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Evolution of Quaternary Depositional Environments in Lop Nor, Xinjiang: Sedimentary Records from LDK01 Drilling

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Lop Nur is located in the interior of Asian and the lowest part in the eastern Tarim Basin. It is the final destination of major river systems in Tarim Basin and the accumulation center of salt materials (Xia, 1987). As being the second largest potash metallogenic areas Lop Nur hosted huge amounts of glauberite and the pore within which reserved large-scale potash-bearing brines (Wang et al., 2001; Liu et al., 2007). The fault systems in Lop Nur were typified by graben fault systems which formed some large salt-depression such as Luobei depression (Liu et al., 2006). LDK01 drilling is located in the middle of the Luobei depression, the depth is 781.5 meters, and is the deepest well by systematically studied. In this paper, grain size analysis, magnetic susceptibility and lithological characters of core samples from drill hole LDK01 in Luobei depression were used to discuss the sedimentary environmental evolution since the early Middle Pleistocene in Lop Nor region.

Grain size analysis showed that silt and clay distributed widely in this drill hole. The components of clay, silt, fine sandstone and medium-coarse sand accounted for 1.95%–36.50%, 8.35%–85.76%, 0–58.76% and 0–89.64%, respectively. The upper member was dominated by clay, silt and fine sand and most the coarse sand and gravel existed in the lower member. The average values of sorting coefficient (SD) concentrated between 1.18–2.22 indicate a poor sorting. Skewness coefficient (SK) is with value of 0.12–0.32, negative skewness - very positive skewness is distributed; Kurtosis (KG) is low and gentle, mainly distributed in 0.77–1.23 and in a medium type, which indicates similar components. The Frequency curve showed that the unimodal is dominated and bimodal and multimodal has a smaller proportion. Cumulative

probability curves with one and two-stage based, including that two-stage curves often have coarse cut-off points.

The results showed that fluvial, diluvium, lacustrine and aeolian facies are developed in Luobei depression in Quaternary. Since the middle of early pleistocene, Lop Nor was mainly in semi-arid and subhumid climate, developed a freshwater lake at first and has a stronger hydrodynamic. Coarse clastic rocks and glutenite deposited in the coastal area, provide evidence of a river delta environment. Since the early mid-pleistocene, the climate started to become hot and dry, developed lakeshore and shallow lake microfacies gypsaceous mudstone under the environment of lake data, marked by gypsum-bearing mudstone began to appear. The climate get drier in late pleistocene, tectonic uplifting happened in Luobei area, causing the lake retreated and evaporated into a highly saline environment. Since the holocene Lop Nor became extremely arid and gradually developed into a playa, separated out halide such as halite.

Lop Nor presented the frequent change about the alternation of obvious and rapid lacustrine advance and retreat, it is the typical terrigenous clastic-chemical rock salt deposit pattern, reflecting the fresh water to salt water cycle oscillation changes. Salt lake evolution is the interaction of dry and wet climate cycles and the cyclical recharge of the fresh water from the mountains surrounding this lake basin.

Key words: grain size analysis, evolution of salt lake, Lop Nur

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