Hydrological and biogeochemical regulations of production, storage and exchange of DOM in the South China Sea and West Phillipine Sea

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Production and storage of refractory dissolved organic matter (RDOM) in the marginal ocean basin is an important part of carbon sequestration in the ocean interior. The oligotrophic South China Sea (SCS) is the largest marignal sea in the West Pacific Ocean. It has an active “sandwich”-like water exchange with the West Phillipine Sea (WPS) through the 2200m-deep Luzon Strait (LS). An inflow from the WPS to the SCS occurred in the upper and deeper layers which is balanced by the outflow from the SCS to the WPS in the intermediate layer. However, little is known about the influence of such interaction between the marginal sea and open ocean on the ocean carbon cycle.

In this study, we use spectral analysis (absorption and fluorescence) to characterize the qualitative and quantitative variation of DOM in the SCS-LS-WPS continium. The hydrological and biogeochemical controls on colored DOM(CDOM) and fluorescent DOM (FDOM) dynamics of the whole water depth were discussed.The levels of CDOM and FDOM showed a decreasing trend along the SCS-LS-WPS transect at all isopycnal layers, implying the different coupling mechanism between biological pump (BP) and microbial pump (MCP) in the marginal sea and the adjacent open ocean. The *in situ* production rates of two humic-like components (peak C and M) were different in the SCS and WPS, which might be linked to different complex mechanisms. The production rate of FDOM in the SCS was higher than it in the WPS, implying that the middle layer export from the SCS will carry vast amount of relatively fresh RDOM (lower humification degree) into the WPS.

The relationship between FDOM and apparent oxygen utilization (AOU) suggested that the deep SCS seems to be a reprocessing place for DOM inported from the WPS. DOM eventually becomes more refractory when outflowing back to the WPS. This study demonstrate the importance of interaction between the marginal sea and open ocean on the accumulation and storage of RDOM in the dark ocean.