Precession-band variance missing from East Asian monsoon runoff

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Confidence in reconstructing East Asian monsoon rainfall using precipitation isotope proxies is a matter of debate, largely due to the lack of correlation between precipitation amount and isotopic composition in the present climate. We address this using $\delta^{18}O$ of foraminiferal $CaCO_3$, offshore from the Yangtze River Valley (YRV), to reconstruct seawater $\delta^{18}O$, a variable linearly related to salinity, responding primarily to dilution by local precipitation and YRV runoff.

We present four new, very highly resolved records spanning the past 400,000 years (~200 year sample spacing) from IODP Site U1429, East China Sea. We show that the Precession- and millennial-scale variance in the onshore YRV speleothem $\delta^{18}O$ record (10.1038/nature18591) is also embedded in the offshore Site U1429 planktonic foraminfera $\delta^{18}O$ record (*Globigerinoides ruber*). However, after removing variance associated with changing surface temperatures (Mg/Ca-based SST) and global seawater $\delta^{18}O$, the resulting local seawater $\delta^{18}O$ record bears little resemblance to the speleothem $\delta^{18}O$ record. Unlike speleothem $\delta^{18}O$, dominated by precession-band (23-ky) cyclicity, the seawater $\delta^{18}O$ is dominated by eccentricity (100-ky) and obliquity (41-ky) cycles as well heterodynes thereof, with little precession-scale variance. This spectral signature is consistent with an array of regional monsoon proxy records, suggesting that East Asian monsoon rainfall is more sensitive to high latitude ice sheet and greenhouse gas forcing than to direct insolation forcing.

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