



Observational Climatology and Characteristics of Wintertime Atmospheric Blocking over Ural-Siberia

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This study investigates the climatological aspects and temporal characteristics of wintertime Ural-Siberian blocking (USB, centered over 30°–100°E), for the period 1980/81–2009/10. Sixty-eight events are identified and their physical structure is diagnosed using thermodynamic and geostrophic vorticity tendency equations. In climatology, horizontal advections play a fundamental role in constructing a USB event, in which the anticyclonic center is a warm core in the troposphere and a cold core in the lower stratosphere. The decay of the thermal structure is related to diabatic cooling along the vertical structure and warm advection in the lower stratosphere. Meanwhile, the collapse of the height structure is caused primarily by cyclonic vorticity advection.

A strong interrelationship exists between the intensity and extension of USB events. The temporal characteristics of USB events are analyzed by examining strong and weak events, which are of high and low intensity. The strong events are probably preceded by an open ridge over Europe and a cyclogenesis over the Mediterranean Sea, and their formation is followed by the stronger amplification of a Rossby wave packet across Eurasia. On the other hand, the weak events are likely to be triggered by surface cold anomalies over Siberia. Overall, the evolution of a USB event forms a dynamic linkage with the Siberian high, in which the decay stage of the USB event is accompanied by a southeastward migration of the Siberian high and a subsequent cold air outbreak in East Asia. These results advance our understanding of USB and its relationship with East Asian winter monsoon (EAWM) activities.