AMOC Variability at 16°N in Comparison with Higher Latitudes

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The Meridional Overturning Varibility Experiment (MOVE) has been making AMOC observations at 16°N continuously since 2000. The time series is now long enough to discuss multi-year variability. Two recent studies have compared MOVE results with observations at other (higher) latitudes in the North Atlantic:

One focuses on annual and faster time scales, and reveals correlations between four latitudes (circa 42°, 39°, and 26°N in addition to 16°N) that can be related to large-scale wind forcing patterns. Substantial re-processing is needed to derive data products that are comparable, and a further limitation is that the period with concurrent data availability at all four sites is only 3.6 years. That said, statistically significant correlations between the arrays and the large-scale wind field appear to point to consistent phase delays between the arrays, and driving mechanisms involving a quick barotropic response to the wind field as well as another response secondary to the North Atlantic Oscillation wind pattern.

The other study concentrates on multi-year time scales and emphasizes coherent density changes between two latitudes (26°N and 16°N). Both arrays report long-term hydrographic changes in the deep ocean, which manifest as shifts in the temperature-salinity relationship. These are presently barely above the detection limits of the sensors, but occur at both arrays over large depth ranges. This causes density anomalies and thereby dynamic height shifts that are relevant for the circulation, and the resulting interannual changes in geostrophic flow will be discussed. Together, these studies present first steps at identifying meridional coherence between multiple observational studies of the AMOC.