

THE QUATERNARY VARIATION OF WESTERLIES AND ASIAN MONSOON CLIMATE SYSTEMS IN THE DESERT AREAS OF NORTHWESTERN CHINA

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The research area, the west Alashan Plateau in the Inner Mongolia of China, is a potentially important region for understanding atmospheric circulation changes that have led to shifts in the significance of westerlies and Asian monsoon climate systems during the Late Quaternary. Owing to the ancient and present morphodynamics, aerodynamic relief dominated by megadunes, desert plains, lake beds, alluvial fans, and desert gorges occur side by side in the investigated areas. These megadunes consist of active and relic dunes from different phases. The old consolidated surfaces of dunes and ancient lake sediments and terraces from the dune areas and the periphery of the dune fields show approximately a 10ka-scale periodic cycle of appearances of more humid climate. The chronology was provided by comparison of radiocarbon dates obtained from different landforms and thermoluminescence dating of sand dunes. Grain sizes and mineralogical analyses as well as paleomagnetic properties of sediment samples confirm the diversity of dune sand sources and the long existence of lakes among the dunes. The alluvial fans and erosion gorges are the evidences of past processes of water also. The increased precipitation at the ca 30 ka B.P., 19 ka B.P. in the research area and in the westerly neighboring deserts is ascribed to the influences of westerlies. The westerlies played a larger role in northwestern China during ice ages. The Holocene periods of more humid conditions should be caused by fluctuations of Asian monsoon.