Current Gaps & Future Perspectives

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November 16, 2015

stochasticity *versus* determinism

AGB estimates used for identifying spatial and temporal trends
Testing for differences between 2 estimates necessitates the quantification of the confidence level of those estimates

- most allometric equations did not report
  - model uncertainties
  - parameter uncertainties
- many people use allometry in a deterministic way

so that very often differences in time/space are highlighted with no statistical support at all

uncertainties from the dataset itself

Basicaly 3 dataset are used with allometry

- DBH subject of measurement errors (always positive)
- height subject to measurement errors (approx. white noise)
- species-specific WD values neglect individual variability

data uncertainties may be managed with appropriate error laws

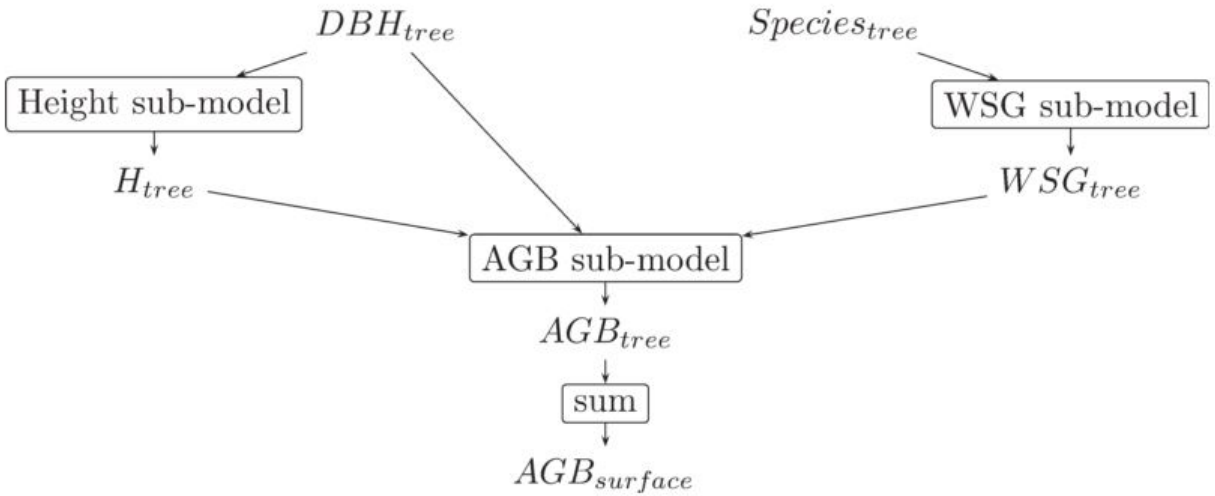
uncertainties from the statistical models

all statistical models are approximation of the reality

- the height submodel
- the WSG submodel
- the AGB submodel

all parameters from all submodels have to be sampled in there distribution laws

a general scheme for error propagation



- easier in a Monte Carlo scheme
- a final error value integation all data- and model- uncertainties
- sensitivity analyses to highlight main error sources

PhD thesis of *Molto 2014* in French Guiana

main sources of uncertainties ?

- the AGB submodel, by far
  - the choice of this submodel is crucial
  - estimates of errors on parameters for this model is necessary
- improve AGB prediction by improving AGB submodel only
  - but an impassable limit due to natural variability among trees ?
  - investigate new variables ? Which ones ?
    - but an impassable limit due to natural variability among trees ?
    - investigate new variables ? Which ones ?
    - crown size ? irregular trunk ?

Finding a compromise between data costs in time acquisition and practical usefulness for standard forest inventories

Do allometries change in disturbed forests ?

