Geophysical Research Abstracts
Vol. 18, EGU2016-6742-4, 2016
EGU General Assembly 2016

Last Interglacial (MIS5e) hydrographic shifts linked to meltwater discharges from the East Greenland margin

Anastasia Zhuravleva (1), Henning A. Bauch (2), and Nicolas Van Nieuwenhove (3)

(1) The Academy of Sciences and Literature, Mainz c/o GEOMAR Helmholtz Centre for Ocean Research, Kiel, Germany (azhuravleva@geomar.de), (2) Alfred Wegener Institute, Helmholtz Centre for Polar and Marine Research, Bremerhaven c/o GEOMAR Helmholtz Centre for Ocean Research, Kiel, Germany (hbauch@geomar.de), (3) Department of Geoscience, Aarhus University, Aarhus, Denmark (nvn@geo.au.dk)

The East Greenland Current (EGC) plays a key role in transporting polar water from the Arctic to convectional sites of the Iceland and Labrador seas. Ongoing melting of the Greenland Ice Sheet (GIS) as well as the Arctic sea ice prompts freshening of the EGC and accumulation of low-density water in the subpolar North Atlantic, thus affecting the stabilities of water mass overturning and subsequent northward heat transfer.
To assess natural eastern GIS dynamics and possible freshwater-induced regional oceanic reorganizations we analyzed several sediment sequences from the poorly investigated area along the eastern Greenland margin and the western Nordic Seas. Records span the last interglacial (LIG, MIS5e) cycle, including deglacial Termination 2 and the LIG climatic optimum. On a global scale, the latter is believed to have been warmer than present, with a higher sea level, and may, therefore, serve as a promising analogue for future hydrographic changes.
Based on various proxy data (stable isotopes, planktic foraminiferal assemblages, ice-rafted debris) our reconstructions support the notion of a “two-step development” of Termination 2 which underwent severe surface freshening in the subpolar North Atlantic. This is shown in extremely light oxygen isotopic values registered all along the eastern Greenland margin during early MIS5e, which are indicative for pronounced eastern/central GIS retreat and a further propagation of the resulting meltwater southward via the EGC. In addition, we find compelling evidence for at least two separate meltwater episodes in proximity of the eastern GIS during early MIS5e. The climatic episode in between is correlated with an early LIG warm peak, which may be linked to enhanced presence of Atlantic water in the central Nordic Seas (Bauch et al., 2012) and further downstream along southern Greenland (Hillaire-Marcel et al., 1994, Irvali et al., 2012). Our data, therefore, reveal a complex and variable dynamic of the EGC during MIS5e which influenced the convectional sites in the Labrador and Iceland seas.

References

Bauch, H. A., Kandiano, E. S., & Helmke, J. P. (2012). Contrasting ocean changes between the subpolar and polar North Atlantic during the past 135 ka. Geophysical Research Letters, 39(11).

Hillaire-Marcel, C., Vernal, A. D., Bilodeau, G., & Wu, G. (1994). Isotope stratigraphy, sedimentation rates, deep circulation, and carbonate events in the Labrador Sea during the last∼ 200 ka. Canadian Journal of Earth Sciences, 31(1), 63-89.

Irvali, N., Ninnemann, U. S., Galaasen, E. V., Rosenthal, Y., Kroon, D., Oppo, D. W., Kleiven, H. F, Darling, K. F, & Kissel, C. (2012). Rapid switches in subpolar North Atlantic hydrography and climate during the Last Interglacial (MIS 5e). Paleoceanography, 27(2).