NORTHERN ARIZONA UNIVERSITY

Department of Mathematics and Statistics

COLLOQUIUM
Tuesday, February 16th, 2015
4:00 – 5:00 pm, Adel Mathematics Bldg., Room 164
(refreshments at 3:45)

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Bayesian and non-Bayesian approaches to quantifying physiological, morphological, and allometric traits of U.S. tree species

Abstract: Functional traits that describe physiological, morphological, and allometric properties of trees are important for understanding tree growth and mortality and predicting forest diversity and productivity. Substantial empirical work has been conducted to quantify various functional traits of multiple tree species across the US. We extracted published trait information (summary statistics, parameter estimates) from the primary literature for about 50% of the 300+ US tree species identified by the US Forest Service (USFS). This talk describes a Bayesian meta-analysis approach for analyzing this literature data to evaluate sources of variability underlying within and among species trait variability, and for providing trait estimates for all 300+ species. We use these results to develop semi-informative priors for ca. 30 functional traits, which we use in a Bayesian model that fits an individual-based model (IBM) of tree growth to millions of observations of repeated tree height and diameter provided by the USFS. This talk summarizes our crude, but computationally efficient MCMC approach for fitting a complex IBM to the large USFS dataset, with the goal of quantifying the "theoretical trait space." To quantify this trait space, we applied step-wise and best-subsets regression approaches to the posterior samples generated from the MCMC routine to explore the multivariate structure of the trait (parameter) space, which revealed interesting structure that has not been previously described by more empirical approaches.