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Neoglacial Ice Advance and Sediment Provenance Changes in Southwest Greenland and its Marginal Seas Traced by Radiogenic Isotopes

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Marine sediments from the West Greenland margin represent high-resolution archives of Holocene climate history, past ice sheet dynamics, changes in meltwater discharge and coastal current intensities. We investigate potential changes of sediment provenances using strontium (Sr) and neodymium (Nd) radiogenic isotopes as tracers for the origin and pathways of the silicate detrital fraction in marine sediments. Meltwater discharge and coastal currents are the most important transport pathways for detrital sediments into (northeast) Labrador Sea, which is an important pathway for freshwater from the Arctic Ocean and meltwater from the Greenland Ice Sheet to enter the North Atlantic, where deep water formation takes place. Variations in freshwater supply into Labrador Sea may influence deep water formation and therefore further circulation and climate patterns on a global scale.

The marine sediment record collected in Nuuk Trough, southwest Greenland, displays uniform isotopic compositions throughout most of the Holocene, indicating well mixed detrital material from local sources through meltwater discharge and distal sources transported via the West Greenland Current. From around 4 ka BP to present the composition of Nd isotopes reveals a steep (εNd: -29 to -35) and the Sr isotope composition a slight ($^{87}Sr/^{86}Sr$: 0.723 to 0.728) but pronounced shift. This time interval coincides with the transition into the Neoglacial time period [1], which is characterized by a significant drop in atmospheric temperatures [2], and the onset of the modern Labrador Sea circulation pattern (e.g. [3]). We suggest that the shift in Nd and Sr isotopes indicates a change towards less distal and more local sediment sources, possibly caused by enhanced erosion of the local bedrock during Neoglacial ice advance [4], along with a decrease in meltwater discharge [5] and coastal current strength, leading to a sediment delivery shift.

[1] Funder & Fredskild (1989) Quaternary geology of Canada and Greenland, 775–783. [2] Seidenkrantz et al. (2007) The Holocene 17, 387-401. [3] Fagel et al. (2004) Paleoceanography 19, PA3002. [4] Funder et al. (2011) Developments in Quaternary Sciences 15, 699-713, (and references therein). [5] Møller et al. (2006) The Holocene 16, 685-695.

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