

Glider observations of interleaving layers in the Kuroshio

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Interleaving layers (or thermohaline intrusions) were sometimes observed by repeated ship-based hydrographic surveys with coarse spacing between adjacent stations in the Kuroshio off Taiwan, but have never been examined in a dynamic context. A Seaglider was navigated along a triangle track east of Taiwan to complete two repeated high-resolution hydrographic observations from December 2016 to March 2017. Prominent interleaving layers were observed between dissimilar intermediate water masses across the Kuroshio. During the observations, a dipole eddy pair and a relatively large anticyclonic eddy impinged on the offshore flank of the Kuroshio, respectively, which brought certain impacts on the formation and growth of the interleaving. Aside from the complicated physical processes in the upper 200 m, salinity profiles indicate that interleaving layers appeared within 500 and 800 m with vertical and horizontal length scales of $O(50\text{ m})$ and $O(10\text{-}100\text{ km})$, respectively. The time scale for the interleaving layers should be much less than 30 days, inferred from the discrepancy in the interleaving features between the two surveys. The instability analysis together with values of the Turner angle calculated from the hydrographic data suggests that the double-diffusive instability is the primary driving mechanism for the observed interleaving layers.

Keywords: Kuroshio, Interleaving, Double-diffusive instability, Glider observation