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Room:Convention Hall

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Analysis of accuracy and effectiveness in ensemble-type data assimilation considering continuity and nonlinearity

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In the data assimilation, variables in a numerical simulation model are modified through observed data. This procedure makes it possible to give more accurate estimation of uncertain initial and boundary conditions, unobservable state variables and parameters, and predictions. We analyzed the property of the ensemble type data assimilation such as ensemble Kalman filter and smoother, ensemble 4DVAR, particle filter and smoother, and merging particle filter, which can give direct approximation of probability density. We compare their similarity and differences through mathematical analysis, and show pros and cons among them. We also show the numerical results of several assimilated models including Lorenz 96 model. Those results imply that spatially continuous property and nonlinearity of physical systems play an important role for the estimation effectiveness and accuracy in the ensemble type data assimilation.

Keywords: data assimilation, ensemble approximation, ensemble Kalman filter, particle filter