

Abstract

48 marine surface sediment samples from west off Spitsbergen and the Barents Sea have been analysed for TOC, CaCO₃, N_{tot}, N_{org}, δ¹³C_{org}, δ¹⁵N_{tot}, δ¹⁵N_{org}, and parameters from Rock-Eval-pyrolysis as well as for clay mineral assemblages (XRD) with focus on organic carbon origin and distribution to yield an up to date picture of recent sedimentation pattern. ROV-pictures have been used to support interpretation of the results. Three short cores of Storjorden (dated by ¹⁴C and ²¹⁰Pb) were analysed similarly to reveal environmental changes during the last ~150 years. Coarse grained surface sediments from outer shelf areas are considered to represent erosional surfaces formed by contour currents. Thus nearby palaeo IRD-signals do not necessarily reflect recent ice rafting rather than out-washing of soft Holocene sediments since the onset of the contour current most probable during neoglaciation ~2.6 Ky BP (Andruleit et al., 1996). Low carbonate contents in fjord environments and their submarine extensions to the shelf break are interpreted as a result of dissolution presumably due to brine formation in these environments. Erosional channels in the soft substrates as seen by ROV pictures are probably caused by dense brines flushing the shelf (e.g. Quadfasel et al., 1988) and may be related to extraordinary high sedimentation rates recorded by Honjo et al. (1988).

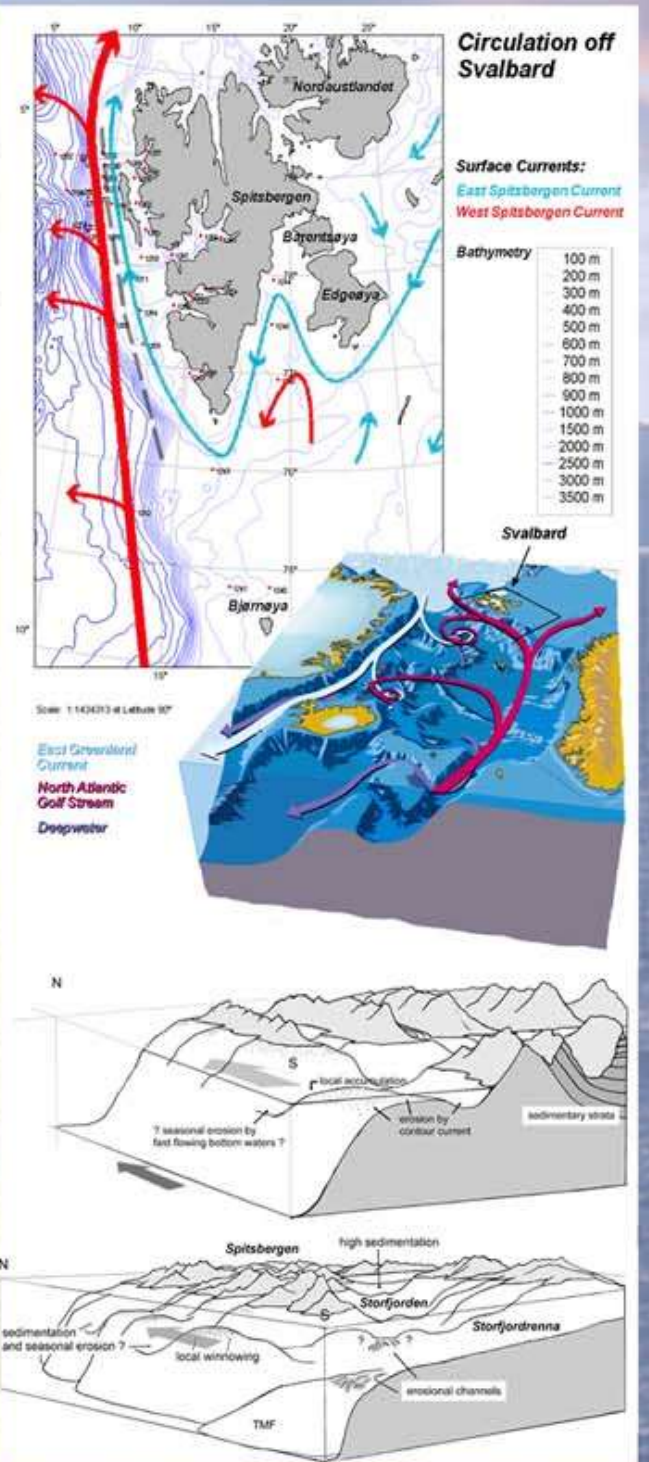
Organic matter from surface sediments exhibits highest TOC/N_{org} ratios and lowest δ¹³C_{org} values at inner fjords while strong gradients exist towards more open marine conditions. Decreasing maturity of organic matter (Rock-Eval pyrolysis) from land to sea support these results. Based on a δ¹³C_{org} binary mixing model, organic matter of the inner fjords is dominated by the terrigenous portion while more open marine sites display minor or even no terrestrial contribution. Spots dominated by marine productivity have been found at the outer Isfjorden, west off Prins Karls Forland as well as off the Kongsfjorden/ Krossfjorden area and may reflect local upwelling in concert with geologic hinterland conditions at this locations (Svendsen et al., 2002). Accumulation rates of marine organic carbon identify the Storjorden as sink for carbon dioxide but decreased as well as reconstructed primary productivities since the early 1960ies. Negative correlation of the Isfjord temperature record with reconstructed productivities of core 1244 could be explained by a reduced annual duration of the marginal ice zone in the area as a result of global warming.

