



Composition and variability of the Denmark Strait Overflow Water in a high-resolution numerical model hindcast simulation

Erik Behrens (1), Kjetil Våge (2), Benjamin Harden (3), Arne Biastoch (4), and Claus Böning (4)

(1) National Institute for Water and Atmospheric Research (NIWA), Wellington, New Zealand, (erik.behrens@niwa.co.nz), (2) Geophysical Institute, University of Bergen and Bjerknes Centre for Climate Research, Norway, (3) Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, USA, (4) GEOMAR – Helmholtz Centre for Ocean Research Kiel, Kiel, Germany

The upstream sources and pathways of the Denmark Strait Overflow Water and their variability have been investigated using a high-resolution model hindcast. This global simulation covers the period from 1948 to 2009 and uses a fine model mesh ($1/20^\circ$) to resolve mesoscale features and the complex current structure north of Iceland explicitly. The three sources of the Denmark Strait Overflow have been analyzed using Eulerian and Lagrangian diagnostics: the shelfbreak and the separated East Greenland Current and the North Icelandic Jet. Total transports of volume and freshwater and their seasonal to decadal variability are predominantly affected by the shelfbreak EGC. In terms of the volume and freshwater transport and their seasonal to interannual variations, the shelfbreak EGC plays the primary role for the Overflow. On the other hand, the North Icelandic Jet contributes the densest water to the Overflow and shows only small temporal transport variations. During summer months, the net volume and freshwater transports to the south are reduced. On interannual timescales, these transports are highly correlated with the large-scale wind stress curl associated with the North Atlantic Oscillation, with enhanced southward transports during positive phases. The Lagrangian trajectories support the existence of a hypothesized overturning loop along the shelfbreak north of Iceland, where water carried by the North Icelandic Irminger Current is transformed and feeds the North Icelandic Jet.