New findings shed light on major environmental shift by Middle Eocene in Southern China

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Hervey clouds formed during storm from north-west to south-east, at monsoon, over Salt Lake, Calcutta. Credit: Biswarup Ganguly/Wikipedia

The modern environment of southern China is dominated by a humid monsoon climate, and presents a striking contrast to the widespread deserts found at similar latitudes elsewhere.

The formation of a monsoon climate marks a major environmental shift in southern China during the Cenozoic; however, the origin and possible driving mechanism of the climate transition remain unclear.

Researchers from the Institute of Tibetan Plateau Research (ITP) of the Chinese Academy of Sciences compared Paleogene palynological records and investigated the temporal evolution of palynoflora during the Paleogene, especially the Eocene. Their findings would provide helpful insights into the evolution of climate patterns and the initiation of monsoon in southern China.

They concentrated on the Paleogene palynological records from seven basins throughout southern China.

The Paleogene palynoflora revealed two completely different vegetation and climate patterns: the Paleocene to early Eocene was characterized by a relatively high abundance of xerophilous Ephedripites and drought-resistant Pterisisporites, suggesting an arid/semi-arid climate.

While the middle Eocene to Oligocene was composed of subtropical wet evergreen and deciduous broad-leaved mixed forest characterized by a significant increase in broad-leaved, coniferous taxa, and the almost complete disappearance of xerophilous taxa, together indicating the emergence of a warm-humid climate at that time.

The researchers summarized the evolution of climate patterns in southern China during the Paleogene using paleoenvironmental maps for five different time intervals based on palynological records and other geological indicators.

They also revealed that the major environmental transition occurred roughly around the middle Eocene. This transition may mark the establishment of the monsoon climate.

Furthermore, the middle Eocene climatic parameters obtained by the coexistence approach (CA) were compared with those of modern sites under individual climate regimes; the reconstructed climatic parameters were most similar to those of the modern East Asian monsoon (EAM) climate in southern China, while being distinct from those of modern Indian monsoon or Inter-Tropical Convergence Zone (ITCZ) monsoon.

These results further support the previous view that an EAM, similar to that of the present, has prevailed in southern China since as early as the middle Eocene.

The evolution of the Paleogene palynoflora in southern China is largely consistent with global climate change.

The researchers infer that the enhancement of the East Asian winter monsoon during the middle Eocene was closely related to long–term global cooling, while the intensified East Asian summer monsoon was primarily caused by the northward drift of the Indian Subcontinent and the uplift of the Tibetan Plateau.

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