

Tropisar project

Ground data: errors

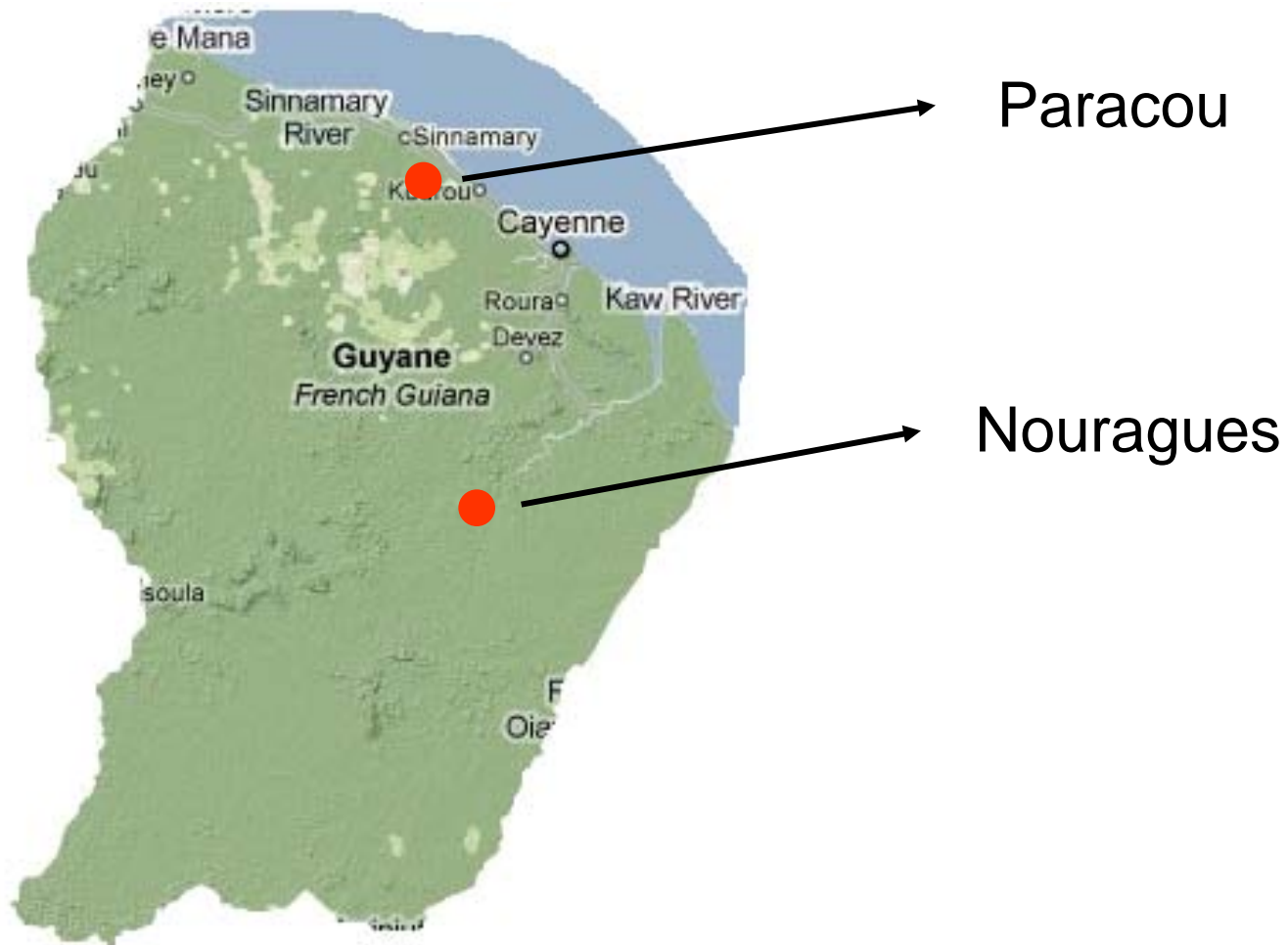
Maxime Réjou-Méchain, Lilian Blanc & Jérôme Chave



