Uncertainty quantification and climate model experiments

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There are many sources of uncertainty that arise with climate models and projections of future climate. Often, ensembles (collections of climate model output run with different conditions or different models) are used to study these sources of uncertainty, and the statistical analysis of these ensembles presents a number of challenges, including the size and complexity of the spatial-temporal fields that make up climate model output. In this talk, I will discuss these challenges within the context of two regional climate model experiments: one focused on temperature change over North America while the other explores the role of model parameterization and resolution on precipitation. A statistical framework for evaluating sources of uncertainty will be presented, and this framework is based on an underlying spatial model that incorporates a multi-resolution basis with a regularization based on a Markov random field prior distribution on the coefficients.

Key Words: Functional ANOVA; Spatial modeling; large datasets