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Paleoenvironmental Record from Wuqi Paleolake in Northern Chinese Loess Plateau

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Jinding core (ZK04, 36°47′35.36″N，108°19′05.24″E) is located in the northern area of Luohe river basin, northern Chinese loess plateau, lying to the southeast of Wuqi County about 20 km. The total depth of Core ZK04 is 92.20 m, and the central section (30.17-60.56 m) is " Wuqi paleolake" lacustrine strata with the thickness of more than 30 meters.

This study uses paleomagnetic chronology combining with grain size and magnetic susceptibility index to study the paleoenvironmental evolution of "Wuqi paleolake". Paleomagnetic results (Fig. 1) show that Core ZK04 records nine magnetozones, including five normal magnetozones and four reverse magnetozones. By comparing with the latest Geomagnetic Polarity Time Scale(GPTS), and combining with the existing data and literature, the study determines that " Wuqi paleolake"

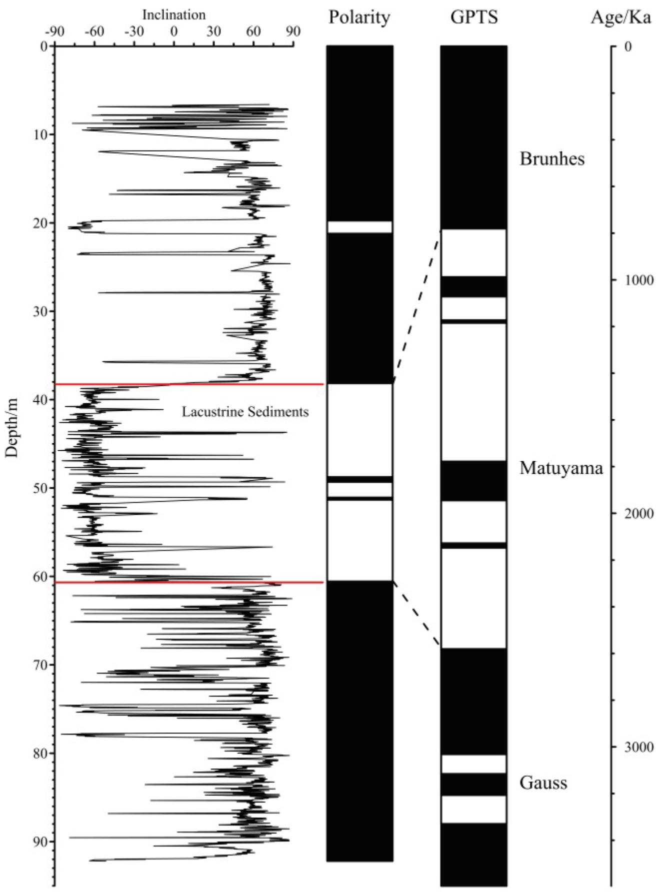

Fig. 1. Correlating magnetic polarity stratum of Core ZK04 with the Geomagnetic Polarity Time Scale

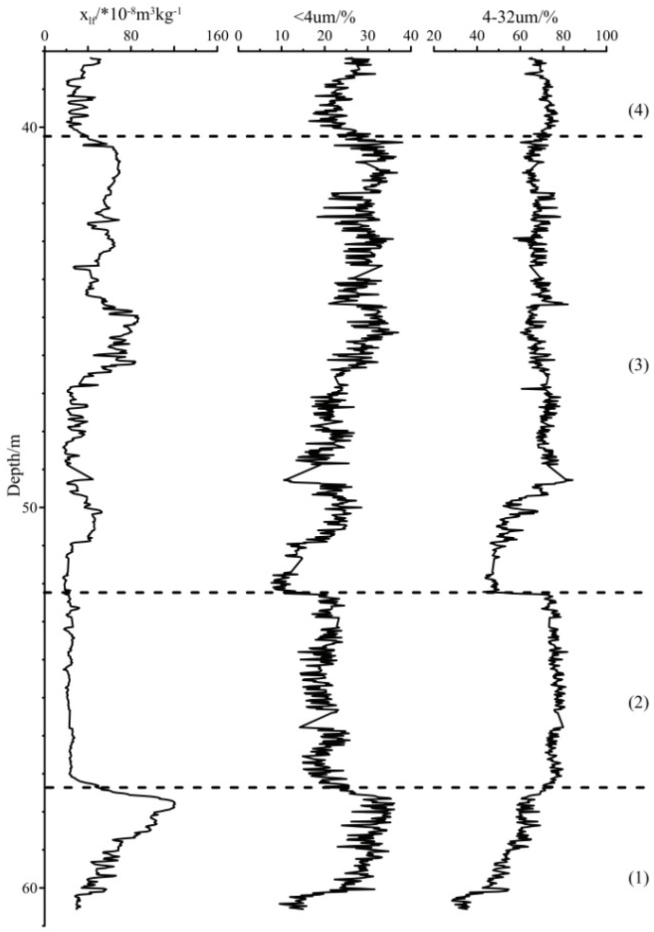

Fig. 2. Magnetic susceptibility and grain size curve of "Wuqi paleolake" lacustrine sediments

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formed at about 2.58 Ma B.P. and terminated at about 0.78 Ma B.P..

