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The variability of thermodynamics and sea level of North Sea under recent climate variation (1950-2000)

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Variability of stratification and sea level of the North Sea was studied using a simulation performed with HAMSOM (HAMburg Shelf Ocean Model). The atmospheric forcing was obtained from REMO downscaled from NCEP and the open boundary values from a global model (MPI-OM). The model results were validated using both in situ and satellite derived datasets. Annually averaged temperature time-series obtained from the aforementioned simulation showed an uncharacteristic cooling in the 1970s. This underestimation of temperature occurs mainly in the southern and central North Sea, which is also reflected in the linear trends of SST. We compared the simulated temperature and salinity distribution in a vertical section, taken in the Northern North Sea with observational data, the results of which indicated that the model was able to capture the general characteristics of thermodynamics and stratification in the North Sea. The sea level trends showed a steady increase in the whole North Sea, with the strongest increase in the German Bight. The sea level signal is also strongly influenced by positive and negative phases of the North-Atlantic Oscillation (NAO), as indicated by the strong correlation between the NAO index and model derived sea surface height. To estimate the model uncertainty in the future projection run, we are also running the model using different atmospheric and lateral boundary conditions (NCEP for atmospheric forcing and GECCO for lateral forcing) for the hindcast period (1950-2000).