

Peer Review

Review of: "Modelling and Mapping of Aboveground Carbon of Oluwa Forest Reserve Using Landsat 8 TM and Forest Inventory Data"

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This manuscript addresses an important and policy-relevant topic: modelling and mapping aboveground carbon (AGC) in a tropical rainforest using Landsat 8 imagery integrated with field inventory data. The integration of ground-based measurements with remote sensing is appropriate for REDD+, CDM, and national carbon accounting frameworks. The study area is clearly described, field methods are detailed, and the attempt to validate spectral-index-based models against plot-derived AGC is commendable. The reported mean AGC (150.7 t/ha) is within the expected range for tropical rainforest systems, and the spatial carbon map provides practical value for forest management and climate mitigation planning.

However, there are several major methodological and statistical concerns that must be addressed before the results can be considered robust:

1. Implausible RMSE Values

The reported RMSE values (e.g., 6.38E-16) are mathematically implausible for biomass/carbon modelling using Landsat data. Such near-zero error suggests either:

A computational error,

Overfitting,

Leakage between training and validation data,

Or use of the same dataset for calibration and validation.

In real-world remote sensing biomass modelling, RMSE values are typically in the range of 10–40 t/ha depending on forest heterogeneity. The authors must clarify:

How RMSE was calculated,

Units used,

Whether cross-validation was applied,

Whether validation was independent.

Without correction, the claim of 94% predictive accuracy is not credible.

2. Sample Size and Independence

Although 20 plots were selected, Table 2 shows **324 observations**. It is unclear:

Whether 324 refers to individual trees rather than plots,

Whether plot-level aggregation was performed before regression,

Whether spatial autocorrelation was tested.

Biomass modelling should use plot-level AGC (e.g., t/ha per plot) as independent units. Using individual tree values while linking them to pixel-level spectral indices may violate independence assumptions.

3. Model Overfitting and Validation

The manuscript states that the model was validated with an independent dataset, but no details are provided regarding:

Size of the validation dataset,

Data split strategy (e.g., 70/30 split, k-fold cross-validation),

Whether spatial cross-validation was applied,

Confidence intervals of predictions.

Given the extremely high R^2 (0.94), stronger validation procedures are required.

Declarations

Potential competing interests: No potential competing interests to declare.