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Impact of an abrupt Arctic sea ice reduction on high and mid-latitude climate.

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In the past decades, anthropogenic global warming combined with natural variability has been driving the loss of Arctic sea ice, which is projected to disappear in summer in the second half of the 21st century. The current sea ice melting is accompanied by a significant Arctic warming, which induces several climatic responses not limited to the high latitudes. These responses include changes in storm tracks, modification of the jet stream patterns as well as a stimulation of the planetary waves. The frequency, intensity and persistence of extreme weather events, including droughts, heat waves and cold spells, might be influenced by the melting of sea ice via these climate changes. The objective of this study is to determine the short-term changes in the high and mid-latitude climate due to a sudden loss of Arctic sea ice. These changes are analysed using different climate models that participate to the EU Horizon 2020 PRIMAVERA project. First, we find that the rapid loss of Arctic sea ice in summer causes intense Arctic warming, which is accompanied by an increase in precipitation in this region in autumn. Second, significant cooling in eastern Eurasia is modelled in autumn and winter. This is directly related to the strengthening of the Siberian anticyclone following the abrupt reduction of Arctic sea ice. Third, a warming and drying out of the Mediterranean Basin is found in one of the models and is related to the amplification of the Azores anticyclone and its shift towards Europe. These climatic responses are likely to be expected in the coming years with a sudden Arctic sea ice loss, but further modeling studies are needed in order to improve our understanding of Arctic sea ice loss impacts on the climate.