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Orbital scale variability of the Asian monsoon modulated by the Tibetan Plateau uplift identified in a coupled ocean-atmosphere model

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A fast Ocean-Atmosphere Model was applied to simulate the Asian monsoon changes on conditions of high mountains (HM) and low mountains (LM) in the present-day Tibetan plateau region with Earth's orbital parameters (precession and obliquity) variations. The experiments show that, when orbital changes induced boreal summer insolation increases (decreases), the monsoonal precipitation notably increases (decreases) as well along regions from North Africa to East Asia, which are northernmost regions influenced by summer monsoon. Furthermore, the Asian monsoonč̆mainly characterized by precipitationč̆ĥas much greater response to insolation forcing in HM scenario than that in LM case. Such monsoonal rainfall variations are closely related to atmosphere circulation changes. The simulated results from this coupled ocean-atmosphere model may provide us with a new perspective to understand the mechanism of dramatically increased East Asian monsoon variability on orbital time scale during Pliocene, as recorded in Chinese loess-paleosol sequences.