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Differential and equatorial heating drive African monsoon variations during mid Holocene

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The Sahara was wet 11–5 kya and during multiple interglacial periods. The prevailing understanding is that such wet episodes were instigated by variations in the differential heating of the hemispheres, driven by Earth's Precession. However, comprehensive climate models forced by orbital variations severely underestimate these wet conditions, implying misrepresentation of critical processes in climate models. Here we employ recent theory that relates the position of the intertropical convergence zone (ITCZ) to the atmospheric energy budget to analyze simulations of the mid Holocene by climate models participating in the third phase of the Paleo Model Intercomparison Project (PMIP3). We find that variations in the regional energy balance, which are independent from orbital forcing, are critical for understanding African climate variations. The findings challenge the view that Precession is the pacemaker of African humid periods, and point to equatorial heating as an important but so-far unexplored potential driver of wet conditions in the Sahara.