



Redistribution and transport of melt-water supplied sediments and nutrients in Arctic fjords: The influence of flocculation in Disko Fjord, West Greenland

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In the Arctic, thawing permafrost and increased melting of glaciers are important drivers for changes in fine-grained sediment supply and biogeochemical fluxes from land to sea. Flocculation of suspended sediment is a controlling factor for the magnitude of fluxes and deposition rates in the estuarine and marine environment but comparatively little is known about the flocculation processes in the Arctic. We investigated flocculation dynamics from a melt-water river in the inner Disko Fjord, West Greenland, over the course of a week in July 2013. A novel, laser-illuminated camera system was used and showed significant improvements of the particle size measurement capabilities. Flocculation was observed in eulerian deployments during periods with lowest turbulent shear and along-fjord profiles showed flocculation especially at the limit of the dynamic and highly turbid freshwater plume. This resulted in significant volumes of large sized flocs at depth below the plume. Water samples were gathered and analyzed for particulate and dissolved C and N, and highly reactive Fe concentrations. The carbon values are small but noteworthy (e.g. DOC in the range of 1-4 mg/L) and the sediments are rich in highly reactive iron with values in the range of 5-50 g/kg, showing that significant amounts of nutrients are transported through the system. The observed flocculation dynamics highlight the potential for redistributing sediments and nutrients in the water column, and serves as an important factor in the biogeochemical fluxes from land to sea in the Arctic.