

B01-O09

SPATIAL-TEMPORAL PATTERNS OF THE COLD SURGE EVENTS IN CHINA IN RECENT 50 YEARS AND ITS RELATIONSHIP WITH ARCTIC SEA ICE

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Based on the observed daily mean temperature data from 527 China stations with a long time series from the year 1961 to 2010, the National Center for Environmental Prediction/ National Center for Atmospheric Research (NCEP/NCAR) reanalysis dataset and the sea ice concentration (SIC) dataset from Illinois University, this study analysis the spatial-temporal patterns of the cold surge events in China in recent 50 years and the related SIC anomaly and atmospheric circulation. It reveals that there are two leading modes of the cold surge frequency in China. The first mode shows obvious interdecadal variation of the cold surge frequency in north China, with higher than the normal frequency of cold surge occurrence before the year 1980, but lower after the year 1980. The second mode is mainly shown as interannual variability of the cold surge frequency in the south of China. The reduction of cold surge frequency in the first mode is mainly related to global warming. The reduction of the Arctic sea ice enhanced the Arctic Oscillation since the late of 1980s and excited a wave trains of Eurasian teleconnection (EU) pattern and then influenced the cold surge events in China. The second mode is mainly related to the rapid melting of Arctic sea ice and the appearance of Arctic dipole anomaly of atmospheric circulation in the summer during the past few years, which increased the cold surge events in late winter in the south of China by exciting a cross-polar wavetrain and EU-like teleconnection in pre-winter season.