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Deep Western Boundary Current variability in the Labrador Sea and its link with sea surface height variability

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The subpolar North Atlantic plays an important role in connecting the upper and the lower branches of the Atlantic Meridional Overturning Circulation. The Labrador Sea is part of this system. By means of repeat hydrographic sections and a mooring array, the Deep Western Boundary Current (DWBC) system is measured at the southern exit of the Labrador Sea with help of the 53°N Observatory since 1996. DWBC variability is operating on various time scales and comprises signals of a couple weeks, associated with topographic waves, to several decades and connected with the NAO forcing (Zantopp et al., 2017).

Here we use satellite altimetry to (1) improve reconstruction of the DWBC transport from sparse moored arrays and considering high resolution synoptic surveys and (2) better constrain the transport for connecting it to potential drivers.

We find that the width of the DWBC at the surface estimated from satellite altimetry relates to the horizontal and vertical structure of the flow which in turn enables an improved reconstruction of the flow and its transport. Applying Multivariate Empirical Orthogonal Function analysis of sea level anomaly (SLA) and moored instrument velocity data, as well as composite analysis, reveals states of more barotropic and more baroclinic DWBC, as well as variations in current velocity.

Further analysis in the coming weeks will focus on determining the impact of varying the spatial extent of SLA and mooring data on the multivariate EOF modes, as well as identifying possible mechanisms that generate the observed the co-variability.

References

Zantopp, R., Fischer, J., Visbeck, M., and Karstensen, J.: From interannual to decadal: 17 years of boundary current transports at the exit of the Labrador Sea, J. Geophys. Res.-Oceans, 122, 1724–1748, https://doi.org/10.1002/2016JC012271, 2017.

Topic

Future AMOC observing –outlining a roadmap

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