Geophysical Research Abstracts
Vol. 14, EGU2012-4750, 2012
EGU General Assembly 2012

Stepwise transition from deglacial/Early Holocene to modern-like conditions in the eastern Fram Strait, sub-Arctic north, inferred from planktic foraminifer fauna and sea surface temperatures

K. Werner (1), R.F. Spielhagen (1,2), E. Kandiano (1), and H.C. Hass (3)

(1) GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany, (2) Academy of Sciences, Humanities, and Literature Mainz, Germany, (3) Alfred Wegener Institute for Polar and Marine Research, Wadden Sea Station, Sylt, Germany

The heat content of the Arctic Ocean is mainly controlled by the inflow of north-heading warm and saline Atlantic Water through eastern Fram Strait. The eastern Fram Strait is therefore ice-free all year, opposite to its perennially ice-covered western part where large amounts of Arctic sea ice are exported year-round to the Nordic Seas. The Early and Mid-Holocene phases (ca 12 to 5 cal ka BP) in the (sub-)Arctic have been especially marked not only by high summer insolation but also by rising sea level and the final disintegration of large ice sheets that had been established during the preceding glacial phase. Two sediment cores with multidecadal resolution from the Western Svalbard margin have been investigated for its planktic foraminiferal distribution, sea surface temperatures, planktic and benthic stable isotope ratios, and lithological parameters to derive information on the Holocene variability of the heat transport to the Arctic Ocean and related fluctuations of the marginal ice zone in the eastern Fram Strait. Planktic foraminifer fauna and a summer sea surface temperature reconstruction based on the modern analogue technique imply a stepwise transition from deglacial/Early Holocene to modern-like conditions in the eastern Fram Strait. Repeated short-term advances of the sea ice margin accompanied the generally strong heat transport to the Arctic Ocean during the Early to Mid-Holocene. Consistent with the decreasing solar insolation, cooler (sub-)surface conditions established after ca 5 cal ka BP most likely related to both a weakening of the Atlantic Water inflow and strong export of Arctic sea ice through Fram Strait. The Late Holocene Neoglacial phase was characterized by high contents of ice-rafted material and dominance of the cold water-indicating planktic foraminifer species *Neogloboquadrina pachyderma*. Cool Late Holocene conditions are reversed by a strong warming event likely caused by a significant strengthening of Atlantic heat advection to the Arctic during the present, anthropogenically influenced period.