Session: C28 Poster: W58A

Dynamics and feedbacks controlling the intertropical convergence zone location and sensitivity to cumulus parameterization

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The Atmospheric General Circulation Models ARPEGE-CLIMAT and LMDz are used in an aquaplanet configuration to study the response of a zonally symmetric atmophere to a range of Sea Surface Temperature (SST) forcing. We impose zonally-symmetric SST distributions that are also symmetric about the equator, with varying flatness at the equator. In both models, we obtain the characteristic Intertropical Convergence Zone (ITCZ) splitting that seperates two regimes of equilibrium (in terms of precipitation): one with one ITCZ over the equator for large SST gardients in the tropics, and one with a double ITCZ for small tropical SST gradients. Transition between these regimes is mainly driven by changes in the low-level convergence that are forced by the SST gradients. Model-dependent, dry and moist feedbacks intervene to reinforce or weaken the effect of the SST forcing. It is suggested that these feedbacks influence the location of the ITCZ. Sensitivity experiments to the parameters of the convection scheme are performed within the full AGCM ARPEGE and its aquaplanet configuration. The purpose is to validate this idealized approach and understand the interaction between large-scale circulation and moist convection and its role in the ITCZ location. Feedbacks associated to clouds and those between moisture and convection will be analyzed.