Forest SAT 2026

Association for Forest Spatial Analysis Technologies

May 4-8, 2026 | Gainesville, Florida, USA

Title: Quantitative Structure Modeling (QSM) from Terrestrial Laser Scanning and Open-Source Tools

Instructors/Affiliation: Jinyi Xia (jinyixia@ufl.edu).

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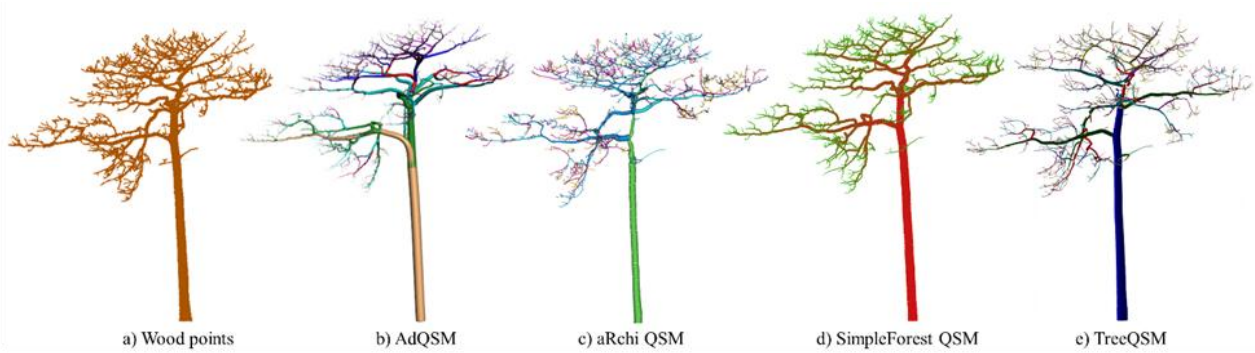
Description: QSM is a powerful method for reconstructing 3D tree architecture and estimating structural metrics such as trunk and branch volume, diameter, and branch count. Participants will gain practical experience with four widely used and actively developed QSM tools:

- *TreeQSM* – a classical, robust modeling framework, ideal for standard workflows.
- *AdQSM* – an adaptive method with enhanced flexibility.
- *aRchi* – an R package that facilitates integration with statistical analysis pipelines.
- *SimpleForest* – a C++-based tool optimized for batch processing of large datasets.

The workshop will cover the full pipeline from QSM configuration, generation, visualization, and structural metric extraction.



Learning Objectives: *By the end of the workshop, participants will:*

- *Understand the principles and applications of Quantitative Structure Models (QSM)*
- *Learn to generate and visualize 3D tree models using different QSM tools*
- *Extract structural metrics such as trunk and branch volume, diameter, and branch count*
- *Gain hands-on experience with TreeQSM, AdQSM, aRchi, and SimpleForest*
- *Compare tool capabilities and choose appropriate methods for different use cases*

Target audience: Researchers, graduate students, and professionals in forestry, ecology, remote sensing, or related fields interested in tree structure analysis and 3D modeling.

Format & Activities: The workshop combines short theoretical overviews with practical sessions. Participants will work with real 3D tree data and follow a complete QSM workflow: from model configuration and generation to visualization and metric extraction, using four different tools (TreeQSM, AdQSM, aRchi, SimpleForest).

Expected outcomes: Participants will:

- *Learn to use four major QSM tools*
- *Be able to reconstruct and analyze 3D tree architecture*
- *Understand the strengths and differences between available QSM software*

Language: English

Requirements: Computer with R studio installed.

Schedule: January 22, 9:00 AM – 2:00 PM (EST).

Duration: 4 hours.

Instructor Biography:

Aug.2022 - present: Jinyi Xia is a Ph.D. candidate in the School of Forest, Fisheries, and Geomatics Sciences at the University of Florida. Her research focuses on applying terrestrial and mobile laser scanning (TLS/MLS) to quantify three-dimensional structural attributes of Southern pine forests, with particular emphasis on stem and branch morphology, crown architecture, and their responses to silvicultural treatments. She integrates advanced point cloud processing techniques, semantic segmentation algorithms, and quantitative structure modeling (QSM) to improve the accuracy of tree metric estimation and to enhance the applicability of LiDAR technologies for forest monitoring and management.

Agenda

Eastern Time (ET)	Topic	Instructor
09:00 – 10:00	Introduction to TLS and QSM	Jinyi
10:00 – 10:30	Introduction to TLS data preprocessing	Jinyi
10:30 – 11:00	Introduction to TreeQSM	Jinyi
11:00 – 11:30	Introduction to AdQSM	Jinyi
11:30 – 12:00	Introduction to aRchi	Jinyi
12:00 – 13:00	**Break**	–
13:00 – 13:30	Introduction to SimpleForest	Jinyi
13:30 – 14:00	Introduction to QSM visualization	Jinyi