

Seasonal Changes in Dissolved Organic Nutrient Cycling in the Yellow Sea and the East China Sea

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We investigated seasonal variations in the cycling of dissolved nutrients and organic matter in the Yellow Sea and the East China Sea shelf waters from 2017 to 2021. The vertical profiles of dissolved inorganic nitrogen (DIN) and phosphorus (DIP) showed typical seasonal changes, showing very low DIN concentrations in the upper layer from spring to autumn, with an N-limited condition, except for areas affected by Changjiang Diluted Water (CDW) and areas affected by freshwater in the southern coast of Korea. However, during this period, dissolved organic nitrogen (DON) and phosphorus (DOP) concentrations were up to 6 and 3 times as high as DIN and DIP, respectively, in the upper layer. The stoichiometry in dissolved organic pools in spring and autumn showed notably low DOC/DON and DOC/DOP ratios in the upper ocean, indicating more fresh and bioavailable DON and DOP in biological production, whereas the ratios were relatively higher in summer indicating less bioavailability with direct utilization by phytoplankton and bacteria. In winter, however, the ratios were relatively lower and all nutrients were vertically uniform due to strong vertical mixing. Thus, our study highlights large seasonal changes in the cycling DON and DOP and subsequent changes in their bioavailability and ecosystem responses.