

Data Assimilation in nonlinear models

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The concept of data assimilation encompasses the various methodologies used to blend the information from observations and model outputs to provide a suitable model solutions incorporating data from observations and able to initialize the ocean model. Since the pioneering failure of the first meteorological application of data assimilation in 1922, much has been understood about model filtering, initialization and interpolation procedures. The optimal solution of the data assimilation problem is based on the Bayes theorem, which allows to calculate the probability distribution of the model states conditioned by the observed state. However, closed optimal solutions of the Bayes theorem exist only for linear models. For non-linear models, only approximate solutions do exist, and a richness of sub-optimal methods have been proposed in the last twenty years. Each sub-optimal approach differs on the strategy used to beat the curse of dimensionality. A review of these approaches is given here.