Cross-Site Synthesis of Tier 3 Sap Flux Data

PINEMAP 2014 Annual Meeting

Purpose

Use a common framework for the analysis of canopy transpiration and stomatal conductance across all four Tier 3 sites (throughfall reduction × fertilization studies) to investigate differences in responses related to site differences.

Current Status

Completed preliminary analysis of data from 2013 growing season (Fig. 1) for 3 sites.

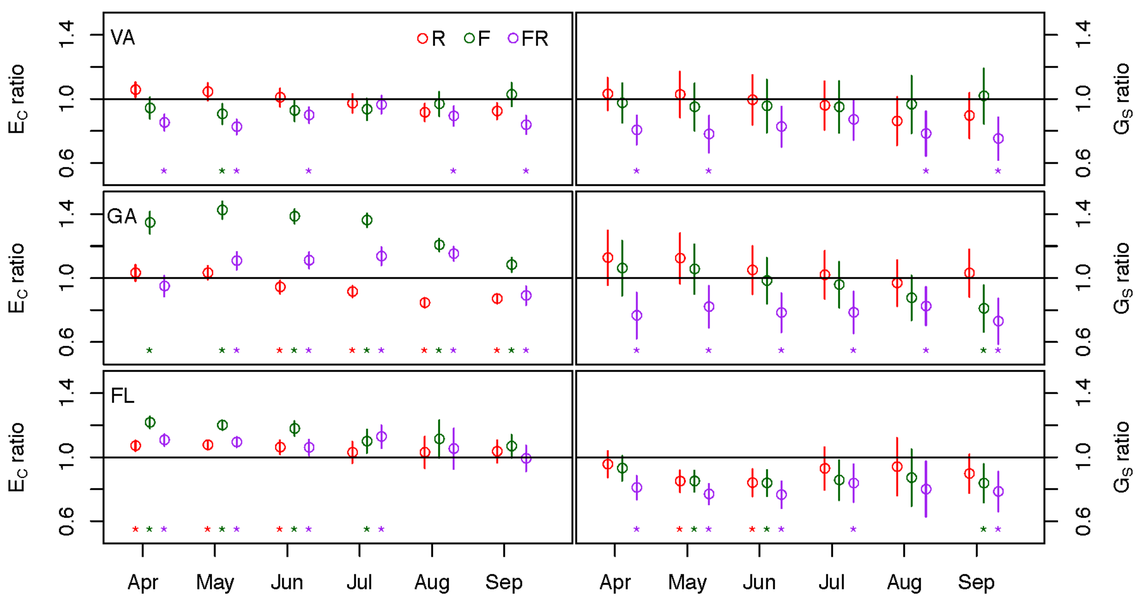

Figure 1. The ratio of monthly mean estimates of canopy transpiration (E_C) and daytime stomatal conductance (G_S) for throughfall reduction (R), fertilization (F) and combined (FR) treatments to that of the control treatment at Tier 3 sites in VA, GA and FL. Error bars represent 95% credible intervals of posterior distributions of mean half-hourly values. Asterisks represent months where the ratio differed from unity with 95% confidence using a normal parameteric bootstrap of monthly mean values.

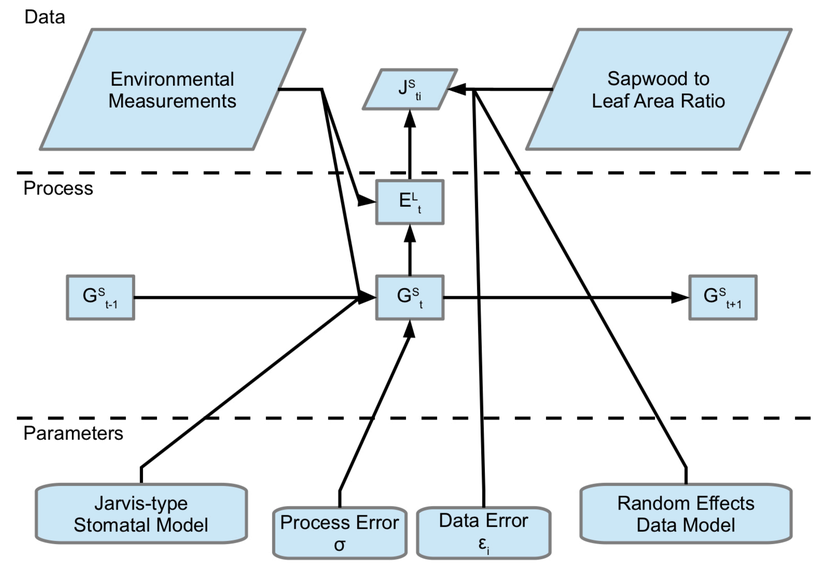

Figure 2. Basic structure of the State-space Canopy Conductance (StaCC) model. StaCC efficiently combines information from environmental measurements and stand characteristics to simultaneously fill gaps in sap flux data and estimate the responses of G_S to incoming light, vapor pressure deficit and soil moisture.

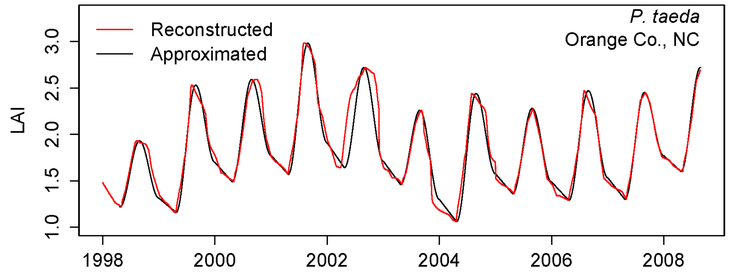

Figure 3. Leaf area index (*LAI*) for a stand planted in 1983, as reconstructed using the methodology of McCarthy *et al.* (2007) and as approximated from annual minima and maxima using a stereotyped annual pattern described by 3 parameters.

Next Steps

1. Develop a data assimilation workflow using TerraC to facilitate future analyses across sites using the StaCC model (Fig. 2).
2. Develop algorithms for developing consistent values of leaf area index (LAI, Fig. 3) and volumetric soil water content (VWC) at a daily time step for each treatment at each site.
3. Assess radial variation in sap flux for each treatment and site, using sensors at multiple depths. Data collection is already underway.

USDA United States Department of Agriculture National Institute of Food and Agriculture

Pine Integrated Network: Education, Mitigation, and Adaptation Project (PINEMAP) is a Coordinated Agricultural Project funded by the USDA National Institute of Food and Agriculture, Award # 2011-68002-30185