ForestSAT 2026

Association for Forest Spatial Analysis Technologies

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

Title: Mapping Forest Attributes Using Airborne Laser Scanning and Artificial Intelligence

Instructors/Affiliation: Cesar Alvites

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Description:

Stem volume is an essential component for estimating aboveground biomass and carbon stocks. Stem volume estimates are frequently used for acting forest management interventions and to monitor indirect and direct anthropogenic disturbance on forests. Field measurements provide accurate estimates but are spatially limited to plot areas (i.e. 900m2, 530m2). By leveraging Airborne Laser Scanning (ALS), it is possible to upscale plot-level forest attributes, including stem volume, to produce wall-to-wall maps across large areas. This hands-on virtual workshop introduces participants to one widely used upscaling framework: the area-based approach. Through guided exercises, participants will learn how to handle and process ALS data, link it with field measurements, and generate large-scale stem volume maps. Emphasis will be placed on understanding the strengths and limitations of this approach, best practices for data integration, and practical applications for biomass and carbon stock mapping. By the end of the workshop, participants will gain practical skills in ALS-based mapping techniques, preparing them to apply these methods for forest inventory, ecological monitoring, and resource management.

Learning Objectives:

Participants will gain hands-on experience with:

- Introduction to ALS systems and field data datasets
- Basic concepts for R coding

Practical exercises, including:

- Process and visualize DTM (Digital Terrain Model), DSM (Digital Surface Model) and CHM (Canopy Height Model) from ALS data,
- Build an upscaling model and apply it to wall-to-wall mapping.
- Analyze and interpret stem volume patterns across different covers.
- This course is supported by step-by-step tutorials and an example web application to guide participants in learning in-depth analysis.

Target audience:

Students, researchers, and professionals in forestry, ecology, remote sensing, or environmental sciences interested in local tools for forest monitoring. Only basic R coding knowledge is required.

Format & Activities:

This virtual, hands-on workshop includes short lectures and live demonstrations, step-by-step guided exercises in R and QGIS, model building and wall-to-wall mapping workflows. Tutorials and example applications for extended practice

Expected outcomes: Participants will:

Access and process ALS datasets for forest applications.

Develop and apply an area-based upscaling model to generate wall-to-wall stem volume maps.

Visualize, interpret, and compare stem volume patterns across different forest types and land covers.

Integrate ALS-derived metrics with field measurements to improve biomass and carbon stock estimates.

Confidently use R and QGIS for geospatial data analysis and forest monitoring workflows.

Language: English

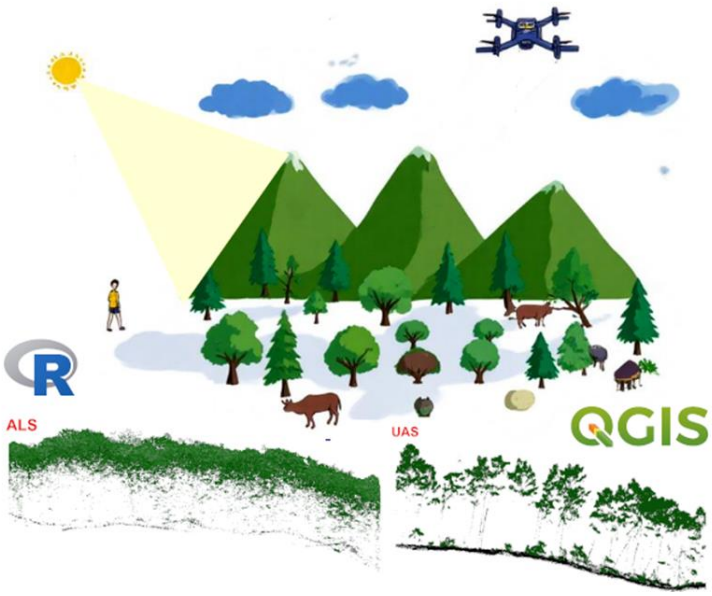
Requirements: Computer with R and QGIS software.

Schedule: February 9, 9:00 AM – 2:00 PM (EST)

Duration: 4 hours.

Instructor Biography:

Cesar Alvites was born in Peru and holds a Ph.D. in Science, Technology, and Biotechnology for Sustainability from the University of Tuscia and the University of Molise, Italy. He earned his first degree at Universidad Católica Sapientiae in Peru. His research interests center on forest monitoring, forest ecology, silviculture, and the use of advanced remote sensing technologies. Dr. Alvites has extensive experience with terrestrial, airborne, and satellite-based LiDAR (Light Detection and Ranging) systems, integrating these data sources to study forest structure, biomass, and ecosystem dynamics. He is passionate about developing and applying remote sensing methods to better understand forest resources and their changes over time. His work combines field investigation with geospatial analysis to support sustainable forest management, ecological research, and climate-related applications.



Agenda

Eastern Time (ET)	Topic	Instructor
09:00 – 09:30	Introduction to ALS systems and field data datasets (NASA and Copernicus missions' products)	Cesar Alvites
09:30 – 10:30	Access and download NASA ALS missions' products	Cesar Alvites
10:30 – 11:30	Break	-
11:30 – 12:30	Processing and visualization of DSM, DTM and CHM	Cesar Alvites
12:30 – 14:00	Build an upscaling model, generate a wall-to-wall map and analyze it.	Cesar Alvites