The biomarker (n-alkane) distribution and nitrogen isotopic composition of surface and core sediments from Ahansar Lake, Kashmir valley (India): Assessment of organic matter sources and implications for paleoproductivity and paleoenvironmental changes.

Bulbul Mehta (1), Birgit Gaye (2), Sunil Kumar (1), Sandhya Mishra (3), Ambili Anoop (1), and Praveen K. Mishra (4)

(1) Indian Institute Of Science Education and Research Mohali, India (bulbulmehta@iisermohali.ac.in), (2) Universität Hamburg, Bundesstraße 55, Germany, (3) Birbal Sahni Institute of Palaeosciences, Lucknow, Uttar Pradesh, India, (4) Wadia Institute of Himalayan Geology, Dehradun, Uttarakhand, India

The n-alkane (nC14–38) distributions, amino acids (AA) concentrations, pollen data coupled with stable isotopic ($\delta15N$), and elemental (TOC, TN, C/N) analyses were performed on short core sediments (ca. 55 cm long) retrieved from Ahansar Lake, Kashmir valley (India) to decipher the paleoenvironmental changes. The analyses were also conducted on modern vegetation (aquatic and terrestrial plants), catchment and lake surface sediments to disentangle the modern organic matter sources in lake system and also assess the utility of various organic proxies (n-alkanes, amino acid, $\delta15N$ and C/N) for paleoclimate reconstruction. The n-alkane distribution of catchment sediments and modern vegetation indicates a strong odd over even predominance characterized by the presence of higher chain lengths (n-C27 to n-C33), whereas the lake surface sediments show a high contribution (ca. 80%) of short chain n-alkanes (n-C15 to n-C21) typical of aquatic productivity. The spatial variability of n-alkane indices (P-aqueous (Paq) and terrestrial versus aquatic ratio) in Ahansar Lake demonstrates their applicability as proxies for both aquatic and terrestrial contribution. The relatively low C/N ratios with high AA content show the enhanced aquatic productivity of the lake. This also leads to good organic matter preservation as revealed by the amino acid spectra. The $\delta15N$ values in the lake surface sediments are relatively low suggesting ample nitrogen supply from terrestrial sources. The modern calibration enables us to identify "climate sensitive proxies" which can be utilized in core sediments to reconstruct past environmental changes from the region.
The investigation of core sediments reveals high $\delta15N$ and low C/N values from $\sim$ 25 cm depth indicating enhanced productivity in the lake. This inference has been further supported by n-alkanes indices indicating high Paq and low TAR values. Similarly, the pollen data also provides evidences of increased anthropogenic influence in the upper part (0-25 cm depth) of the core. The chronology based on 14C and Pb-210 on the Ahansar core sediments will provide timings for the recorded paleoenvironmental changes and possible anthropogenic influence in the basin.