



The impact of zonal organization of convection in the tropical rain belt on the zonal-mean tropical precipitation

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The spatial and temporal organization of convection has been shown to have a substantial impact on the model climate in simulations of radiative convective equilibrium. This raises the question whether convective organization also has an impact on the tropical climate in more realistic settings. Here we are going to focus on the impact of zonal organization of convection, such as is common in the rain belt of the intertropical convergence zone (ITCZ), on the large-scale circulation and the zonal-mean meridional response in particular. By combining observational and reanalysis data with climate simulations on an aquaplanet, we show that stronger zonal organization of convection is associated with a substantial zonal-mean meridional response. Increased zonal organization leads in particular to a widening of the ITCZ without systematically affecting the overall tropical precipitation. This occurs because, the meridional moisture decreases at the expense of increasing zonal moisture convergence. As a consequence less moisture is transported into the equatorial region, reducing precipitation there, while leaving more moisture to increase precipitation at higher latitudes.