Deep-sea meiobenthic communities underneath the marginal ice zone from East Greenland

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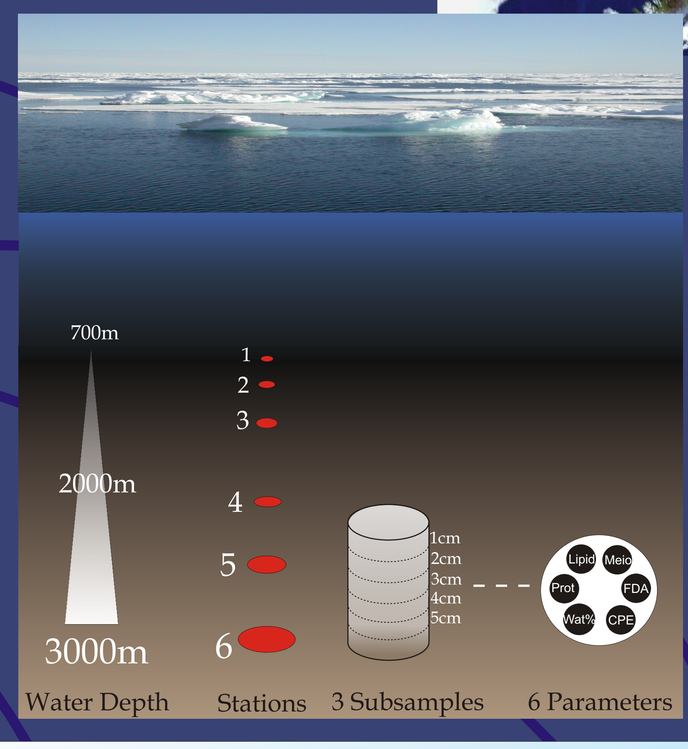
Foreword

Marginal Ice Zones and primarily the ice-edges are known to be high productive systems in Arctic Seas and one of the most important contributor for the input of fresh organic material to the deep-sea floor. Particularly along the oligotrophic Greenland margin, the Marginal Ice Zones concentrate most of the phytoplankton production. So far, litlle is known about the importance of the ice-edge production to the deep-sea meiobenthos. This study intends to characterize the impact of the ice-edge production on the deep-sea meiobenthic communities, particularly nematodes, along the East Greenland related margin.

Sampling Strategy

Six stations were sampled with a multi-corer along a depth transect (656-3033m) crossing the East Greenland continental margin. The shallowest stations, 1 and 2, were located in ice-covered region; the intermediate stations, 3 and 4, were underneath the ice-edge; and the deepest stations, 5 and 6, located free of ice.

At each station six parameters were analyzed: 1) Sediment water content (WAT%), indirect measure of sediment porosity; 2) Chloroplastic pigmetns equivalents (CPE) and its subcomponents (Chlorophyll-a and Phaeopigments), indicating the avaiability of organic material; 3) Bacterial esterase activity (FDA); 4) Phospholipids (PL), indirect indicator of microbial biomass; 5) Particulate protein (PP), for the estimation of small organisms biomass; and 6) Meiofauna (Meio), organisms with the size spectra ranging from 0.032 and 0.5mm (see scheme). For each parameter three replicates were taken with a syringe of 1.2 cm and 2cm in diameter for the abiotic and biotic factors, respectively. All samples were vertically sliced at each centimeter depth.

