

Impact of the Holocene Thermal Maximum on subalpine forest diversity in central Taiwan

Liang-Chi Wang¹

¹ National Chung Cheng University

The East Asian summer monsoon (EASM) is crucial in the global monsoon system and significantly influences Taiwan's climate and ecosystems. However, studying its impact on vegetation diversity during the Holocene in Taiwan faces challenges due to unclear and absent high-resolution climate records. Pollen, charcoal, and diatom records from Tien Pond (TP) provide detailed insights into vegetation changes, fire frequency, and hydrological conditions over the last 8500 cal BP, shedding light on EASM intensity patterns and their connection with subtropical forest ecosystems. Paleo-temperature estimations derived from the proportion of upper montane forest (UMF) and principal component analysis (PCA; PC2) reveal the warm Holocene Thermal Maximum (HTM) period between 7000–2860 cal BP. Additionally, paleo-precipitation patterns inferred from diatom concentration and PCA (PC1) indicate reduced EASM precipitation during the HTM, contrasting with the late Holocene precipitation decrease in northern China. The positive relationship between the palynological richness index (PRI) and arboreal pollen percentage underscores the crucial role of forest canopy cover in maintaining forest diversity. The high PRI observed during the warm/dry HTM period suggests that subtropical montane forests acted as climate refuge, sustaining rich biodiversity amid climatic shifts. These findings carry significant implications for conserving and managing subtropical forest ecosystems in the face of impending climate change.

Keywords: Pollen, diatom, charcoal, vegetation history