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Spatio-temporal variability of stable carbon and nitrogen isotope ratios in suspended particulate matter in a tropical lagoon in India

Mohd Amir (1), Debajyoti Paul (1), and Rabindro Nath Samal (2)

(1) Department of Earth Sciences, Indian Institute of Technology Kanpur, Kanpur, India (mamir@iitk.ac.in), (2) Wetland Research and Training Centre, Chilika Development Authority, Odisha, India

The coastal lagoons represent an important transition zone between land and sea. These are enriched by inputs of both inorganic and organic matter from continental as well as oceanic sources and are one of the most dynamic and productive aquatic ecosystems. Here, we present stable carbon (δ13C) and nitrogen (δ15N) isotope compositions of suspended particulate organic matter (POM) from Chilika Lake in India, the largest lagoon in Asia, to understand the spatial and seasonal variability in POM sources. Sampling was done for three seasons– monsoon, winter and summer– from 30 stations as well as from streams/rivers draining into the lagoon. The average δ13C and δ15N values of the riverine particulate matter are –27‰ and 6‰ respectively. Significant differences in δ13C and δ15N ratios are observed between the northern and southern parts of the lagoon. Typically, δ13C is higher by about 3–4‰ in the locations under marine influence than in the sites influenced by freshwater discharge. On the other hand, higher δ15N values are obtained for the samples from the northern part influenced by freshwater input also containing wastewater discharge. The δ15N shows a gradual decrease of about 4–5‰ from north to south and higher values at the locations influenced by marine input. Large seasonal variability in the carbon and nitrogen isotopic compositions are observed in our study. The δ13C values of summer POM are higher than the monsoon/winter POM. Both the δ13C and δ15N of POM during the monsoon are heavily influenced by terrestrial input. The observed isotopic variability may be related to both anthropogenic (wastewater input/fertilizers) and natural (marine vs. terrestrial inputs) factors.