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Sedimentary profile from oxbow lake as an archive for past productivity and vegetation changes: a case study from Ganges basin, West Bengal, India

Subhadeep Rakshit, Sambit Ghosh, Prasanta Sanyal, and Anoop Ambili
Department of Earth Sciences, Indian Institute of Science Education and Research Kolkata, India (rks.subhadeep@gmail.com)

Isotope ($\delta^{13}C_{SOM}$) and biomarker (lipid n-alkane) investigations has been carried out on three sedimentary profiles (ca. 1.8 m depth) collected from Mohanpur, West Bengal, India with the aim of reconstructing paleovegetational and paleoproductivity changes. Satellite images reveal that the investigated sediments has been deposited in an oxbow lake setting of the river Ganges. The correlation of the three sedimentary profiles has been achieved using lithological and isotopic ($\delta^{13}C_{SOM}$) marker layers. The total organic carbon (TOC) content of the profile ranges from 0.9% to 0.1%. The isotopic analysis ($\delta^{13}C_{SOM}$) shows values mostly fluctuating between -19.2‰ to -22‰ with a rapid excursions ($\sim$5‰) showing enriched $\delta^{13}C_{SOM}$ value (-14.2‰) observed at ca. 1.5 m depth. The biomarker studies of the profile reveals dominant preferences in short carbon chain (C_{14}, C_{16}, C_{18}, C_{20}) with a little preferences for higher chain (C_{29}, C_{31}, C_{33}). Interestingly, n-alkanes at 1.5 m depth shows very high concentration in short chain n-alkanes. Since the lower chain n-alkane represents aquatic vegetation/productivity and higher chain indicates the terrestrial contribution, the data from the investigated sedimentary profile shows contribution mostly from aquatic vegetation with a little contribution from terrestrial plants. This inference has been further corroborated by $\delta^{13}C_{SOM}$ values (-19.2‰ to -22‰) of the sedimentary profile typical of mixed aquatic and terrestrial vegetation. Additionally, the enriched $\delta^{13}C_{SOM}$ value (-14.2‰) coupled with very high concentration of short chain n-alkanes at 1.5 m depth reveals intense lake eutrophication. The development of rigorous chronology and high resolution data set of additional analytical parameters (e.g., C/N, $\delta^{15}N$) will provide crucial paleoclimate data set from this unexplored setting of Indian summer monsoon domain.