



Dispersal of fluvial sediment in two sub-arctic fjords on the Labrador Coast: Nachvak Fjord and Saglek Fjord, Canada

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Recent marine records of fluvial sediment supply to two sub-arctic fjords in northern Labrador (Eastern Canada) have been studied in order to determine fluvial transfer of terrestrial material to the fjords, and to develop baseline knowledge for future studies. Multibeam and sub-bottom acoustic data and sediment cores (box and gravity) were collected in Nachvak and Saglek fjords in Northern Labrador, within Canada's Torngat Mountains National Park, as part of the most extensive study of the park's marine resources to date. In order to assess sediment discharge and the fjord's sediment dispersal system, data collection was concentrated on marine basins fed by the largest fluvial catchments associated with each fjord. Each core was sub-sampled for X-radiography, grain size, and radiochemical analysis, and was analyzed for sedimentary structures and sediment accumulation rates. Radiochemical analysis is based on the particle-bound radioisotopes ^{210}Pb and ^{137}Cs , which have been used to determine sediment accumulation rates (SAR), and ^{210}Pb inventories and flux over decadal to centennial time scales. Sediment thickness and extent in the fjord basins were studied from sub-bottom profiles and bathymetry data. Results show that in both fjords sediment is accumulating in depocenters in the center of each basin. In Nachvak Fjord, which is fed primarily by small rivers with very steep, small, presently glaciated catchments, the thickness of postglacial sediment observed in sub-bottom profiles compares well with thicknesses projected from recent sediment accumulation rates and implies that postglacial sedimentation was on average constant. In Saglek Fjord, which is fed by larger rivers with more extensive catchments that lack glaciers, postglacial sediment thickness is on average 40 % less than that projected from recent sediment accumulation rates, suggesting more rapid sediment accumulation for the past ~ 100 y than for that averaged over post-glacial time. Present mass accumulation rates for the Nachvak fjord basin are on average $1200 \text{ t km}^{-2} \text{ y}^{-1}$, and 39,000 t/y for the entire basin, and for Saglek, $1100 \text{ t km}^{-2} \text{ y}^{-1}$, and 43,000 t y^{-1} for the entire basin. Comparison between MAR values and results from a previously published statistical model estimating fluvial sediment supply from catchment properties shows that the model overestimates fluvial measured sediment flux by a factor of 5-25, with marginally closer results for Nachvak Fjord than for Saglek Fjord. This suggests that either the fjord's marine basins are less efficient sediment traps than we had hypothesized, or that the model is significantly overestimating the fluvial sediment flux.