Abstract View

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The Forced Annual Reversal of the Atlantic North Equatorial Countercurrent

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ABSTRACT

We analyze the variability of the thermal structure associated with the Atlantic North Equatorial Countercurrent (NECC) and its relation to the seasonally varying winds. The analysis performed allows us to establish the period of time and the region where the NECC reverses direction. West of 25°W, the depth of the thermocline in the southern side of the NECC (4 to 7°N) annually oscillates 180° out of phase to the oscillations on the northern side (7 to 10°N). East of 25°W the thermocline rises and falls nearly in phase across the countercurrent. If the flow can be uniquely presumed from the thermal structure, the NECC disappears during the boreal spring in the western basin. The reversal of phase from north to south over one part of the ocean, but no the other, is shown to be mirrored in the annual variation of the curl of the stress induced at the surface by the winds. In order to quantify this result, the different terms of the vorticity equation are calculated from the data. We conclude that those derived from the acceleration terms do not contribute significantly to the thermocline displacement anywhere in the region of the NECC and that in the interior of the basin, the reversal of the trade winds is responsible for the reversal of the NECC through the combined mechanisms of local Ekman pumping and the divergence of the geostrophic currents.