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Hydrological and biogeochemical Controls on Absorption and Fluorescence of Dissolved Organic Matter in the Northern South China Sea

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Absorption and fluorescence of dissolved organic matter (DOM) were investigated in the northern South China Sea (SCS) and adjacent Kuroshio section of the West Philippine Sea (WPS). Two humic-like (C1, C2) and three protein-like (C3-C5) fluorescent components were identified using parallel factor analysis (PARAFAC). chromophoric DOM (CDOM) and fluorescent DOM (FDOM) in the northern SCS showed similar distribution patterns to the adjacent Kuroshio section and global open ocean, yet exhibited higher values in the whole water column. An isopycnal mixing model was adopted to quantify the difference in CDOM and FDOM in the euphotic zone between the northern SCS and WPS. Results showed that CDOM and humic-like FDOM were mainly modulated by Kuroshio intrusion, while protein-like FDOM were more affected by biological activities. At mid-depth, significant linear relationships between a350, C1, C2 and apparent oxygen utilization (AOU) suggested that CDOM and humic-like FDOM were produced in situ coupled to remineralization of biogenic sinking particle. Excess humic-like FDOM in the intermediate water of northern SCS were determined and more proportion of high molecular weight organic carbon was exported to the open ocean interior. In addition, regional distribution patterns of CDOM and FDOM were also tuned by mesoscale processes in the northern SCS. Different CDOM and FDOM components in the euphotic zone have apparently different responses for changes of biological activity and vertical mixing driven by eddies. Moreover, cold eddy could capture more sinking particles and finally increase the accumulation of bio-refractory CDOM and humic-like FDOM in the dark ocean. Finally, we demonstrated that the ratio of two humic-like FDOM (C1:C2, or peak C:M) may be a good indicator of water mixing, evolution of mesoscale eddies, photochemistry in the upper water and remineralization in the deeper layer.