EMS Annual Meeting Abstracts
Vol. 16, EMS2019-471, 2019

A statistical forecast model for the Chinese winter temperature based on autumn SST anomalies

Junmei Lu

State Key Laboratory of Severe Weather, Chinese Academy of Meteorological Sciences(wind-ljm@163.com)

This study investigates the impacts of the autumn sea surface temperature anomalies (SSTAs) on the following winter (DJF) 2-m air temperature anomalies (TSAs) in China; and discusses the potential predictability of the DJF TSAs based on the intimate link between the DJF TSAs and autumn global SSTAs. The empirical orthogonal function (EOF) analysis suggests that the three leading EOF modes jointly account for 80% of the total TSA variances and are characterized by a homogeneous spatial pattern, a north-south seesaw pattern and a cross structure pattern. These EOFs are temporally stable and suggest the potential predictability of the DJF TSAs. The EOF1 mode is influenced by changes in the intensities of the Siberian high, East Asian winter monsoon (EAWM) and East Asian trough related to a Eurasian teleconnection pattern, which can be tracked back to the autumn (SON) SSTAs. The Arctic Oscillation (AO) exerts a strong influence on the EOF2 mode. The configuration of the global SON SSTAs induces the AO signal and causes a TSA oscillation between the northern and southern parts of China. The EOF3 mode is associated with the western pathway of the EAWM and the westward shift of the Siberian high, which are attributed to two SON SSTA patterns. The multiple correlation coefficients between the SSTA indices and winter atmospheric circulations suggest the cooperative contribution of the autumn global SSTAs to the DJF TSAs. Therefore, a physically motivated statistical model is established based on the autumn SSTA indices. Cross validation suggests that this statistical forecast model shows a good performance in predicting the DJF TSAs.