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Modeling the Interaction between Easterly Waves and Deep Convection in Costa Rica

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Easterly waves (EWs) are an important feature of the intertropical convergence zone, they often serve as precursors to tropical cyclones, and, during boreal summers, are one of the main contributors to rainfall in various countries in Central America. Given the land-sea configuration that features the region, a better understanding of the EWs impact on regional rainfall would leverage the comprehension of regional interactions processes. EWs were also one of the foci of OTREC (Organization of Tropical East Pacific Convection), an observational campaign that took place in Costa Rica and Colombia from 5 August to 9 October 2019. Here, we will present some results obtained with high-resolution numerical simulations conducted with the System for Atmospheric Modeling (SAM), which are based on data collected during OTREC. We will begin by presenting a series of simulations forced with high-frequency radiosonde data collected in Santa Cruz, Costa Rica, for a weeklong period during OTREC, highlighting model performance in reproducing the data. We will then discuss more idealized SAM simulations designed to investigate convective initiation and convective organization at various stages of EW passage. Finally, using sensitivity experiments with SAM in which we override soil moisture conditions, we will address the role of surface moisture in modulating the interaction between EWs and deep convection over land. This work aims to improve current knowledge on the role of EWs for regional rainfall, influence on the initiation of deep convection and further surface-atmosphere feedbacks.