Geophysical Research Abstracts
Vol. 21, EGU2019-3198, 2019
EGU General Assembly 2019

Multi-scale Water Vapor Transport and Atmospheric River over the Pan-North Pacific Region

Xuejuan Ren
Nanjing University, School of Atmospheric Sciences, Nanjing, China (renxuej@nju.edu.cn)

The natural variability of atmosphere and sea surface temperature (SST) over the North Pacific basin involves multiple timescales. It includes two modes of decadal variability in the North Pacific, the Pacific Decadal Oscillation (PDO) and North Pacific Gyre Oscillation (NPGO), ENSO and subseasonal variation. The PDO and the NPGO influence the precipitation and temperature over Pan-Pacific region through atmospheric circulations and hydrology processes. Among these processes, the water vapor transport is a key one. We investigated the features of atmospheric circulation and moisture transport associated with PDO and NPGO, with emphasis on multi-scale water vapor transport and atmospheric river (AR) over the North Pacific. During the positive phase of PDO, the geopotential height anomaly at 500 hPa exhibits a Pacific/North American (PNA)-like pattern. During the positive phase of NPGO, the geopotential height anomaly at 500 hPa is characterized by a dipole pattern of negative anomaly to the north of 40ºN and positive anomaly to the south of 40ºN over the North Pacific region. Associated with the positive phase of PDO, the ocean-to-land moisture transport is enhanced along 30ºN and reduced over the Northeast Pacific for the time-mean integrated vapor transport (IVT). The synoptic poleward transport is suppressed north of 40ºN and enhanced south of 40ºN. Associated with the positive phase of NPGO, the zonal moisture transport is intensified south of 20ºN and along 45º-50ºN for the time-mean IVT, and weakened over the west coast of North America for the low-frequency IVT. The synoptic poleward transport is suppressed south of 30ºN. The eastern part of the North Pacific AR belt moves slightly southward during the PDO positive phase, while the whole North Pacific AR belt shifts northward during the NPGO positive phase. The investigation about AR anomalies during a period when the PDO and NPGO coexist, shows that the AR frequency over the North American west coastal regions is dramatically influenced by the conjunction of the PDO and NPGO modes.