

## Why the ITCZ is in the Northern Hemisphere: Role of the AMOC

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The Northern Hemispheric location of the intertropical convergence zone is one of the defining features of the tropical climate. We present evidence that shows that the location of the ITCZ in the Northern Hemisphere is due to the AMOC. Recent model results have shown that the ITCZ responds to heat flux anomalies even in the high latitudes. We argue that the upward surface flux in the North Atlantic (and downward flux in the South Atlantic) ultimately results in a rearrangement of the Hadley circulation, and a large northward cross-equatorial moisture transport, drawing the rain band into the NH.

We use satellite data and atmospheric reanalyses to approximate the surface fluxes, showing that the AMOC is the dominant factor heating the NH. Model simulations with symmetrized surface flux have the ITCZ flipping into the SH. Idealized coupled model simulations, with simplified basin shapes, corroborate our theory. With a single rectangular basin, the ITCZ is in the SH. But the addition of a Drake Passage-like feature into this model anchors deep water production in the NH, and shifts the ITCZ into the NH. We discuss implications for natural climate variations, climate modeling, global warming, and paleoclimate.