January 13, 2011

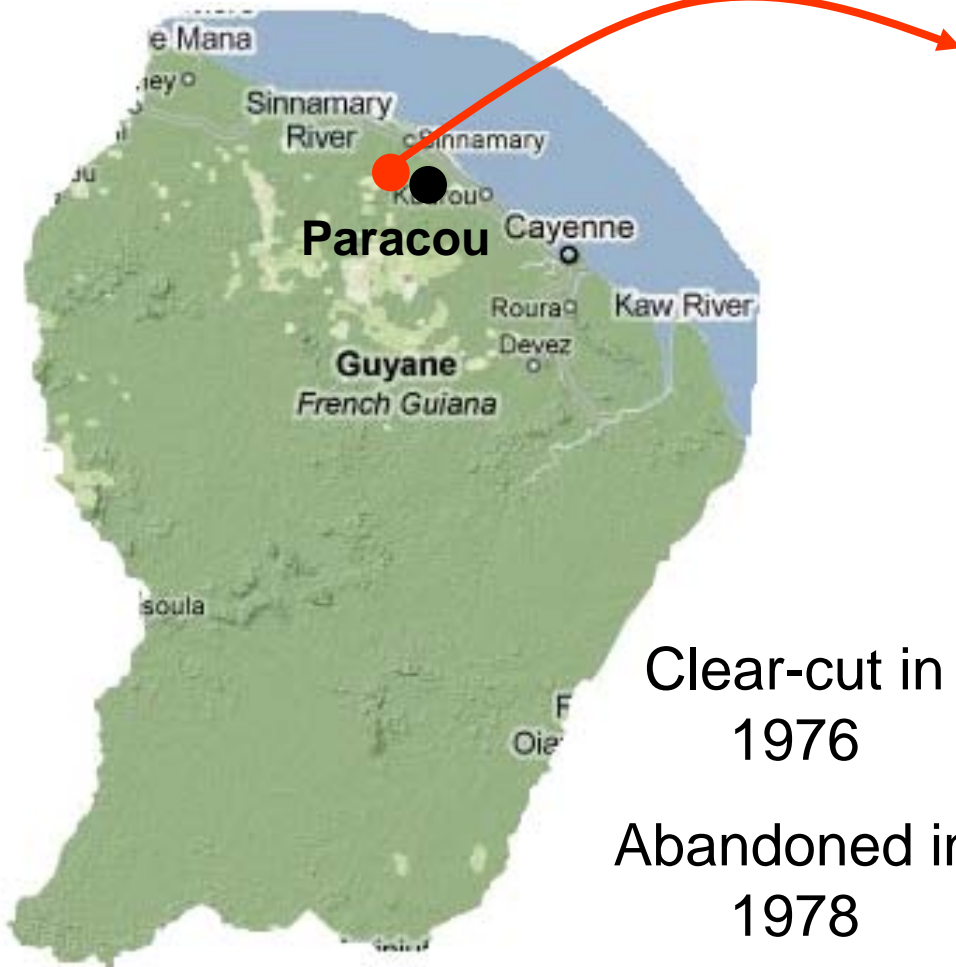
Ground sites

2 study zones



Paracou

Located near Paracou

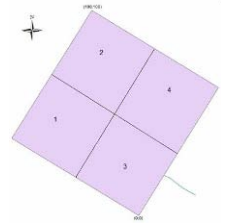


Arbocel

1 plot of 6.25 ha

in

