**Holocene evolution of deep circulation in the North Atlantic**

**constrained by sedimentary radiogenic tracers**

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Radiogenic isotopes of the detrital sedimentary fraction are used to trace sediment provenance. In particular Nd and Pb constitute suitable tracers of the origin of deep-sea sediments of the North Atlantic. In the Northern North Atlantic their isotopic composition is controlled by the interaction of mid-Atlantic mantle sources and old crustal-derived North American, Canadian, Greenland inputs. Changes in the Nd and Pb signatures of clay-size fraction of Late Glacial and Holocene sediments (MD99-2227, 3460 m, off Southern Greenland) provide constraints on the different source areas that supplied the fine clayey particles into the Labrador Sea. Changes in their relative contribution through time bring further information on the deep circulation pathways. Radiogenic signature can therefore be used as *indirect* paleoceanographic tracers.

Here we compare the Sm, Nd and Pb sedimentary signatures at the inlet of the Labrador Sea with other cores retrieved along the gyres of North Atlantic Deep Water (NADW) components. Cores were collected along fractures zones on the Mid-Atlantic Ridge: MD99-2254 on the Eastern side of the Bight Fracture Zone (2440 m) and HU91-045-080 on the western side of the Charlie Gibbs Fracture Zone (CGFZ, 3024 m). An additional core HU91-045-091 (3870 m) was taken on the Western side of the CGFZ, in the Labrador Sea but out of the present deep circulation gyre.

Outside the present deep gyre, we note a stable Sm, Nd and Pb composition in the core HU91-045-091. This site is under the influence of proximal supplies characterised by old crustal material. We conclude that the core HU91-045-091 remains outside of the deep circulation gyre over the Holocene. In contrast cores HU91-045-080 et MD99-2254 from the Eastern atlantic basins are both characterised by a marked change in their isotopical signature, with a sharp increase in the chemical Sm/Nd ratio at ca. 6 kyr BP. Those chemical changes reflect a different composition of the particles driven by the deep currents through time. They imply a reorganisation of the deep North atlantic components in the Eastern North Atlantic basins. The compositional shift records a higher contribution of volcanic-derived material relative to crustal supplies, suggesting more contribution of the water mass that follows the Mid-Atlantic Ridge topography, i.e., the North East Atlantic Deep water (NEADW), in the deep circulation gyre. A similar shift is observed but later (at 3 kyr BP) in core MD99-2227. Off Southern Greenland the volcanic material is only of distal origin. The volcanic-derived particles are probably carried by the NEADW in core MD99-2227. The observed temporal and spatial changes in the Nd and Pb isotopic composition of the Northern North Atlantic sediments indicate that the present deep circulation gyre was established quite recently during the last 3kyr.