



Impacts of Sea Surface Salinity Bias Correction on North Atlantic Ocean Circulation and Climate Variability in the Kiel Climate Model

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We investigated impacts of correcting North Atlantic sea surface salinity (SSS) biases on the ocean circulation of the North Atlantic and on North Atlantic sector mean climate and climate variability in the Kiel Climate Model (KCM). Bias reduction was achieved by applying a freshwater flux correction over the North Atlantic to the model. The quality of simulating the mean circulation of the North Atlantic Ocean, North Atlantic sector mean climate and decadal variability is greatly enhanced in the freshwater flux-corrected integration which, by definition, depicts relatively small North Atlantic SSS biases. In particular, a large reduction in the North Atlantic cold sea surface temperature (SST) bias is observed and a more realistic Atlantic Multidecadal Variability (AMV) simulated. Improvements relative to the non-flux corrected integration also comprise a more realistic representation of deep convection sites, sea ice, gyre circulation and Atlantic Meridional Overturning Circulation (AMOC). The results suggest that simulations of North Atlantic sector mean climate and decadal variability could strongly benefit from alleviating sea surface salinity biases in the North Atlantic, which may enhance the skill of decadal predictions in that region.