

東亞冬季風年際變化之主要模態及其可預測度
Leading modes of East Asian winter monsoon variability and their predictability

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摘要
Abstract

The variability and predictability of the East Asian winter monsoon (EAWM) have been studied, based on observed datasets and multi-model ensemble (MME) hindcast experiments archived at the APEC Climate Center. The focus is on the leading modes of EAWM variability, which are identified based on multivariate EOF analysis of monthly 850 hPa wind and temperature during boreal winter. The leading EAWM mode from observations is characterized by strong temperature anomalies covering a broad region from the northwestern flank of the Siberian high to northeastern Asia. The second mode is associated with fluctuations of temperature and monsoon northerlies over the East Asian locations of Korea, Japan and eastern coastal China. Moreover, the first EAWM mode is found to be influenced by the Arctic Oscillation (AO), while the second mode is closely associated with the Eurasia (EU) pattern.

In general, the dominant EAWM circulation patterns from each member model of the MME compare well with their observational counterparts. However, the temporal variations of these modes are more difficult to reproduce in model simulations. There is evidence that the leading mode is more predictable. On the other hand, there is almost no skill in capturing the climate fluctuations associated with the second mode. Implications of these findings are further assessed in the context of circulation changes during ENSO. It is found that most models have difficulty in capturing the timing and magnitude of the ENSO impact related to the second mode, while the projection onto the leading mode is more robust in the model historical predictions. Implications of these findings on the seasonal EAWM forecasts will be discussed.