



Department of Decision Sciences

Statistics Seminar

Quantifying the Uncertainty in Climate Model Simulations

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Abstract

A key component in understanding and modeling the Earth's climate is a rigorous and comprehensive quantification of its relevant uncertainties. Together with sophisticated physical models, modern statistical methodology is needed to describe multiple climate processes over different spatial and temporal scales. In particular, powerful statistical methods are needed to handle large amounts of data and extract information on the complexities of the climate system. In addition, there are a number of uncertainties that affect the simulations from a climate model. Among them: variability of the initial conditions; variability and lack of knowledge for some of the inputs; model structure. In this talk I will review a number of problems where Bayesian hierarchical models are used to tackle climate model uncertainty quantification. This include probabilistic calibration of the parameters of an intermediate complexity model, as well as unified forecasting from ensembles of climate model simulation at different resolutions and time horizons. These examples can be seen as a proxy for the use, in general settings, of statistical tools to quantify the uncertainty inherent in simulations of complex systems.