

Turbulent mixing and near-inertial internal waves induced by the Kuroshio over seamounts in the Tokara Strait

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Recent observations in the upstream side of the Tokara Strait during November 2016, where the Kuroshio south of Kyushu flows over a number of seamounts, show banded structures of large amplitude high vertical wavenumber shear roughly along isopycnal, which are suggestive of near-inertial internal waves. The measured vertical section of laterally high resolution (~ 1 km) tow-yo microstructure measurements show the banded layers of large turbulent kinetic energy dissipation rates clearly associated with the near inertial shear banding. In this study, the results from the similar tow-yo microstructure surveys during November 2017 and June 2018 cruise, which are extended further downstream side of the Tokara Strait in the Kuroshio are analyzed. It is found that the high vertical wavenumber near-inertial shear is amplified near the seamounts in the Kuroshio, and that turbulent kinetic energy dissipation rates are elevated near the seamounts over 100 km along the Kuroshio axis by a factor of 100-1000. This length scale, over 100 km, is much larger than that of the hydraulically controlled isopycnal displacements with large Froude number in close proximity to the seamounts ~ 5 km. In the presentation, mechanisms of the amplified near-inertial shear and elevated turbulence over such a wide length scale are discussed with the results from June 2018 cruise and using numerical simulations with and without tide.

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