



On the spreading of South Atlantic Water into the northern hemisphere

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Cross-equatorial transports from the southern hemisphere contribute to the upper branch of the meridional overturning circulation. In the western tropical North Atlantic the southern water masses can be identified by their distinct salinity and temperature signature. We present a study of the large-scale spreading of South Atlantic Water (SAW) into northern hemisphere from the equator to 25°N, from 70°W to 30°W. The contribution of SAW to the upper ocean water masses are determined using a water mass analysis applied on a data set of CTD data from the Hydrobase project and the Argo float program. The observations are complemented with results from the high resolution FLAME model (resolution 1/12°), which realistically simulates the inflow of SAW into the Caribbean. The analysis reveals the mean SAW propagation pathways in the North Atlantic and identifies the regions of largest variability in the SAW content. High SAW fractions in the thermocline and central water layers are limited to the area south of 10°N, where the water body consists to 80%-90% of SAW. The results confirm that the zonal currents in the equatorial gyre are mainly formed of SAW. In the intermediate layer weaker currents are found and the northward excursion of the NEC allows the SAW in this layer to intrude further north. The transition into North Atlantic Water occurs on a small spatial scale in the upper water layers, but gradually from 12°N to 20°N in the intermediate layer.