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[Volume 16, Issue 5 \(May 1986\)](#)

Journal of Physical Oceanography

Article: pp. 967–980 | [Abstract](#) | [PDF \(1.18M\)](#)

Horizontal Variability of Microstructure in the Vicinity of a Sargasso Sea Front

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(Manuscript received February 27, 1985, in final form December 9, 1985)

DOI: 10.1175/1520-0485(1986)016<0967:HVOMIT>2.0.CO;2

ABSTRACT

Temperature microstructure variability has been determined from measurements of electrical conductivity (~ 1.5 cm wavelength resolution) along two depths in the seasonal thermocline of the Sargasso Sea in July 1981. The microstructure sensors were attached to a thermistor chain, which was towed in and away from a frontal shear zone in the region of the Subtropical Convergence Zone. Averaged over the 170-km-long tow, the estimated dissipation rate of temperature variance, χ , was $\sim 10^{-8} \text{ }^\circ\text{C}^2 \text{ s}^{-1}$, but χ values ranged from 10^{-11} (noise level) to 10^{-5} in the most energetic events. Cox numbers, C , were calculated by making use of a local temperature gradient calculated over a fixed ~ 1 m vertical spacing on the chain. Mean values of C were ~ 10 , but values as high as 10^5 were observed. The signals were highly intermittent, varying by as much as five orders of magnitude over scales of the order of 10 m. Probability distributions of χ and C appeared to resemble the lognormal form only in cases where the data were carefully drawn from energetic events. Low values of a large-scale Richardson number (7 m vertical by 450 m horizontal averages) have no consistent relationship to the occurrence of an event.

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