



OSL chronology of Yardangs revealed paleolake shrink and wind erosion since mid-Pleistocene in Qaidam Basin, Tibetan Plateau

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Yardangs in Qaidam Basin (QB), as a wind-eroded landform carved into paleo-lacustrine sediments, indicate an environmental transformation from lacustrine accumulation to wind erosion. Their formation ages are significant for the study of regional climate change and landform evolution; however, it is constrained by the limitation of dating methods. In this study, quartz optically stimulated luminescence and feldspar post-IRSL IRSL (pIRIR) were implemented in paleo-lacustrine sediments from yardangs to explore yardang development and lake evolution. The dating studies demonstrate a result of paleo-lacustrine sediments deposited from ~ 100 ka to ~ 330 ka, which mostly display several clusters (~ 97 - 122 ka, ~ 192 - 258 ka, ~ 296 - 331 ka) at interglacial periods, showing a possibility of mega lakes accumulated during interglacial periods mainly. Moreover, a conclusion may be deduced that Qarhan paleolake might be still with an expansive area in MIS7 but shrink to be smaller in MIS5, illustrating an aridification since mid-Pleistocene in QB. Additionally, the absence of paleo-lacustrine sediments during glacial periods might not only sustain the small or dried lakes during glacial periods, but also suggest a wind-eroded environment with ~ 0.02 - 0.2 mm/yr erosion rates estimated by maximum yardang height with minimum wind-eroded time in different areas. Considering these knowledges, yardangs controlled by a severe wind might have been carved principally since MIS6, especially MIS4, and their form had reached maturity with streamline shape at least in MIS2 resulted by the covering aeolian sands deposited at ~ 7 - 9 ka. Our dating results and abundant wind-eroded materials from yardangs offer direct chronological and geomorphology evidence to support the hypothesis proposed by Kapp et al. (2011) [1], implying that QB is a probable major source of China Loess Plateau.

References

[1] Kapp P, Pelletier JD, Rohrmann A, Heermance R, Russell J and Ding L, 2011. Wind erosion in the Qaidam basin, central Asia: Implications for tectonics, paleoclimate, and the source of the Loess Plateau. *Geological Society of America Today* 21(4-5): 4-10.