

Dissolved organic carbon

Knut Yngve Børsheim
Institute of Marine Research,
and Bjerknes Centre for Climate Research,
and Institute of Biology, the University of Bergen.

The biological transfer of carbon in the oceans and the flux of CO₂ between ocean and atmosphere are important links in the global carbon cycle. One important aspect is that a remarkably large part of the carbon fixed by photosynthesis in the euphotic zone of Arctic seawater accumulates as dissolved organic carbon (DOC) during the productive season (Børsheim and Mykkestad 1997; Børsheim 2000). In order to incorporate the DOC fluxes in models of carbon cycling and ocean acidification, it is important to know the magnitude of the transient DOC pool, the year to year variability, and the fate of the material after the productive season.

A previous survey found transient DOC in the range 0.73 to 1.5 mol C m⁻² in the euphotic zone at the end of the productive season (Børsheim and Mykkestad 1997). The turnover of transient DOC was in the range 30 to 90 days (Børsheim 2001). The characterization of fluxes and fate of this material is needed for reliable carbon budget calculations and modelling of the ocean carbon cycle processes such as acidification.

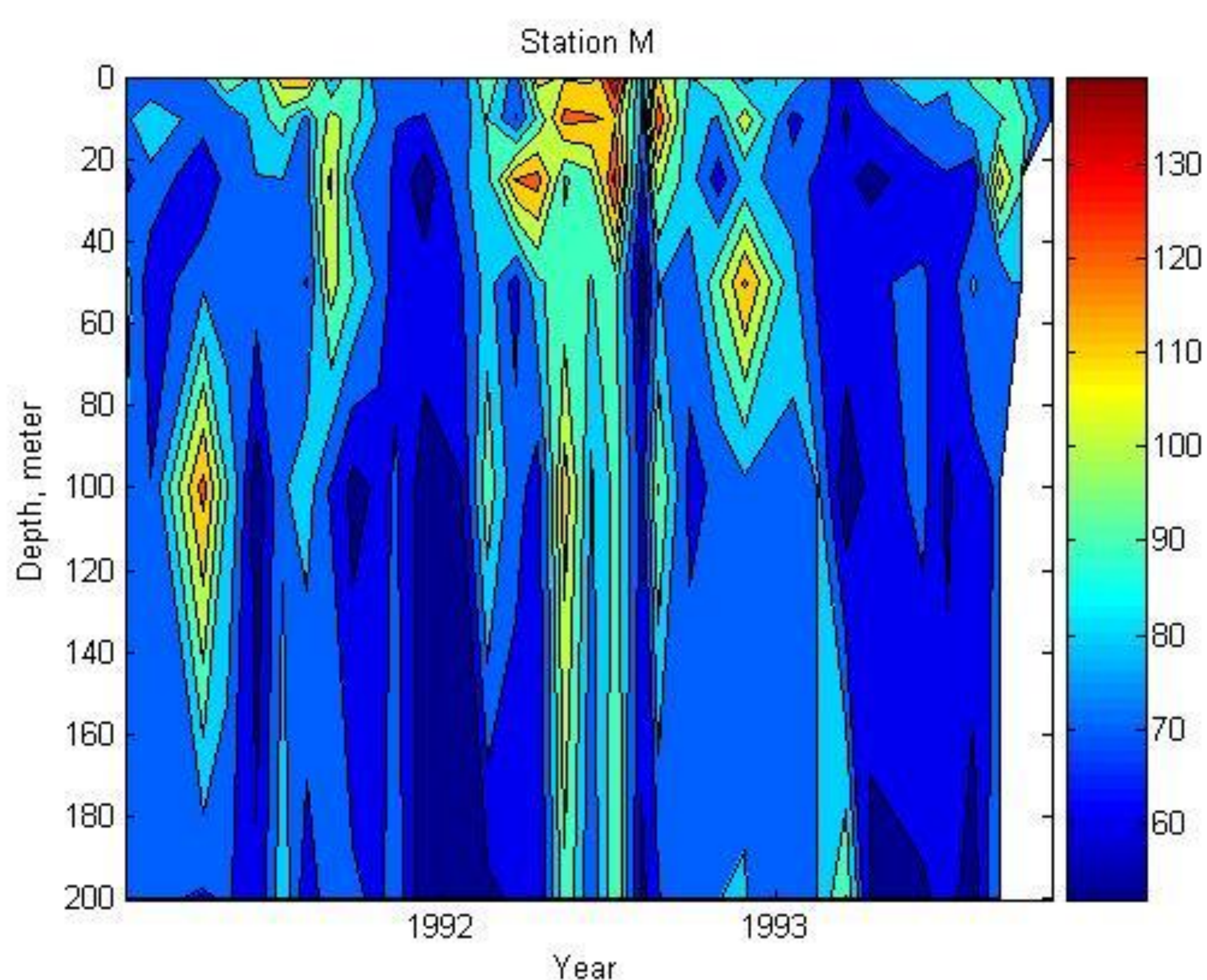


Figure 2. DOC at Station M (66°N, 2°E) in the Norwegian Sea during three years (μM C). The amount of carbon that accumulates as DOC in the Nordic seas corresponds to up to 50% of the estimated primary production.

