



Decadal change in the South China Sea summer monsoon variability and its prediction

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The intensity of the interannual variability (IIV) of the South China Sea summer monsoon (SCSSM) was partly modulated by the Pacific Decadal Oscillation (PDO) during the 20th century. The SCSSM was characterized by larger (smaller) IIV in the warm (cold) phase of the PDO. Results show that the IIV of the tropical Pacific SST and the ENSO–SCSSM relationship play important roles in the modulation of the PDO on the SCSSM IIV. In the warm phase of the PDO, the variability of the SST in the tropical Pacific tends to be larger than that in the cold phase, along with stronger ENSO events. Subsequently, the interaction between the tropical Pacific SST and the SCSSM becomes stronger via changing the strength and position of the Walker circulation and the anomalous western North Pacific anticyclone. Therefore, the large IIV of the tropical Pacific SST and the close ENSO–SCSSM relationship jointly lead to the large SCSSM IIV in the warm phase of the PDO, and vice versa. Moreover, it is also found that the coupled ocean-atmosphere general circulation models from the ENSEMBLES (Ensemble-based Predictions of Climate Changes and Their Impacts) and DEMETER (Development of a European Multimodel Ensemble System for Seasonal to Interannual Prediction) projects are more skillful in prediction of the atmospheric circulation and precipitation within the SCSSM area in the warm phase of the PDO than that in the cold phase. The larger IIVs of the SCSSM and the tropical Pacific SST in the warm phase of the PDO may contribute to the better prediction of the SCSSM.