Recently, there has been increasing evidence that Arctic warming and extreme cold events over the northern continents are intimately related. These Arctic warming are thought to be partly driven by losses of Arctic sea-ice, the mechanism that links sea-ice decline to extratropical cold winters remains a subject of debate. Here, by observational analyses, we suggest that easterly wind anomalies over Barents-Kara Seas driven by losses of Arctic sea-ice in late fall lead to the Arctic Sea-ice anomalous decreasing in the following winter. These sea-ice anomalies are linked to regional Arctic warming in winter. The regional warming is accompanied by the local development of an anomalous anticyclone and downstream development of mid-latitude trough, which provide a favorable condition for strong cold surge events. These links between Arctic and mid-latitude weather are also robustly found in idealized climate model experiments.

**Key words:** Arctic sea-ice, Arctic-to-extratropic connection, East Asia, cold winters, atmospheric circulation