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Stochastic PDEs in GFD and Climate Prediction.

Weather and climate prediction have, for the past century, developed from the vision of Vilhelm Bjerknes who first noted that the forecasting problem could be solved using a closed set of deterministic PDEs. This realization set into motion the research which culminated in the development of the sophisticated computational models used today to forecast a range of climate predictions out as far as the projection of anthropogenic climate change into the next century.

The stochastic extension of these prediction problems was initiated in the middle 1960's, when the limited nature of the predictability of the climate system was recognized by Lorenz while concurrently the formalism of stochastic-dynamic prediction was developed by Epstein. The current extension of these ideas has led the geophysical prediction community into the prediction of forecast reliability and uncertainty quantification. These needs have forced the weather and climate communities to explicitly account for the stochastic aspects of unresolved scales and physical processes and their impact on the uncertainty of weather and climate predictions. I will review the state of the art in stochastic modeling of climate and try to predict the developments in the near future. (Received September 20, 2007)