



## **The Rapid Arctic Warming in Recent Decade and Its Impact on Eurasia Winter Weather**

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The Arctic is warming much more rapidly than the lower latitudes. In contrast to the rapid Arctic warming, in winters of the recent decade, the cold-air outbreaks over East Asia occur more frequently and stronger than in 1990s. By accompanying the snow over East Asia, the strong cold surges have led to a severe socio-economic impact. Such severe cold surges in recent decade over east Asia is consistent with the more dominant negative phase of the Arctic Oscillation (AO), that may be attributed by the Arctic amplification. In both observation-based reanalysis and numerical model experiments, the Arctic sea ice melting leads to the weakening of the AO polarity by reducing the meridional temperature gradient through a heat flux feedback. The Arctic warming and associated sea ice melting over the Kara-Barents area in late fall and early winter first release a lot of heat to the atmosphere from the ocean by a strong contrast in temperature and moisture and higher height anomaly is developed over the Kara/Barents and the Ural mountains. The anomalous anticyclonic anomaly over the Arctic strengthen the Siberian High and at the same time the east Asian trough is developed over the western coast of the North Pacific. Through the passage between the margin of the Siberian High and east Asian trough, an extremely cold air is transported from east Siberia to east Asia for sometimes more than a week. Such a severe cold air brings about the moisture from nearby ocean, largely influencing the daily lives and economy in Eurasia. The recent Arctic and associated sea ice melting is not only contributed to the local climate and weather, but also a severe weather in mid-latitudes through a modulation in polar vortex.