Progress Report

Environmental Predictors of Form and Quality
CAFS.18.74

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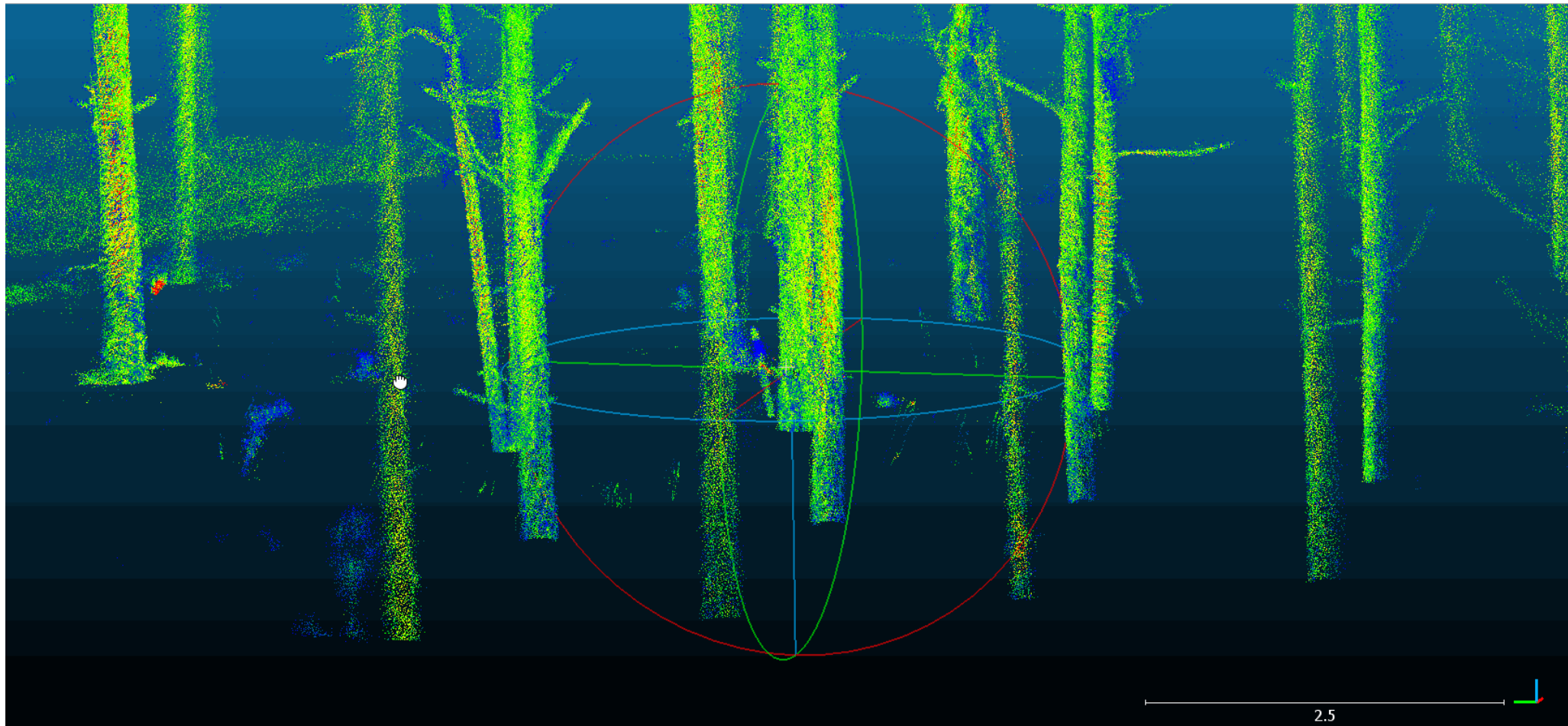
