



The spatial variability of organic carbon concentrations, C/N ratios and $\delta^{13}\text{C}$ in surface sediments of two high Arctic fjords (Spitsbergen)

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The Arctic Ocean, and especially its shelf, is considered to be an important region for the global carbon cycle. This is due to the high, but concentrated in a short time, primary production, specific thermohaline circulation and physicochemical conditions of sea water. It was estimated that the Arctic shelf seas are responsible for 7-11% of total carbon dioxide uptake by the oceans. Additionally, the Arctic Ocean is considered to be one of the youngest marine ecosystems in the world. This results in less trophic links in the food web and higher efficiency of organic matter burial in sediments than it is observed in the marine ecosystems of lower latitudes.

The main aim of this study was to estimate the spatial variability of organic carbon (OC) concentrations, C/N ratios and $\delta^{13}\text{C}$ in surface sediments from two high Arctic fjords: Hornsund and Adventfjorden. Hornsund is a southernmost fiord on the western coast of Spitsbergen. It is a medium size fiord with a complex coastline including numerous bays and fourteen tidewater glaciers entering directly the fiord. Adventfjorden belongs to the largest fiord system of the west Spitsbergen – Isfjorden. The innermost part of Adventfjorden is composed of a tidal flat formed at the mouth of two braided rivers (the Adventelva and the Longyearelva) fed by meltwater from glaciers. Both fjords are under influence of different water masses. The whole Isfjorden is affected by warm and saline Atlantic water from the West Spitsbergen Current (WSC). In Hornsund the influence of WSC is less pronounced at the expense of strong pressure from cold and less saline waters of coastal Sørkapp Current coming from the northeastern Barents Sea.

Surface sediments were sampled at four locations in each fiord along the fjords' axes starting from the tidal flat in Adventfjorden and the vicinity of Hornbree glacier in Hornsund. The OC concentrations in Hornsund were much lower (from 1.6% to 1.8%) than those in Adventfjorden (from 2.4% to 5.2%). In both fjords the highest OC concentrations were noticed at innermost stations and they decreased towards the mouths of the fjords. The decrease in OC concentrations along the fjords' axes was followed by the drop of C/N ratios and increase of $\delta^{13}\text{C}$. The C/N ratios ranged from 9.7 to 15.0 in Hornsund and from 15.0 to 36.5 in Adventfjorden, while $\delta^{13}\text{C}$ from -27.5‰ to -25.4‰ and from -26.3‰ to -25.8‰ respectively. High C/N ratios and low $\delta^{13}\text{C}$ values coinciding with higher OC concentrations at the innermost stations suggest that glaciers and rivers are important source of OC to surface sediments, especially in Adventfjorden which is highly influenced by terrestrial input.