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Multiple equilibria of the Hadley circulation: a cause for the double ITCZ?

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Simple axisymmetric models as well as aquaplanet atmospheric General Circulation Models exhibit multiple regimes of the Hadley circulation, in which, for Sea Surface Temperature forcings symmetric about the equator, the latitudinal distribution of precipitation is either symmetric or asymmetric about the equator. Sometimes these regimes overlap creating multiple equilibria. Results from a simple model of the Quasi-equilibrium Tropical Circulation Model family suggest that the double Intertropical Convergence Zone syndrome could be related to this behavior of the atmospheric models. We also show that the occurrence of multiple equilibria is sensitive to the vertical profile of wind and therefore to the vertical profile of convective heating.