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Present and future influence of ocean heat transport on winter Arctic sea-ice variability

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The recent retreat of Arctic sea ice area is overlaid by strong internal variability on all timescales. In winter, the variability is currently dominated by the Barents Sea, where it has been primarily driven by variable ocean heat transport from the Atlantic. As the loss of winter Arctic sea ice is projected to accelerate and the sea ice edge retreats deeper into the Arctic Ocean, other regions will see increased sea-ice variability. The question thus arises how the influence of the ocean heat transport will change. To answer this question, we analyze and contrast the present and future regional impact of ocean heat transport on the winter Arctic sea ice cover using a combination of observations and simulations from several single model large ensembles from CMIP5 and CMIP6. For the recent past we find a strong influence of the heat transport through the Barents Sea and the Bering Strait on the sea ice cover on the Pacific and Atlantic side of the Arctic Ocean, respectively. There is strong model agreement for an expanding influence of ocean heat transport through these two gateways for high and low warming scenarios. This highlights the future importance of the Pacific and Atlantic water inflows.