

Interannual variability of winter precipitation over northwest India and adjoining region: impact of global forcings

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Abstract

The role of El Niño/Southern Oscillation (ENSO) and the mechanism through which ENSO influences the precipitation variability over northwest India and the adjoining (NWIA) region is well documented. In this study, the relative role of North Atlantic Oscillation (NAO)/Arctic Oscillation (AO) and ENSO in modulating the Asian jet stream in the Northern Hemisphere winter and their relative impact on the precipitation variability over the region have been estimated through analysis of observed data. It is seen that interannual variations of NWIA precipitation are largely influenced by ENSO. An empirical orthogonal function (EOF) analysis has been carried out to understand dominant modes of interannual variability of zonal wind at 200 hPa of the Northern Hemisphere. The EOF-1 pattern in the tropical region is similar to that of an ENSO pattern, and the principal component (PC) time series corresponds to the ENSO time series. The EOF-2 spatial pattern resembles that of NAO/AO with correlation of PC time series with AO and NAO being 0.74 and 0.62, respectively. The precipitation anomaly time series over the region of interest has marginally higher correlation with the PC-2 time series as compared to that of PC- 1. Regression analysis of precipitation and circulation parameters indicates a larger contribution of the second mode to variability of winds and precipitation over the NWIA. Moisture transport from the Arabian Sea during the active phase of NAO/AO and the presence of a cyclonic anomaly lead to higher precipitation over the NWIA region.