Geophysical Research Abstracts
Vol. 16, EGU2014-12703, 2014
EGU General Assembly 2014

The Holocene Thermal Maximum in the Greenland Sea and Fram Strait: Temporal and spatial variability

Robert F. Spielhagen (1), Henning A. Bauch (1), Christelle Not (1), Maciej M. Telesinski (2), and Kirstin Werner (3)

(1) Academy of Sciences Mainz & GEOMAR Kiel, Paleoceanography, Kiel, Germany, (2) GEOMAR Kiel, Paleoceanography, Kiel, Germany, (3) GEOMAR Kiel & Byrd Polar Research Center, Columbus OH, USA

The Holocene Thermal Maximum (HTM) is a distinct time interval in the early Holocene when strong advection of Atlantic Water to the northern Nordic Seas led to the development of conditions favorable for plankton growth due to limited sea ice coverage. Here we present a synthesis of records from the northern and western part of this area, reaching from the SW Greenland Sea (73°N) to the Yermak Plateau (81°N) and revealing temporal and spatial differences in HTM development. High-resolution radiocarbon dating enables us to constrain the timing of the HTM on (sub)millennial scale resolution. In the Fram Strait and on the Yermak Plateau, rapidly increasing subpolar foraminiferal amounts in the sediments and calculated fluxes indicate the arrival of subsurface warm and saline Atlantic Water at 11-10.5 ka. Depending on the temporal resolution, the records show that the maximum influx was terminated already 2000 years later (9-8 ka), contemporaneous to the short period of maximum sea surface temperatures (cf. Risebrobakken et al., 2011, Paleoceanography v. 26). In the northernmost Greenland Sea, low-resolution records show that the timing may have been similar here. A new submilliennial-scale record from the Vesterisbanken (73°N) in the Greenland Sea, however, reveals a somewhat different picture for this more southern area, affected by the Greenland Gyre. A reduction in annual ice coverage, as indicated by increasing total amounts of planktic foraminifers in the sediment, also occurred between 11 and 10 ka, but the maximum Atlantic Water advection came later (9 ka) and lasted until 6 ka. Apparently, the SW Greenland Sea site records the history of Atlantic Water in the Greenland Gyre that decoupled from the northward flowing Norwegian Atlantic Current/Westspitsbergen Current south of the Fram Strait and supplied relatively high amounts of heat to the subsurface Greenland Sea well into the middle Holocene. At that time, the more northerly sites had already experienced a substantial cooling and an increase in ice coverage, probably induced by a stronger sea ice production in the Arctic Ocean than in the Early Holocene.