High and low-latitude forcing of East Asian monsoon precipitation change during the late Pliocene

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3.6 Ma represents a time period when Earth transitioned from single pole ice sheets to permanent ice sheets existing in both hemispheres. However, it remains unclear how this transition had its impact on East Asian summer monsoon system, which controls living of a large population. Here, we present a high-resolution (2~4 kyr) monsoon precipitation record from the Chaona section on the central Chinese Loess Plateau during the 3.95-2.95 Ma, using the magnetic parameter-based precipitation proxy ($\chi$fd/HIRM). The results reveal intensified precessional and semiprecessional fluctuations during high eccentricity, emphasizing direction role of low latitude insolation played in forcing Asian monsoon precipitation. The precipitation records also show that the 41-kyr cycles intensified after 3.3 Ma, in contrast with decreased obliquity variation amplitude of summer insolation. We interpret the enlarged 41-kyr precipitation cycles in our records as a result of high latitude ice sheet forcing. Together, our work provides an example demonstrating both high and low latitude forcing of Asian monsoon precipitation during the late Pliocene.