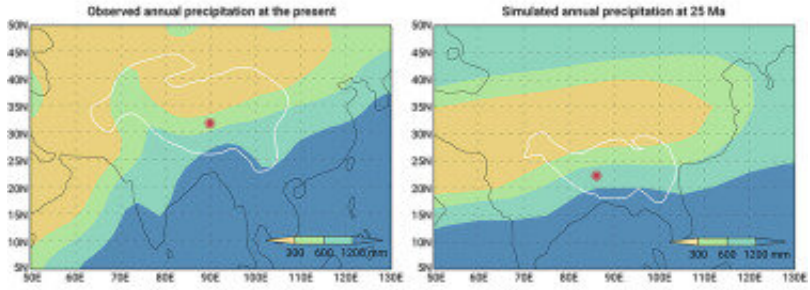
Bridging the knowledge gap on the evolution of Asian monsoons

June 1 2021, by Li Yuan



Graphical abstract. Credit: *The Innovation* (2021). DOI: 10.1016/j.xinn.2021.100110

As an important part of global atmospheric circulation, the Asian monsoon greatly affects the ecological system and social economy in Asia. However, the evolution and related driving forces of the Asian monsoon before the Miocene are still controversial.

A collaborative team led by Prof. Wang Yufei from the Institute of Botany, Prof. Deng Tao from the Institute of Vertebrate Paleontology and Paleoanthropology, and Prof. Liu Xiaodong from the Institute of Earth Environment of the Chinese Academy of Sciences reconstructed the precipitation data of central Tibet during about 26-16 million years ago (Ma) by applying the coexistence approach to sedimentary pollen data, and detected an intensified Asian monsoon during this time.

The study was published in *The Innovation*.

Paleoclimate modeling showed that the study area in central Tibet was located at ~22.27 °N ~25 Ma, where the climate was controlled by the intertropical convergence zone (ITCZ) in summer but not in winter.

Similar to the generation mechanism of modern tropical monsoon, a monsoon climate developed in central Tibet during the Late Oligocene to Early Miocene under the influence of the ITCZ.

Through spectral analysis at the 95% confidence level with a Monte Carlo test, the researchers revealed that the Asian monsoon fluctuated in ~1.35 Ma and ~0.33 Ma cycles, which appeared to correspond to the eccentricity with a ~0.4 Ma cycle and the obliquity amplitude with a ~1.2 Ma cycle during 26-16 Ma.

This coupling relationship suggested that the fluctuations in the Asian monsoon during 26-16 Ma could be attributed to the long-period cyclicities in obliquity (~1.2 Ma).

These findings provide climate data that can be used to understand the Asian monsoon evolution during the Late Oligocene to Early Miocene and highlight the effects of paleogeographic patterns and long-period orbital forcings on the tectonic-scale evolution of the Asian monsoon.

More information: Gan Xie et al, Bridging the knowledge gap on the evolution of the Asian monsoon during 26–16 Ma, *The Innovation* (2021). DOI: 10.1016/j.xinn.2021.100110

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