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Sediment characteristics and sediment biota interections in an Arctic fjord (Kongsfjorden, Svalbard)

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The aim of this study was to investigate sedimentation regime and its influence on biota in Kongsfjorden (Svalbard).

Sediment cores were taken along a transect from Kongsbreen glacier to the mouth of Kongsfjorden. The cores were dated with ^{210}Pb method and analysed for down core variations of grain size, moisture, organic matter content (LOI), C_{org} and N_{org}.

A ^{210}Pb derived sedimentation rate of 2 cm·year^{-1} was estimated in one core (collected 4 km from the glacier outflow). This high accumulation rate was in agreement with the ^{137}Cs profile. In the vicinity of the glacier, the ^{210}Pb method proved to be unsuitable for dating the sediments due to sediments mixing.

Grain size analyses showed differentiation of sediments through Kongsfjorden. This is attributed to different conditions of sedimentation in adjacent fjord regions. Down-core gradient in sediment grain size in the core collected near the glacier (clay content: upper part 1,0%-6,5%, deeper part 15,6%-45,0%) was found. Sediments in a core collected in shallow water were homogenous. The finest sediments were deposited in the outer part of Kongsfjorden. In spite of the fact, that icebergs usually don't reach the outer part of the fjord, there was a high percentage of ice-rafted mineral debris (sand + pebbles up to 8 %).

Within the region of the glacier front, low organic matter concentrations were found, as a result of small primary production (high turbidity) and organic matter diluting by large loads of inorganic material. This is accompanied by low benthic biomass due

to sediment dynamics and low food supply. In contrast, organic matter concentrations were as high as 9.4% in the outer part of the fjord.

This study has shown that the inner Kongsfjorden system is one of high sedimentation, and variable distribution of sediment properties. The latter result from glacial processes which influence particle suspension density and sinking rates. Suspension density in turn influences primary and secondary production. Extensive reworking of surface sediments in the outer part of the fjord, due to bioturbation and physical processes, contributes to seabed sediment properties.