Introduction

The arid history during the present Holocene interglacial could provide analogs for the future climatic variations in the Eurasian continent interior. Here we use pollen records of a terminal lake in a Chinese desert to support our previous finding that Holocene climate in arid and summer monsoon margin regions was generally unstable with a specially strong drought in the mid-Holocene (Chen, et al, 2001, 2003; Zhu, et al, 2002).

Geographical Settings

The Shiyang River drainage lies on the northern side of the Qilian Mountain, the northern margin of the Tibetan Plateau, and at the eastern end of the Hexi corridor. The drainage is on the margin of present E. Asian summer monsoon in arid western China, an area where climate is strongly influenced by both the E. Asian Monsoon and the prevailing Westerlies. Study site (SJC Section 39°00’38”N/103°20’25”E) is indicated as a triangle.

Lithology and Laboratory Methods

Pollen samples were taken from a 700 cm deep section (SJC) in a terminal lake of Shiyang River, with a resolution of 50 year interval. The sediments of the section consist of silty clay, silt and sand.

The chronology of the section is controlled by thirteen radiocarbon dates on charcoal, bulk organic matter and pollen concentrates. The section spans from the last glacial to the present.

Pollen Assemblages

Standard techniques were employed for pollen extraction and analysis with some modifications. The pollen assemblages are shown in the following Figures.

Discussion and conclusions

Comparisons of pollen concentrations (A), the high elevation vegetation pollen concentrations (B) and Picea-Pinus percentages at the SJC section (C) with percentages of hematite-stained grains in Core VM29-T91 in the North Atlantic, a ice-raft and temperature proxy record (D; Bond, et al, 2001), and with potassium ion content in the GISP2 Ice core, a proxy of the Siberian High (E; Mayewski, et al, 1997). The episodes of high hematite-stained grain content are marked in sequence from 80-8. Shaded areas indicate periods of weak summer monsoon and thus dry climate events in the study area, and principle periods of strong Siberian High.

Summary:

1. At the monsoon margin of the south Mongolian plateau, our pollen results show three main stages during Holocene, i.e., the wet early Holocene (11.6-7.1 Cal ka), dry Mid-Holocene (7.1-3.8 Cal ka) and wet late Holocene (3.8-0 Cal ka).
2. Holocene climate in monsoon margin has the general millennial and centurial-scale humid variations, which are similar to rapid Holocene climate changes documented elsewhere and to those during last glacial.
3. The general strong dry climate lasting from ca 7000 to 5000 cal year was in the so-called mid-Holocene mega-thermal period in E. Asian Summer Monsoon Margin.

References


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