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## Precessional effects on West Africa summer monsoon intensity and duration

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The changes of summer monsoon precipitation over West Africa has been well documented for the past climate. However, the specific changes in the onset, withdrawal, and duration of the WASM have not been explored extensively due to the lack of high temporal resolution reconstructions.

Solar insolation, which reaches its maximum during boreal summer, acts as the primary energy source for the monsoon system. The precession of Earth's orbit regulates the occurrence of perihelion and aphelion and the length of the summer season. To examine the role of precession on the WASM, we conducted 24 time-slice simulations, altering the precession angle from 0° to 345° with a 15° interval.

Using simulated daily precipitation for West Africa, we analyzed the intensity, onset, withdrawal, and duration of the summer monsoon in our model study. Our findings reveal that precession has a significant influence on the intensity and duration of the WASM. Generally, during the northern summer, if Earth is closer to perihelion, the WASM tends to be stronger but shorter. Conversely, if Earth is closer to aphelion, the WASM is weaker but has a longer duration.

These results emphasize the importance of considering the orbital effect on the WASM intensity and duration over a precessional cycle.