



Late Quaternary pollen data collection and application in land-cover reconstruction for East Asia and Siberia

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The various climatic systems and vegetation zones in the East Asia cause the numerous open questions concerning the evolution of the Asian Monsoon and vegetation change on various time-scales. Fossil pollen is one of the most spatially extensive terrestrial palaeoenvironmental proxies during the late Quaternary, and the multi-record fossil pollen synthesis is a potential solution for the open questions in palaeoecology and palaeoclimatology. We collected and selected 274 pollen records from eastern continental Asia (70° [U+F02D] 135° E and 18° [U+F02D] 55° N). After pollen percentage recalculations, taxonomic homogenization, age-depth model revision, and pollen abundance linear interpolation, a taxonomically harmonized and temporally standardized fossil pollen dataset established at a 500-year resolution covering the last 22 ka. In addition, we also established a modern pollen dataset including 2626 modern pollen data from China and Mongolia. We used the calibration-set based on modern pollen and satellite-based Advanced Very High Resolution Radiometer (AVHRR) observations of woody cover, to reconstruct woody cover for the 274 fossil pollen records. The spatial range of forest has not noticeably changed in eastern continental Asia during the last 22 ka, although woody cover has, especially at the margin of the eastern Tibetan Plateau and in the forest-steppe transition area of north-central China. Vegetation was sparse during the LGM in the present forested regions, but woody cover increased markedly at the beginning of the Bølling/Allerød period (B/A; ca. 14.5 ka BP) and again at the beginning of the Holocene (ca. 11.5 ka BP), and is related to the enhanced strength of the East Asian Summer Monsoon. Forest flourished in the mid-Holocene (ca. 8 ka BP) possibly due to favourable climatic conditions. In contrast, cover was stable in southern China (high cover) and arid central Asia (very low cover) throughout the investigated period. Forest cover increased in the north-eastern part of China during the Holocene. Recently, we have extended our pollen dataset to Siberia by collecting 178 fossil pollen records and 2100 modern pollen data from Siberia and its surrounding areas. We believe the improved pollen dataset can support us more accurate and comprehensive understanding in palaeoecology and palaeoclimatology.