Abstract View

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Circulation and Heat Flux in the Bermuda Triangle

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ABSTRACT

Data from the *Atlantis* 215 cruise from Cape Henry to Bermuda to Fort Pierce is analyzed to determine absolute geostrophic velocities in the region. The search procedure that Fiadeiro and Veronis (1982) proposed for finding an empirical level of no motion is used to obtain 3500 m as the average level which satisfies mass balance for the bottom three of the five layers that appeared to be conservative ones. Mass in the two upper layers is not conserved for any choice of a reference level. Since those two layers contain the Gulf Stream, which is known to have finite velocities near the bottom, an inverse calculation is used to provide a velocity correction in the boundary region so that all layers satisfy mass conservation. An improved method, summarized in the Appendix, is used to carry out the inverse calculation. The results include mass transports of 31 Sverdrups (Sv) through Fort Pierce 64 Sv past Cape Romain, and 91 Sv past Cape Hatteras in agreement with direct determination of transports. Also, an intense anticyclonic eddy exists just to the east of the Bahamas with a transport from edge to center of 35 Sv.

Heat flux calculations for the region indicate a net influx of 5.3×10^{14} W into the surface layer. Of this amount 1.7×10^{14} W goes to heat the underlying layer and 3.6×10^{14} W is used to heat the surface layer. The rate of heat accumulation during this June–July period of observation is nearly the same as the rate of heat lose that Bunker (1976) determined for the winter season. It also agrees with the difference calculated by Niiler and Richardson (1974) between summer and winter heat fluxes through the Florida Straits.

Some details of the treatment of the data and methods of interpolation and extrapolation are described.

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