Abstract View

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# Finestructure and Microstructure Observations During the Passage of a Mild Storm

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ABSTRACT

Finestructure and microstructure observations of temperature and salinity were made over a two-week period in late winter at a site in the central North Pacific, during which time a mild storm, maximum winds of 18 kt, passed through the area. The strong initial lateral variability in *T* and *S*, but weak vertical stratification, was altered apparently by mixing due to surface cooling and the storm winds to produce several discrete types of water. These began to spread laterally several days after the onset of the storm and resulted in a triple step structure of 50 m thick homogeneous layers at one location.

Temperature fluctuations in the mixed layers varied between $10^{-3}$ and $10^{-2}$°C rms, and χ, the rate of destruction of temperature fluctuations, ranged from $1\times10^{-10}$ to $4\times10^{-2}$°C$^{-2}$ s$^{-1}$. The lower values occurred early in the storm after the mixed layer reached an equilibrium depth of about 100 m. The 2.5 m thick transition region at the base had a sharp interface, 0.25 m thick, but there was no evidence of entrainment. Apparently in the absence of a strong source of temperature fluctuations, $T^{-2}$ had been reduced by the turbulence. A few days later a mixed layer half as thick, apparently resulting from the intrusion of denser water beneath, showed a transition with numerous small-scale instabilities and an overturn on a 0.12 m thick interface directly below the mixed layer. Spectra of the three observations during the storm showed fairly good fits to the “universal” spectral forms for temperature fluctuations in fully-developed turbulence, unlike the spectra of data taken after the storm.

At the one station that did not have an intrusion in the surface layer, the change in the heat content of the surface water, due to the air-sea exchange, was much less than that of the deeper water, which was replaced by on intrusion. Thus, when strong lateral variability exists, e.g., in late winter off the main storm track, the sinking and lateral spreading motions of the type proposed by Stommel and Fedorov (1967) resulting from even a mild storm, may be much more important than the direct vertical mixing.

In the stratified water below the surface layers the levels of microstructure detected during the storm appeared little

different from those found afterward.

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