Chemical and Isotopic Composition of Estuarine Organic Matter: Implications for the Relative Contribution and Reactivity of Anthropogenic Sources of Organic Matter

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Abstract
The source and composition of suspended particulate organic matter in the Manko estuary, Okinawa Island, Japan, has been evaluated using fatty acid biomarkers and stable carbon and nitrogen isotopes. Fatty acid signature and stable isotope data have revealed that terrestrial organic matter (including terrestrial vascular plants), bacteria, phytoplankton produced within the estuary and coastal sea, green macroalgae and mixed planktonic-sources predominantly contributed to the organic matter pool in the estuary. The combined approach has also allowed for the prediction of the following mixing regime and distribution of organic matter sources along the estuarine salinity gradient; Allochthonous, both terrestrial and river-borne organic matter which dominate the riverine section of the estuary seem to be slightly diluted with autochthonous organic matter in the middle estuary (site M) and thereafter, in the lower reaches of the estuary (Site SW2) are measurably admixed with tidally introduced marine organic matter. However, the autochthonous primary production within the estuary seems to be highly dependent on the discharges of terrestrial organic matter and nutrients as depicted in fatty acid signatures and isotopic composition of residential and agricultural wastewater runoff. Isotopic composition of dissolved constituents (particularly, ammonia and nitrate) highly influences the composition of autochthonous primary producers. The linkage between suspended organic matter sources and the diet of tilapia (*Oreochromis mossambicus* [Peters]) is also discussed.

Keywords
Isotopic composition,
Estuarine organic matter,
Reactivity,
Stable isotopes,
Fatty acids