EGU21-14024
https://doi.org/10.5194/egusphere-egu21-14024
EGU General Assembly 2021

Modern warming exceeds sea surface temperatures of the Holocene Thermal Maximum in Kongsfjorden, Svalbard

Harikrishnan Guruvayoorappan[1], Arto Miettinen[2], Dmitry Divine[3], and Rahul Mohan[1]
[1]National Centre Polar and Ocean Research, Polar Microplaeontology and Past climate Division, Vasco da Gama, Goa, India (rahulmohangupta@gmail.com)
[2]Ecosystems and Environment Research Programme, University of Helsinki, Finland (arto.miettinen@helsinki.fi)
[3]Norwegian Polar Institute, Tromsø, Norway (dmitry.divine@npolar.no)

Certain past climatic events act as an analogue for future climatic conditions. The Holocene epoch featured a number of climatic variations of which Holocene Thermal Maximum (HTM) stands out as a recognizable phenomenon, especially in the North Atlantic and the Arctic. Similar to modern warming, HTM in Svalbard recorded extreme warmth along with intense deglaciation and sea ice retreat. Therefore, predictions of future climate using HTM depends on understanding the changes in interactions between ocean, sea ice, and atmospheric conditions. While many studies exist on this period, only few have reconstructed ocean surface conditions in the Arctic at high resolution. Here we present the first diatom-based high-resolution quantitative reconstruction of sea surface conditions from Kongsfjorden, Svalbard covering the period of ca. 10.5 to 7.5 cal. kyr BP. Our reconstructions of sea surface temperature (SST) and sea ice conditions are based on diatom microfossil records from a 454 cm long marine sediment core from Kongsfjorden, Svalbard. The section from 454 to 300 cm was used for reconstructions owing to the lack of availability of diatom microfossils. Owing to their high sensitivity towards SST and sea ice, diatoms act as excellent proxies of these environmental conditions in the past. The SST record from Kongsfjorden reveals moderately warm open water conditions and highly variable sea ice conditions during the HTM. The SST achieves maximum values during the early Holocene insolation maxima ca. 10.5 to 7.5 cal. kyr BP, followed by a slow cooling trend simultaneously with the decreasing insolation intensity. Our results emphasize the regional heterogeneity observed in ocean surfaces during the HTM and how modern warming in the study area has already reached sea surface temperatures comparable to the HTM.