SEMIANNUAL PROGRESS REPORT

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In carrying out our research we have been closely following our research plan. In particular:

- We successfully implemented the 2004 version of the NCEP GFS on our Linux cluster and.
- We coded an improved efficiency version of our Local Ensemble Kalman Filter (LEKF) data assimilation scheme. We call the new scheme Local Ensemble Transform Kalman Filter, indicating that the new scheme combines ideas from our own LEKF scheme and from the Ensemble Transform Kalman Filter of Bishop et al. (2001). On our 40-processor Linux cluster the new LETKF scheme is about 6 times faster than the original LEKF scheme.
- We generated a set of "simulated" observations mimicking the observational data files of NCEP for the three-month test period. The locations of the simulated observations were identical to the locations of the real observations in the test data set. We used this simulated observations for testing the implementation of our LETKF scheme on observational data given in prepbuffer format. We are also planning to use the results of this experiment as a benchmark, that shows the accuracy of our data assimilations system for the case when there is no model error. We hope that this information will help us better identify problems associated with the use of an imperfect model.
- We are currently running LETKF data assimilation experiments with the real weather observations. In these experiments, we use a 3-dimensional version of the LETKF, in which effects of the model errors are represented by simple variance inflation. We hope to report on the results of this experiments in about a month.
- We developed a new scheme for the parameterization of model errors in the LEKF (LETK) framework. This technique was successfully tested on the 40-variable Lorenz model. These results are described in the manuscript "Baek, Hunt, Szunyogh, and Ott: Local Ensemble Kalman Filtering in the Presence of Model Errors, that we are planning to submit to Tellus for publication in the coming weeks. One of our main goals for the next half a year is to test this technique on the NCEP GFS and real observations. (Our other major goal for the remainder of the year is to test the 4-dimensional version of the scheme on real observations).
- We also continued our efforts to carry out basic predictability research associated with the data assimilation/ensemble generation problem. We have two recently accepted papers on these results, one in Tellus (Szunyogh, Kostelich, Gyarmati, Patil, Hunt, Kalnay, Ott and Yorke: Assessing a Local Ensemble Kalman Filter: Perfect Model Experiments with the NCEP global model) and one in JAS (Oczkowski, Szunyogh, and Patil: Mechanisms for the development of locally low dimensional atmospheric dynamics). Both papers acknowledge the support of the NOAA THORPEX Grant.
- We contributed 5 presentations to the First International THORPEX Symposium and we contributed 3 papers to the WMO publication on the same meeting.