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Variation in the reliability of ensemble predictions of SSTs from seasonal to decadal timescales

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Useful climate forecasts on decadal timescales should be reliable (i.e. forecast probabilities match the observed relative frequencies) but this is seldom examined. The reliability of sea surface temperature predictions on seasonal to decadal timescales from the Met Office Decadal Prediction System (DePreSys) is assessed in retrospective forecasts starting every year from 1960 to 2005. Factors affecting reliability are diagnosed by comparing the dispersion (the ratio of ensemble spread to forecast error) for an initial condition ensemble and two perturbed physics ensembles for initialized and uninitialized predictions. At lead times less than 2 years, the initialized ensembles tend to be under-dispersed, and hence overconfident, like many other seasonal prediction systems. For longer lead times, all three ensembles are predominantly over-dispersed. Such over-dispersion is primarily related to excessive inter-annual variability in the climate model. These findings highlight the need to carefully evaluate reliability and simulated variability in seasonal and decadal prediction systems.