Presented by Cristian R. Montes
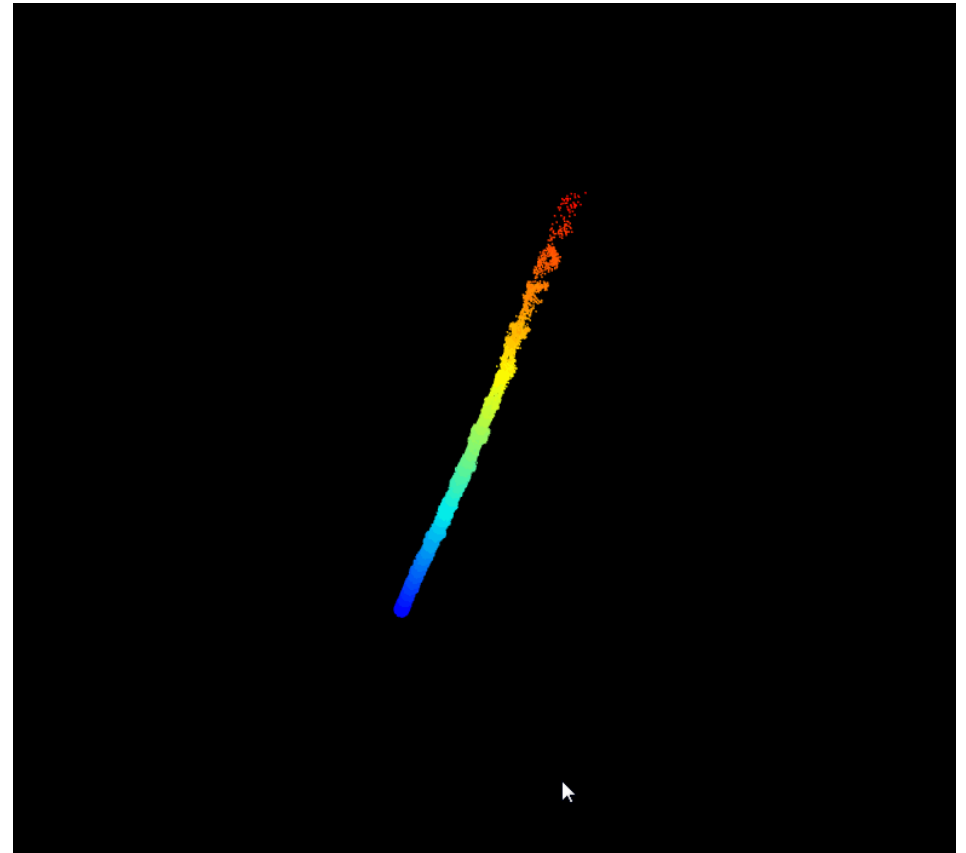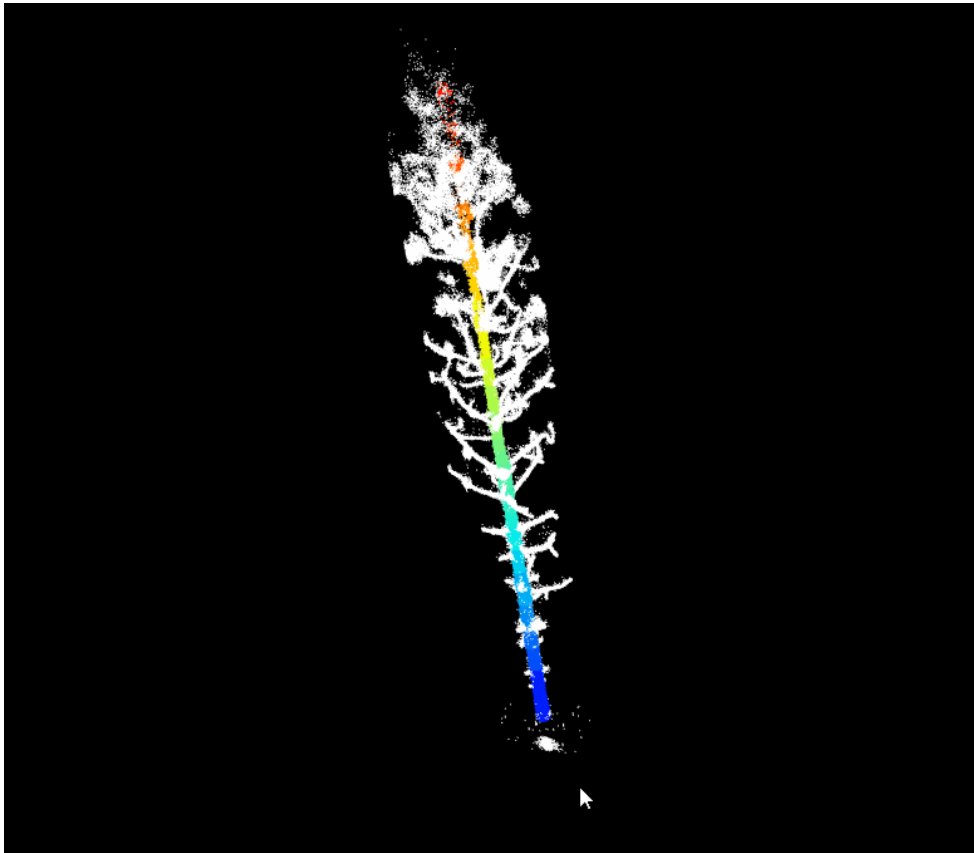
Project Overview

