

Variability of sea surface temperature and sea ice extent in Kongsfjorden, Svalbard during the last 2 000 years

Tiia Luostarinen (1), Arto Miettinen (2), and Katrine Husum (2)

(1) Department of Geosciences and Geography, University of Helsinki, Helsinki, Finland (tiia.luostarinen@helsinki.fi), (2) Norwegian Polar Institute, Tromsø, Norway

The climate on the western and northern Spitsbergen margin is strongly dependent on the inflow of warm and saline Atlantic Water (AW), which is the largest heat source of the Arctic Ocean. Any changes in the inflow of AW can have a major impact on the environment of the area. The inflow has been especially strong during the last 30 years. As the Arctic is going through rapid changes, studies on past climate variability and environmental change are needed to understand the long-term effects of these changes.

In this study we investigate sea surface temperatures (SST) and sea ice variability in high temporal resolution using marine subfossil diatom assemblages from Kongsfjorden. The quantitative diatom-based August SST reconstruction is the northernmost reported to date. The oceanographic conditions in Kongsfjorden are strongly related to the characteristics of the West Spitsbergen Current (WSC), which transports AW and therefore also heat and salt into the Arctic Ocean.

A 50 cm long marine sediment core NP15-Kb0 is analyzed for diatoms at 1.0 cm intervals. The preliminary age model based on three AMS ^{14}C dates indicates that the core represents approximately an interval 500-1500 Common Era (CE). A diatom calibration set consisting of 183 surface sediment samples from the North Atlantic is used to convert diatom counts to SSTs using a weighted-averaging partial least squares (WA-PLS) transfer function method. The qualitative sea ice reconstruction is based on the occurrence of diatom species belonging to Marginal Ice Zone assemblage. This study brings more information about ocean surface conditions in NW Svalbard during the Medieval Climate Anomaly, which is important considering the present warming conditions of this climatically sensitive area.