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The importance of heat transports and local air-sea heat fluxes to the Barents Sea climate variability

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The inflow of warm and saline Atlantic water into the Barents Sea is of significant importance to the regional ocean climate, as well as for the biomass production and fish distribution within the Barents Sea. Much effort has therefore been spent to explore the potential predictability of the system, either based on observations or using ocean- or coupled atmosphere-ocean models. An isopycnic coordinate ocean model has been used to investigate the importance of different mechanisms on the Barents Sea temperature variability. For evaluation of the model in the Barents Sea, observed and simulated time series from the Kola section are used. It is here shown that heat transport through the Barents Sea Opening is more important to climate variability in the Barents Sea than the total heat flux between ocean and atmosphere. The climate variability in the Barents Sea is governed by a combination of the heat transport, the solar heat flux and the ice fraction, while the non-solar and the total heat flux is a function of the heat content variability. Furthermore, the heat content lags the heat transport by 6 months, and heat flux lags the heat content by 1 month.