A Coupled Ensemble Data Assimilation System for Seasonal Prediction in Australia

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A new coupled ensemble-based ocean analysis system called the POAMA (http://poama.bom.gov.au) 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) [1], but uses covariances estimated 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 reanalysis from 1980 to present has been completed with this system. Both in situ temperature and salinity observations are assimilated, and ocean current corrections are generated based on the ensemble covariances. The performance of PECDAS is evaluated through a series of comparisons with assimilated and independent observational data. The comparison of PECDAS reanalysis to a non-coupled reanalysis [2] 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.

References

[1]Oke, P. R., A. Schiller, D. A. Griffin, and G. B. Brassington. Ensemble data assimilation for an eddy-resolving ocean model of the Australian region, *Quart. J. Roy. Meteor. Soc.*, 131, 3301-3311, 2005.

[2] Yin, Y., O. Alves, and P. R. Oke. An ensemble ocean data assimilation system for seasonal prediction, *Mon. Wea. Rev.*, 139, 786-808, 2011.