Geophysical Research Abstracts
Vol. 14, EGU2012-527, 2012
EGU General Assembly 2012

Modern spatial (seasonal) variability in sea ice cover of the Kara and Laptev seas: Reconstruction from new biomarker data determined in surface sediments

X. Xiao, K. Fahl, and R. Stein

Alfred Wegener Institute for Polar and Marine Research, Geoscience, Germany (xiaotong.xiao@awi.de)

Sea ice is a fundamental component of Earth's climate system, contributing to heat reduction (albedo) and deep-water formation. In order to understand processes controlling the recent dramatic reduction in Arctic sea ice cover, it is essential to determine spatial and temporal changes in sea ice occurrence and its natural variability in the present and past. Here, we present new biomarker data from surface sediments and related to the modern spatial (seasonal) sea ice variability in the Kara and Laptev seas. That means, we determined concentrations of the sea ice diatom-derived biomarker „IP_{25}" (isoprenoid with 25 carbon atom; Belt et al., 2007), phytoplankton-derived biomarkers (brassicasterol and dinosterol) and terrigenous biomarkers (campesterol and ß-sitosterol) to estimate recent sea ice conditions in the study area. Assessment of sea ice conditions based on these biomarkers shows that a marginal ice zone exists along the continental shelf/slope of Kara and Laptev seas during summer/early fall. Elevated IP_{25} as well as brassicasterol and dinosterol values occurring in the central Kara and Laptev seas are related to extended sea-ice-cover and higher primary production (close to ice edge situation). Further to the north, lower IP_{25} and phytoplankton biomarker concentrations point to a more close sea ice cover situation. There are no IP_{25} and very low brassicasterol and dinosterol concentrations in the river mouths but high terrigenous biomarker (campesterol and ß-sitosterol) concentrations due to the fresh water inflow transporting terrigenous matter to estuaries. A combined phytoplankton-IP_{25} biomarker approach („PIP_{25} index"; Müller et al., 2009, 2011) is used to reconstruct the modern sea ice distribution more quantitatively.

References:

Belt, S.T., Massé, G., Rowland, S.J., Poulin, M., Michel, C., LeBlanc, B., 2007. A novel chemical fossil of palaeo sea ice: IP25. Org. Geochem. 38, 16-27.

Müller, J., Massé, G., Stein, R., and Belt, S., 2009. Extreme variations in sea ice cover for Fram Strait during the past 30 ka. Nature Geoscience, DOI: 10.1038/NGEO665.

Müller, J., Wagner, A., Fahl, K., Stein, R., Prange, M., and Lohmann, G., 2011. Towards quantitative sea ice reconstructions in the northern North Atlantic: A combined biomarker and numerical modelling approach. Earth Planet. Sci. Lett. 306, 137-148.