Geophysical Research Abstracts
Vol. 21, EGU2019-10931, 2019
EGU General Assembly 2019
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On the role of Ural Blocking in driving the Warm Arctic - Cold Siberia pattern

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Arctic warming and sea ice loss over the Barents-Kara Seas (BKS) have been associated by previous studies with cold spells in mid-latitude Central Asia (CAS), a link known as the Warm Arctic - Cold Siberia (WACS) pattern. Blocking is related to winter cold extremes in mid-latitudes and its possible connection to WACS calls for a detailed investigation. Here, we employ reanalysis data to clarify the role of Ural Blocking (UB) in driving the WACS on short (daily to sub-seasonal) to interannual timescales. We have identified a robust upward trend in winter UB occurrence that could account for the recent mid-latitude cooling. We show that UB is particularly efficient in inducing a dipole of temperature anomalies that markedly projects on the WACS. On short timescales, UB controls the pace of the WACS; it induces warm (cold) advection over the BKS (CAS) with the near-surface temperature anomalies peaking 3-5 days after the UB onset. The sea ice deficit over the BKS develops slower; it is more persistent and appears to be controlled by atmospheric processes. Winters with more frequent UB favor the emergence of the WACS signal in winter means. Thus, the interannual variability of WACS is strongly linked to UB; during winters with high (low) UB activity, BKS warming and CAS cooling are enhanced (weakened). Finally, UB emerges as the dominant process driving the recent cooling trend over CAS while over the BKS it only acts to enhance locally the strong background warming trend related to Arctic Amplification.