Geophysical Research Abstracts
Vol. 16, EGU2014-13079, 2014
EGU General Assembly 2014

Contrasting development of Pleistocene warm temperature regimes across the Arctic

Henning Bauch (1) and Nalan Nalan Koç (2)

(1) Mainz Academy c/o GEOMAR, Kiel, Germany (hbauch@geomar.de), (2) 2Norwegian Polar Institute, Tromsø, Norway (nalan.koc@npolar.no)

Late Pleistocene records from the North Atlantic characterize intervals of major interglacials as times of comparable ocean warmth (± 1-2°C) due to enhanced poleward flow of warm North Atlantic surface waters. A number of recent observations and interpretations from various climate archives would imply varying impacts on the arctic environment during older interglacials. Among warm periods of the past 500 ka, marine isotope stage 11 (MIS 11) is often named as the prominent interglacial phase with a particularly tight global-scale climate connection. For Greenland, it was even suggested that the ice sheet was so strongly reduced in size that trees were able to thrive. And as noted in records from Lake El'gygytgyn in NE Siberia, average temperatures and precipitations exceeded those of the Holocene by far. Indeed, this interpretation of a rather moist and warm climate over Siberia seems to be in line also with assumptions concluded from other lake (Baikal) and speleothem records.
In terms of meridional transfer of ocean-atmosphere heat across the North Atlantic, the Nordic Seas comprise the major gateway to the Arctic Ocean. By investigating in detail the oceanic surface ocean warmth during MIS 11 we cannot identify overly enhanced heat flow from the North Atlantic into the Arctic during this interglacial interval. As further deduced from our data, subsequent warm periods (e.g., MIS 5e and MIS 1) appear to have had significantly warmer surface ocean conditions than MIS 11. Moreover, sediment records from close to Greenland would imply a very active eastern ice sheet margin throughout MIS11 with regard to iceberg release rates and occurrence of sea ice. It is therefore proposed that the observation of rather cold surface conditions in the Nordic Seas but comparatively warm temperature regime over the Pacific side of the Arctic either resulted in or caused a distinct cross-arctic climate contrast. That situation significantly changed atmospheric circulation patterns with effects on arctic albedo and associated feedback factors, such as seasonal sea ice extent as well as circum-arctic vegetation, snow cover, and moisture supply.