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Evolution of the Indian summer monsoon during the interval 32.7–11.4 cal. ka BP: Evidence from the Baoxiu peat, Yunnan, southwest China

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Abstract

There have been few investigations of the phase relationship between the Indian summer monsoon (ISM) and the East Asian summer monsoon (EASM) during the last glacial period. We present multi-proxy mineralogical and geochemical records from a peat core taken from the Baoxiu Basin, central Yunnan, southwest China, to investigate changes in chemical weathering and climate associated with the ISM in southwest China spanning the interval ~32.7–11.4 ka BP. The results suggest that the LGM period (23–18 ka BP) was characterized by cold and dry climatic conditions. A comparison of proxy data from Baoxiu peat with other related proxy climate records reveals that broadly synchronous variations in the ISM and EASM on orbital timescales can be attributed to solar radiation forcing in the Northern Hemisphere. In addition, four synchronous weak millennial-scale monsoonal events coincide well with cooling events recorded in the NGRIP ice core (corresponding to the Younger Dryas, and Heinrich events H1, H2, and H3). Significantly, the strengths of the two Asian monsoons show an inverse relationship during the interval 23–19 ka BP, probably resulting from El Niño-like conditions in the tropical Pacific.

Key Words: Peat; East Asian summer monsoon; Indian Summer Monsoon; Chemical weathering

1. Introduction

The Indian summer monsoon (ISM) and the East Asian summer monsoon (EASM) are two subsystems of the Asian monsoon. They are independent systems but