Abstract View

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Meridional Heat Transport Variability at 26.5°N in the North Atlantic

Eve R. Fillenbaum, Thomas N. Lee, William E. Johns, and Rainer J. Zantopp

Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, Florida

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ABSTRACT

Data from almost five years of current meter moorings located across the Bahamas Escarpment at 26.5°N are used to investigate meridional heat transport variability in the section and its impact on transatlantic heat flux. Estimates of heat transport derived from the moored arrays are compared to results from the Community Modeling Effort (CME) Atlantic basin model and to historical hydrographic section data. A large fraction of the entire transatlantic heat flux is observed in this western boundary region, due to the opposing warm and cold water flows associated with the Antilles Current in the thermocline and the deep western boundary current at depth. Local heat transport time series derived from the moored arrays exhibit large variability over a range of ± 2 PW relative to 0°C, on timescales of roughly 100 days. An annual cycle of local heat transport with a range of 1.4 PW is observed with a summer maximum and fall minimum, qualitatively similar to CME model results. Breakdown of the total heat transport into conventional “barotropic” (depth averaged) and “baroclinic” (transport independent) components indicates an approximately equal contribution from both components. The annual mean value of the baroclinic heat transport in the western boundary layer is 0.53 ± 0.08 PW northward, of opposite direction and more than half the magnitude of the total southward baroclinic heat transport between Africa and the Bahamas (about −0.8 PW) derived from transatlantic sections. Combination of the results from the moored arrays with Levitus climatology in the interior and historical Florida Current data yields an estimate of 1.44 ± 0.33 PW for the annual mean transatlantic heat flux at 26.5°N, approximately 0.2 PW greater than the previously accepted value of 1.2–1.3 PW at this latitude.

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Headquarters: 45 Beacon Street Boston, MA 02108-3693
DC Office: 1120 G Street, NW, Suite 800 Washington DC, 20005-3826
amsinfo@ametsoc.org Phone: 617-227-2425 Fax: 617-742-8718
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