

Characteristic Features in the East-Asian Cold Anomalies in Winter of 2010/11, and its Relationship with Blocking

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East Asia experienced extremely cold weather in January 2011, while the previous December and the following February had normal winter temperature. In this study NCEP/ NCAR reanalysis data are used to investigate the characteristic features observed in the meteorological fields during this winter period by focusing on the blocking phenomena formed at Northeastern Asia. In January the planetary-wave pattern was dominated by stationary-wave form in the mid-to-high latitude region, while transient waves were significant in the previous month. In the climatological-mean 500-hPa geopotential heights the wave numbers 1, 2, and 3 are dominant during the whole winter. In January 2011 the waves of number 1, 2, and 3 were dominant and stationary as in the climatological-mean field. In December 2010 and February 2011, however, the waves of number 4, 5, and 6 played a major role and show a transient pattern. In addition to the distinctive features in each month the planetary wave patterns were dependent on the latitude. The 2010/11 winter was divided into three periods P1, P2 (cold period), and P3 for the cold area (30-50N, 115-135E). During P1 and P3 temperature anomalies from the climatological mean were small with large standard deviation compared to those of P2, which had large negative anomaly and small standard deviation. The period P2 was dominated by blocking, which was determined by distributions of 500-hPa geopotential height and potential temperature on the 2 PVU surface. Correlation-coefficient analyses show that during P2 the temperature in the cold area is related with pressure of Northeastern Asia, while the temperature during P1 and P3 is related with pressure of Northwest of Korea. All the observations imply that, during the cold period P2, the temperature in the cold area was affected by blocking located in Northeastern Asia.

Keywords: Cold anomaly, East-Asia winter temperature, blocking