

Impact of Arctic sea ice decline on recently observed climate change: a coordinated multi-model study

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To what extent the recent sea-ice decline influenced Northern Hemisphere climate trends remains an open question. To address this we perform two atmospheric general circulation model experiments: In both experiments observed daily sea ice cover variations are prescribed for the period 1982 to present, while for SST, one experiment uses observed daily variations and the other the observed climatology. The experiment is performed by six different state-of-the-art AGCMs. Our results show that the observed wintertime temperature trend near the surface is poorly reproduced. The impact of SIC variation seems to be confined near the surface, while SST variation seems a key for temperature trend above. This suggests a necessity to consider the atmospheric poleward energy transport associated with SST variation to understand the observed arctic amplification. The simulations fail to reproduce the observed changes in the Siberian High and Eurasian wintertime cooling. Northern hemisphere surface and zonal mean tropospheric temperature trends are better reproduced in boreal autumn, but the impact of sea ice decline remains limited to the lower troposphere. Other aspects of SIC/SST impact on the observed circulation change such as NAO shall also be discussed.

Keywords: Sea ice decline, Climate Change, Sea ice impact