



Efficient estimation of ocean mixing and heat uptake.

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The rate of ocean heat uptake is one of the dominant uncertainties in the speed of anthropogenically-forced climate change. One way of estimating ocean mixing is through parameter estimation in complex climate models. We have previously used the ensemble Kalman filter for multivariate parameter estimation, and find it to be spectacularly effective for linear systems, but its accuracy is known to degrade with increasing nonlinearity (as is commonly found in realistic applications). Here we present two alternative methods based on Importance Sampling. One method is precise but only computationally affordable for moderate dimensionality. A further modification increases efficiency at the cost of introducing an approximation into the solution, however this method remains more accurate than the EnKF at comparable computational cost. Results and implications for climate change prediction will be presented.