Picture below. A recent addition to the BCCR activities in Bergen is the investigation of the role of dissolved organic carbon (DOC) in the carbon cycle in the Greenland Sea. A Teledyne/Tekmar Apollo 9000 high temperature combustion oxidation TOC analyzer, with autosampler holding 72 vials, is installed at the Institute of Marine Research.

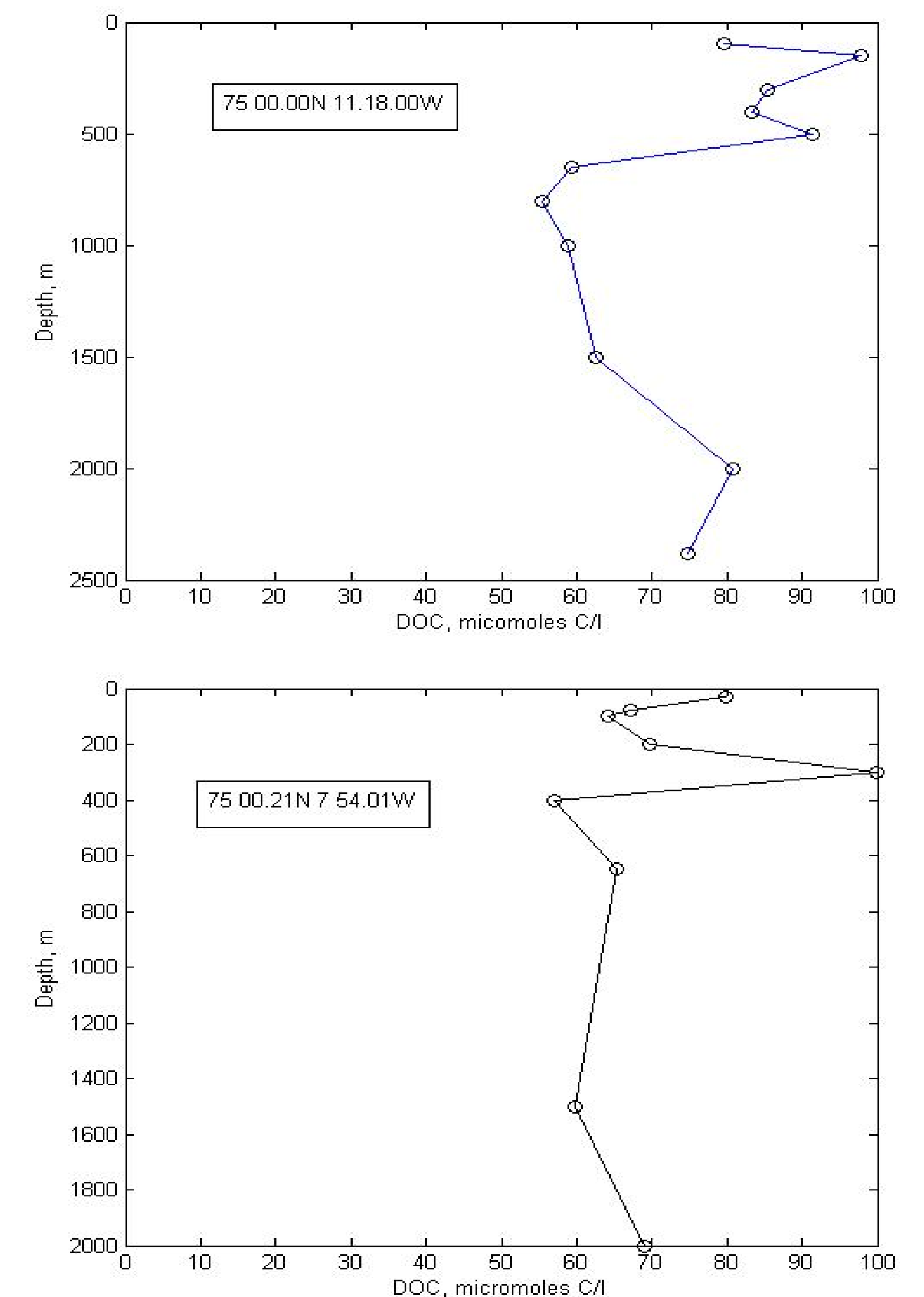


Figure 1. Concentration of DOC at two Stations in the Greenland Sea July 2006.

References.

Børsheim, K.Y., & Mykkestad, S.M. (1997) Dynamics of DOC in the Norwegian Sea inferred from monthly profiles collected during three years at 66°N2°E. *Deep-Sea Research* 44:593-601.

Børsheim, K.Y. (2000). Bacterial production rates and concentrations of organic carbon at the end of the growing season in the Greenland Sea. *Aquatic Microbial Ecology* 21:115-123