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Atlantic Meridional Overturning Circulation: Variability of the Deep Western Boundary Current at 26.5°N during 2004-2009

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Five years of data from a line of dynamic height moorings (DHM), bottom-pressure recorders (BPR), and pressure-equipped inverted echo sounders (PIES) near the Atlantic Ocean western boundary at 26.5°N are used to evaluate the structure and variability of the Deep Western Boundary Current (DWBC) during 2004-2009. Comparisons made between transports estimated from the DHM BPR and those made by the PIES demonstrates that the two systems are collecting equivalent volume transport information. Integrated ~450 km off from the continental shelf and between 800 and 4800 dbar, the DWBC has a standard deviation during these five years of 16 Sv (1 Sv = 10^6 m^3 s-1). Both the barotropic (full-depth vertical mean) and baroclinic flows have significant variability (> 10 Sv) on time scales ranging from a few days to months, with the barotropic variations being larger and more energetic at all time scales. The annual cycle of the deep transport is highly dependent on the horizontal integration distance; integrating ~100 km offshore yields an annual cycle of similar magnitude but shifted in phase relative to that found from current meter arrays in the 1980s-1990s, while integrating ~450 km offshore the annual cycle becomes quite weak. Variations in the DWBC transport far exceed that of the total basin-wide meridional overturning circulation (standard deviations of 16 Sv vs. 5 Sv). Integrating transport in the deep layer out to the west side of the Mid-Atlantic Ridge reduces the deep variability somewhat (standard deviation 10 Sv), but it is clear that some compensation of the western basin deep variability must occur in the eastern basin.