Geophysical Research Abstracts
Vol. 15, EGU2013-6541, 2013
EGU General Assembly 2013

Postglacial inception of the modern-AMOC based on proxy-reconstructions for 1 ka-time slices of paleo-sea surface conditions and paleo-density gradients in the upper water column

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The post-glacial evolution of paleo-sea surface conditions (winter vs summer SST and SSS; sea-ice cover) has been reconstructed for 19 sites of the northern North Atlantic and 9 Arctic sites, in 1 ka-time slices and from the Younger Dryas (YD) to 6 ka BP, based on estimates from the modern analogue technique applied to dinocyst assemblages. This information has also be used to calibrate potential density vs calcite-18O relationships, for 11 sites of the northern North Atlantic, thus allowing us to estimate the evolution of density gradients between the photic zone (as recorded by dinocysts) and the underlying pycnocline with the intermediate water layer, as recorded by 18O-data in the mesopelagic foraminifer Neogloboquadrina pachyderma. Paleo-sea surface conditions point to the persistence of strong E-W and S-N salinity and temperature gradients throughout the interval, but with large difference in the amplitude and timing for the local attainment of the so-called "Holocene optimum". Paleo-density gradients, south of the Denmark-Strait-Iceland-Faroe sills, also illustrate a strong E-W difference, with the persistence of low-density surface waters in the west, but a relatively narrow range of density values in the subsurface water layer. These paleodensity gradients also indicate that conditions suitable for intermediate- to deep-water production were restricted to the sector west of 45°W. In this area, some sporadic winter production of intermediate/deep waters might have occurred during the pre-8 ka interval possibly in relation with brine distillation from sea ice, but pervasive convection occurred later, as illustrated by higher-resolution paleo-density records from the Labrador Sea.