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# Influence of mixing parametrization scheme on properties of Atlantic Water in the Arctic Ocean

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The proper representation of Arctic Ocean water masses is still a challenge for global medium-resolution ocean models that are commonly used for climate simulations. In particular, these models have difficulties in simulating the Atlantic water layer in the Arctic. We use Finite Element Sea Ice-Ocean Model (FESOM) configured as an ocean component of the AWI-CM climate model to demonstrate the sensitivity of the Atlantic water layer representation to the vertical mixing parameterization and to identify its effects on the representation of the Arctic Ocean water mass properties.

With the K-Profile Parameterization (KPP, Large et al., 1994) scheme global model bias is reduced, while locally in the Arctic Ocean the Pacanowski and Philander (1981, PP) scheme produces better results in terms of the Atlantic water properties. We further try to identify the areas where the choice of the mixing scheme predefines the properties of the Atlantic water. To do this we run the set of experiments that employ KPP scheme for most of the globe, but locally use PP in different key areas of the North Atlantic and Arctic Ocean. We find that the biggest improvement in the Atlantic water properties occurs after we locally change the mixing scheme to the PP in the area to the south of Spitzbergen. The possible explanation is reduced amount of vertical mixing produced by the PP scheme compared to KPP scheme at the entrance to the Arctic Ocean and consequent thinning of the Atlantic water layer.