Multidisciplinary **S**imulation, **E**stimation, and **A**ssimilation **S**ystems
Seminar Series

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Building State-of-the-Art Forecast Systems with the Ensemble Kalman Filter

Abstract: The development of numerical weather prediction was one of the great scientific and computational achievements of the last century. Computer models that approximate solutions of the partial differential equations that govern fluid flow and a comprehensive global observing network are two components of this prediction enterprise. An essential third component is data assimilation, the computational method that combines observations with predictions from previous times to produce initial conditions for subsequent predictions. The best present-day numerical weather prediction systems have evolved over decades and feature model-specific assimilation systems built with nearly a person century of effort.

This talk describes the design of a community software facility for ensemble Kalman filter data assimilation, the Data Assimilation Research Testbed (DART). DART can produce high-quality weather predictions but can also be used to build a comprehensive forecast system for any prediction model and observations. DART forecast systems must be inexpensive to implement and must run efficiently on computing platforms ranging from laptops to the largest available supercomputing. A description of the basic ensemble Kalman filter algorithm is followed by a discussion of algorithmic enhancements, in particular localization of observation impacts and inflation of prior ensembles, that are essential for efficient implementations for large prediction models. Several example applications in geosciences will be used to examine additional capabilities of modern ensemble prediction systems.

Biography: Jeffrey Anderson's research career has spanned two decades and has been focused by the common theme to improve predictions of the earth's atmosphere. He has made research contributions in theoretical geophysical fluid dynamics, seasonal prediction, predictability, ensemble prediction and ensemble data assimilation. His accomplishments in software engineering, applied mathematics and statistics have been directly in support of his goal to improve prediction.

Thursday, Oct. 15, 2015
3:00PM; Rm. 5-314
Massachusetts Institute of Technology
77 Massachusetts Avenue
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Host: Pierre Lermusiaux
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