

# Millennial-scale climate instability in ‘hothouse’ state: implication from mid-Cretaceous and Quaternary lacustrine records in Mongolia

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Understanding of past climate variability and stability under exceptionally warm ‘hothouse’ conditions is essential for future climate projections. An annually laminated lacustrine record of Early Aptian (ca. 123–119 Ma) in southeast Mongolia provides evidence of millennial-scale extreme drought events during the mid-Cretaceous, resembling the abrupt climate fluctuations during the last glacial (e.g., Dansgaard-Oeschger cycle). We also present evidence of drastic environmental change during the last glacial from two lake sediment records in northern and southern Mongolia. Our findings, in conjunction with comparison of last glacial records, point to a previously unidentified mode of millennial-scale climate instability in the polar-ice-free ‘hothouse’ state. This climate instability is likely linked to reduced high-latitude ocean ventilation and switching of deep-water formation sites.

Keywords: Climate instability, hothouse, mid-Cretaceous