CATS CENTRE FOR THE ANALYSIS OF TIME SERIES

Hailiang Du and Leonard Smith

Multi-model Cross Pollination in Time: Assimilating the Future for Better Forecasts

Sixth Annual CliMathNet Conference, 19-21 September 2018, Reading

20 September 2018

Abstract

Multi-model ensembles have become popular tools to account for some of the uncertainty due to model inadequacy in weather and climate simulation-based predictions. The current multi-model forecasts focus on combining single model ensemble forecasts by means of statistical post-processing. Assuming each model is developed independently or with different primary target variables, each is likely to contain different dynamical strengths and weaknesses. Using statistical post-processing, such information is only carried by the simulations under a single model ensemble: no advantage is taken to influence simulations under the other models. A novel methodology, named Multi-model Cross Pollination in Time, is proposed for multi-model ensemble scheme to take advantage of instances where some models produce systematically more skillful forecast of some components of the model-state via integrating the dynamical information regarding the future from each individual model operationally. The proposed approach generates model states in time via applying data assimilation scheme(s) to yield truly “multi-model trajectories”. It is demonstrated to outperform traditional statistical post-processing in the 40-dimensional Lorenz96 flow. Data assimilation approaches are originally designed to improve state estimation from the past to the current time. The aim of this talk is to introduce a framework that uses data assimilation to improve model forecasts at future time (not to argue for any one particular data assimilation scheme). Thus the basis for a more general approach to reduce the impact of model discrepancy could be deployed in future operational forecasting is suggested.

LSE