



Interdecadal changes in the East Asian winter monsoon and their possible causes

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Using Ensemble Empirical Mode Decomposition (EEMD) for detecting the interdecadal changes in the East Asian winter monsoon (EAWM), this study investigates that the intensity of the EAWM experienced remarkable transition around mid-1980s and late 2000s: a strong period (P1, 1960-1986), a weak period (P2, 1987-2007), and a strong period (P3, 2008-2013). The EAWM is influenced by a distinctive cold (warm) temperature anomaly, and cold (warm) sea surface temperature (SST) anomalies are present over the North Pacific (NP) during P1 (P2). In contrast with P1, the EAWM is characterized by a large temperature difference between Eurasian continent and NP, and a negative Pacific Decadal Oscillation (PDO)-like SST pattern is found over the NP during P3. During three periods, the Siberian high (SH) plays an important role in deciding the intensity of the EAWM. In addition, the EAWM exists under the influence of an enhanced atmospheric circulation associated with a positive North Pacific Oscillation (NPO) and a negative PDO during P2 and P3, respectively. Accordingly, to recognize the impacts of this climate variability on the weakening (strengthening) EAWM, the combined effect of the SH and NPO (SH and PDO) is explored during P1 and P2 (P2 and P3). Consequently, while the atmospheric variabilities such as SH and NPO are the dominant contributors to the weakening of EAWM after the mid-1980s, the SST variability such as PDO contributes to the strengthening of EAWM along with the SH variability in recent decade.