Abstract View

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Decay of Turbulence in the Upper Ocean following Sudden Isolation from Surface Forcing

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ABSTRACT

Measurements of velocity, hydrography, surface meteorology, and microstructure were made through several squall events during a westerly wind burst that occurred in the Western Pacific warm pool in December 1992. Sustained wind forcing generated a weakly stratified turbulent surface layer that extended to the top of the main thermocline. Following each rain event, freshwater formed a statically stable layer in the upper 4–12 m. The subsequent evolution of the mixing profile was strongly depth-dependent. Turbulence increased dramatically in the fresh layer adjacent to the surface but *decreased* in the underlying layer. The factor by which turbulence decreased following a given squall was strongly correlated with the net rainfall. The observed timescale for the decay of the turbulence was about 0.7 buoyancy periods, similar to decay times observed near the surface after sunrise. However, these decay times are significantly larger than those estimated indirectly (as the ratio of dissipation rate to turbulent kinetic energy) from turbulent patches in the thermocline. To account for the discrepancy, the authors hypothesize that turbulence production continues to act during the observed decay process, partially counteracting the effect of dissipation.

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