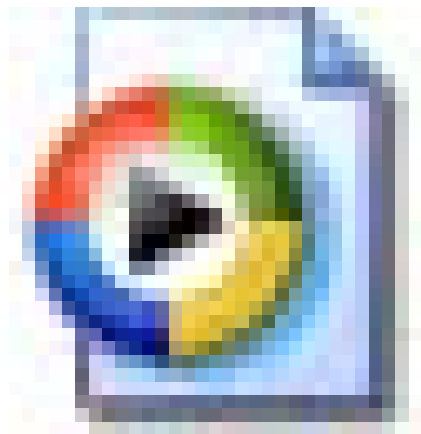
Secondary forest



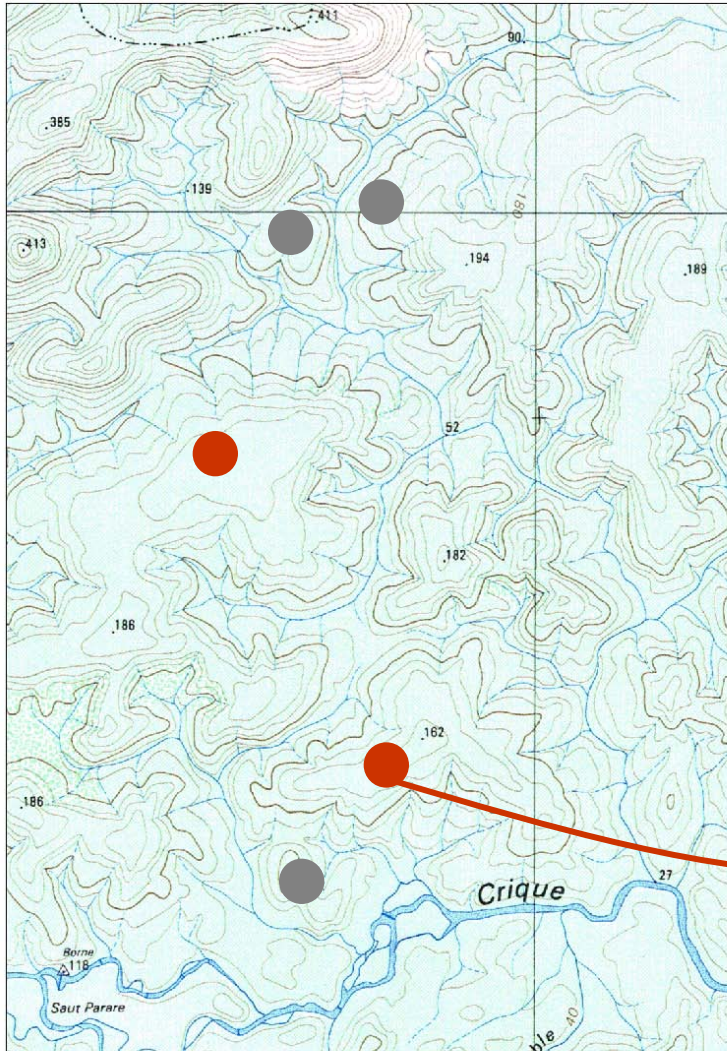
Clear-cut in
1976

Abandoned in
1978



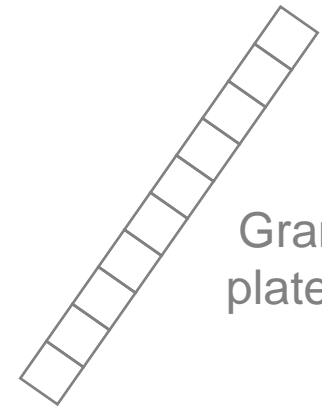
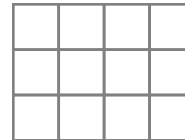