According to the magnetic susceptibility, sedimentary environment and grain size, and comparing with the stage pattern of climate change, the environment/climate evolution of “ Wuqi paleolake” can be divided into four main stages (Fig. 2)：

Ⅰ.Transition stage (57.46-60.56 m). The formation of the paleolake was during the period of 2.58-2.39 Ma B.P.. Magnetic susceptibility shows an obvious fluctuation, and the content of <4μm components has a tendency to increase slowly. This reflects that the region may already form the small-scale water flow in the period, but large-scale lake basin has not yet formed because of the terrain and climate factors. The climate conditions are relatively warm and humid in this period.

Ⅱ. High lake surface stage (52.26-57.46m). During 2.39-2.09 Ma B.P. magnetic susceptibility is the lowest value of the whole lacustrine sediments, and the drop of magnetic susceptibility is mainly due to reducing environment is a disadvantage of the formation and preservation of some magnetic minerals；In addition, the content of <4μm components gradually decreasing and content of 4-32μm components gradually increasing in this stage, that may imply that water body gradually becomes shallow afterwards. In general, water body is relatively deep during this period, and “ Wuqi paleolake” has a certain scale from this moment, but the overall climate change trend from semi-arid to drought makes water body gradually shrink.

Ⅲ. Low lake surface stage (40.34-52.26m). During 2.09-1.38 Ma B.P. magnetic susceptibility increases on the whole, and magnetic susceptibility and grain size curves show the characteristics of the aeolian sediments. This stands for the increase of dust components transferred on upper air, and implies that water body becomes shallow in this stage.

Ⅳ. Lake surface fluctuation stage (38.17-40.34 m). During 1.38-0.78 Ma B.P. magnetic susceptibility falls to lower level, “ Wuqi paleolake” is mainly shore and shallow lake. In this stage the climate condition is quite unstable, and the fluctuation of the lake is associated with the strong fluctuation of climate.

Key words: Wuqi paleolake, magnetic susceptibility, grain size, paleomagnetic chronology, paleoenvironment, Chinese Loess Plateau

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References

An Fuyuan, Ma Haizhou, Wei Haicheng, Fan Qishun and Han Wenxia. 2013. Grain-size distribution patterns of lacustrine sediments of Qarhan area and its environmental significance. *Arid Land Geography*, 36(2): 212-220(in Chinese).

Chen Bishan, Pan Anding and Zhang Yuanfang. 2010. Grain-size characteristics and their environmental significance of Gahai Lake sediments in Qaidam Basin. *Marine Geology & Quaternary Geology*, 30(2): 111-119(in Chinese).

Dong Yanyu, Jin Fang and Huang Junhua. 2011. Poyang Lake sediments grain size characteristics and its tracing implication for formation and evolution processes. *Geological Science And Technology Information*, 30(2): 57-62(in Chinese).

Gradstein F.M., Ogg J.G. and Smith A.G.. 2004. *A Geologic Time Scale*. United Kingdom: Cambridge University Press.

Ma Long, Wu Jinglu, Wen Junhui, Liu Wen and Jilili Abuduwaili. 2013. Grain size characteristics and its environmental significance of lacustrine sediment recorded in Wuliangsu Lake, Inner Mongolia. *Acta Sedimentologica Sinica*, 31(4): 646-652(in Chinese).

Shen Hongyuna, Jia Yulian, Zhang Hongmei, Wei Ling and Wang Pengling. 2006. Environmental change inferred from granular size character of lacustrine sediment in Inner Mongolia Huangqihai, during 8.0-2.2 ka BP. *Arid Land Geography*, 29(4): 457-462(in Chinese).

Shi Linfeng, Zheng Mianping, Li Jinsuo, Wang Youde, Hou Xianhua and Ma Nina. 2010. Magnetostratigraphy of Liang ZK05 borehole in Dalangtan, Qaidam Basin. *Acta Geologica Sinica*, 84(11):1631-1640(in Chinese).

Tian Qingchun, Yang Taibao, Zhang Shuxin, Shi Peihong, Zhang Junhui and Fan Zhe. 2011. Magnetic susceptibility and its environmental significance of lake sediments in Tibet Plateau. *Acta Sedimentologica Sinica*, 29(1): 143-150(in Chinese).

Wang Junlan, Li Hui, Deng Wei, Guo Xiaoyan, Li Shuang and Zhang Jiawu. 2012. Paleoenvironmental significance of magnetic susceptibility and grain size of lake sediments from Gaxun Nur, Inner Mongolia, China. *Journal Of Desert Research*, 32(3):661-668(in Chinese).

Wu Jian and Shen Ji. 2009. Paleoenvironmental and paleoclimatic changes reflected by diffuse reflectance spectroscopy and magnetic susceptibility from Xingkai Lake sediments. *Marine Geology & Quaternary Geology*, 29(3): 123-131(in Chinese).

Xie Yuanyun, Li Changan, Wang Qiuliang and Yin Hongfu. 2007. Grain-size characteristics and their environmental significance of Jiangling Lake sediments in Jianghan Plain. *Journal of Jilin University(Earth Science Edition)*, 37(3): 570-577(in Chinese).

Yin Yong, Fang Nianqiao, Wang Qian, Nie Haogang and Qin Zunli. 2002. Magnetic susceptibility of lacustrine sediments and its environmental significance: evidence from Napahai Lake, Northwestern Yunnan, China. *Scientia Geographica Sinica*, 22(4): 413-419(in Chinese).

Yu Zhitong, Liu Xingqi, Wang Yong, Chi Zhenqing, Wang Xiujun and Lan Haiyan. 2014. A 48.5-ka climate record from Wulagai Lake in Inner Mongolia, Northeast China. *Quaternary International, In Press, Corrected Proof, Available online 5 May 2014.*