

Processes for Occurrence of Strong Cold Events over Eastern China

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An extreme cold event hit eastern China around 24 January 2016 with surface air temperature reaching more than 10°C below climatological mean. Analysis revealed that this event occurred following a northeastward extension of the Ural ridge, an intensification of the Siberian High, an accumulation of cold air around the Lake Baikal, a southwestward deepening of the East Asian trough, and a southeastward expansion of the Siberian High. A composite analysis of 37 strong cold events with temperature anomalies over eastern China exceeding -5°C identified for the winters from 1979/80 to 2015/16 shows that the above features are common to these cold events. These events are preceded by a negative phase of the Arctic Oscillation by about 7 days. A stationary wave train is observed over the Eurasian continent starting about one week before. The southward intrusion of cold air to eastern China is mainly through advection of mean temperature gradient by anomalous meridional winds. A comparative analysis indicates that the southward invasion of cold air to eastern China is related to two factors. One is the latitudinal location of the wave train over the mid-high latitude Eurasian continent. The other is a subtropical wave train emanating from the mid-latitude North Atlantic. When the mid-high latitude wave train is located too northward and the subtropical wave train induces an anomalous mid-tropospheric high over southern China, the East Asian trough does not extend southwestward and the Siberian High does not expand southeastward. In such case, the cold air mainly affects Northeast China and northern Japan.