



**Center for Advanced Forestry Systems
2020 Annual Meeting Project Progress Report**



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PROJECT ID: CAFS.18.74

YEAR: 2 of 3

PROJECT TITLE: Environmental predictors of form and quality in loblolly pine

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PROJECT DESCRIPTION:

The project aims at developing a cost-effective methodology to assess stem quality using ground based mobile Lidar technology to reduce sampling cost while increasing the amount of information captured at the time of an inventory. Plot level observations are going to be correlated with landscape based environmental variables (soil particle size distribution, water deficit and excess water), to determine stochastic defect models. In the past, assessments like this were only possible with a portable lidar instrument. The mobile lidar provides much more flexibility, at the cost of a noisier dataset. Specialized algorithms of data assimilation will allow for a better location of diameters and defects along the tree.

HYPOTHESES or OBJECTIVES:

We hypothesize that defects (forking, rust and ramicorn presence) can be spatially identified with a correlation to auxiliary variables like water deficit, excess water and soil physical properties.

- First objective from this project is to describe stem defects using ground based lidar by means of a data assimilation algorithm.
- Second objective is to correlate defect with environmental variables to determine spatially explicit defect models.

EXPERIMENTAL PLAN:

Year 1: Plot measurements and assimilation algorithms development.

Year 2: Spatial model development for the US South.

MAJOR FINDINGS:

An algorithm to detect trees and tree form.

An algorithm to make trees straight

DELIVERABLES:

Examples of deliverables: services, reports or products created as a result of the project; for instance, publication, thesis, model, or new protocol developed.

MEMBER COMPANY BENEFITS:

Examples: Tree sampling algorithms using a ground based Lidar system.