

Interannual variability of Kuroshio nitrate flux and transport along western boundary in the North Pacific

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An eddy-resolving coupled physical-biological ocean model has been employed to examine the interannual variability of nitrate flux and transport mechanism by the Kuroshio during 1995-2012. The Kuroshio provides an advective flux of nitrate carried in subsurface waters, redistributing nitrate from the tropics to the mid-latitude. Some observed data capture the nitrate flux and transport in the subsurface layers by the Kuroshio. The maximum nitrate flux core appears about 400 m depth in the East China Sea, and the nitrate transport by the Kuroshio had a mean of 170 kmol s⁻¹. The model reproduces the maximum nitrate flux core in the subsurface layer from the Luzon strait to the Kuroshio Extension with the downstream. Along the vertical section of east side of Taiwan (24N), west side of Okinawa (28N), south of Kagoshima (130E), the time series of nitrate flux, volume transport, and nitrate concentration show the interannual variation. The variability of nitrate flux is strongly correlated with the variability of Kuroshio volume transport, but the nitrate concentration shows the increasing trend between 1995 and 2008. This trend may be related to the variability of nitrate concentration in the upstream of Kuroshio.

Keywords: Nitrate transport, Kuroshio, Interannual variability, High-resolution ocean physical-biological model