



## Department of Mathematics and Statistics

### COLLOQUIUM

**Tuesday, November 10<sup>th</sup>, 2015**

4:00 – 5:00 pm, Adel Mathematics Bldg., Room 164  
(refreshments at 3:45)

**Dr. Ed Ryan**

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### **Statistical and mathematical approaches to understanding the factors governing ecosystem carbon fluxes**

Abstract: Gross primary production (GPP) and ecosystem respiration ( $R_{\text{eco}}$ ) are two major fluxes in the global carbon cycle. At the ecosystem scale, the first represents the total amount of carbon (C) removed from the atmosphere by plants via photosynthesis, whilst the second represents the loss of C from the surface of the terrestrial biosphere via soil and plant respiration. However, there remains large uncertainty on future model projections of GPP and  $R_{\text{eco}}$  – both globally and regionally – where elevated levels of  $\text{CO}_2$  and warming are expected. We aimed to (1) quantify GPP and  $R_{\text{eco}}$  aggregated over six years and (2) evaluate potential drivers of GPP and  $R_{\text{eco}}$  with global change, using the Prairie Heating and  $\text{CO}_2$  Enrichment (PHACE) experiment in semiarid grassland in southeastern Wyoming. PHACE consists of the treatments: control, warming only, elevated atmospheric  $\text{CO}_2$  ( $e\text{CO}_2$ ) only,  $e\text{CO}_2$  and warming, and irrigation only. To address these research aims, we fit two different non-linear models to the treatment-level GPP and  $R_{\text{eco}}$  data both within a Hierarchical Bayesian framework, a novel feature being the inclusion of antecedent – as well as current – environmental predictors.

Ecosystem respiration is controlled by belowground C cycle processes, which operate at a very fine scale. Thus, a third aim of this project was to accurately quantify the production of soil C at 1cm increments in depth down to 1 meter, and to rigorously test frequently adopted steady-state assumptions about the transport of soil C.

Algebra Combinatorics Geometry and Topology (ACGT) Seminar meets every Tuesday, 12:45 – 1:45 pm, AMB 164.

Applied Math Seminar (AMS) will meet occasionally on Thursdays, 12:45 – 1:45 pm, AMB 164. Stay tuned for several upcoming talks.

Friday Afternoon Undergraduate Mathematics Seminar (FAMUS) meets Fridays, 3pm, AMB 164.