From Days to Decades: Variability of the Subpolar DWBC Transports

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The Deep Western Boundary Current (DWBC) is a key element of the Meridional Overturning Circulation (MOC) in the subpolar North Atlantic (SPNA), and the Labrador Sea is the location where the North Atlantic Deep Water (NADW) constituents merge. Diverse pathways, underway modifications through thermohaline processes (e.g., entrainment and convection) and other forcing have modified the DWBC layers enroute. At the exit of the Labrador Sea a moored observatory (the "53°N-Array") has been installed since 1997. With 17 years of data, this is one of the longest full ocean depth records of the boundary circulation worldwide. Transports derived for water mass layers show variability from days to decades with two frequency bands dominating the deep variability. The first variance maximum at 10-20d periods is due to topographic Rossby Waves (Fischer et al., 2015 – an international cooperation) tied to the steep Labrador Shelf break, but also found all along the western margin of the SPNA.

A second energy maximum is found at quasi-decadal time scales, especially in the deep overflow components. This is associated with a deep baroclinic current core hugging the continental slope at depth below 2000m. The overarching question is whether this Labrador Sea export can be interpreted as a fingerprint of the deep AMOC component on such timescales. This is investigated in conjunction with other long term subpolar observations and high resolution (VIKING20) model output. Presently the 53°N-Array is continued as part of the international OSNAP program.

Theme 1 Oral presentation