Nouragues



Nouragues experimental site

Petit plateau



Grand plateau

Balanfois



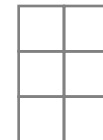
2 ha

Pararé ridge



1 ha

October 2010

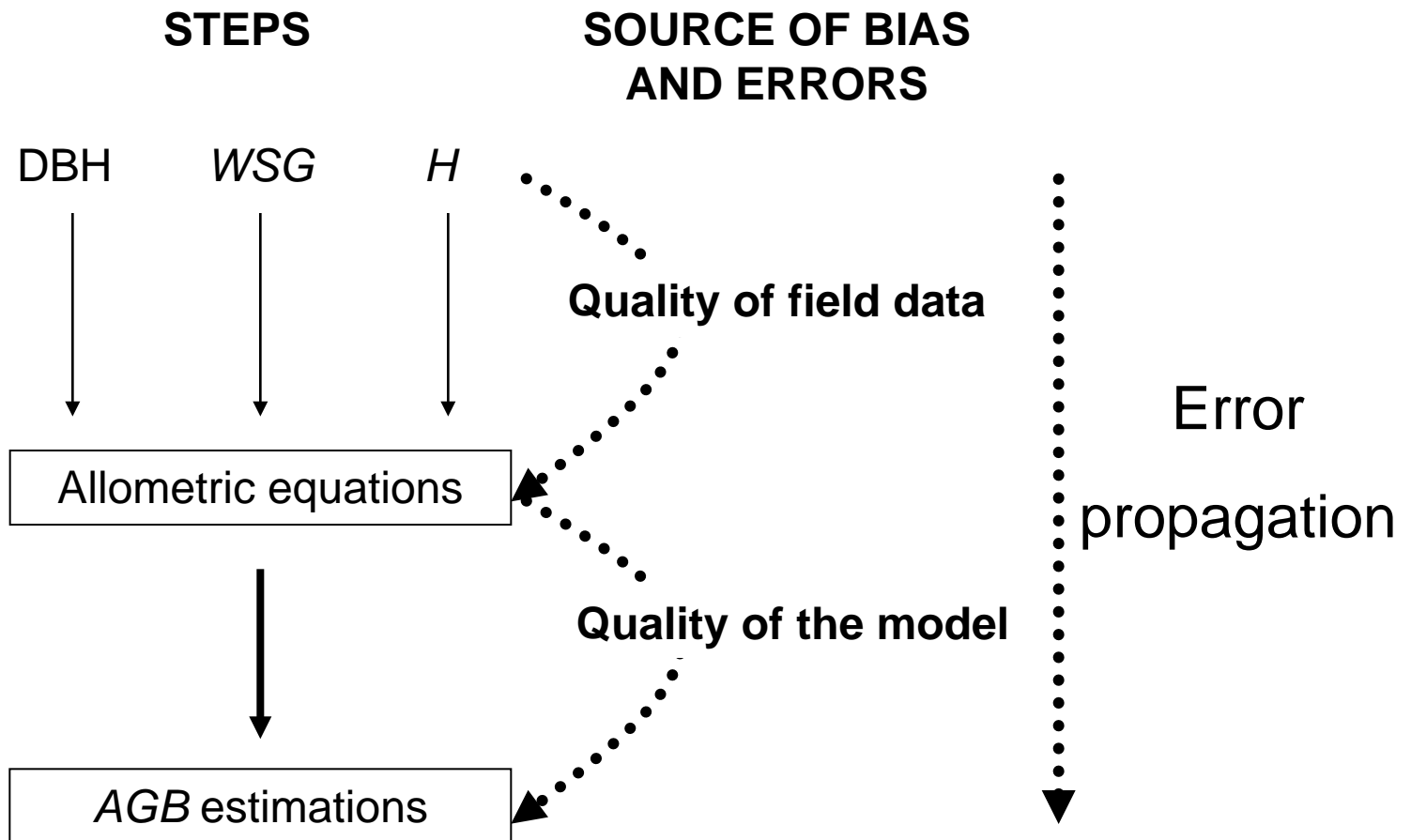


Pararé

Plot summary

Site	Forest type	Census date	Number of plots	Total census size	Number of trees
Paracou	Mature rain forest	2009	6	37.5	22,868
Paracou	Mature rain forest	2010	1	25	12,959
Paracou	Disturbed rain forest	2009	9	56.25	37,997
Paracou	Pinus plantation	2010	2	0.98	1178
Paracou	Coco plantation	2010	1	0.25	40
Paracou	Secondary forest	2010	1	0.28	367
Paracou	Flooded forest	2010	2	1	1275
Arbocel	Regrowth from clear-cut	2009	1	6.25	5468
Nouragues	Mature rain forest	2008	1	10	5098
Nouragues	Mature rain forest	2008	1	12	6338
Nouragues	Mature rain forest	2010	1	6	3093
Nouragues	Mature rain forest	2010	1	2	985
Nouragues	Mature rain forest	2010	1	1	484
Total			28	157.51	98150

Biomass estimation and error propagation



Tree census

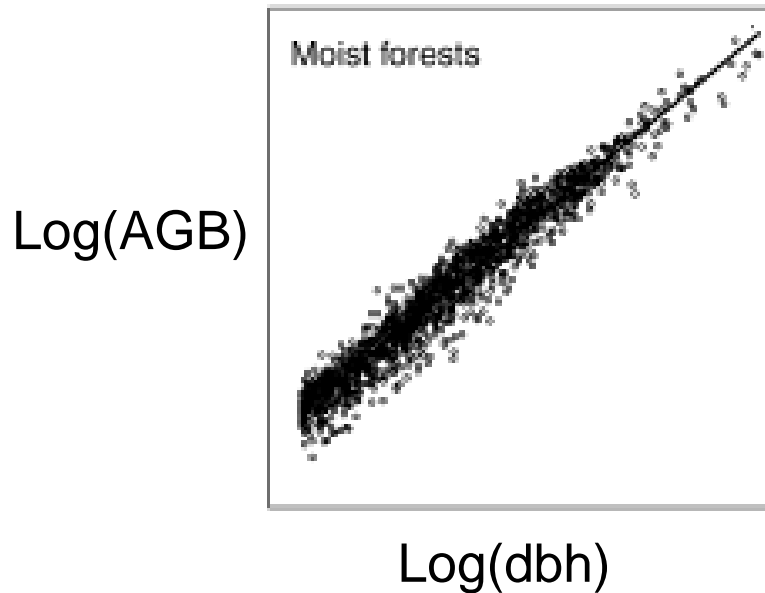
3029 tree heights measured in six 1-ha subplots.