References

Andruleit, H., Freiwald, A., Schafer, P. 1996: Bioclastic carbonate sediments on the southwestern Svalbard shelf. *Marine Geology* 134 (3-4): 163-182.
 Honjo, S., Manganini, S. J., Wefer, G. 1988: Annual particle flux and winter outburst of sedimentation in the northern Norwegian Sea. *Deep-Sea Research*, 35(8) 1223-1234
 Quadfasel, D., Rudels, B. & Kurz, K. 1988: Outflow of dense water from a Svalbard fjord into the Fram Strait. *Deep-Sea Research* 35(7) 1143-1150
 Svendsen, H., Beszczynska-Møller, A., Hagen, J. H., Lefauconnier, B., Tverberg, V., Gerland, S., Ørbæk, J. B., Bischof, K., Papucci, C., Zajaczkowski, M., Azzolini, R., Bruland, O., Wienecke, C., Winther, J-G. & Dallmann, W. 2002: The physical environment of Kongsfjorden-Krossfjorden, an Arctic fjord system in Svalbard. *Polar Research* 21(1), 133-166



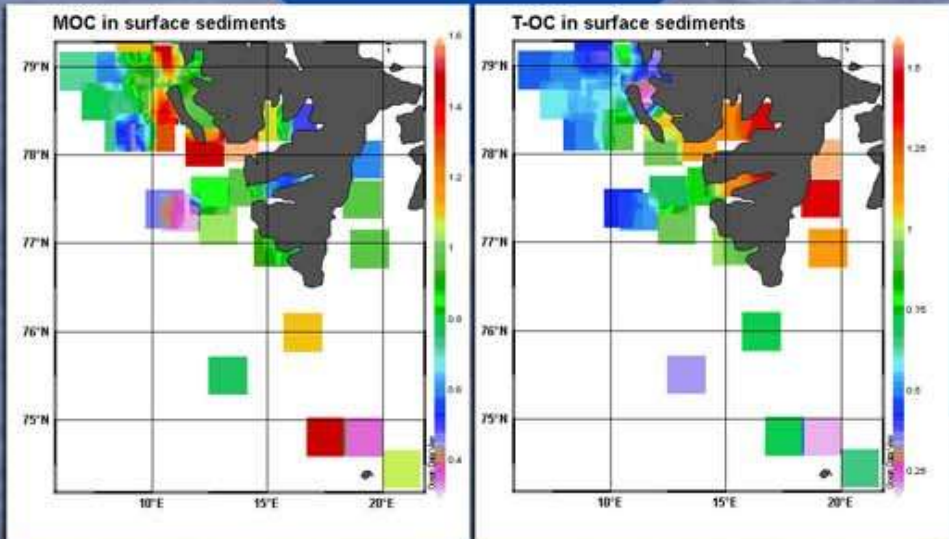
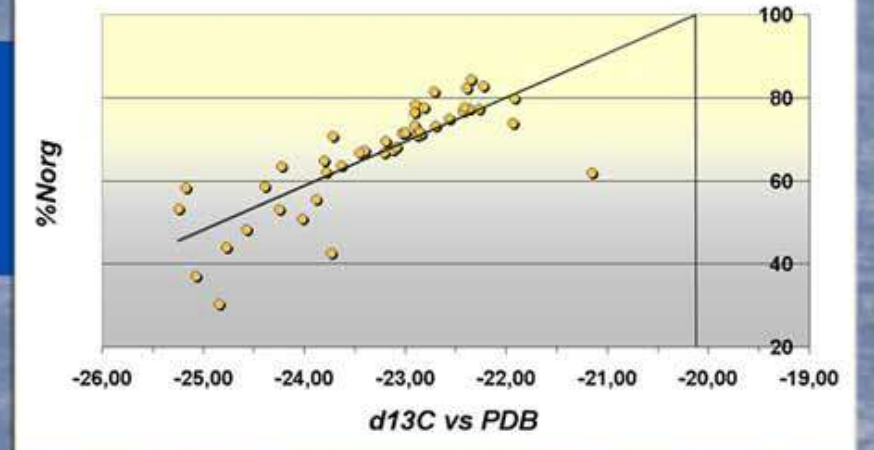
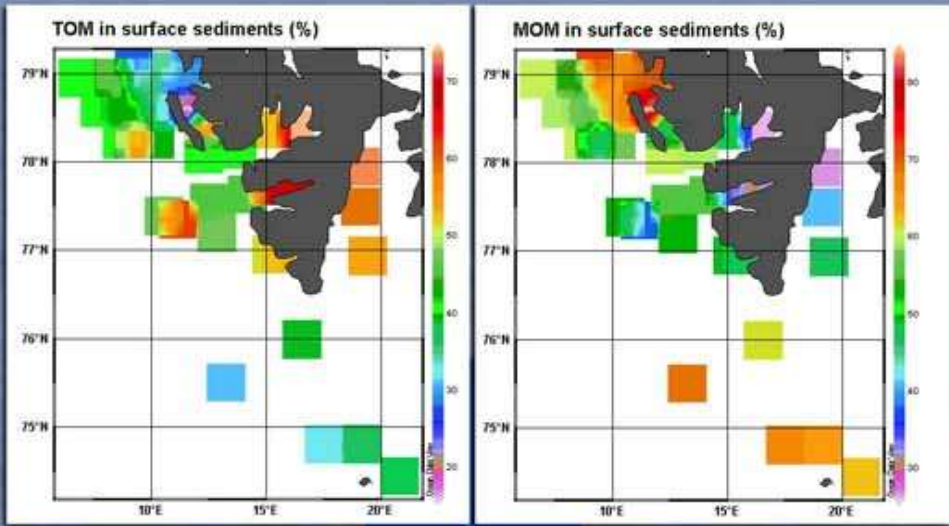
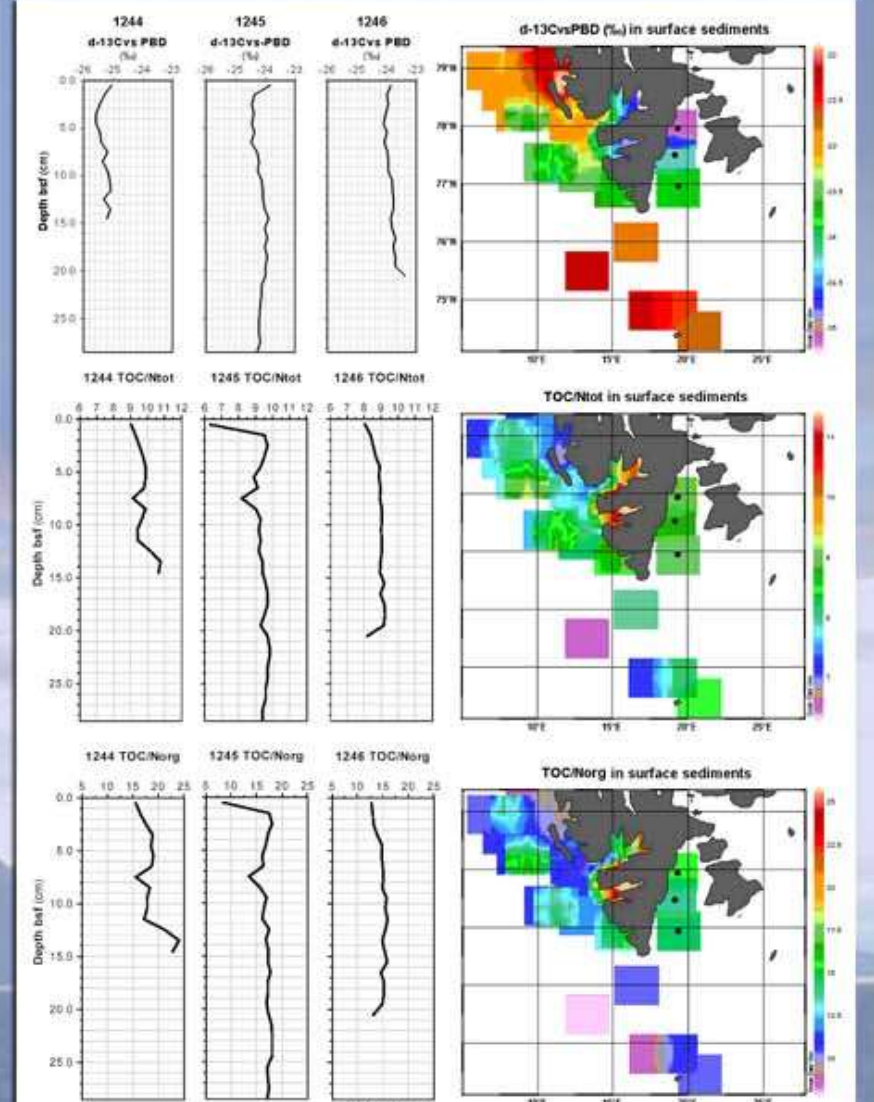
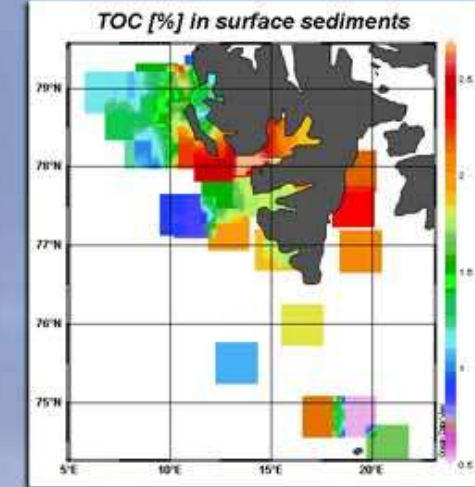
Accumulation of:
 77 -245 x 10³ tons
 of marine organic carbon per year
 equivalent to: 281 -898 x 10³ tons
 of carbon dioxide per year



