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Using stable isotopes and spectral properties to quantify the contributions of particulate organic matter and dissolved organic matter to organic matter decomposition triggered by typhoons

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Typhoons can significantly change marine biogeochemical processes. The organic matter (OM) decomposition (carbon source) plays an important role in biogeochemical process in coastal waters after typhoons. However, more field investigations are needed to quantify the contributions of particulate organic matter (POM) and dissolved organic matter (DOM) to OM decomposition triggered by typhoons. To address this issue, the stable isotopes of particulate OM (POM) and the spectral properties of dissolved OM (DOM) were investigated before and after Typhoon "Barija" in Zhanjiang Bay, northwestern South China Sea. High-salinity seawater intruded from the lower bay to the upper bay due to the external forces of clockwise wind stress, thereby forming an ocean front in the middle bay during the typhoon. The POM decomposition induced by the typhoon in the upper bay (inventory 72%) was substantially higher than in the lower bay (inventory 5%) due to the barrier effect of ocean front in the middle bay. However, the decomposition removed only 1–4% DOM in the upper bay, and a net addition of DOM occurred in the lower bay due to phytoplankton growth and POM decomposition. More importantly, although the quantity of DOM is much larger than that of POM in the water, the inventory of POM in the upper bay removed by typhoon-induced decomposition (20.19 g m^{-2}) is much higher than that of DOM (16.08 g m^{-2}). Overall, our study suggests that POM decomposition is more critical than DOM decomposition after typhoons, mainly controlled by the strong ocean front and vertical mixing.