration in Artic Continental Sediments – Preliminary results from ^{32}Si incubations and porewater geochemistry.

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Silicate mineral alteration and early diagenetic processes play an important role in global biogeochemical cycles and regulating oceanic pH across Earth's history. These alteration processes produce authigenic clays in marine sediments, i.e. reverse weathering (RW) reactions, and are a major sink for various oceanic elemental cycles. The role of melting polar glaciers, which facilitates the export of dissolved silicate and other cations (e.g. K, Mg, Mn, Al, Fe), has become a topic of interest for potentially stimulating the formation of secondary authigenic precipitates. As in low latitudes, the current understanding of high latitude early diagenetic products lacks clarity regarding the driving mechanisms behind silicon (Si) sorption and authigenic formation, and there is little data constraining the rate in which Si is precipitated and/or released. This lack of understanding means that traditional approaches to studying the global Si cycle (e.g. stable isotope studies) are unconstrained. Fresh sediments were collected aboard the *RV Kronprins Haakon* from the Svalbard Fjords of Tempelfjorden and Hornsund Fjord in the early spring of 2023 as part of the Artic SGD project; using this material we preformed shipboard incubations with the radioisotope tracer ^{32}Si to quantify the rates of early diagenetic processes. Thus, we combine conventional geochemical techniques with novel stable and radioisotope methodologies to interpret marine silicate diagenetic processes. Results reveal a fast (< 120 hours) and dynamic two-way exchange between sediments and their porewaters, with the precipitation of Si presumed to be greater than the adsorption of Si. Major cation concertation analyses indicate an overall increase in porewaters (via dissolution) with time, with different dissolution patterns controlled by sample locality and sediment type. Downcore increasing δ^{56}Fe porewater values correspond to elevated dissolved silica concentrations, signalling Fe adsorption via newly formed clayey phases. Here we discuss future directions in this multi-faceted examination of silicate alteration within early diagenesis.