An early-Pleistocene environment of a Tibetan lake related to tectonic activity and climatic change

Z. D. Jin（金章东）[1, 2], M. J. Bickle [2], & S. M. Wang（王苏民）[1]
1. Nanjing Institute of Geography & Limnology, CAS, Nanjing 210008, China
2. Department of Earth Science, University of Cambridge, Downing Street, CB2 3EQ, United Kingdom
Email: zhdjin523@hotmail.com; zhdjin@niglas.ac.cn

1. Introduction

The significance of the Tibetan Plateau studies stems from the wide recognition that the knowledge of the uplift has played a major role in understanding Asian/global climatic change since late Cenozoic. Much effort has been invested during the last decades in studying sedimentation in the Bengal Fan and loess deposition in association with the uplift, however little evidences come from internal plateau till now. The determination of the time and duration of the uplift is essential for the tests and calibrations of global atmospheric circulations. Tectonic activities are likely to cause important variation in the supply of detrital sediment to the deltas and/or the plains, however sediments in rivers and the Bengal fan have proven very hard to correspond to tectonic events, perhaps due to long-term transportation.

Here we present an early-Pleistocene lacustrine record from the longest lake sediment core by far from a tectonically-driven basin in the central Tibetan Plateau. The palynological and geochemical records allow us to address the response of basin ecosystem to possible forcing factors, such as climatic change and/or tectonic erosion.

2. Sampling and methods

Sediments and dating: The core CE (31°31′18″N, 91°32′55″E, 4520 m above sea-level, 206.5 m overall length) was drilled from the Co Ngoin (Co = lake) basin in July 1999. The age model for the top 197 m of the core CE was developed by using paleomagnitism profile correlating with the grain size and pollen variations.

Experiment and analyses:

We chose adult and A-1 valves of the ostracods *Qinghaicypris* Huang 1979, and *Psychrodromus* Danielopol & McKenzie 1977 in some intervals, for trace element (Mg and Sr) and stable isotopic (C and O) measurements. Mg/Ca and Sr/Ca ratios were analyzed on a Vista ICP-AES using an intensity ratio calibration. Stable isotopes analyses were carried out on a VG SIRA mass spectrometer at the Godwin Laboratory, University of Cambridge.

Fig.1 Sketch geological map of the Co Ngoin basin showing the rocks and sediments surrounding the lake, and location site of core recovered on the eastern beach of the lake. Inserted map showing contours (in kilometers) of broad-scale elevation in southern Asia and location of Co Ngoin in the central Tibetan Plateau.

3. Results

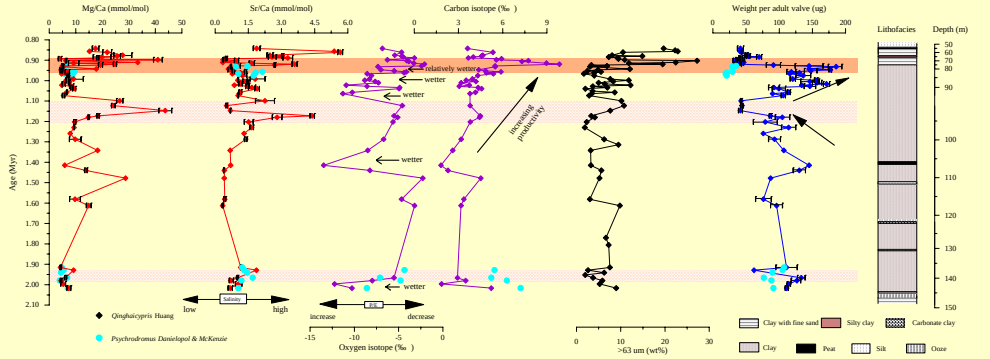

Figure 2 Data from the interval 52-143 m in Co Ngoin (CE) sediment core. Shaded bands highlight the tectonic and/or climatic fluctuations. Trace element ratios (Mg/Ca and Sr/Ca) and stable isotopes (oxygen and carbon, relative to Vienna Pee Dee belemnite) of two genus ostracod shells are shown. Weight and valve number of adult ostracod and weight percentage of coarse particles (>63um) of sediments are also included. All curves are plotted against depth and age.

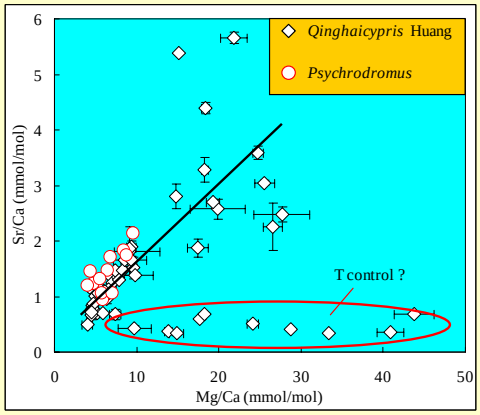

Figure 3 The relationship between the molar Mg/Ca and Sr/Ca ratios of the ostracod shells of *Qinghaicypris* Huang and *Psychrodromus* Danielopol & McKenzie preserved in early Pleistocene sediments of Co Ngoin.

4. Implications

The Co Ngoin data show that the amplitude of environmental changes during early Pleistocene was in association with climatic change and/or tectonic activity. Regard less of effect of the tectonics, the climate in the central Tibetan Plateau during early Pleistocene was multistage in which moisture availability and temperature oscillated abruptly. It was interrupted by at least three drying episodes. The interstadial periods between drying episodes also show obvious climate instability, for example there are three relatively wetter oscillation episodes between 1.15 and 0.93 Myr. Pollen and ostracods (both *Qinghaicypris* Huang and *Psychrodromus*) records express a synchronous respond to these oscillations. The ostracod records have yielded the original information about variations in stable isotope composition of the early Pleistocene central Tibetan Plateau.

5. References

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6. Acknowledgements

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