



The observed formation features of the subseasonal Pacific-Japan pattern

Yuexiang Sun and Benkui Tan

Peking University, School of Physics, Department of Atmospheric and Oceanic Sciences, Beijing, China (sunyx@pku.edu.cn)

The Pacific-Japan (P-J) pattern is an important atmospheric teleconnection pattern that strongly influences the summertime weather and climate over East Asia, which has been received considerable attention in meteorological society. This study aims to examine the formation mechanisms of the P-J pattern at the subseasonal timescale, which has been received relatively less attention in the past studies.

Based on daily data from National Centers for Environmental Prediction /National Center for Atmospheric Research (NCEP/NCAR) reanalysis, daily interpolated outgoing longwave radiation (OLR) data provided by the National Oceanic and Atmospheric Administration, tropical cyclone's best-track dataset from the China Meteorological Administration (CMA)'s tropical cyclone (TC) database, this study tries to examine the formation features of Pacific-Japan pattern (P-J) and underlying physical processes. Results show that the P-J pattern in the reanalysis data sets has an intrinsic timescale of one week or so. Initially, the P-J pattern arises from a weak disturbance over the extratropical western Pacific which takes the form of a dipole structure with its two anomalous centers located over the Aleutian Islands and East of Japan, respectively. Associated with the development of the dipole-like disturbance, the western pacific subtropical high (WPSH) shifts northeastward (southwestward) for the positive (negative) P-J patterns. At the same time, the monsoon trough also extends to eastward (westward) for the positive (negative) P-J patterns associated with the shift of WPSH. These large-scale atmospheric circulation changes are favorable for convection over the Philippines Sea and unfavorable for convection over the region east of Japan for the positive P-J patterns. The reverse is true for the negative P-J patterns. Particularly, this study further demonstrates that for the positive P-J pattern, more tropical cyclones tend to occur over the Philippines Sea for positive P-J pattern as the dipole is growing up. As a result, the diabatic heating associated with tropical cyclones in turn enhance the divergence of the atmosphere in upper troposphere, which leads to further development of the P-J patterns. While for the negative P-J patterns, more tropical or extratropical cyclones to be active over the Pacific region near Japanese Islands, and the diabatic heating associated with the tropical or extratropical cyclones will in turn enhance the P-J pattern.