Abstract View

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Signatures of Mixing from the Bermuda Slope, the Sargasso Sea and the Gulf Stream

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ABSTRACT

Nearly simultaneous profiles of temperature microstructure and velocity shear were made adjacent to the island of Bermuda. Profiles with elevated microstructure levels were found in close association with regions of pronounced steplike finestructure, which contained nearly adiabatic regions from 2 to 10 m thick. The temperature spectra and the presence of numerous centimeter-scale temperature inversions gave evidence that active turbulent mixing was occurring in some of these regions. These were the locations in which large-scale surveys, reported by Hogg *et al*. (1978), found that eddies impinging on the island were forcing alongshore flow.

Although the mixing was intense by comparison with profiles in the thermocline, the limited geographical extent of the affected areas and the moderate levels indicate that mixing adjacent to islands is of minor importance on a global basis.

A very limited number of profiles taken in the Sargasso Sea found microstructure levels in the thermocline that were similar to previous data from the Pacific. In both sets of observations the microstructure levels are consistent with K_z levels significantly below 10^{-4} m^2 s^{-1}. Although the surface winds were very light, a 135 m deep mixed layer was turbulent. The spectral forms showed general, but not exact, agreement with the “universal” spectral forms.

The microstructure activity in the Gulf Stream was dominated by double-diffusive signatures on the upper and lower boundaries of the numerous thermohaline intrusions that were present. Thus the high shear values, 10^{-2} s^{-1}, did not inhibit the formation of double-diffusive structures. In intervals not containing inversions, the microstructure levels were little different from those in the Sargasso Sea. These levels are much lower than those found in the Equatorial Undercurrent and are not consistent with the values assumed for vertical turbulent diffusivities in models of the Stream.

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