



Late attainment of full Holocene interglacial conditions in the northern North Atlantic

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The postglacial changes in sea surface conditions were reconstructed in more than 30 cores from the northern North Atlantic and subarctic seas based on the modern analogue technique applied to dinocyst assemblages. The reconstructed parameters include winter and summer sea-surface temperature (SST) and salinity (SSS) in addition to sea-ice cover, thus allowing assessment of surface density and seasonal contrast of climate. Results illustrate important changes in sea-surface conditions through the early to mid-Holocene transition. Despite differences in timing and amplitude, the overall data point to the persistence of strong east to west gradients and to a late attainment of “optimum” conditions. In the western part of the basin (northern Labrador Sea, Baffin Bay, eastern Greenland margins), a main change is marked by an increase in salinity and a decrease in the seasonal contrast of temperature from 7.5 ka BP. In several of the study cores, the isotopic composition (^{18}O and ^{13}C) of planktic foraminifers (*N. pachyderma* left-coiled) provides complementary information on subsurface conditions. By combining the information from dinocyst and isotope proxies, it was possible to calibrate potential density vs calcite- ^{18}O relationships, and therefore to calculate density gradients from surface to sub-surface water masses, along the pycnocline. Paleo-density gradients also illustrate east to west differences and reveal conditions unfavorable to vertical convection after 7.5 ka BP if not later in the Labrador Sea, and about 6.5 ka in the western Nordic Seas.