Paleoclimatic records spanning the past 30 cal ka BP inferred from Qionghai Lake sediments in southwest China: insights from geochemical investigations and grain-size characteristics

G. WANG[1]*, Y.L. WANG[12]*, Z.F. WEI[1] AND W. HE[1]

[1]Key Laboratory of Petroleum Resources, Gansu Province/ Key Laboratory of Petroleum Resources Research, Chinese Academy of Sciences, Lanzhou 730000, China (*correspondence: gwang@lzb.ac.cn;wyll6800@lzb.ac.cn)

[2]Key Laboratory of Cenozoic Geology and Environment, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China

Geochemical and grain-size investigations from Qionghai Lake in SW China have been studied in order to provide new perspective on detailed paleoclimate history for the past 30 cal ka BP, and to determine the potential driving factor. The study region is characterized by a typical sub-tropical monsoonal climate where southwest monsoon prevails.

Results and Discussion

A continuous 23.90-m-long sediment core, which approached the bedrock, was taken from Qionghai Lake for geochemical investigations (TOC, TN, χ_{LF}, carbonate content, $\delta^{13}C$ value of organic matter) and particle size analyses. Based on the AMS ^{14}C dating of twevle plant remains, with the aid of CLAM software , an age-depth model for Qionghai Lake sediments was extablished. According to the variations of derived-proxies, the climate can be divided into four stages: warm and humid climate conditions from 29.1 to 23.2 cal ka BP, climate shifted to cold and dry during the period of 23.2 to 15.4 cal ka BP, dry and relatively stable climate from 15.4 to 9.7 cal ka BP, a warm and wet climate in the early to mid-Holocene and a dry late Holocene. Typical warm and cold climate events were observed, including Last Glacial Maximum (21.6 to 19.4 cal ka BP), H1 cold event (17.6 to 15.8 cal ka BP), Younger Dryas event (12.5 to 11.6 cal ka BP), “8200 a” cold event (8.5 to 8.1 cal ka BP) and Holocene Climatic Optimum (6.6 to 4.6 cal ka BP).

Comparing our results with regional and over-regional records, the evolution history of climate in Qionghai Lake area are generally assoociated with the intensity of southwest monsoon, primarily in response to the Northern Hemisphere solar insolation on millennial scale induced by the orbital forcing. Position of Intertropical Convergence Zone may add complementary effect on the evolution of monsoon strength in the Holocene.