Assessing Large-Scale Aboveground Carbon Dynamics in Mediterranean Forests Using Multi-Temporal ALS Data

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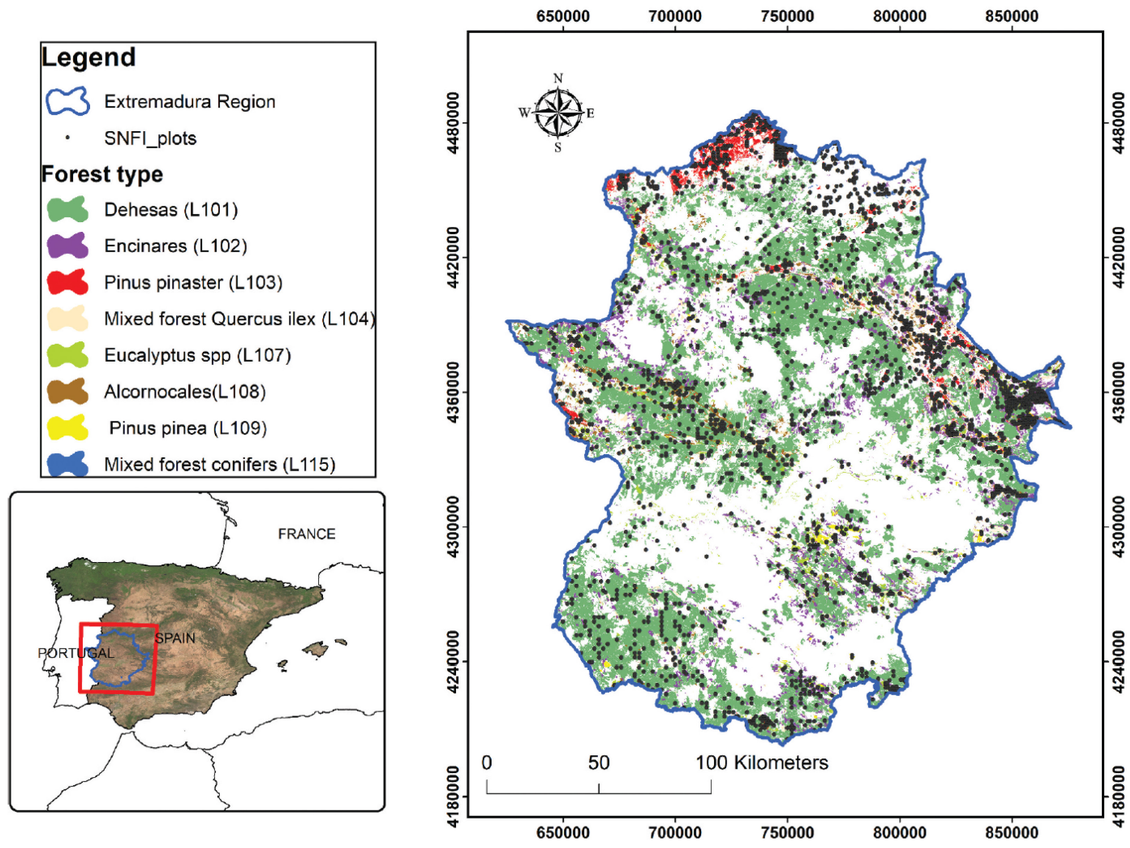
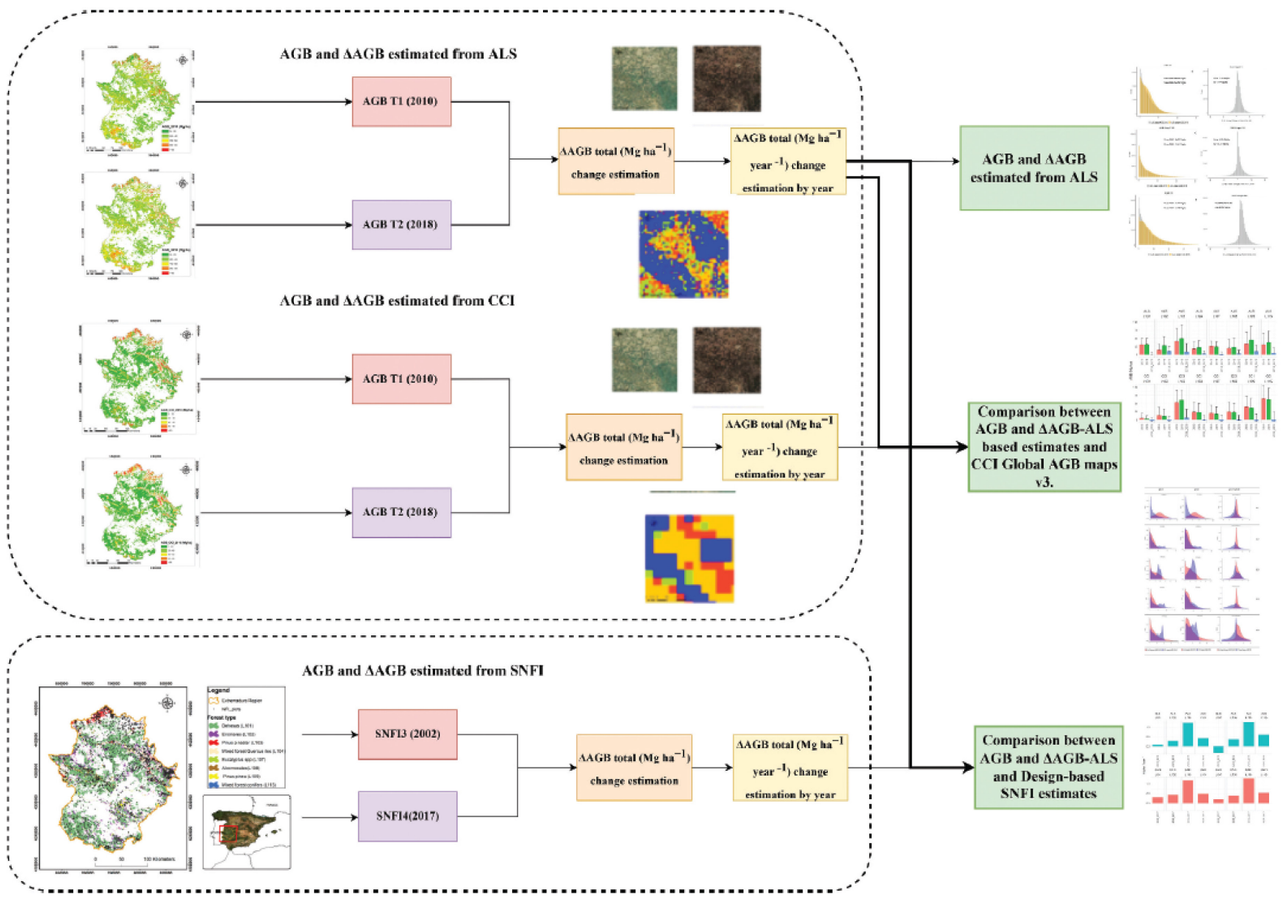
Introduction

