

Project information

Keywords

sea ice, ocean temperatures, climate, paleoceanography

Project title

Holocene ocean temperatures and sea ice history at north-east Svalbard - from past to present warm extremes (HOLIS)

Year

2016

Project leader

Katrine Husum

Geographical localization of the research project in decimal degrees (max 5 per project, ex. 70,662°N and 23,707°E)

81° 04.9' N, 28° 55.6' E

Participants

Norsk Polarinstitutt, UNIS, UiT - Norges Arktiske Universitet, British Antarctic Survey, University of Plymouth, Universitetet i Bergen, National Centre of Antarctic and Ocean Research (India)

Flagship

Arctic Ocean

Funding Source

FRAM and participating institutions

Summary of Results

A sediment core, JR142-11-GC, from the Kvitøya Through, NE Svalbard has been investigated in order to reconstruct ocean temperatures and sea ice during the early Holocene. The early Holocene experienced a warmer climate than today and by reconstructing ocean temperatures and sea ice, we aim to obtain natural baseline values for warm periods. The sediment core has been analyzed with regard to stable isotopes ($d_{18}O$, $d_{13}C$) from benthic foraminifera and sea ice biomarkers, e.g. IP25 and HBI III. The results show that the sea ice decreased abruptly after mid Younger Dryas. This is in accordance with a sea ice record also based on IP_{25} from the western Barents Sea. The Holocene sea ice record of NE Svalbard also show robust evidence of seasonal sea ice throughout the entire Holocene including the Holocene climate optimum. Sea ice records from NE Svalbard and western Barents Sea seem to reflect more of an influence of inflowing Atlantic water in contrast to central northern Barents Sea, which appears to be more influenced by the increased length of winter and spring throughout the Holocene. This study show that the estimate of spring sea ice concentrations at NE Svalbard has an overall increase from 10 to 60 % throughout early Holocene. The trend seem to follow the $d_{18}O$ values reflecting bottom water temperatures at NE Svalbard. The increasing bottom water temperatures during early Holocene is a regional signal due to increased inflow of Atlantic water. The $d_{18}O$ data from NE Svalbard covering the early Holocene seem to follow the same overall pattern as western Barents Sea. This may suggest a similar development of bottom water temperatures along the main pathway of north flowing Atlantic water during the early Holocene. It must be noted however that the age model is still preliminary.

Published Results/Planned Publications

Husum, K., Belt, S. T., Divine, D., Hogan, K., Ninnemann, U. S., Noormets, R., Miettinen, A., & Godtliobsen, F. Holocene ocean and sea ice history in the European Arctic from past to present warm extremes: preliminary results from NE Svalbard. AGU Fall Meeting, San Francisco, USA, December 12-16 2016. PP43C-2341.

Husum, K., Belt, S. T., Divine, D., Hogan, K., Ninnemann, U. S., Noormets, R., Miettinen, A., & Godtliobsen, F. Early Holocene sea ice fluctuations in the European Arctic.

Communicated Results

The results were presented as a poster at the American Geophysical Union Fall meeting in San Francisco, USA in December 2016.

Budget in accordance to results

Funding was spend according to budget except for some of the laboratory costs which was covered by project partner.

Could results from the project be subject for any commercial utilization

No

Conclusions

All planned analysis except for three radiocarbon dates have been carried out.

The samples for radiocarbon dating have been submitted to the laboratory, and results are expected to be ready in March 2017. All other results are ready. When all data are available they will be written up as a paper for an international peer-reviewed journal. Cooperation between project partners went very well and will continue when preparing the paper. The results from this study are very elucidating and welcome as there are few data on Holocene sea ice distribution for this region. The results will help establish baseline values for natural ocean-climate fluctuations in the Arctic.