

# **Atlantic Meridional Overturning Circulation Influence on the Annual Mean Intertropical Convergence Zone Location in the Miocene**

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The Intertropical Convergence Zone (ITCZ) has an annual mean location north of the equator today. The factors determining this location and the evolution to its modern state are actively debated. Here we investigate how the Atlantic Meridional Overturning Circulation (AMOC) influences the ITCZ during the early-to-middle Miocene. By conducting a paleoclimate modeling sensitivity study to northern high-latitude gateway opening, we show that North Atlantic Deep-Water formation strengthens the AMOC, in alignment with Miocene North Atlantic ventilation proxies. A vigorous AMOC increases northward Atlantic Ocean heat transport and cross-equatorial atmospheric energy transport shifts southwards to compensate, pushing the ITCZ northwards. Our study supports AMOC development as a strong contributor to the ITCZ's northern location today and bolsters the energetic framework that links the ITCZ shifts to atmospheric energy balance. Existing proxy-based interpretations of ITCZ history are too sparse to strongly confirm these results. We predict a strong in-phase relationship between AMOC strength and ITCZ's northward location, which should be testable in high resolution paleoclimate records.