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Paleoclimate and Asian monsoon variability inferred from n-alkanes and their stable isotopes at lake Donggi Cona, NE Tibetan Plateau

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The Tibetan Plateau is one of the most extensive and sensitive region of elevated topography affecting global climate. The interplay between the Asian summer monsoon and the westerlies greatly influences the lake systems at the Tibetan Plateau. Despite a considerable number of research efforts in last decade, possible environmental reactions to change in monsoon dynamics are still not well understood. Here we present results from a sediment core of lake Donggi Cona, which dates back to late glacial period. Distinct organic geochemical proxies and stable isotopes are used to study the paleoenvironmental and hydrological changes in late glacial and Holocene period. Sedimentary n-alkanes of lake Donggi Cona are used as a proxy for paleoclimatic and monsoonal reconstruction. The hydrogen (δD) and carbon (δ13C) isotopes of n-alkanes are used as proxy for hydrological and phytoplankton productivity, respectively .

Qualitative and quantitative analysis were performed for n-alkanes over the sediment core. δD proxy for sedimentary n-alkanes is used to infer lake water and rainfall signal. δD of (n-alkane C23) records the signal of the lake water, whereas δD of (n-alkane C29) record the precipitation signal, hence act as an appropriate proxy to track Asian monsoon. Long chain n-alkanes dominate over the sediment core while unsaturated mid chain n-alkenes have high abundance in some samples. From 18.4-13.8 cal ka BP, sample shows low organic productivity due to cold and arid climate. After 13.8-11.8 cal ka BP, slight increase in phytoplankton productivity indicate onset of weaker monsoon. From 11.8-6.8 cal ka BP, high content of organic matter indicates rise in productivity and strong monsoon with high inflow. After 6.8 cal ka BP, decrease in phytoplankton productivity indicating cooler climate and show terrestrial signal. Our results provide new insight into the variability of east Asian monsoon and changes in phytoplankton productivity for last 18.4 ka.

Keywords: n-alkanes; n-alkane C23; n-alkane C29; hydrogen isotopes (δD); carbon isotopes (δ13C); east Asian monsoon; precipitation;