Comparing and testing optimal perturbations for decadal climate predictions: do they work?

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In the ocean, decadal 'optimal perturbations' (OPs) are small anomalies of temperature and salinity which grow most rapidly over lead times of a few years. We explore the potential of OPs to help generate ensembles of decadal climate predictions. Firstly, we test OPs in a set of perfect-model simulations with the HadCM3 GCM, and find that the OPs increase the ensemble spread in the expected regions, and perhaps also improve skill. Secondly, we calculate OPs from a wide range of GCMs, and find a large diversity in their structure and rate of growth. Finally, we compare OPs estimated from long observations of SSTs with those derived from GCMs and find that very few models show similar amplification rates and patterns.