Methodology

Protocol for Field Calibration

Summary

This protocol provides requirements and procedures for the calibration of remote sensing outputs using ground-truthing data. It provides high-level guidance on calibration methods, minimum sample plot requirements, and regression analysis.

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1 Introduction

1.1 Normative References

1.1.1   The following document should be read in conjunction with:

- [M001 - Methodology for Terrestrial Forest Restoration](#)

- [Terms & Definitions](#)

1.2 Objective

1.2.1   This protocol provides guidelines for developers on the collection of field data necessary to calibrate the calculation of net GHG removals.

1.2.2   Equitable Earth uses the data gathered by developers to enhance the accuracy of net GHG removals estimated and quantified using M001.

1.3 Scope & Applicability

1.3.1   This protocol applies to projects calibrating Aboveground Biomass (AGB) values to enhance the accuracy of net GHG removal estimates.

1.3.2   Field calibration may be initiated under the following circumstances:

1.3.2.1   **Developer-initiated calibration**. Developers formally request field calibration at the beginning of the project design phase.

1.3.2.2   **Equitable Earth-recommended calibration**. Equitable Earth detects inconsistencies or high variability in AGB values within its dataset. In such cases, Equitable Earth will notify developers and recommend field calibration. If developers choose not to proceed with field calibration, Equitable Earth defaults to the most conservative dataset available.

1.3.3   Field data collection and calibration must be conducted in conformance with the procedures outlined in this protocol.

2 Data Extraction Protocol

This section outlines the procedures for extracting, processing, and submitting field data used to calibrate AGB estimates against Equitable Earth remote sensing outputs.

2.1 Sample Plot Selection And Measurement

Sample plot

2.1.1   Developers must strive to align field data collection schedules with remote sensing data acquisition periods to ensure direct comparability.

2.1.2   Equitable Earth follows a stratified sampling approach for the selection of sample plots to ensure representative coverage of the project area by:

2.1.2.1   Defining the location of sample plots based on the stratification of the project area, as well as the spatial resolution of the AGB provider data

2.1.2.2   Sharing the relevant shapefiles with the developers to facilitate field data collection

In-Situ measurement

2.1.3   Developers must perform all measurements using LiDAR scanning in each sample plot identified by Equitable Earth.

2.1.4   For each sample plot, developers must document environmental conditions that could influence measurement accuracy (e.g., weather conditions, terrain, surface types).

2.1.5   Developers may record additional field measurements (e.g., tree height and diameter), but such measurements will not be considered for calibration in this version of the protocol.

2.2 Data Quality Assurance

Quality requirements

2.2.1   To maintain high data integrity, developers must implement the following quality control measures, based on parameters defined by Equitable Earth after sample plots have been established:

2.2.1.1   Ensure the completeness of LiDAR scans before leaving each sample plot.

2.2.1.2   Perform secondary scans on a statistically representative subset of plots, as defined by Equitable Earth, to assess consistency and repeatability.

2.2.1.3   Document and flag any measurement discrepancies exceeding predefined error thresholds defined by Equitable Earth for further review and resolution.

Data Submission

2.2.2   Developers must submit the following to Equitable Earth:

2.2.2.1   **Field data**. It must be processed in *LAS* format and consistently formatted for all sample plots.

2.2.2.2   **AGB maps**. The map must be based on LiDAR-derived metrics (e.g., tree height, canopy cover) and the application of appropriate biomass estimation models.

2.2.2.3   **Calibration report**. Developers must use the template provided by Equitable Earth and include the following information:

     1)   **Objective and scope.** A summary of the data collection process and its purpose.

     2)   **Field methods.** A detailed description of sampling strategies and LiDAR scanning techniques.

     3)   **Data summary.** A comprehensive table of recorded LiDAR measurements, including any identified inconsistencies.

     4)   **AGB calculation methodology.** A detailed explanation of how the AGB values were derived from the LiDAR data, including any models or equations used, along with the assumptions made.

     5)   **Challenges and limitations.** Documentation of issues encountered and their potential impact on data quality.

2.3 Data Storage And Access

2.3.1   Developers and Equitable Earth must retain all datasets, including raw LiDAR scans, shapefiles, geotiffs, calibration reports, and associated documentation throughout the project crediting period.

2.3.2   Developers must grant Equitable Earth and the validation and verification body (VVB) full access to raw datasets for potential recalibration and auditing purposes.

2.3.3   Data management practices must fully comply with Equitable Earth's Privacy Policy and applicable national and international data security standards.

3 Recalibration of Carbon Estimates

This section sets out the procedures and requirements followed by Equitable Earth to assess and correct any systematic discrepancies between remote sensing-derived biomass estimates and field-collected data.

3.1 Dataset Preparation

3.1.1 Equitable Earth compares the AGB maps derived from LiDAR-based data provided by the developer with remote biomass estimates received from its AGB provider.

3.2 Calibration Methods

3.2.1 Equitable Earth applies multiple regression models (e.g., linear, exponential, logarithmic, and others, as appropriate) and different functional forms (e.g., power or logarithmic transformations) to evaluate the relationship between the LiDAR-based field measurements and the biomass estimates from the AGB provider.

3.2.2 The modelling process should account for relevant site-specific variables, such as forest type, canopy structure, and other environmental factors.

3.3 Adjustment Implementation

3.3.1 If a relationship between the two datasets is established, Equitable Earth must evaluate the model's performance and limitations using the available field data and a representative subset of remote estimates.

3.3.2 The decision to apply the model for calibration must depend on its statistical reliability and its ability to accurately represent the relationship between the datasets.

3.3.3 If the model is deemed sufficiently strong and consistent, Equitable Earth applies the model to calibrate the remote AGB estimates for the entire dataset.

3.3.4 Equitable Earth documents a summary of the evaluation process and any adjustments made in the corresponding report, whether GHG Parameters and

[Baseline Calculation](#) or [GHG Monitoring Report](#). Equitable Earth shares the results with the developer before report publication.

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