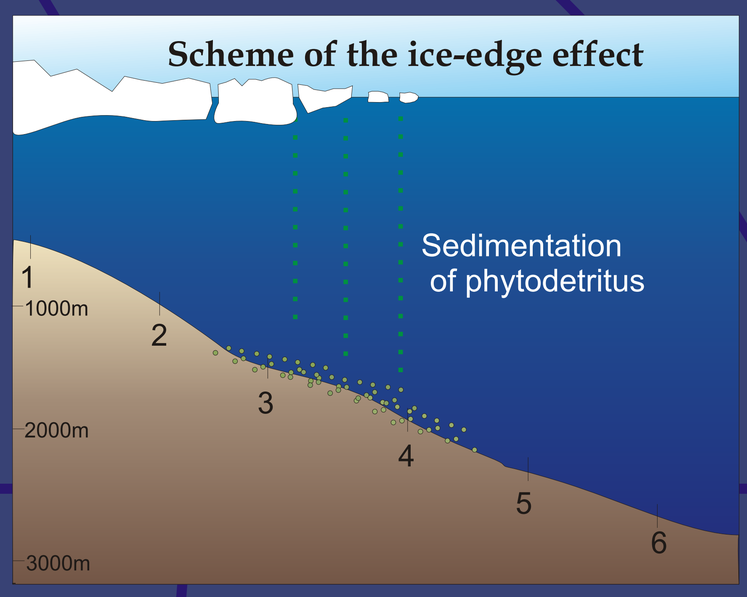


Ice-edge effect

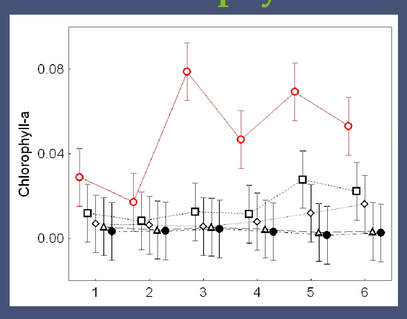
It was observed a high concentration of organic material (CPE) and, particularly, of Chlorophyll-a underneath the ice-edge decreasing significantly towards the stations under the ice-cover. Significant increases at the stations underneath the ice-edge were also observed for bacterial activity and meiofauna density.

The regional varying input of phytodetritus to the benthic system also increased the number of nematodes species and affected the structure of the nematode community. The nematode communities structure from the deepest stations (5 and 6) and the station under the ice-edge (4) were more similar between each other than the stations under the ice.

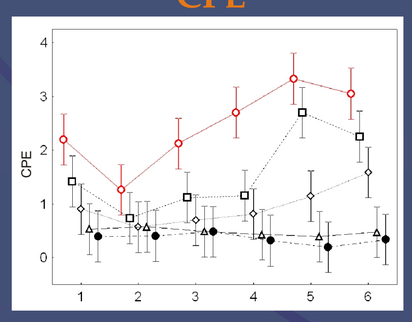
For the 10 most abundant nematodes genera, three distinct distribution patterns were observed along the transect. Whilst the genera *Theristus, Desmoscolex, Microlaimus, Neochormadora* and *Leptolaimus* characterized the shallowest stations, the genera *Halalaimus* and *Acantholaimus* were more abundant at the deepest stations. The most oportunstic genera, such as *Monhystera, Daptonema* and *Tricoma*, were more abundant at the intemediate stations.



