

**VII Simposio de Doctorandos de la UAH en Investigación con Tecnologías de la
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Plantilla para el envío de resúmenes

Título (máximo 30 palabras): Simulating LiDAR to understand fire effects: Integrating RTM and 3D forest reconstruction.**Ponente (Nombre y apellidos):** Adrián Enrico Baissero García**Resumen (máximo 400 palabras):****Palabras clave:** Terrestrial LiDAR Systems, Radiative Transfer Models, 3D Forest Reconstruction, Fire Simulation, Helios++.

Forests are vital components of the global carbon cycle, acting as both carbon sinks and sources depending on their health and disturbance levels (Vahedifard et al., 2024). Monitoring changes in forest biomass and structure, particularly in the context of increasing wildfire intensity and frequency (Ruffault et al., 2020), is necessary for understanding ecosystem dynamics and managing resources (Bispo et al., 2016; Haemaelaeninen et al., 2024).

Traditional field-based methods for biomass estimation, while reliable, are labor-intensive and often limited in scope. Terrestrial LiDAR systems (TLS), offer a fast, non-destructive, high-resolution alternative for capturing forest structure and estimating aboveground biomass (AGB) (Calders et al., 2020; Newnham et al., 2015; Delagrangue et al., 2014; Hackenberg et al., 2015).

Radiative transfer models enabled the simulation of laser pulse interactions with forest elements across different fire severities. The models used account for the scatter, absorption and reflectance of the laser pulse, at the same wavelength of the validated data, 1610nm. The simulation results of biomass consumption can further be used to develop combustion completeness models, which may incorporate more operationally accessible data, such as optical remote sensing, to assess carbon emissions effectively.

The objectives of this study were to: 1) Reconstruct realistic 3D forest and vegetation models from field and LiDAR data. 2) Simulate LiDAR acquisitions before and after fire using Helios++ Radiative Transfer Model.