

Plateau. Fig. 7 shows the phytolith-based reconstructions of temperature and precipitation in Baoji over the last 150 ka and the 95% confidence interval.

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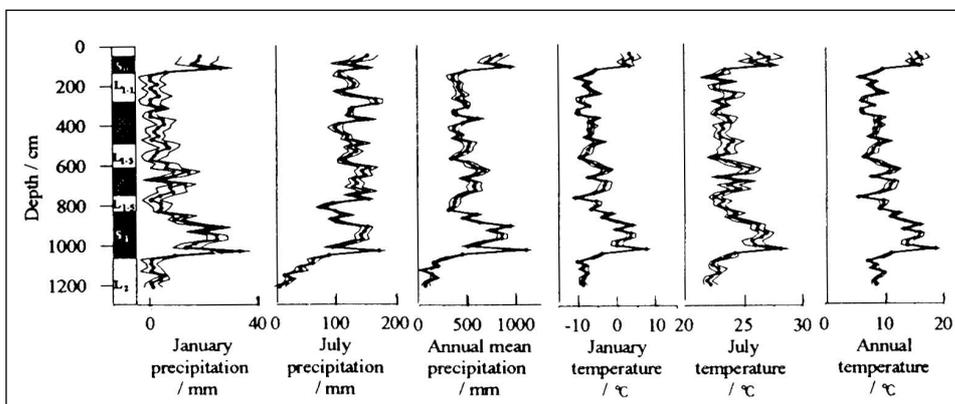


Fig. 7: Estimated temperature and precipitation variations in Baoji during the last 150 ka based on phytolith-climate transfer functions. Thick lines represent estimated regression values, fine lines are 95% confidence intervals.

Comparison of East Asian Monsoon Proxies from the Central China Loess Plateau and Lake Biwa

The pattern of climate in eastern Asia is dominated by the summer and winter monsoons (Gao, 1962). The loess-paleosol sequence on the Loess Plateau of central China constitutes an excellent proxy record of variations in East Asian monsoon climate over the past 2.5 Ma (An *et al.*, 1990; 1991; Ding *et al.*, 1995). Magnetic susceptibility (MS) of the loess and paleosols has been used as a proxy indicator for the summer monsoon intensity, i.e., high magnetic susceptibility values reflect increased summer monsoon intensity (An *et al.*, 1991); while the median diameter of quartz (QMD) isolated from the loess and paleosols can be regarded as a proxy index of the strength of winter monsoon winds, i.e., the greater the quartz median diameter, the stronger the winter monsoon winds (Xiao *et al.*, 1995). Studies on grain-size distribution, oxygen isotope composition and micromorphological features of monomineralic quartz isolated from sediments of Lake Biwa, central Japan suggested that quartz particles finer than 10 μm were derived, through the transport of the winter monsoon, from arid/semiarid regions of the Asian continent, and thereby can be regarded as eolian quartz (Xiao *et al.*, 1997a). By contrast, quartz grains coarser than 20 μm in the Lake Biwa sediments were considered to be derived, through soil erosion, from the surrounding terrain of the lake (Xiao *et al.*, 1997b). Eolian quartz flux (EQF) to Lake Biwa provides direct information on variations in the East Asian winter monsoon strength, i.e., the higher the eolian quartz flux, the stronger the winter monsoon winds (Xiao *et al.*, 1997a); whereas the fluvial quartz flux (FQF) reflects significant changes in paleoprecipitation over the lake area, and thus can be associated with the intensity of the summer monsoon, i.e., high fluvial quartz flux values imply increases in summer monsoon intensity (Xiao *et al.*, 1997b).

As shown in figure 8, the EQF and FQF records of Lake Biwa sediments can be well

compared with the QMD and MS records of the Chinese loess and paleosols. The intervals of high EQF values correspond to the periods of great QMD values, whereas the intervals of high FQF values correlate to the periods of high MS values. The EQF and the QMD as winter monsoon proxies indicate that the winter monsoon strengthened during periods marked by high EQF and QMD values, and it was relatively weaker when EQF and QMD values were lower. As summer monsoon proxies, the FQF and the MS reveal significant variations in the intensity of the summer monsoon, i.e., the higher the FQF and MS values, the stronger the summer monsoon circulation. Variations in winter monsoon strength indicated by the EQF and QMD proxies bear a general inverse relation to those in summer

monsoon intensity inferred from the FQF and MS proxies.

These four proxy records of East Asian paleomonsoon climate can be correlated with the SPECMAP marine $\delta^{18}\text{O}$ stages 1 through 6 (Martinson *et al.*, 1987) (Fig. 8). The main intervals of low EQF and QMD values and high FQF and MS values apparently coincide with SPECMAP $\delta^{18}\text{O}$ substages 5e, 5c, and 5a, stage 3, and the early part of stage 1, while the main intervals of great EQF and QMD values and low FQF and MS values occurred during $\delta^{18}\text{O}$ stages 4 and 2.

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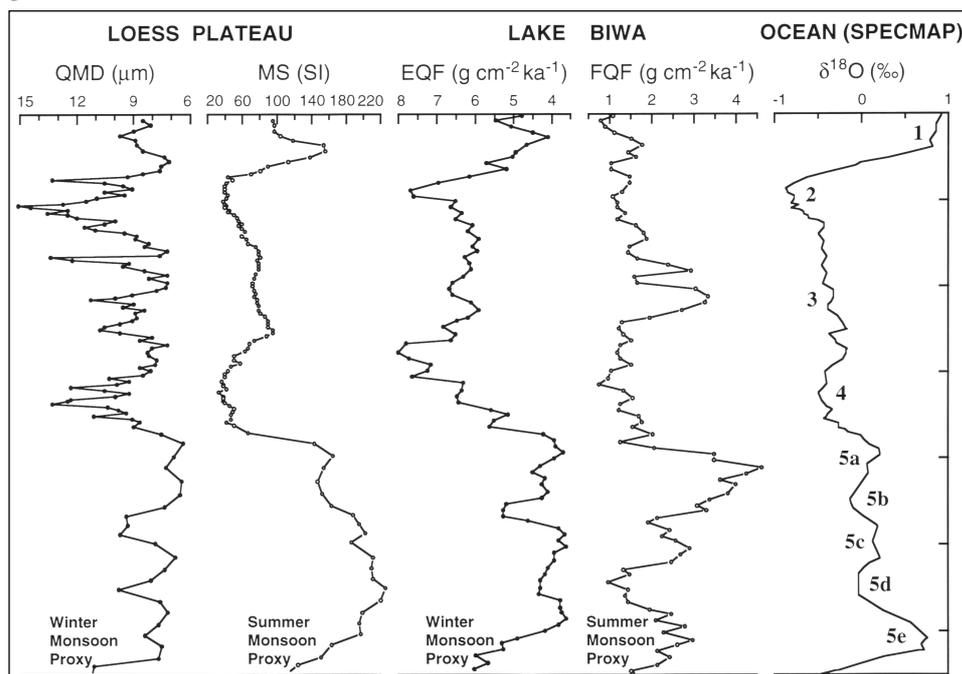


Fig. 8: Time series of the last ca. 130,000 years comparing the quartz median diameter (QMD) and magnetic susceptibility (MS) of the loess-paleosol sequence at Luochuan in the central part of the Loess Plateau and the eolian quartz flux (EQF) and fluvial quartz flux (FQF) of Lake Biwa sediments the SPECMAP $\delta^{18}\text{O}$ record (from Quaternary Science Reviews, in press).