

Changes in Tibetan Plateau latitude as an important factor for understanding East Asian climate since the Eocene: A modeling study

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Previous climate modeling studies suggest that the surface uplift of the Himalaya–Tibetan plateau (TP) is a crucial parameter for the onset and intensification of the East Asian monsoon during the Cenozoic. Most of these studies have only considered the Himalaya–TP in its present location between $\sim 26^{\circ}\text{N}$ and $\sim 40^{\circ}\text{N}$ despite numerous recent geophysical studies that reconstruct the Himalaya–TP 10° or more of latitude to the south during the early Paleogene. We have designed a series of climate simulations to explore the sensitivity of East Asian climate to the latitude of the Himalaya–TP. Our simulations suggest that the East Asian climate strongly depends on the latitude of the Himalaya–TP. Surface uplift of a proto-Himalaya–TP in the subtropics intensifies aridity throughout inland Asia north of $\sim 40^{\circ}\text{N}$ and enhances precipitation over East Asia. In contrast, the rise of a proto-Himalaya–TP in the tropics only slightly intensifies aridity in inland Asia north of $\sim 40^{\circ}\text{N}$, and slightly increases precipitation in East Asia. Importantly, this climate sensitivity to the latitudinal position of the Himalaya–TP is non-linear, particularly for precipitation across East Asia.

