Vegetation-based moisture shifts in Qaidam Basin (NE Tibetan Plateau) during the Mid-Pleistocene Transition

Andreas Koutsodendris1*, Jörg Pross1, Christian Herb2, Xiaomin Fang3, Erwin Appel2

1 Institute of Geosciences, University of Frankfurt, Germany
2 Department of Geosciences, University of Tübingen, Germany
3 Institute of Tibetan Plateau Research, Chinese Academy of Sciences, Beijing, China
koutsodendris@em.uni-frankfurt.de

To better understand the evolution of the Asian monsoon during the Mid-Pleistocene Transition (MPT; ~1.2-0.7 Ma BP), which marks the shift from the 41-ka to the 100-ka ice-volume cycles during the Quaternary, we here investigate changes in moisture availability over the Qaidam Basin (NE Tibetan Plateau). Given the strategic position of the Qaidam Basin between the monsoon-westerlies-Siberian High climate systems and the sensitive response of desert plants to moisture shifts, we evaluate the vegetation dynamics on a continuous palaeolake sediment core (SG1) at centennial- to millennial-scale resolution. The most dominant pollen taxa comprise Artemisia and Chenopodiaceae, which account for ~60% of the total pollen grains on each sample. Based on the criterion that Chenopodiaceae can tolerate drier conditions than Artemisia, we apply their ratio (A/C) as a measure of relative moisture availability in arid regions. Our results provide evidence for increasing moisture during the younger intervals of the MPT (i.e., MIS 19-21). Such conditions point to strengthening of the influence of the summer monsoon and/or weakening of the winter monsoon over the Tibetan Plateau during that time, possibly driven by orbital forcing (i.e., low eccentricity and precession).

Key words (for online publication): Mid-Pleistocene Transition; Tibetan Plateau; Qaidam Basin; vegetation dynamics; Asian monsoon; orbital forcing