

A study on mixed layer depth variability in the Kuroshio Extension region based on a frontal Ekman model

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In oceanic frontal regions, surface geostrophic currents have a vertical shear aligned with the density front that can balance a portion of the surface wind stress, and only the portion of the wind stress that is not in balance with the surface geostrophic shear (i.e. "effective wind stress") forces an ageostrophic Ekman spiral. Thus, if the front were uniform with depth, it is expected that the vertical velocity at the mixed layer base is better represented by the curl of the effective wind stress, rather than the full wind stress. In this study, we have examined the above in the Kuroshio Extension region, where a prominent sea surface temperature front exists, and some preliminary results based on an analysis of a high-resolution ocean assimilation product are presented.

Keywords: Mixed layer depth, Frontal Ekman model, Ekman pumping, Kuroshio Extension