The Central-Pacific type of ENSO and its connection to Pacific Meridional Mode

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In this study, we examine the simulation of the Pacific meridional mode in pre-industrial experiments of the Coupled Model Intercomparison Projects Phase (CMIP5) and link the Pacific meridional mode simulations to the simulation of the Central-Pacific (CP) and Eastern-Pacific (EP) types of El Niño Southern Oscillation (ENSO). Objective criteria are developed to evaluate the model performance in Pacific meridional mode simulations, which gauge the intensity, spatial pattern, air-sea coupling strength, and persistence strength of the coupling of the model meridional mode. Our analyses indicate that most of the CMIP5 model overestimate the air-sea coupling strength in the subtropical where the Pacific meridional mode model occurs, but underestimate the persistence of the coupling. Based on our criteria, ten CMIP5 models are found capable of realistically simulating the Pacific meridional mode. Further analyses reveal that CMIP5 model simulations of the CP ENSO is linked to the model performance in simulating the Pacific meridional mode; the models that are more capable of simulating the Pacific meridional mode also produce stronger CP ENSO. This study demonstrates that the subtropical dynamics and coupling affect the ability of CMIP5 models in simulating the different flavors of ENSO, which should be considered as one of the importance matrices for CMIP5 model evaluation.

Keywords: Central-Pacific types of ENSO, Eastern-Pacific types of ENSO, Pacific meridional mode

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