



Statistical Sciences  
UNIVERSITY OF TORONTO

## SEMINAR

January 14<sup>th</sup>, 2016 at 3:30pm

*\*Refreshments at 3:10pm*

Sidney Smith Hall, Room 2106

Speaker: Andrew Finley, Michigan State University

Host: Patrick Brown

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### **Process-based hierarchical models for coupling high-dimensional LiDAR and forest variables over large geographic domains**

Recent advancements in remote sensing technology, specifically Light Detection and Ranging (LiDAR) sensors, provide the data needed to quantify forest characteristics at a fine spatial resolution over large geographic domains. From an inferential standpoint, there is interest in prediction and interpolation of the often spatially misaligned LiDAR signals and forest variables. I propose a fully process-based Bayesian hierarchical model for above ground biomass (AGB) and LiDAR signals. The process-based framework offers richness in inferential capabilities (e.g., inference on the entire underlying processes instead of their values only at pre-specified points) and their easier interpretability.

Key challenges we obviate include misalignment between the AGB observations and LiDAR signals and the high-dimensionality in the model emerging from LiDAR signals in conjunction with the large number of spatial locations. We offer simulation experiments to evaluate our proposed models and also apply them to a challenging dataset comprising LiDAR and spatially coinciding forest inventory variables collected on the Penobscot Experimental Forest, Maine.