Home
Online Library CP
- Recent Final Revised Papers
- Volumes and Issues
- Special Issues
- Library Search
- Title and Author Search

Online Library CPD
Alerts & RSS Feeds
General Information
Submission
Review
Production
Subscription
Comment on a Paper

Volumes and Issues Contents of Issue 2 Special Issue

Clim. Past, 5, 157-169, 2009
www.clim-past.net/5/157/2009/

Three exceptionally strong East-Asian summer monsoon events during glacial times in the past 470 kyr

D.-D. Rousseau[1,2], N. Wu[3], Y. Pei[3], and F. Li[3]
[1]Ecole Normale Supérieure de Paris, Laboratoire de Météorologie Dynamique (UMR INSU/CNRS 8539), and CERES-ERTI, 24 rue Lhomond, 75231 Paris cedex 5, France
[2]Lamont-Doherty Earth Observatory of Columbia University, Palisades, NY 10964, USA
[3]Key Laboratory of Cenozoic Geology and Environment, Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China

Abstract. Chinese loess sequences are interpreted as a reliable record of the past variation of the East Asian monsoon regime through the alternation of loess and paleosols units, dominated by the winter and summer monsoon, respectively. Different proxies have been used to describe this system, mostly geophysical, geochemical or sedimentological. Terrestrial mollusks are also a reliable proxy of past environmental conditions and are often preserved in large numbers in loess deposits. The analysis of the mollusk remains in the Luochuan sequence, comprising L5 loess to S0 soil, i.e. the last 500 ka, shows that for almost all identified species, the abundance is higher at the base of the interval (L5 to L4) than in the younger deposits. Using the present ecological requirements of the identified mollusk species in the Luochuan sequence allows the definition of two main mollusk groups varying during the last 500 kyr. The cold-aridiphilous individuals indicate the so-called Asian winter monsoon regime and predominantly occur during glacials, when dust is deposited. The thermal-humidiphilous mollusks are prevalent during interglacial or interstadial conditions of the Asian summer monsoon, when soil formation takes place. In the sequence, three events with exceptionally high abundance of the Asian summer monsoon indicators are recorded during the L5, L4 and L2 glacial intervals, i.e., at about 470, 360 and 170 kyr, respectively. The L5 and L4 events appear to be the strongest (high counts). Similar variations have also been identified in the Xifeng sequence, distant enough from Luochuan, but also in Lake Baikal further North, to suggest that this phenomenon is regional rather than local. The indicators of the summer monsoon within the glacial intervals imply a strengthened East-Asian monsoon interpreted as corresponding to marine isotope stages 12, 10 and 6, respectively. The L5 and L2 summer monsoons are coeval with Mediterranean sapropels S12 and S6, which characterize a strong African summer monsoon with relatively low surface water salinity in the Indian Ocean. Changes in the precipitation regime could correspond to a response to a particular astronomical configuration (low obliquity, low precession, summer solstice at perihelion) leading to an increased summer insolation gradient between the tropics and the high latitudes and resulting in enhanced atmospheric water transport from the

tropics to the African and Asian continents. However, other climate drivers such as reorganization of marine and atmospheric circulations, tectonic, and the extent of the Northern Hemisphere ice sheet are also discussed.

Final Revised Paper (PDF, 4342 KB) Supplement (33 KB) Discussion Paper (CPD)

Citation: Rousseau, D.-D., Wu, N., Pei, Y., and Li, F.: Three exceptionally strong East-Asian summer monsoon events during glacial times in the past 470 kyr, Clim. Past, 5, 157-169, 2009. Bibtex EndNote Reference Manager