Effects of perturbed SST distribution and air-sea interaction on organized tropical convection in the SPCAM and high-resolution CESM

ABSTRACT:
Energy exchange across the tropical air-sea interface plays a fundamental role in moist convection initiation, organization, and propagation. Our understanding of these processes and their representation in global climate models is hampered by the complexities of moist convection, insufficient model grid resolution, and the small but growing amount of observational data. Results from two air-sea interaction modeling projects are presented. In the first, an atmosphere-only version of SPCAM highlights the response of the mean atmospheric state and MJO to prescribed SST perturbations associated with the Indian Ocean Dipole (IOD). Unexpectedly, the MJO is largely insensitive to IOD SST anomalies within the Indian Ocean region, but it weakens significantly when the model is forced with IOD SST anomalies that occur contemporaneously in the Pacific basin. Insights into this behavior and its implications will be discussed. The second project leverages a modified configuration of 0.25° CESM coupled to an oceanic mixed-layer model (a 1D version of POP; “CESM-1dPOP”) developed through a partnership between Berkeley Lab and NCAR. A suite of CESM-1dPOP runs designed to isolate effects of mesoscale air-sea interaction on tropical cyclones and the MJO will be introduced and preliminary results presented.

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