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Assessment of an Arctic Ocean model in a global configuration using the Finite Element Sea-ice Ocean Model (FESOM)

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The coupled sea-ice ocean model FESOM is based on the finite element method and hydrostatic primitive equations. Both the ocean and ice modules are discretized on the same triangular surface meshes, allowing direct exchange of fluxes and fields between the two components. Recently, this model has been employed to resolve multi-scale dynamics in the Arctic Ocean. This work is conducted using global simulations with local mesh refinement in the Arctic Ocean. The global background resolution is 1.5 degree. Two simulations with different resolutions of 24km and 9km in the Arctic region have been conducted. The model performance in the Arctic Ocean is assessed comparing the available observational data. The comparison results demonstrate that the model can well simulate the general ocean circulation and important ocean and sea ice processes, although model parameters and/or forcing for the focus of the Arctic Ocean modeling need to be further optimized in the future work. The sensitivity of the model performance to local mesh refinement in the Arctic Ocean is analyzed.