

## A new forecasting method for the flood and heat wave in summer for the northern part of southern China

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The climate forecast for the flood and/or drought along the Yangtze River in China is a very important part of the climate service to the government. The operational meteorological forecast should be provided for the policies ahead. Thus how to use the precursors in winter for the prediction of flood and heat wave in summer is an important issue. Based on observed snow, precipitation and temperature data, NCEP/NCAR reanalysis data, and sea surface temperature data, the relationship between the number of winter snow cover days in Northeast China and the following summer's rainfall and high temperature in the northern part of southern China is analyzed and the possible underlying mechanisms discussed. Results indicate that a negative relationship is significant throughout the study period but is more obvious after the 1980s. The pre-winter circulation patterns in years of more snow cover days and less summer rainfall in the northern part of the area south of the Yangtze River are almost the same. In years of more snow cover days, lower temperatures in the lower level over Northeast China are found in winter and spring. The winter monsoon is weaker and retreats later in these years than in those with fewer snow cover days. In spring of years with more snow cover days, anomalous cyclonic circulation is observed over Northeast China, and an anomalous northerly wind is found in the eastern part of China. In summer of these years, an anomalous northeasterly wind at the lower level is found from the area south of the Yangtze River to the East China Sea and Yellow Sea; and with less southwesterly water vapor transport, the rainfall in the area south of the Yangtze River is less than normal, while the opposite patterns are true in years of fewer snow cover days. In recent years, the stable relationship between winter Northeast China snow cover and summer rainfall in the area south of the Yangtze River can be used for summer rainfall prediction. Significant negative correlation is found between hot days and precipitation to the south of the Yangtze River. Thus, more snow cover days in Northeast China in winter can be a predictor of more hot days and heat waves in the following summer in the area south of the Yangtze River. The results are of great importance to short-term climate prediction for summer rainfall and heat wave, which can be provided as references to the climate prediction service to the government.

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