

Myr-scale monsoon records paced with Milankovitch cycles during Triassic-Jurassic

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Earth's orbital variations on timescales of 10^4 - 10^5 years, known as Milankovitch cycles, have played a critical role in pacing climate change and ecosystem dynamics, through glacial and/or monsoon dynamics. However, the climatic and biotic consequences of these cycles on much longer ($\sim 10^7$ years) timescales remain unclear, due to a lack of long proxy records with precise age constraints. Here, we show ~ 10 -Myr scale variations in early Mesozoic (250-180 Ma) records of pelagic biogenic-silica burial flux, atmospheric $p\text{CO}_2$, and sea-surface-temperature (SST). Their phase relationships, coupled with carbon cycle modeling results, suggest that orbitally-paced summer monsoon dynamics modulates changes in global weatherability, affecting changes in $p\text{CO}_2$ and SST.