Geophysical Research Abstracts
Vol. 17, EGU2015-10633-1, 2015
EGU General Assembly 2015

Export of newly formed LSW

Katharina Müller (1), Birgit Klein (2), Johannes Karstensen (3), Jürgen Fischer (3), Till Baumann (3), and Torsten Kanzow (1)

(1) Alfred-Wegener-Institut, Helmholtz-Zentrum für Polar- und Meeresforschung, Bremerhaven, Germany (kmueller@awi.de), (2) Bundesamt für Seeschifffahrt und Hydrographie, Hamburg, Germany (Birgit.klein@bsh.de), (3) GEOMAR, Helmholtz-Zentrum für Ozeanforschung Kiel, Germany

The Atlantic meridional overturning circulation represents the strongest mechanism for oceanic northward heat transport. This is accomplished by moving warm water northward in the upper ocean compensated by a deep return flow of cold and dense North Atlantic Deep Water (NADW). Labrador Sea Water (LSW) constitutes the shallowest component of NADW. Since LSW is also supposed to be the most sensitive NADW component to climate change it is of particular interest. LSW is formed by deep convection not only in the centre of the Labrador Sea but also near its western boundary. Recent studies have suggested that LSW formed in the boundary region enters its export route from the Labrador Sea, the Deep Western Boundary Current, faster than LSW originating from the central Labrador Sea.

In this study the spatial and temporal evolution of the export of newly formed LSW is investigated. For this purpose hydrographic mooring data from an array located at the western bounndary at 53°N starting in the late 1990s until 2014 and data from the Argo float network is used. The averaged seasonal salinity cycle at the array, particularly at the moorings further onshore, shows a pronounced freshwater signal in May indicating the arrival of newly formed LSW in the boundary current. In order to learn more about its preceding pathway and the corresponding export timescale the mooring data is complemented by data from Argo floats. Besides the annual cycles of LSW formation and export, their interannual variations are important aspects affecting the large-scale circulation. For instance, in years of relatively strong convection, as in 2008 and 2012, LSW is observed to pass the boundary current array at 53°N earlier, i.e. in February and March, respectively, than in years with weak convection, as in 2007 or 2010. Besides seasonal variations in the boundary current, a possible explanation for the earlier freshwater signal in years of enhanced convection might be a shift in convection sites southwards and/ or towards the boundary.