



The summer northern annular mode and abnormal summer weather in 2003

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The summer Northern Hemisphere annular mode (summer NAM), a new mode determined through empirical orthogonal function (EOF) analysis for each individual calendar month, can describe aspects of anomalous summers such as the summer of 2003, which featured warm temperatures in Europe, Canada and Russia and cold temperature in Japan. Atmospheric circulation anomalies of the summer NAM closely resemble the anomalies in the summer of 2003 and the summer NAM index was quite large during the period from mid-July to early August when abnormal weather took place in Europe, Canada and Russia. The index includes representations of hemispheric double-jet streams and blockings that support extended periods of abnormal weather. The double-jet is formed and maintained by wave forcing during the period. In contrast to the Arctic and North Atlantic oscillations, the summer NAM pattern accounts for many of the anomalous weather features observed during summer of 2003.