Changes of deep water mass provenance during the last 30,000 years: A comparison between the eastern and western Atlantic basins

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The deep Atlantic Ocean provides a large potential for CO_2 storage, especially during glacial times. It is thought that the release of stored CO_2 to the atmosphere is tightly coupled to changes in deep Atlantic circulation during transitions from glacials to interglacials [e.g. 1,2]. However, to understand Atlantic-wide circulation changes it is essential to also reconstruct the interactions and differences between the deep eastern and western Atlantic basins through time.

Here we present 11 new records of water mass changes derived from authigenic Nd isotopes of bulk sediments covering the past 30 000 years [3]. A depth transect from the Blake Ridge in the Northwest Atlantic complements published data from the western basin [4], while a latitudinal transect of new records from seven sites extends the eastern one. This allows us to better assess the interaction between the eastern and western basins and how it changed over glacial/interglacial times.

The new Nd isotope records reveal a general difference between the deep eastern and western Atlantic basins that seems to be caused by the semi-closure of the eastern basin by the Mid-Atlantic Ridge. Water masses entering the eastern basin have to pass through fracture zones causing enhanced mixing which leads to a homogenized deep water column [5]. This effect probably also caused deglacial water mass changes recorded at the Blake Ridge and other deep NW Atlantic sites [6] not to be resolvable in the eastern basin.

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