	Paracou P6	Grand Plateau	Petit Plateau	Balanfois	Pararé	Pararé ridge
Number of trees	593	462	483	533	474	484
Mean(H)	19.94	20.37	19.58	21.68	21.9	21.48
SD(H)	6.17	8.23	8.42	8.02	7.88	7.74

Biomass estimation: allometry

1504 trees



Selection of the best
allometric models

(Chave *et al.* 2005)

$$AGB = WSG \times \exp(-1,499 + 2,148 \times \ln(DBH) + 0.207 \times \ln(DBH)^2 - 0.0281 \times \ln(DBH)^3)$$

$$AGB = 0,0509 \times WSG \times DBH^2 \times H$$

Including tree height information?

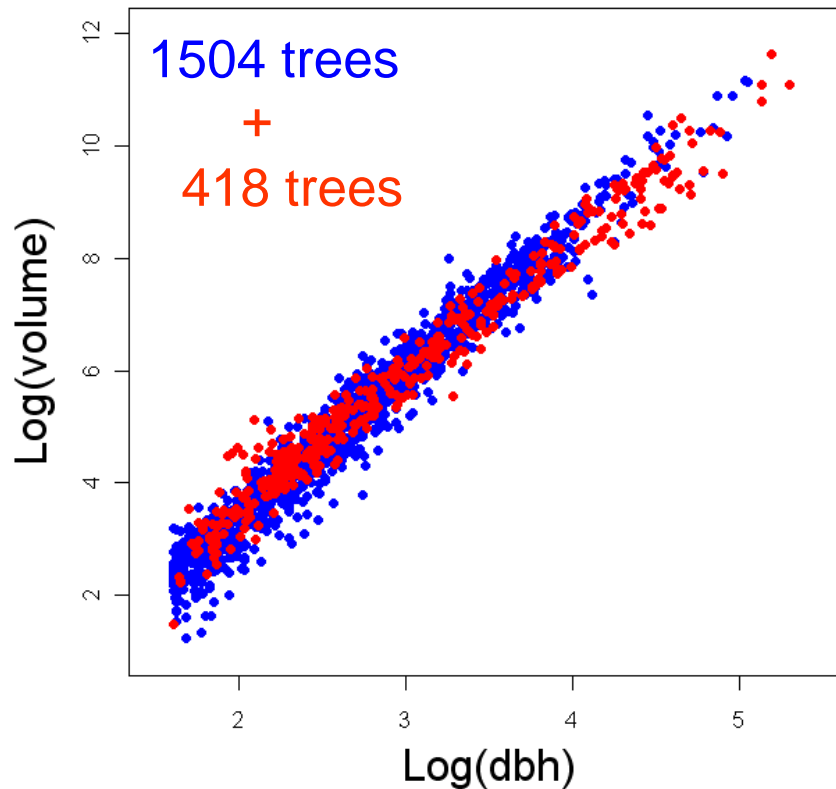
Comparison of the two allometric models in 6 plots of 1 ha in which all trees were measured for their total tree height (n=3029)

	Paracou P6	Grand Plateau	Petit Plateau	Balanfois	Pararé	Pararé ridge
Ntree	593	462	483	533	474	484
<i>AGB</i>	376.49	466.25	520.49	480.12	461.23	465.85
<i>AGB(H)</i>	344.1	447.25	483.17	464.4	430.07	437.87
% Error	8.60	4.08	7.17	3.27	6.76	6.01

