Peatland primary productivity response to the monsoon evolution in the past 20,000 years, Central China

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Résumé

A better understanding of a peatland primary productivity and carbon storage might provide an insight into future ecosystem response to global change. Dajiuhu wetland is a key area for understanding how wetland responded to the monsoon climate system in central China. In order to explore the relation between peatland primary productivity and paleoclimate change, a continuous and undisturbed peat core (ZK5) with a depth of 300 cm was collected using a 50-cm-long Russian-type peat corer at the center of the Dajiuhu Peatland. TOC and LOI, phytolith assemblages and indices (*Iw*, Bc), and geochemical elementary data are comprehensively analyzed to rebuild the paleo-monsoon history and peatland primary productivity in the past 20 cal ka BP. The dominant phytoliths in core samples are from grasses including bulliform cells (parallelepipedal bulliform cells and cuneiform bulliform cells), short cells (rondels, bilobates, crosses, saddles and trapeziform polylobates), long cells (elongates smooth, elongates dendriform, and elongates echinate) and hair cells (point-shaped), and trees including vascular tissues, multifaceted blocky, acicular hair cells, and unknown origin. Phytolith indices including bulliform cells index (Bc), warmth index (*Iw*) were calculated and analyzed. Chronology is determined by ten radiocarbon dates. The phytolith assemblages exhibited 4 paleoecology zones and reflected the history of paleovegetation evolution, indicating a large dominance of Pooideae during the Holocene; The geochemical elements combined with the deposition rate revealed 5 stages of peatland evolution. Correlation of primary productivity with the monsoon intensity and solar radiation during the past 20000 years revealed the followings: low primary productivity and plant biomass input were induced during the weak monsoon and declined insolation during Last Glacial Maximum (20-18 cal ka BP); last Deglaciation (18-11.5 cal ka BP) was characterized by the wildly fluctuating monsoon and increasing primary productivity; during the early-mid Holocene (11.5-3.0 cal ka BP), high primary productivity and rising temperature corresponded to the enhanced monsoons; decreasing primary productivity were observed due to the reduced solar radiation and weak monsoons since 3.0 cal ka BP. Two significant long-scale cold events are recorded by warmth index including Heinrich (H1) and Younger Dryas (YD). The complex climatic combination (warm-wet, warm-dry, cold-wet, cold-dry) in the study area is different from the typical pattern (cold-dry and warm-wet) in the Chinese Loess Plateau. Our results are significant in understanding how peatland primary productivity responds to the monsoon changes since the Last Glacial Maximum in Shennongjia National Nature Reserve.

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Mots-Clés: Dajiuhu Peatland, geochemical elementary