Abstract View

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Sharp Frontal Interfaces in the Near-Surface Layer of the Ocean in the Western Equatorial Pacific Warm Pool

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ABSTRACT

During the TOGA COARE rich horizontal temperature and salinity variability of the near-surface layer of the ocean in the western Pacific warm pool was observed. High-resolution measurements were made by probes mounted on the bow of the vessel in an undisturbed region at ~ 1.7-m depth during four COARE cruises of the R/V *Moana Wave*. The authors observed several tens of cases of periodic sharp frontal interfaces of width 1–100 m and separation 0.2–60 km. The sharp frontal interfaces were often found in frontal regions and on the periphery of freshwater puddles. Maneuvers of the ship were conducted to determine the spatial orientation of a sharp frontal interface. The interfaces revealed anisotropy with respect to the wind direction. They were most sharp when the wind stress had a component along the buoyant spreading of the front. A possible origin of the sharp frontal interfaces is discussed. These interfaces may develop by nonlinear evolution of long-wave disturbances on the near-surface pycnocline that is often observed in the warm pool area. A shallow-water model may describe some features of the observations. A dimensionless number of the Reynolds type is a criterion of transition from wave train solution to dissipative shock-wave structure. The model predicts spatial anisotropy depending on the relative angle between the wind stress and horizontal density gradient.