

Testing different initialization strategies with surface variables for decadal projections in a perfect model framework

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Decadal prediction of the climate is one of the major challenges in today's climate science. In this scope, our study aims at gaining more understanding in the effect of nudging of surface variables on the initialization of an ocean model, in a perfect model framework. We assess the influence of different initialization setups on a 150-yr long period, with nudging of SST and SSS. We have performed and analysed five initialization experiments, differing in the combination of variables restored and on the area where the nudging was applied.

The different initialization protocols tested in our study are able to efficiently initialize the salinity and temperature at the surface and in the mixed layer. The restoring to SSS allows initializing the temperature below the mixed layer in the North Pacific because of its influence on winter WMT in this region. The surface restoring can also initialize the AMOC for given events, mainly two major AMOC peaks of the target simulation. The initialization of those peaks relies partly on the initialization of the mechanisms of the 20-yr AMOC cycle described in Escudier et al. (2012) and on the initialization of the northward salt flux at 45°N.