Seasonal variations of oxygen and hydrogen isotopes from water samples of Nam Co lake and inflowing river water

J. Wang[1,2], J. Ju[1], G.Daut[2], Y.Wang[1] and L.Zhu[1]

[1] *Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing, China*
[2] *Institut für Geographie, Friedrich-Schiller-Universität Jena, Germany*
wangjb@itpcas.ac.cn

In the recent years, many paleoenvironmental change studies have been conducted in Nam Co, central Tibet. Monitoring studies to understand the modern processes within the lake, however, were insufficient until now. However, these studies are of great importance to evaluate the implications of proxies from lake sediments. Their understanding plays a significant role for paleoenvironmental interpretations. Under the support of the National Natural Science Foundation of China and the Ministry of Science and Education of Germany, a monitoring study was initiated in Nam Co. Here we present preliminary results on seasonal changes of oxygen and hydrogen isotopes from the lake and its tributaries, based on sampling campaigns in 2012.

Lake water was sampled in two stations, T1 (water depth ~58m) in the central part of eastern small basin and T2 (water depth ~92m) in the central area of main basin of Nam Co. Four sampling campaigns were conducted in late May, middle July, middle September and late November respectively in both stations. During these campaigns and additional ones in late June, late August and middle October a total of twenty-one rivers around the lake were selected for sampling. In late November, only five river samples were successfully obtained due to very bad road condition.

The results indicate that in both lake and river water, oxygen and hydrogen isotopes are strongly correlated (R^2=0.8858 and 0.8764 for lake water and river water, respectively, n=110 for both). Within the lake isotopes only show a very slight vertical variation in the individual sites and also almost homogeneous horizontally in different stations. The seasonal variations of isotopes reveal a decreasing trend from late May (averagely -6.32‰ for oxygen isotope and -67.39‰ for hydrogen isotope in T2 station) until September (-6.47‰ and -67.92‰) and increased after that. Significant isotopic differences were detected in all the river water in every month, the seasonal changes display the similar trend with that of lake water, decreasing from the maximum in late May (averagely -13.60‰ for oxygen isotope and -97.35‰ for hydrogen isotope) until the minimum within the dataset in late August (-17.86‰ and -131.36‰) and a slight increase in the end of the year. It is obvious that the isotopes in lake water are much heavier than that of river water, due to an intense evaporation effect in the lake, whereas the river water shows a clear seasonality pointing to different water sources (precipitation, glacier melting ….).

From this study it is evident, that the monitoring of the signal transformation of stable isotope from different sources such as tributaries from the catchment, precipitation, lake water to different isotopic proxies within the lake sediment supplies useful information to interpret these data in terms of climate change, monsoon intensity, lake evolutions, etc. Temperature and precipitation is believed the most important factors influencing variations of water isotopic changes in Nam Co catchment, whereas evaporation within the lake is overprinting the original inflow isotopic signature. More accurate analysis is still in process to reveal the intrinsic forcing which affects the detected isotopic variations.

Acknowledgement: This study was jointly supported by National Natural Science Foundation of China (41071123) and BMBF project (CADY) of Germany.

Key words (for online publication): oxygen isotope; hydrogen isotope; seasonal variations; Nam Co; water samples