Interannual variation and prediction of spring precipitation over southeast China

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The interannual variations and the prediction of the leading two empirical orthogonal function (EOF) modes of the spring (April-May; AM) precipitation over southeast China for the period from 1951 to 2014 are examined using both observational data and the output from six atmosphere-ocean coupled climate models. A positive phase of the leading EOF mode of the spring precipitation over China (EOF1-prec) features enhanced rainfall in southern China. The ENSO-related tropical Pacific SST anomalies in the previous season can serve as a precursor for EOF1-prec. The second EOF mode of spring precipitation (EOF2-prec) over China is characterized by a dipole structure with one pole near the Yangtze River and another one with opposite sign over the Pearl River Delta. An equivalent barotropic Rossby wave train pattern associated with EOF2-prec can be observed, originating from the Ural Mountains across the Eurasian continent reaching the Japan Sea, causing anomalous moisture convergence over the Yangtze River alongside divergence conditions in southern China. A North Atlantic sea surface temperature (SST) dipole in the preceding March can contribute to the wave train-like pattern. An empirical model, constructed based on the observational analysis, can significantly improve the seasonal forecast skill of spring precipitation over China, especially over the Yangtze River area.

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