

## The East Asian winter monsoon variability during the past 150,000 years

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The response of the East Asian winter monsoon variability to orbital forcing is still unclear, and hypotheses are controversial. We present a 150,000 yr record of sea surface temperature difference (delta SST) between the South China Sea and other Western Pacific Warm Pool regions as a proxy for the intensity of the Asian winter monsoon, because the winter cooling of the South China Sea is caused by the cooling of surface water at the northern margin and the southward advection of cooled water due to winter monsoon winds. The delta SST showed dominant precession cycles during the past 150,000 yr. The delta SST varies at precessional band and supports the hypothesis that monsoon is regulated by insolation changes at low-latitudes (Kutzbach, 1981), but contradicts previous suggestions based on marine and loess records that eccentricity controls variability on glacial-interglacial timescales. Maximum winter monsoon intensity corresponds to the May perihelion at precessional band, which is not fully consistent with the Kutzbach model of maximum winter monsoon at the June perihelion. Variation in the East Asian winter monsoon was anti-phased with the Indian summer monsoon, suggesting a linkage of dynamics between these two monsoon systems on orbital timescale.

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