

Turbulence, internal waves, and associated nutrient supply caused by the Kuroshio southeast of Kyushu

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While surface layers of the Kuroshio Current have been known for being nutrient poor, previous studies reported that the Kuroshio carries a large amount of nutrients in dark subsurface layer. Despite of this, it has been unclear whether these subsurface nutrients can be supplied to the upper layers on the continental shelf in the south of Japan. Results published recently, by the author, showed that the Kuroshio flowing on the shelfbreak induces very strong turbulent dissipation rates $O(10^{-7} \text{ W kg}^{-1})$ associated with bands of large amplitude near-inertial internal wave shear, leading to a large diffusive nitrate flux to euphotic zone of $>O(1 \text{ mmol N m}^{-2} \text{ day}^{-1})$. However, questions remain of how these near-inertial internal waves are generated, trapped and induce mixing, and how much contributions to the phytoplankton increase arise. In this study, using a nested high-resolution numerical model, we successfully reproduced these observed features, described above, including banded shear near the Kuroshio. In the presentation, more detailed results will be shown for the lower trophic responses using a coupled ecosystem model.

Keywords: Turbulence, Negative PV, Nitrate flux

