Abstract View

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Fine and Microstructure Observations on a Hydrographic Section from the Azores to the Flemish Cap

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ABSTRACT

Continuous conductivity-temperature-depth-dissolved-oxygen (CTD) data are used to investigate the spatial distribution of fine and microstructure between the Azores and Flemish Cap. The CTD data are used to calculate a conductivity-microstructure Cox number. This indicator summarizes microstructure variance from the 0.08–2 m vertical wavelength range. The CTD data are also used to calculate the finestructure-temperature Cox number. Finally, the fine and microstructure data are combined to calculate lateral flux and flux divergence for the waters east of the Atlantic Current.

The distribution of the conductivity Cox number indicates that vertical mixing is more intense above the base of the main thermocline (5°C isotherm) than below it, and that mixing is more prominent near the North Atlantic Current than farther east. Stations near the front indicate elevated conductivity Cox numbers associated with intrusive features. The hydrographic sections and the finestructure data reveal the presence of intrustive features along the entire section, particularly at the depth of the mid-thermocline oxygen mininum. The finestructure variance exceeds the variance expected from internal-wave straining by a factor of 2–8.

Lateral fluxes and eddy diffusivities are calculated from the finestructure data with the model proposed by Joyce (1977). The calculated lateral fluxes and eddy diffusivities, O(10^3 m^2 s^{-1}), indicate that considerable mixing is occurring at the depth of the oxygen minimum. As the microstructure data indicate that vertical mixing weakens to the east and the finestructure intensities decrease to the east, we conclude that there is a net flux divergence at the level of the oxygen minimum. This flux divergence is consistent with the water-mass modifications required to convert. Gulf Stream water into the water found in and to the east of the North Atlantic Current.

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