

Interdecadal changes of the relationship between western and eastern Eurasian snow cover anomalies and surface air temperature over eastern Eurasia in boreal spring

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Interannual variation of surface air temperature over eastern Eurasia (SATEA) during boreal spring was found to be highly connected with snow cover anomalies over western and eastern Eurasia in the period from 1972 to 2009. SATEA experienced a transition of phase from cold to warm during the late 1980s and the roles of snow cover anomalies played during the transition over the two regions show significant contrasts. The relationship between snow cover anomalies over western Eurasian (SCAWE) and SATEA declined from 1972-1987 (P1) to 1989-2009 (P2) and might be mainly influenced by the Arctic Oscillation (AO). In contrast to this, the relationship between snow cover anomalies over eastern Eurasian (SCAEE) and SATEA increased from P1 to P2 and does not involve the impact of AO. Surface heat flux associated with SCAEE could only explain limit parts of the risen temperature and the atmospheric circulation plays a more important role in the strengthened relationship between SCAEE and SATEA from P1 and P2 through the wind induced heat advection over eastern Eurasian areas. Numerical experiments using a linear baroclinic model indicate that the snow cover anomalies around Lake Baikal may impact the variation of SATEA through modulating atmospheric circulation over the eastern Eurasia-North Pacific areas.