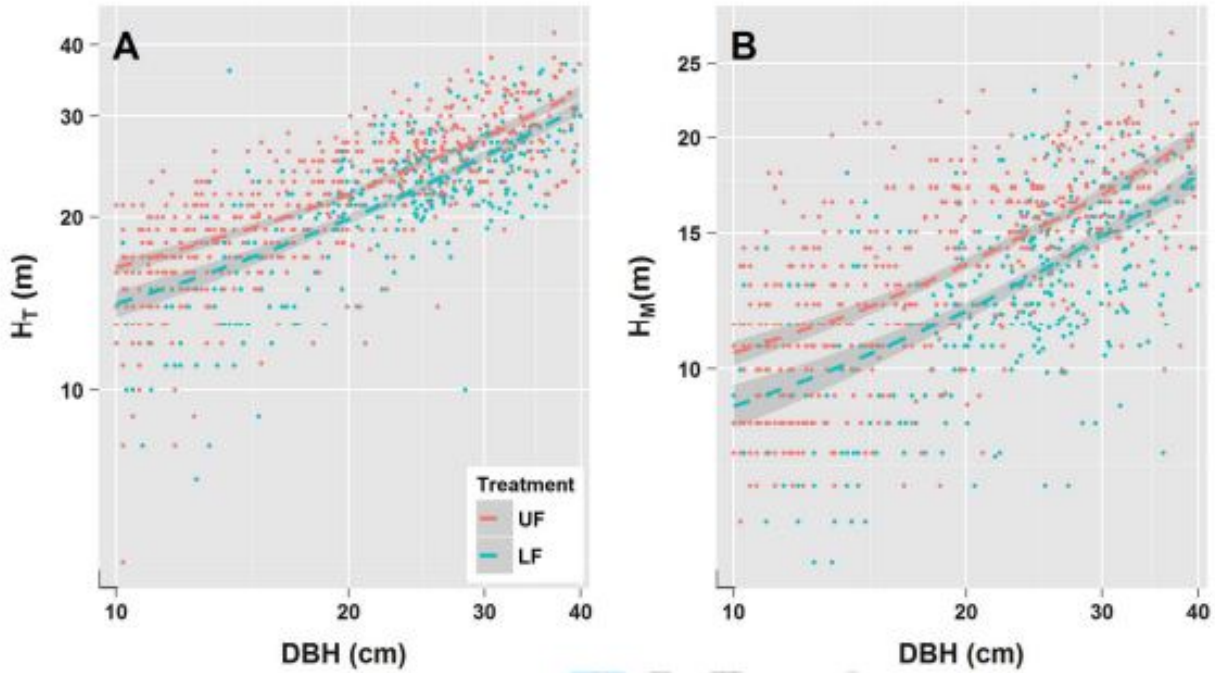
50% of tropical forests are designated for production by National Forest Services

Production forests experienced high disturbance levels

- enhanced light conditions
- do trees form their crown at lower stature ?
- gap in literature on this key issue

