

Effects of the Changjiang (Yangtze) River plume magnitude on organic carbon consumption in the East China Sea in summer

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Understanding how freshwater discharge influences coastal ecological processes is an important factor in exploring global carbon cycling in the adjacent seas. Especially, under the current conditions of climate change, such heavy freshwater discharge events are predicted to become even more pronounced in the near future because of the dramatic increases in extreme rainfall events and floods predicted to occur throughout the world. However, few studies have focused on the effects of freshwater discharged magnitude on organic carbon consumption in continental shelf ecosystems, especially which influenced by large river, e.g., the Changjiang River. In this study, the effects of the Changjiang River plume magnitude on the East China Sea ecosystem were examined by using over a decade of summer data set. Results show that the amount of organic carbon consumption was positively related to the area of the Changjiang diluted water (ACDW; sea surface salinity < 31 ; $p < 0.001$). Interestingly, the rate of organic carbon consumption (per m^3) was however negatively regressed to the ACDW ($p < 0.001$). As expected, the rate of plankton community respiration was also significantly related to plankton biomass, especially phytoplankton. The growth of phytoplankton seemed limited by light intensity in the plume region. In addition, the whole ecosystem in the plume region was more phosphate limitation when using all pooled data. This unprecedented data might help to better understand how ecosystems response to variant magnitude to the river plume.

Keywords: Plankton community respiration, organic carbon consumption, East China Sea, The Changjiang River, River plume, Phytoplankton