

Enhanced nutrient and salinity flux by double diffusion along the Kuroshio from glider measurements

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The Kuroshio is a very strong western boundary current of North Pacific subtropical gyre. Strong vertical mixing processes in the vicinity of the Kuroshio are possible to enhance nutrient supply from the lower layer to the euphotic layer and biological productivity to maintain fish production through feeding for larvae. To explore the mixing processes and biological impact along the Kuroshio, measurements along the Kuroshio from the top of the Izu-Ridge and its downstream off Boso Peninsula were carried out using a glider SeaExplorer equipped with two shear probes, one fast response thermistor, CTD, dissolved oxygen sensor and fluorometer. 65 casts were performed at depths of 0-700m during for 7 days during June 20-27 in 2017 in the KS-17-5 cruise of R/V Shinsei-maru. Various enhanced vertical mixing processes were identified as enhanced turbulence near the Izu-Ridge, in the surface layer during a severe storm and across the Kuroshio and double-diffusive processes, and large mixing efficiency was observed. Among them, double diffusive processes associated with the sub-mesoscale low-salinity water intrusion and with the salinity minimum structure of North Pacific Intermediate Water are found to possibly enhance the salinity and nutrient vertical fluxes by 10-30 times than even in the weak turbulence case. This could enhance the nutrient supply to the biological activity in the Kuroshio and also modify NPIW, especially in the Kuroshio-Oyashio confluence regions.

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