



Rapid Arctic change in recent decades and its influence on the climate change over Eurasia

Seong-Joong Kim, Baek-Min Kim, and Taehyoun Shim

Division of Polar Climate Change Research, Korea Polar Research Institute, Incheon, Republic of Korea
(seongjkim@kopri.re.kr)

For the past 30 years, the Arctic is warming much faster than the rest of the world. Associated with such a marked warming, the Arctic sea ice reached minimum in September of 2012 with about 3.5 million square kilometer in its extent. In contrast to this substantial warming over the Arctic, the Eurasia has experienced severe cold air outbreaks for the past several years in winter. Such cold surges with severe snow storms result in a huge socio-economic impact. Several studies have suggested that the recent winter cold surge over Eurasia is related to the reduction of the Arctic sea ice, though the exact mechanism remains uncertain. Our analyses and results from numerical simulations indicate that the marked sea ice melting over the Arctic, especially over the Barents-Kara Sea, plays a substantial role in increasing atmosphere pressure over the Arctic by enhancing upward propagation of the planetary-scale waves in early winter. The higher pressure over the Arctic consequently brings about the weakening of the stratospheric polar vortex, which in turn induces a negative Arctic Oscillation anomaly at the surface in winter. The weaker polar vortex generally brings cold air to Eurasia. This result implies that the rapid change in the Arctic climate is closely linked with Eurasia, especially in winter.