

How well do climate models simulate atmospheric teleconnection over East Asia and North Pacific associated with ENSO?

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During the El Nino mature phase, atmospheric teleconnections over East Asia and North Pacific considerably vary with sub-seasonal time scales, and are strongly phase-locked to the seasonal evolution. In this study, we investigate how well climate models, participated in the CMIP5, simulate seasonal evolution of teleconnections over East Asia and North Pacific associated with ENSO. In the observation, there is a remarkable anomalous anticyclone over the Kuroshio extension region (i.e. Kuroshio anticyclone), which significantly affects the East Asian climate in the early winter (November-December) of El Nino years. However, in January, the Kuroshio anticyclone suddenly disappears, and a cyclonic flow overwhelms over the North Pacific. It is found here that the CMIP5 models simulate the overall extratropical teleconnection patterns but it fails to reproduce the seasonal evolution of atmospheric circulation. We demonstrate that these systematic errors in ENSO teleconnection can be explained by systematic errors in the tropical precipitation associated with ENSO. In addition, analyses on the intermodel diversity strongly support that the relative magnitudes of western North Pacific (WNP) precipitation and central Pacific (CP) precipitation anomalies are critical for determining ENSO teleconnections over East Asia and North Pacific, and their seasonal evolution.

Key words: ENSO, CMIP5, Teleconnection, East Asia climate