

SESSION: (B2) Modelling issues in S2D prediction

(B2-10)

Subtropical North Atlantic preconditioning key to skillful subpolar gyre prediction

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We compare decadal hindcast results for the Subpolar North Atlantic (SPNA) region from two configurations of the Norwegian Climate Prediction Model. The first configuration obtains its initial conditions by anomaly-assimilating SST-only observations into the ocean component of the coupled Earth system model. The second configuration is identical to the first one except that it additionally anomaly-assimilates temperature and salinity profiles. Prior to 1995, both configurations precondition the SPNA in a cold state with a strong subpolar gyre (SPG) circulation. Differences emerge, however, during the hindcast periods: while the first hindcast set exhibits a rapidly warming SPNA once the assimilation is released, the second set maintains the anomalous cold state over a longer period of time and compares favourably with other prediction systems that have demonstrated SPG hindcast capability. The rapid SPNA warming in the first set primarily originates from a too warm Subtropical North Atlantic (STNA) initial state, leading to excessive northward heat transport that causes the SPG to prematurely rebound. Salinity and dynamical effects identified in previous research likely contribute as well but to a lesser extent. Our results illustrate that a realistic initial state in the SPNA does not alone guarantee decadal forecast skill in that region, regardless of additional degradation due to model bias. Remote effects, in particular the thermodynamic state of the STNA, have to be considered as well to maximise SPNA prediction capability.