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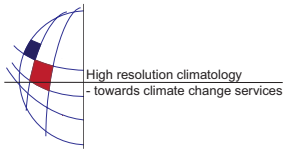

Arctic Oscillation and the Northern Hemisphere Cold Surge at 2009/2010 Winter

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The cause of the cold surge occurred at 2009/2010 winter over northern hemisphere was investigated. During December 2009, the surface temperature was extremely lower by more than 10°C over parts of northern hemisphere. The cold air outbreak was due to the stronger northerly winds in troposphere at mid latitudes associated with the substantially weaker Arctic Oscillation (AO) polarity with the weaker zonal-mean zonal winds and higher geopotential height and associated marked warming anomalies at high northern latitudes, whose signals propagated from the mid-latitude stratosphere at November down to troposphere at December. The marked stratospheric warming in November is associated with the stronger upward propagation of the stationary planetary waves which led to the weaker westerly winds. Analyses indicate that the stronger wave activity was originated in Siberia due to the anomalously larger snow cover during November. The autumn snow cover over Siberia tends to increase with time and the increasing rate is larger towards present. This study indicates that the anomalously increased autumn snow cover over Siberia in part led to the weakening of the AO polarity and consequent cold air outbreak for the 2009/2010 winter.