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Ocean biogeochemical model parameter uncertainties: Application of ensemble data assimilation to a one-dimensional model

Ocean biogeochemical models are increasingly used in the Earth system modelling efforts for climate simulations, and also for the development of marine environmental applications and services. Like any other geoscientific models, the processes within biogeochemical models include simplified schemes called parameterizations. However, the parameter values can be poorly constrained and involve unknown uncertainties. The uncertainty in the parameter values translates into uncertainty in the model outputs. Therefore, uncertainty quantification of biogeochemical model predictions requires a systematic approach to properly quantify the uncertainties related to their parameters. In this study, we apply an ensemble data assimilation method for the quantification of the uncertainty arising from the parameterization within biogeochemical models. We apply the ensemble-based local error-subspace transform Kalman filter into a one-dimensional vertical configuration of the biogeochemical model Regulated Ecosystem Model 2 at the Bermuda Atlantic Time-series Study station. In situ nutrients and oxygen profiles, and satellite chlorophyll-a concentration data are assimilated to estimate 10 selected biogeochemical parameters. We present convergence and interdependence features of the estimated parameters in relation to the major biological processes and discuss their uncertainties.

Which theme does your abstract refer to?

Model error (estimation, representation in variational and ensemble DA, etc)

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