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# The role of vertical mixing schemes on surface salinity variability

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This study investigates the influence of vertical mixing parameterization schemes on the NEMO-OPA v.2 surface temperature and salinity. The model has 31 vertical layers, with a 10-m vertical resolution at the surface, and 1/3º horizontal resolution. The region under study is the eastern North Atlantic Ocean, which is one of the selected areas for the validation of SMOS (Soil Moisture and Ocean salinity) mission. The regional configuration has four open boundaries, with external boundary data obtained from the Mercator model, and realistic atmospheric forcing. Four different schemes computing the vertical eddy viscosity and diffusivity coefficients are investigated. The coefficients are assumed: 1) to be constant, CST; 2) a function of the local Richardson number; 3) computed by the TKE Turbulent closure scheme; and 4) computed using the K-profile parameterization, KPP. We focus on both the surface distribution of temperature and salinity and their vertical distribution.

Our results confirm that the CST parameterization is not adapted to models with varying wind stress intensity. All experiments have shown a strong similarity between the TKE and the RI mixing schemes. In addition, the model outputs of KPP and TKE only differ slightly. The difference between the seasonal averages of SST and SSS of both simulations is of the order of their satellite observational errors. Among the differences, let's notice the fastest deepening of the mixed layer using KPP scheme under the same atmospheric forcing. Also, in the upwelling region, the KPP simulation appears fresher all along the year.