We used data from the Paracou permanent plots to test this idea

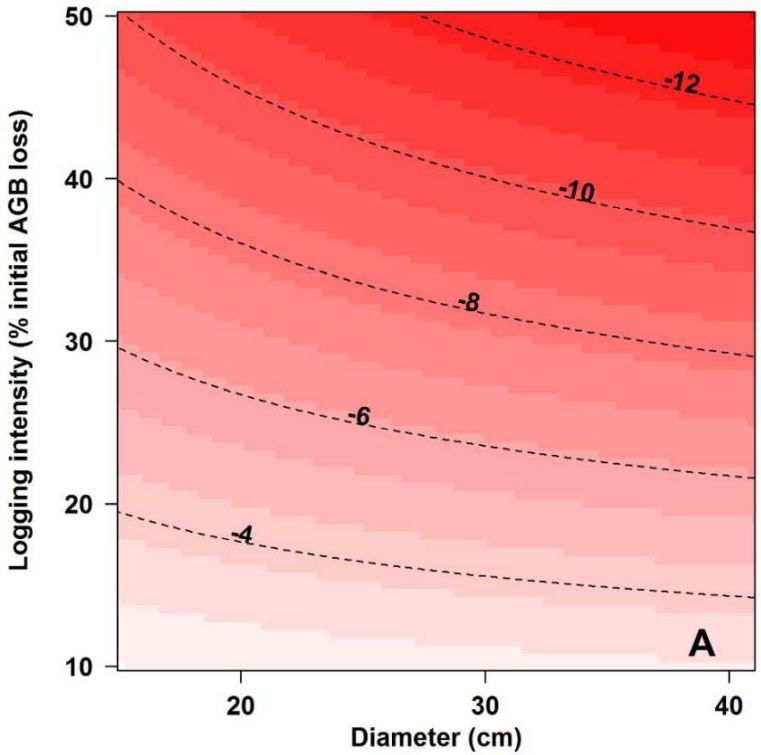
a significant effect



- on both total and merchantable height
- on average 2.0 m shorter

enhanced light conditions induced lower crown development

consequences for biomass estimates



- 6-19% less biomass for Paracou trees

new AGB models for disturbed forests are urgently needed

technological tools

- optical sensors
- lidar technologies
- radar technologies

remote sensing data obtained with aerial techniques must be calibrated against some reference forest inventory plots

- need for accurate field estimates
- key role of allometric equations

proved efficiency at local scale

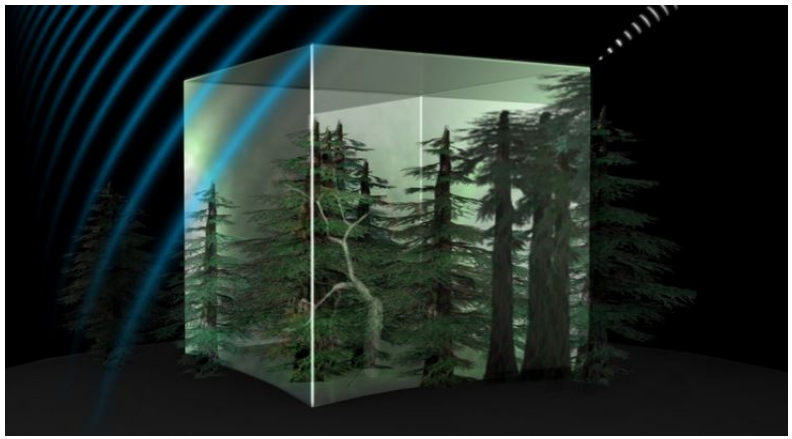
- ability to penetrate tropical forest canopies
- detect 3-D forest structure
- large choices of algorythms

but the best equations *(Vincent 2014)* need field-estimates

- ratio of Basal Area over Mean Canopy Height
- average wood density at the forest scale

room for a regional research work dedicated to the comparison of LiDAR-based AGB estimates to inventory-based estimates

great hopes in Biomass Mission ESA



- $500 million
- P-band synthetic aperture polarimetric radar
- 435 MHz with a bw of 6 MHz
- Paracou is one of the main calibration site

ALOS PALSAR

Phased Array type L-band Synthetic Aperture

- Suriname, used to map vegetation
  - input to REDD Measurement, Reporting and Verification
- Guyana, combined to Envisat & TerraSAR-X
  - new biomass mapping methods
  - calibration done with Iwokrama databases

The total number of logged trees used to calibrate allometric and volumetric equations in the region is impressively high compared to the existing pantropical databases.

- maybe focus more on new modeling mathodology than data collection
- but lack of data in disturbed forests

A good compromise may be to gather Height-only non-destructive data to improve predictions with height-explicit allometries

on data sharing

A major identified problem for foresters, stakeholders or scientists involved in AGBcurrent assessment is that they don't have any access to the native databases from the destructive sampling plots.

- could it be possible to harmonize the diverse databases
- need for a data sharing agreement
- a single database is better but not mandatory
- codes and algorythms may be shared and not native data

Doing so will be far less costly than initiating similar destructive research again.