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ABSTRACT

Sedimentary organic matter in two contrasting Arctic fjords: terrestrial and marine contribution based on elemental and stable isotopes composition and content

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The main aim of this study was to estimate the spatial variability of organic carbon (C_{org}) and total nitrogen (N_{tot}) concentrations, C_{org}/N_{tot} ratios, $\delta^{13}C_{org}$, $\delta^{15}N_{tot}$ and the proportions of autochthonous and allochthonous organic matter in sediments of two contrasting Arctic fjords: Hornsund and Adventfjord. The C_{org} concentrations ranged from 1.38% to 1.98% in Hornsund and from 1.73% to 3.85% in Adventfjord. In both fjords the highest C_{org} concentrations were measured at innermost stations and they decreased towards the mouths of the fjords. This suggest fresh water runoff as important source of OM to surface sediments. The samples from Hornsund were characterized by higher $\delta^{13}C_{org}$ (from -24.90‰ to -23.87‰) and $\delta^{15}N_{tot}$ (from 3.02‰ to 4.93‰) and thus contained higher proportion of marine organic matter than those from Adventfjord (from -25.94‰ to -24.69‰ and from 0.71‰ to 4.00‰, respectively). The strong positive correlation between $\delta^{13}C_{org}$ and $\delta^{15}N_{tot}$ suggests fresh, labile organic matter as a base of the trophic pyramid. The results showed that both fjords differ significantly in terms of sedimentary organic matter characteristics. The samples from Hornsund, except those from the innermost station in Brepollen, had low C_{org}/N_{tot} ratios changing in a narrow range (from 9.7 to 11.3). On the other hand significantly higher C_{org}/N_{tot} ratios, varying in a broader range (from 14.6 to 33.0), were found in Adventfjord. Using the two end-members approach proportions of terrestrial organic matter were estimated. The terrestrial OM contribution for Adventfjord was found in the range 78-87%, in Hornsund the results were in the range 66-77% except - the innermost part of Hornsund, where terrestrial organic matter contribution was 80-82%.