The key role of blocking in Arctic sea ice loss and cold spells over central Asia in autumn 2016

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The possibility of a link between the Arctic Amplification and associated sea ice depletion to the mid-latitude cold weather spells is a topic of debate. Specifically, the role of sea ice loss over the Barents-Kara Seas (BKS) into driving cold episodes over central Asia has been highlighted. In this work, we investigate the dynamical environment leading to repeated cold surges over central Asia and warm conditions over the Arctic during autumn 2016. We use ERA-Interim reanalysis data and COBE sea ice and SST observational data to investigate the daily evolution of the state of the Cryosphere and Atmosphere with view to trace the pathways that lead to these extreme conditions. Abundant high-latitude blocking over Eurasia has been identified as the key circulation pattern that contributed to the sea ice loss over the BKS on short timescales.

Lower than normal sea ice cover was observed in early autumn 2016 over the Arctic. However, we show that successive Eurasian blocking events had a significant impact on the sea ice loss over the BKS. Each blocking event induced a pair of cold (warm) air advection to its south (north). As a result, both the warm anomalies over the Arctic and cooling anomalies over central Asia featured large concurrent variability on synoptic timescales whose pace was set by blocking. Specifically, the strong blocking episodes that occurred to the east of the Urals (60-100 ^{o}E) were particularly effective into inducing cold flow over central Asia, warm conditions over the BKS and, thus sea ice melting there. The BKS sea ice cover minimum for 2016 was recorded in mid-November and December, concurrently with the two strongest blocking episodes occurring to the east of the Urals.

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