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Reassessment of the regional coupled model system in the North Sea: identify the added value of the interactive coupling

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Choosing an interactive coupling between atmosphere and ocean models was widely practiced in regional climate study over the last decades. The added value of the coupling is attributed to providing regional details and incorporating the feedback of the ocean in regional climate downscaling. Such coupled model system serves for a variety of purpose, such as detailed process studies, air-sea interaction studies and long-term simulations. However, the necessity of including the ocean component in the regional climate downscaling is still under evaluation. Here we present a coupled model system applied to the North Sea, comprising a regional ocean model HAMSOM (resolution 3 km), an atmospheric model REMO (resolution 37 km) and the coupler OASIS. The assessment presented in this study focused on the reaction of the ocean component. The uncoupled model experiment used the sea surface temperature (SST) from the global model as boundary input for the atmospheric model. In this presentation, we summarize the differences between the coupled versus uncoupled run. These sensitivity experiments cover the period 1985-2000. We investigate the degree of coherency between coupled and uncoupled SST at large scales, as well as the decadal time scale. We found that the major differences occur in the coastal regions. Hence, the onshore-offshore SST gradient also varies. The latter assessment concentrates on simulated salinity difference, precipitation variability and intra-seasonal variability. This analysis forms a reference to which climate change projections for the North Sea should be contrasted.