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Ocean surface heat flux variability in the Barents Sea: A model study

M. Årthun and C. Schrum
University of Bergen, Geophysical Institute, Bergen, Norway (marius.arthun@gfi.uib.no)

A 40 year (1958-1997) hindcast simulation from the regional coupled ice-ocean model HAMSOM is used to study interannual to decadal variability in climate relevant processes in the Barents Sea. Compared to observations the model captures the variability in temperature and ice extent. Higher heat transport through the Barents Sea Opening (BSO) and less sea-ice characterizes the mid 1970s and the early 1990s, while the opposite situation dominates the 1960s and early 1980s. Clear trends are also seen in both parameters, being +16.9% decade^{-1} and -5.8% decade^{-1}, respectively. The heat input through BSO is effectively lost through intense atmosphere-ocean heat exchange within the Barents Sea; annual mean oceanic heat loss reaching more than 200 W/m^2. Heat flux variability responds to changes in sea-ice cover and advection of heat through the BSO in similar strength both on interannual and quasi-decadal timescales. 5 year composite means of integrated heat fluxes range from -36 TW (low years) to -65 TW (high years) indicating the significant variability. Areas of large heat flux anomalies are identified, and the effect of different forcing mechanisms is investigated.