

Late Quaternary sea-ice history of northern Fram Strait/Arctic Ocean

Anne Kremer (1), Rüdiger Stein (1), Kirsten Fahl (1), Jens Matthießen (1), Matthias Forwick (2), and Matt O'Regan (3)

(1) Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Bremerhaven, Germany, (2) Institute of Geology, University of Tromsø, Tromsø, Norway, (3) Department of Geological Sciences, Stockholm University, Stockholm, Sweden

One of the main characteristics of the Arctic Ocean is its seasonal to perennial sea-ice cover. Variations of sea-ice conditions affect the Earth's albedo, primary production, rate of deep-water etc.. During the last decades, a drastic decrease in sea ice has been recorded, and the causes of which, i.e. natural vs. anthropogenic forcings, and their relevance within the global climate system, are subject of intense scientific and societal debate. In this context, records of past sea-ice conditions going beyond instrumental records are of major significance. These records may help to better understand the processes controlling natural sea-ice variability and to improve models for forecasts of future climatic conditions.

During RV Polarstern Cruise PS92 in summer 2015, a 860 cm long sediment core (PS92/039-2) was recovered from the eastern flank of Yermak Plateau north of the Svalbard archipelago (Peeken, 2015). Based on a preliminary age model, this sediment core probably represents the time interval from MIS 6 to MIS 1. This core, located close to the modern summer ice edge, has been selected for reconstruction of past Arctic sea-ice variability based on specific biomarkers. In this context, we have determined the ice-algae-derived sea-ice proxy IP25 (Belt et al., 2007), in combination with other biomarkers indicative for open-water conditions (cf., Müller et al., 2009, 2011). Furthermore, organic carbon fluxes were differentiated using specific biomarkers indicative for marine primary production (brassicasterol, dinosterol) and terrigenous input (campesterol, β -sitosterol). In this poster, preliminary results of our organic-geochemical and sedimentological investigations are presented.

Distinct fluctuations of these biomarkers indicate several major, partly abrupt changes in sea-ice cover in the Yermak Plateau area during the late Quaternary. These changes are probably linked to changes in the inflow of Atlantic Water along the western coastline of Svalbard into the Arctic Ocean. Furthermore, the repetitive advance and retreat of the Svalbard Barents Sea Ice Sheet might have influenced the terrigenous input and the environmental setting north of Svalbard, as reflected in the sediment composition of Core PS92/039-2.

References

- Belt, S.T., Massé, G., Rowland, S.J., Poulin, M., Michel, C., LeBlanc, B., 2007. A novel chemical fossil of paleo sea ice: IP25. *Organic Geochemistry* 38, 16-27.
- Müller, J., Massé, G., Stein, R., Belt, S.T., 2009. Variability of sea-ice conditions in the Fram Strait over the past 30,000 years. *Nature Geoscience* 2 (11), 772-776.
- Müller, J., Wagner, A., Fahl, K., Stein, R., Prange, M., Lohmann, G., 2011. Towards quantitative sea ice reconstructions in the northern North Atlantic: a combined biomarker and numerical modelling approach. *Earth and Planetary Science Letters* 306 (3,4), 137-148.
- Peeken, I. (Ed.), 2015. Cruise report of Arctic Expedition PS92: TRANSSIZ Cruise from Bremerhaven to Longyearbyen (19.05.2015 - 28.06.2015), in preparation.