Geophysical Research Abstracts
Vol. 12, EGU2010-3987, 2010
EGU General Assembly 2010

Why is ENSO influencing northwest India winter precipitation in recent decades?

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This study examines decadal changes of the El-Niño/Southern Oscillation (ENSO) influence on the interannual variability of north-west India winter precipitation (NWIWP). The analysis is based on correlations and regressions performed using India Meteorological Department (IMD) records based on station data and re-analysis fields from 1950 to 2008. We find that the interannual variability of NWIWP is influenced by the ENSO phenomenon in the recent decades. This conclusion is supported by a consistency across the different observational datasets employed in this study and confirmed by numerical modeling. A physical mechanism for such an influence is proposed, by which western disturbances (WDs) are intensified over north-west India because of a baroclinic response due to Sverdrup balance related to large-scale sinking motion over the western Pacific during the warm phase of ENSO. This response causes an upper level cyclonic circulation anomaly north of India and a low-level anticyclonic anomaly over southern and central India. The cyclonic circulation anomaly intensifies the WDs passing over north-west India.