



Optimization Program Inverse Problems Workshop January 26-27, 2017

Lecture: *Computational Methodologies for Large Data Assimilation Problems*

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Abstract:

Data assimilation is the process of fusing information from priors, models, and observations, in order to obtain best estimates of the state of a physical system such as the atmosphere. Data assimilation relies on comprehensive physical models with large numbers of variables, and on complex observational data sets. The resulting large scale inverse problems need to be solved in faster than real time in order to, for example, meet the demands of weather forecasting. In this talk we introduce variational and statistical estimation approaches to data assimilation. We discuss important computational aspects including the construction of efficient models for (background) errors, the construction and analysis of discrete adjoint models, solving the optimization problem using reduced order model surrogates, estimating the information content of observations, and methodologies that are robust with respect to error in data.