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Role of deep convection strength in the tropical Pacific climate

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Despite the semiannual cycle in the solar radiation on the equator, the annual cycle in sea surface temperature (SST) in the eastern tropical Pacific is predominant due to ocean-atmosphere interactions. Here, we investigate the sensitivity of the equatorial Pacific SST annual cycle to the cumulus convective scheme to describe the dynamical interactions among the climate elements within feedback mechanisms using the Geophysical Fluid Dynamics Laboratory (GFDL) coupled model version 2.1 (CM2.1). In which, we change a critical entrainment rate called 'Tokioka parameter' associated with the strength of the moist convective trigger. Change in Tokioka parameter alters the mean state of the equatorial Pacific basin. The larger Tokioka parameter suppresses the deep convection, which results in a decrease of the east-west temperature gradient across the equatorial Pacific. The smaller temperature gradient weakens the wind field and upwelling in the eastern Pacific. As a result deepened mixed layer causes ocean response to atmosphere to be less sensitive. Furthermore, we attempt to propose dynamical relationship between convection, SST, and the intertropical convergence zone (ITCZ) to explain how change in deep convection leads to change in the tropical Pacific mean state and the amplitude of SST annual cycle.