



Contribution of the phase transition of Pacific Decadal Oscillation to the late 1990s' shift in East China summer rainfall

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Based on our previous study, the interdecadal changes in summer rainfall over East China in the late 1990s are further explored here. The increased local rising motion is implicated as the dominant factor of increased rainfall in the lower Huang-Huai River valley (LHR). Both the observation and numerical experiments using Community Atmosphere Model, version 4 suggest that the negative Pacific Decadal Oscillation (PDO) mode can result in rising anomalies and thus more rainfall in the LHR. The East Asian westerly jet stream (EAWJS) is suggested as a bridge to link the Pacific sea surface temperature anomalies and East Asian summer rainfall. Model results reveal that the negative PDO mode can lead to significant easterly anomalies over East Asia. As a result, the EAWJS is weakened and shifts poleward, which coincides with observed changes in EAWJS after the late 1990s. In addition, weakened and poleward shifted EAWJS can result in an anomalous ascending motion to its south (in the LHR) by modulating the jet-related secondary meridional-vertical circulation. Consequently, rainfall increased in the LHR after the late 1990s. Besides, the positive Atlantic Meridional Oscillation can only induce insignificant changes over East Asia and partly counteract the negative PDO effect there.