This study leverages bi-temporal ALS(ALS) and the Climate Change Initiative (CCI) BIOMASS spaceborne mission to assess aboveground biomass (AGB) dynamics over an eight-year period in Mediterranean forests. By comparing ALS-derived AGB estimates with those from global CCI maps, the research aims to enhance the accuracy of carbon stock assessments vital for forest management and climate action. Our findings underline the potential of multitemporal ALS data to provide more precise regional carbon dynamics, suggesting a path forward for integrating advanced remote sensing with traditional forest inventory methods to better support environmental policy and forest management strategies.

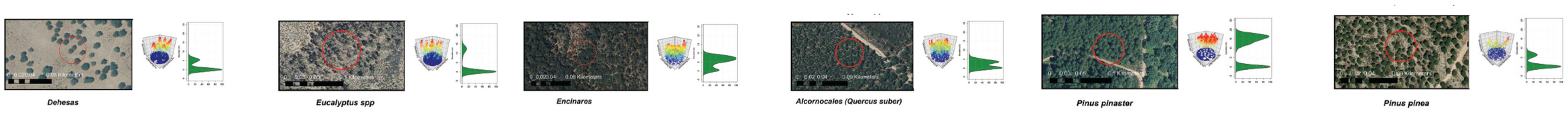


Workflow

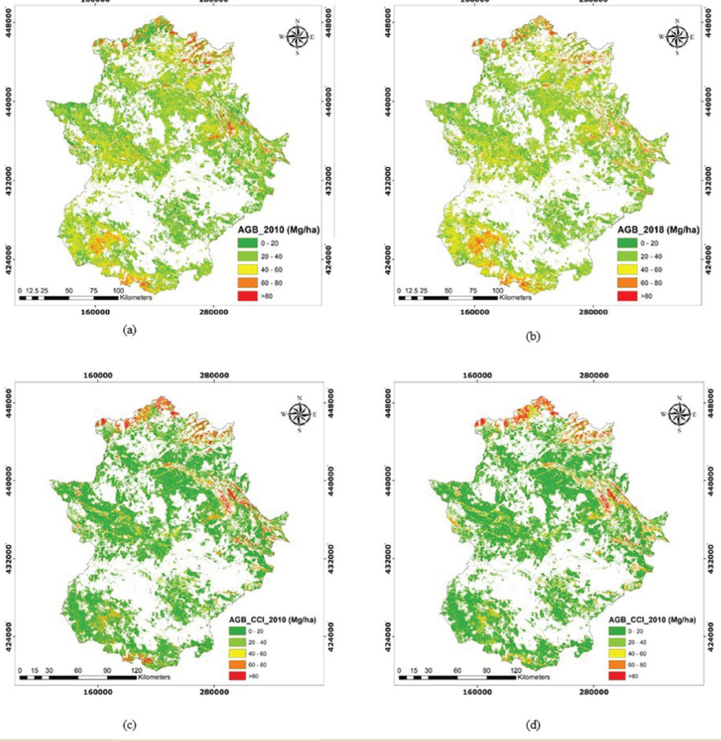


Key Findings/Results:

The study revealed that multitemporal ALS data effectively captured aboveground biomass (AGB) dynamics across various Mediterranean forest types, showing a general increase in biomass over the eight-year period. These ALS-based estimates closely matched those from the Spanish National Forest Inventory (SNFI) at strata levels, showcasing their precision and reliability. In contrast, the global CCI maps were less accurate, particularly in capturing the subtle variations in regional forest biomass. This validation underscores the utility of ALS in improving the accuracy and spatial resolution of biomass and carbon stock assessments at a regional scale.



Conclusions



Our study demonstrates that multitemporal ALS-based maps are effective for assessing aboveground biomass changes in Mediterranean forests, showing significant improvements over global CCI AGB maps. The ALS approach aligns closely with ground-based national forest inventories, offering a reliable method for enhancing regional carbon stock assessments. These findings advocate for the integration of advanced remote sensing techniques with traditional inventory methods to optimize forest management and carbon sequestration policies, thereby contributing to more effective climate change mitigation strategies.

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