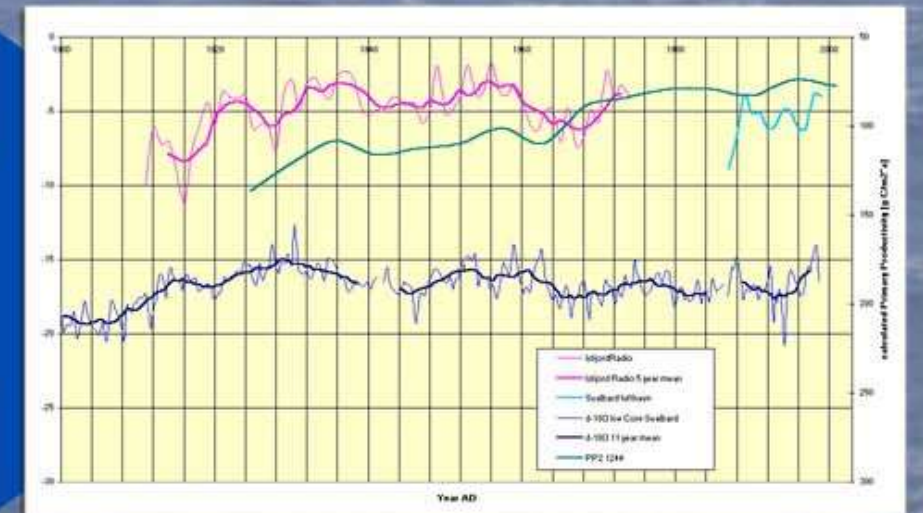
Surface circulation pattern in the GIN-Seas and around Svalbard (cf. Center for Environment and Resource Studies, University of Bergen, SVENDSEN et al., 2002) and simplified sedimentation pattern west and south off Spitsbergen



ROV pictures from the shelf west of Spitsbergen (upper two pictures), the inner fjords (middle) and the Barents Sea (below)



Plotted distribution of marine organic carbon (left) and terrigenous organic carbon (right) in surface sediments



Correlation of reconstructed primary productivity (core 1244), the Isfjord Radio and Svalbard Lufthavn temperature records (pink and light blue lines) and oxygen isotopic record of Lomonossovryvet, Svalbard (dark blue line, POHJOLA et al., in press)