

EGU22-1630

<https://doi.org/10.5194/egusphere-egu22-1630>

EGU General Assembly 2022

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Relationship between the Central Asian Subtropical Westerly and Northwest Indian Summer Monsoon rainfall

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In addition to various factors over the tropics, the interannual variability of northwest Indian summer monsoon (NWISM) rainfall is also regulated by extratropical signals. We defined a subtropical westerly jet index (SWJI) based on the meridional position and intensity of 200-hPa zonal wind within [25-55°N, 40-90°E]. It is found that SWJI exhibits a significant positive correlation with summer rainfall over the NWISM region during 1951-2015. During positive (negative) SWJI years, an upper-level anticyclonic (cyclonic) anomaly over Central Asia along with positive (negative) rainfall anomaly and low-level easterly (westerly) anomalies were observed over the NWISM region. The upper-level anticyclonic (cyclonic) anomaly was accompanied by the descending (ascending) motion and warm (cold) tropospheric temperature anomalies. The anticyclonic (cyclonic) anomaly increased (decreased) the land-ocean thermal contrast by warm (cold) air advection and modified the local meridional circulation. Interannual variability of rainfall over the NWISM region is associated with the meridional position and intensity of the jet that manifest in both upper- and low-level circulation anomalies. Further analysis showed that the interannual variability of SWJI is correlated with Arctic Oscillation (AO). During the positive phase of AO, an upper-level anticyclonic anomaly appeared over Central Asia and favored convection over the NWISM region.