Signal to noise ratio for the NAO in three different ensemble suites with MPI-ESM

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Recent studies point towards an inconsistency between models' inherent predictability and models' corresponding capability of predicting the observed variability of the climate system. This discrepancy is commonly referred to as signal-to-noise paradox (SNP), described by the difference between the correlation of the ensemble mean with (i) an observational reference, and (ii) a single ensemble member. The SNP is often illustrated using the seasonal hindcast skill of the North Atlantic Oscillation (NAO).

Current investigations of the SNP are limited to the analysis in seasonal forecast systems, focusing the average correlation of a single ensemble member against the ensemble mean. In the present contribution, we investigate the SNP for the NAO in three different ensemble suites, all based on the Max Planck Institute Earth System Model (MPI-ESM): A seasonal hindcast ensemble with 30 members, an uninitialised historical ensemble with 100 members, and an assimilation experiment ensemble with 16 members. For all three suites of ensembles, we investigate the SNP and explicitly calculate and show the possible range of correlations between the ensemble mean and a single ensemble member in addition to the average correlation.