Revision of the allometry

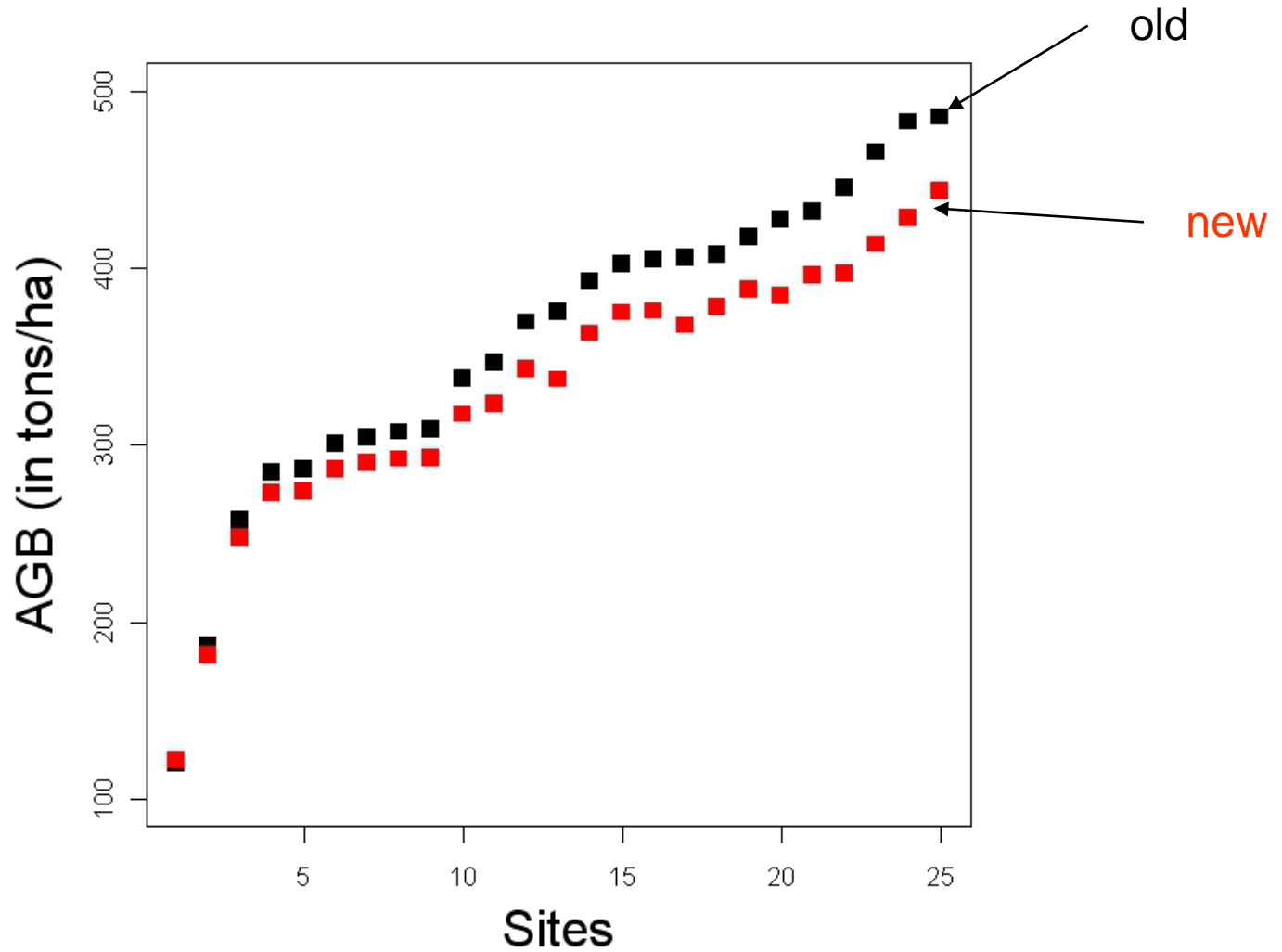
A number of new published studies since 2005 ...

