

δ D values of *n*-alkanes in sediments from Gahai Lake, Gannan, China

YI DUAN^{1,2}

¹ Lanzhou Center for Oil and Gas Resource, Institute of Geology and Geophysics, Chinese Academy of Sciences, Lanzhou 730000, P. R. China

² School of Earth Science and Resources, Chang'an University, Xi'an 710054, P. R. China
E-mail: duany@lzb.ac.cn

Gahai Lake in the Gannan region, located in the northeast of the Tibetan Plateau, is the largest pristine freshwater lake on the plateau. Surface sediments in the Gahai Lake were systematically sampled, and *n*-alkane distribution and hydrogen isotope were analyzed by a gas chromatograph-mass spectrometer and a gas chromatograph-interface-isotope ratio mass spectrometer. The δ D values of *n*-alkanes in the sediments ranged from -247 to -161 ‰ and the mean values varied between -222 and -182 ‰. The studied sediments were divided into types I and II based on the average δ D values of *n*-alkanes. The average δ D values of *n*-alkanes in type I sediments were significantly higher than those in type II sediments and there were good correlations among the δ D values of the *n*-alkanes from the two sediment types. The δ D values of type I sediments indicated that the C_{21} – C_{33} odd-numbered *n*-alkanes were derived mainly from aquatic plants in the Gahai Lake, while the δ D values of type II sediments showed that C_{27} – C_{33} odd-number *n*-alkanes were derived from terrestrial herbaceous plants. This assessment of *n*-alkane sources was also confirmed by their distributions. It was inferred that the medium-chain length *n*-alkanes of relatively high abundance, low δ D values, and low carbon preference index values were derived principally from bacteria. The distribution patterns of the sedimentary *n*-alkane δ D values for the plateau humid climate-freshwater lake and dry climate-saline lake systems were compared. The results further confirmed that sedimentary *n*-alkanes record the hydrogen isotopic composition of source water used by organisms. Therefore, δ D values of sedimentary *n*-alkanes can be used as geochemical indicators for sources of sedimentary organic matter and in paleoclimate studies. Our results also showed that the δ D values of *n*-alkanes from sediments within the lake can differ significantly for a given time period owing to their different biological sources. This should be taken into account when reconstructing paleoclimatic and hydrologic conditions using sedimentary *n*-alkane δ D values.