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A coupled ensemble ocean data assimilation system for seasonal prediction and its comparison with other state-of-the-art systems

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A coupled ensemble-based ocean assimilation system called the POAMA Ensemble Coupled Data Assimilation System (PECDAS) has been developed. PECDAS is an approximate form of ensemble Kalman filter system, its approximations being necessary to reduce its computational cost. It is based on the multivariate ensemble optimum interpolation of Oke et al (2005), but uses covariances from a time evolving model ensemble. The first version of the system is weakly coupled, only ocean observations are assimilated into the coupled model and the atmospheric component is nudged towards pre-existing atmospheric analyses.

A re-analysis from 1980 to present has been completed with this system. Both in situ temperature and salinity observations are assimilated, and current corrections are generated based on the ensemble covariances. The comparisons of the PECDAS reanalysis to a non-coupled re-analysis and other state-of-the-art international reanalyses are presented, with a particular focus on the representations of the main modes of climate variability. The impact of the coupled assimilation on seasonal forecasts will also be presented, including the impact of the ensemble characteristics of the initial conditions on forecast spread.