- Stem quality has huge impact in value but is a subjectively measured variable.

- Ground based mobile Lidar plot measurements.

- Develop algorithms to process Lidar diameters, heights and form.

- Relate form with environmental variables to evaluate likely value areas.
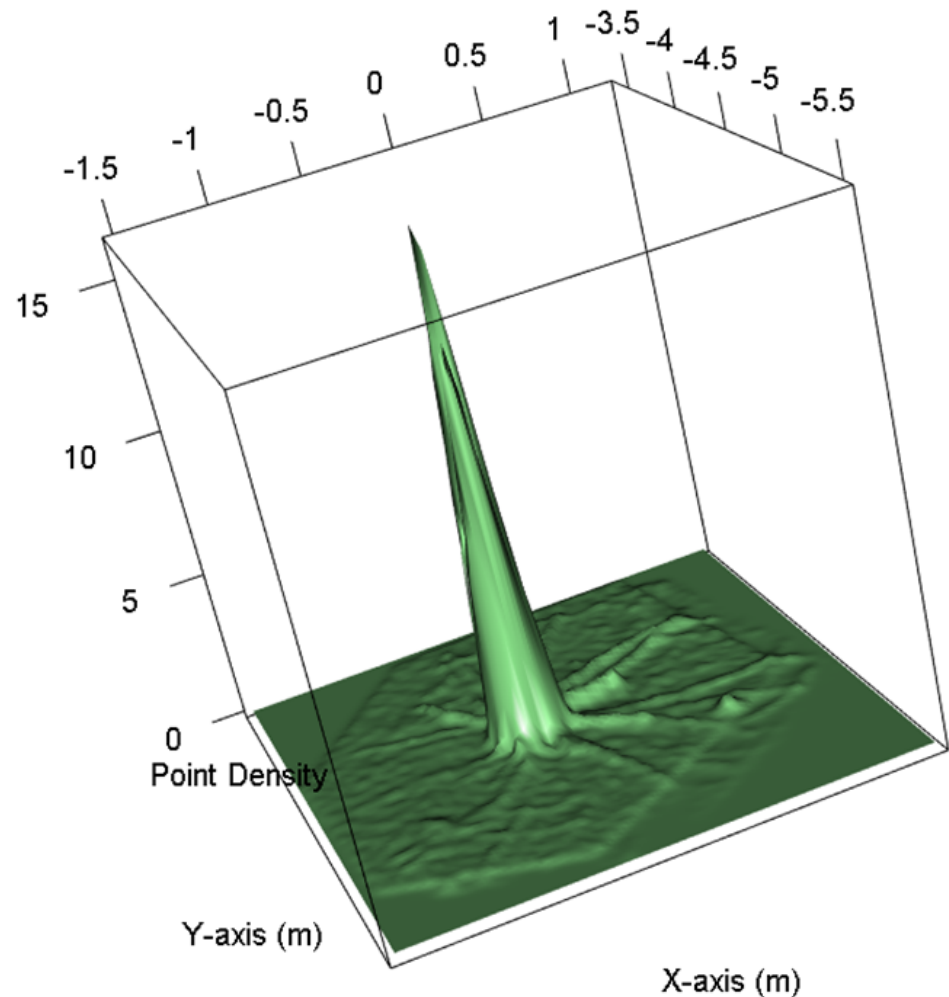
Ground based mobile Lidar Data

2.5

Developed algorithm to isolate stems from branches

Developed a method to Straighten Lidar data to avoid bias.

