

"The Qaidam desert was once a lake: implications to Westerlies and East Asian summer monsoon"

by

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Abstract

The Qaidam Basin, the world's highest desert, has been proposed as the eolian factory. Cold and dry climatic conditions during the glacial periods, along with the equator-ward shift of the polar jet stream over the Qaidam Basin, were considered to be two crucial factors to maintain the high efficiency of wind erosion. However, studies of sedimentation, spore-pollen assemblages, and freshwater fossils indicate an extensive paleo-lake during the Last Glacial. To approach the discrepancy, we apply the compound-specific hydrogen isotope analysis and unsaturated alkenone-based paleothermometry to a dated core from the western Qaidam Basin to reconstruct the paleohydrology and temperature histories from ca. 44 ka to 15 ka. Our results reveal that the Qaidam Basin was wet during the Last Glacial except for three short terms of aridity around 41 ka, 28 ka, and 16 ka. The wet conditions reflect the climatic sensitivity of Qaidam Basin with the wet stage of 44-30 ka corresponding to the strong East Asian summer monsoon (EASM) under high summer insolation and the wet stage of 30-15 ka corresponding to the strong Westerlies under high winter (low summer) insolation. Three short terms of aridity under weak Westerlies and weak EASM are synchronous with the short-term, extreme cooling events in the North Atlantic.

Biography

Zhuang is interested in tectonics-climate-ecology interactions. His current research projects aim at resolving (1) the regional/global climate events over Kyr- and Myr-scale; (2) the Homo development during the late Pleistocene in East Asia (2-1 Ma); (3) the new methodology in paleoaltimetry; and (4) the global ecology turnover (C₃ to C₄ transition) during the late Miocene. He is running the organic geochemistry lab at LSU where the compound-specific isotope analysis and reconstructions of sea surface temperatures and lake temperatures can be conducted.

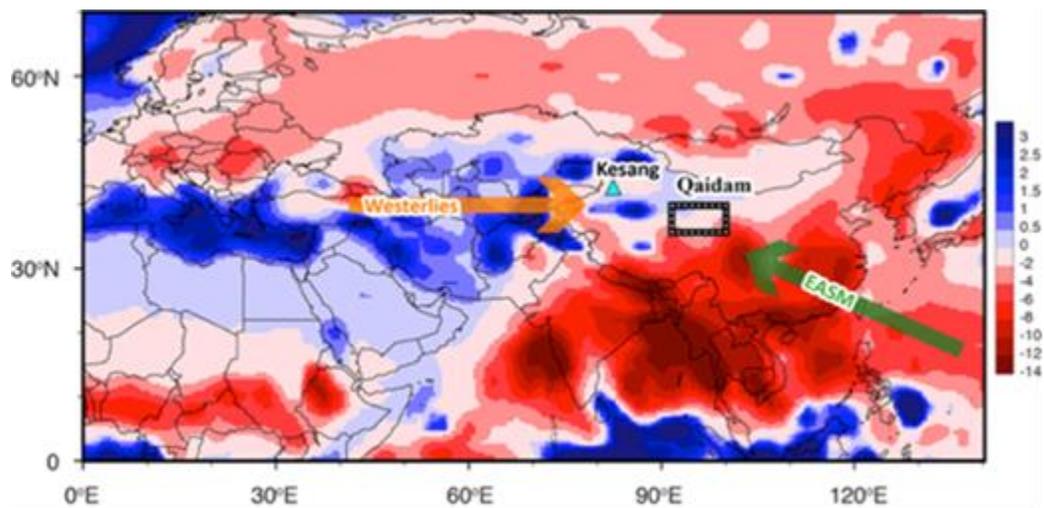


Figure 1. Seasonal differences in precipitations (winters/DJF minus summers/JJA, unit mm/day). Blue indicates more precipitations in winters; red indicates more precipitations in summers. Data are provided by NOAA/OAR/ESRL PSD, Boulder, Colorado, USA; <http://www.esrl.noaa.gov/psd/>. Color lines with an arrow indicate two climatic domains, the Westerlies-dominating areas and the EASM-dominating areas. Note the crucial location of the Qaidam Basin which straddles on the boundary that separates the Westerlies and the EASM.