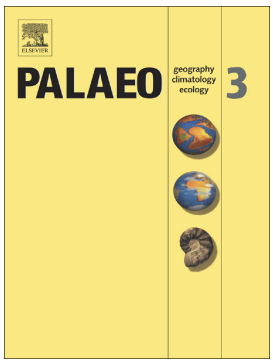

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Variations in the Westerlies in central Asia since 16 ka recorded by a loess section from the Tien Shan Mountains

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Abstract: Central Asia comprises a vast area of arid terrain which has an important impact on the global climate system. Although still debated, the pattern of climatic variations in central Asia is regionally distinctive and does not appear to be strongly related to changes in insolation. To understand the climatic evolution of central Asia, as well as its forcing mechanisms, it is necessary to characterize variations in the Westerlies, which have had a major influence on climate change in the region. Past variations in the Westerlies are commonly reconstructed from records of the composition, grain-size and mass accumulation rate (MAR) of loess and the eolian component of lacustrine sediments which are commonly mixed by the signal of surface atmospheric circulation. Here we present the results of grain-size analysis of a section of last glacial and Holocene loess deposits in the Tien Shan Mountains. The results indicate that the strength of the Westerlies was weakest during the last deglacial and early Holocene (16-6 ka), strongest during the mid-Holocene (6-3.1 ka), and moderate during the late Holocene (3.1-0 ka). By comparison with an independent record of humidity, we propose that the Westerlies were an important driver of moisture variations in central Asia, with strong Westerlies circulation resulting in high precipitation and vice versa during the past 16 kyr.

Key words: MAR; Holocene; last deglacial; precipitation

1. Introduction

Central Asia experiences an arid climate and is dominated by desert. It plays an