The methodology maximizes the kernel density in the direction of the measurement.

Developed several methods to fit circle and ellipses to terrestrial mobile lidar values.

Developed method to estimate height out of diameters measured along the height axis.

Solves for radius and circle center over height, using a Hough transformation.

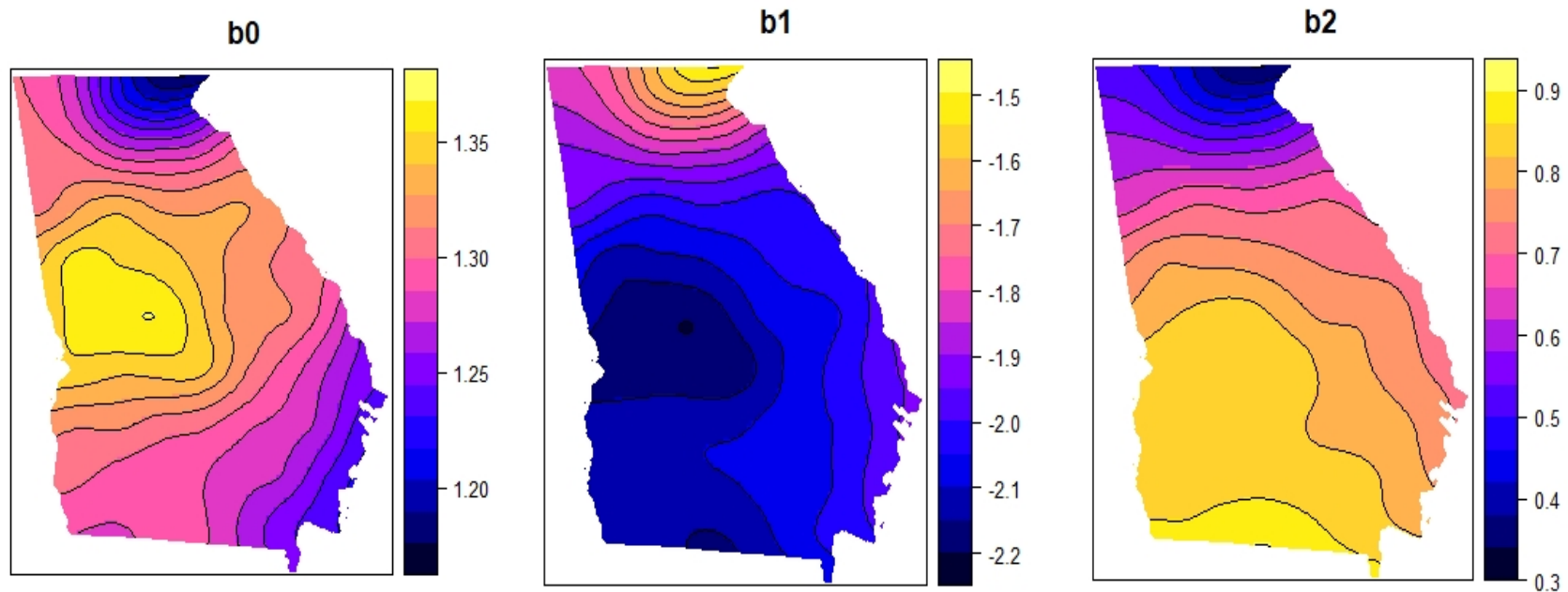$$r_j = \sqrt{(x_{j,i} - x_c)^2 + (y_{j,i} - y_c)^2}$$

Uses the normal wrapped density function as part of the objective function to evaluate optimum fit

$$f(\theta) = \frac{1}{(-4\pi \log \rho)^{1/2}} \sum_{k=-\infty}^{\infty} exp \left(\frac{(\theta - \mu + 2\pi k)^2}{4 log \rho} \right)$$

Taper equations fitted locally; parameters interpolated as a function of environmental predictors.

Spatial Variation in Kozak Taper Equation Parameters

Method uses generalized additive models with variance function dependent of environment and data density.

Allison Sheeks, in preparation

Pack algorithm for ground based lidar into an R package.

Test with other data (can we find phenotipic differences between genotypes?)

Wrap-up and deploy.