EMS Annual Meeting Abstracts
Vol. 15, EMS2018-32, 2018

Causes of Interannual and Interdecadal Variations of the Summertime Pacific–Japan-Like Pattern over East Asia

Li Tao, Tim Li, Yuanhui Ke, and Jiuwei Zhao

School of Atmospheric Science, Nanjing University of Information Science and Technology, Nanjing, China (taoli@nuist.edu.cn)

This study try to explore the mechanisms or different ones control the interannual and interdecadal variability of the Pacific–Japan (PJ) pattern. The PJ pattern index is defined based on the singular value decomposition (SVD) analysis of summertime 500-hPa height in East Asia and precipitation in the tropical western North Pacific. The time series of this PJ index shows clearly the interannual and interdecadal variations since 1948. Idealized atmospheric general circulation model (AGCM) experiments were carried out to understand the remote and local SST forcing in causing the interannual variations of the PJ pattern and interdecadal variations of the PJ-like pattern. It is found that the PJ interannual variation is closely related to El Niño–Southern Oscillation (ENSO). A basinwide warming occurs in the tropical Indian Ocean during El Niño mature winter. The tropical Indian Ocean warming persists from the El Niño peak winter to the succeeding summer. Meanwhile, a cold SST anomaly (SSTA) appears in the eastern western North Pacific and persists from the El Niño mature winter to the succeeding summer. Idealized AGCM experiments that separate the tropical Indian Ocean and western North Pacific SSTA forcing effects show that both the remote eastern tropical Indian Ocean forcing and local western North Pacific SSTA forcing are important in affecting atmospheric heating anomaly in the western North Pacific monsoon region, which further impacts the PJ interannual teleconnection pattern over East Asia. In contrast to the interannual variation, the interdecadal change of the PJ-like pattern is primarily affected by the interdecadal change of SST in the tropical Indian Ocean rather than by the local SSTA in the western North Pacific.