Stable carbon and nitrogen isotopic signatures of organic matter sources in near-shore areas of Lake Victoria, East Africa

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Abstract

Stable isotope ratios of organic carbon and nitrogen (δ13C and δ15N) were measured in suspended particulate matter (SPM) and sediment in the near-shore areas of Tanzanian waters of Lake Victoria (LV) to identify the various sources of organic matter in different areas of the lake. Spatial variations in δ13C, δ15N, and C/N ratios in SPM and sediments in inshore areas were due to differences in the proportions and sources of autochthonous or allochthonous matter. Watershed characteristics, such as urbanization, and lake characteristics, such as algal blooms, also immensely influenced the stable isotope signal of the organic matter in sediments. Stable C and N ratios showed that inshore areas in bays without pronounced fluvial input were dominated by autochthonous planktonic organic matter; conversely, for bays receiving significant fluvial inflows, the composition of organic matter depended on the extent of preservation of shoreline vegetation. Signals resulting from input of anthropogenic organic waste as a result of urbanization were distinguishable from natural sources. This work demonstrates the potential to discriminate between input sources of organic material into lakes using stable isotope signals in sediment and suspended particulate matter.

Keywords: Lake Victoria, Total nitrogen, Organic carbon, Stable isotopes, Sediment, Suspended particulate matter