

Role of Diurnal Warm Layers in the Diurnal Cycle of Convection over the Tropical Indian Ocean during MISMO

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The role of air sea interaction in the diurnal variations of convective activity during the suppressed and developing stages of an intraseasonal convective event is analyzed using in situ observations from the Mirai Indian Ocean cruise for the Study of the Madden Julian oscillation (MJO)-convection Onset (MISMO) experiment. For the whole period, convection shows a clear average diurnal cycle with a primary maximum in the early morning and a secondary one in the afternoon. Episodes of large diurnal sea surface temperature (SST) variations are observed because of diurnal warm layer (DWL) formation. When no DWL is observed, convection exhibits a diurnal cycle characterized by a maximum in the early morning, whereas when DWL forms, convection increases around noon and peaks in the afternoon. Boundary layer processes are found to control the diurnal evolution of convection. In particular, when DWL forms, the change in surface heat fluxes can explain the decrease of convective inhibition and the intensification of the convection during the early afternoon.

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