

# **CLIMATE SENSITIVITIES OF ENSO: BRIDGING THEORIES, OBSERVATIONS, AND MODELING**

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It is well known that ENSO is one of the most important climate fluctuations on earth. But two key questions remain: Why has ENSO behavior varied in the past? How will it change in the future? Insights can be gained by understanding the links between ENSO and the tropical background climatology. We present results from climate model simulations of varying complexity, showing how ENSO responds to changes in the strength of the mean equatorial trade winds, the mean depth of the oceanic thermocline, the mean SSTs in the IndoPacific, and the structure of the wind stress and heat flux responses to SST anomalies. The results offer a common basis for understanding natural and forced variations in ENSO amplitude, period, mechanism, and predictability, and provide physical linkages between paleoclimatic reconstructions and global warming projections of ENSO. Special attention is paid to the “other worlds” simulated by coupled GCMs, and to the implications of nonlinear feedbacks and stochastic forcing for simulating and characterizing ENSO.