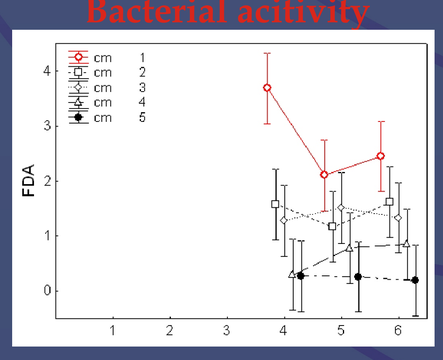
Chlorophyll-*a*



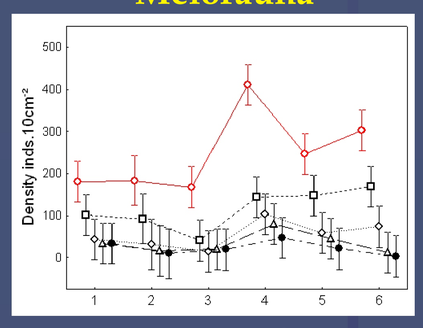
CPE



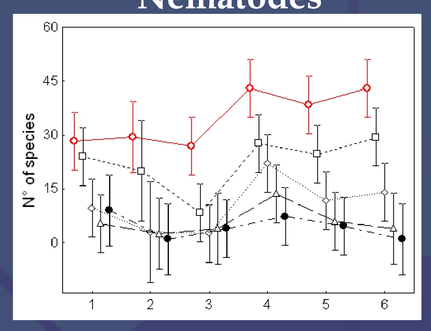
Bacterial acitivity



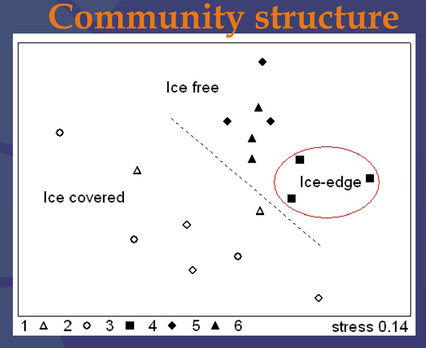
Meiofauna



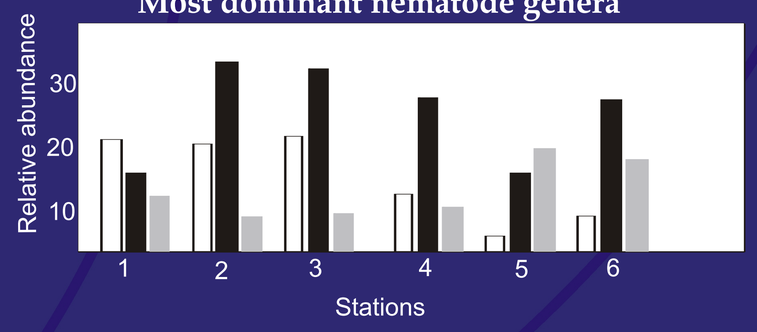
Nematodes



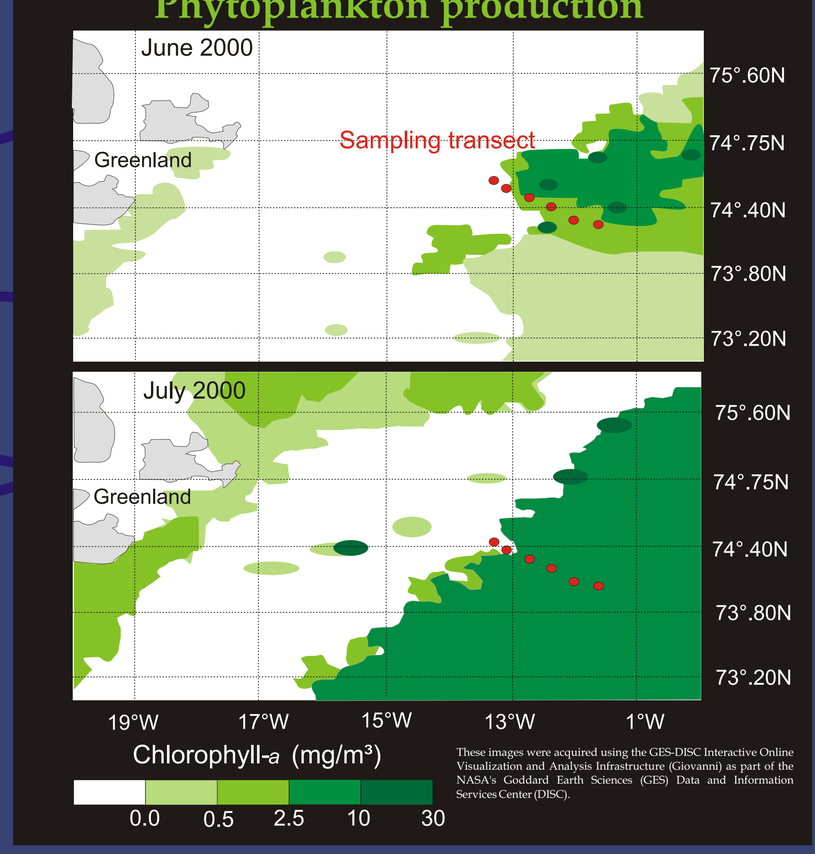
Community structure



Most dominant nematode genera



Phytoplankton production



These images were acquired using the GES-DISC Interactive Online Visualization and Analysis Infrastructure (Giovanni) as part of the NASA's Goddard Earth Sciences (GES) Data and Information Services Center (DISC).

Pelagic-benthic coumpling

Satellites images showed that the phytoplankton production at the ice-edge was high already one month before the sampling (June 2000; see scheme).

On the same time, our study showed that the highest density of meiobenthos and bacterial activity was underneath the ice-edge suggesting a strong pelagic and benthic coupling.

Finally, we can conclude that the phytoplankton production on the ice-edge along the East Greenland margin is a important structuring force for the deep-sea meiobenthic community and probably one of the greatest contributor of fresh material to the system.

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