Allometry for moist forests



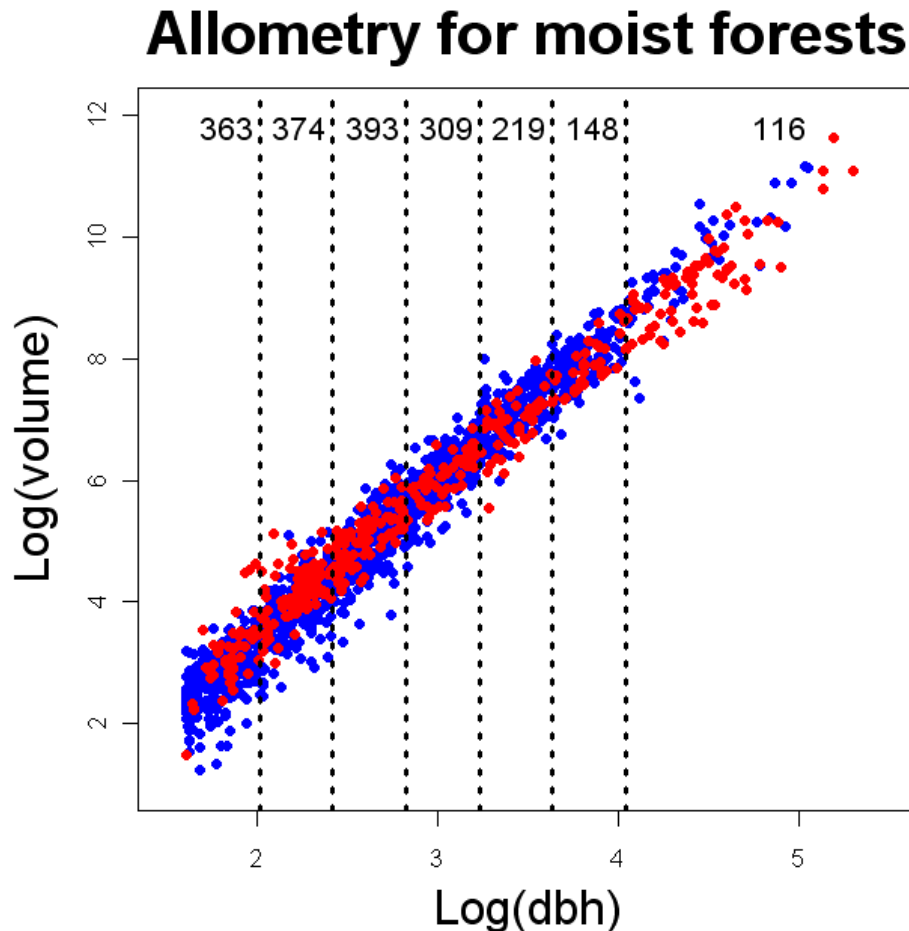
(Chave & Réjou-Méchain *in prep*)

AGB with new allometry



Propagating error sources: allometry

How best to reflect data structure in error propagation?

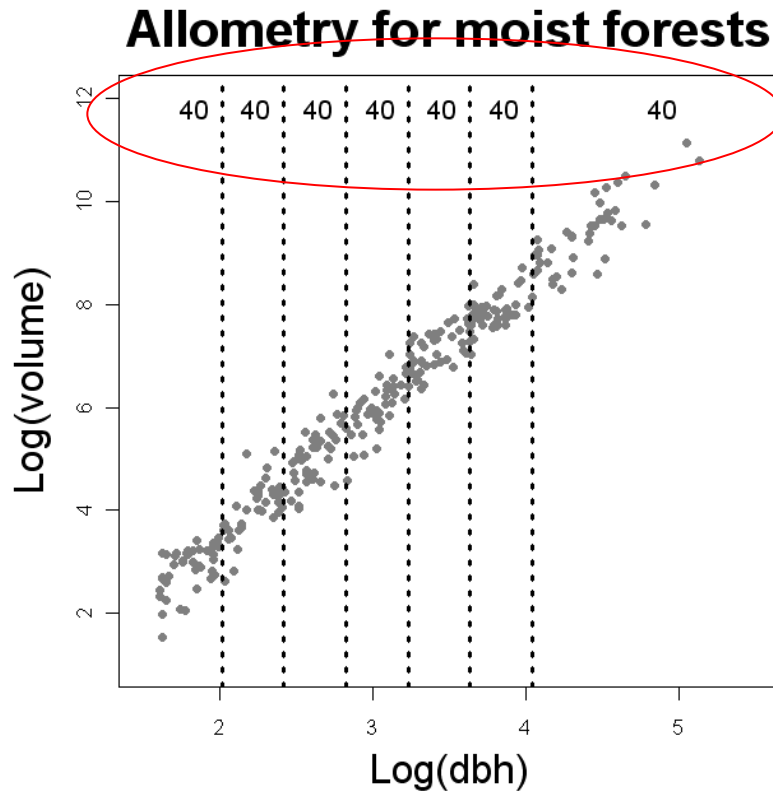


Jack-knife
(without replacement)

(Chave & Réjou-
Méchain *in prep*)

Propagating error sources: allometry

Illustration of a jack-knifed dataset:



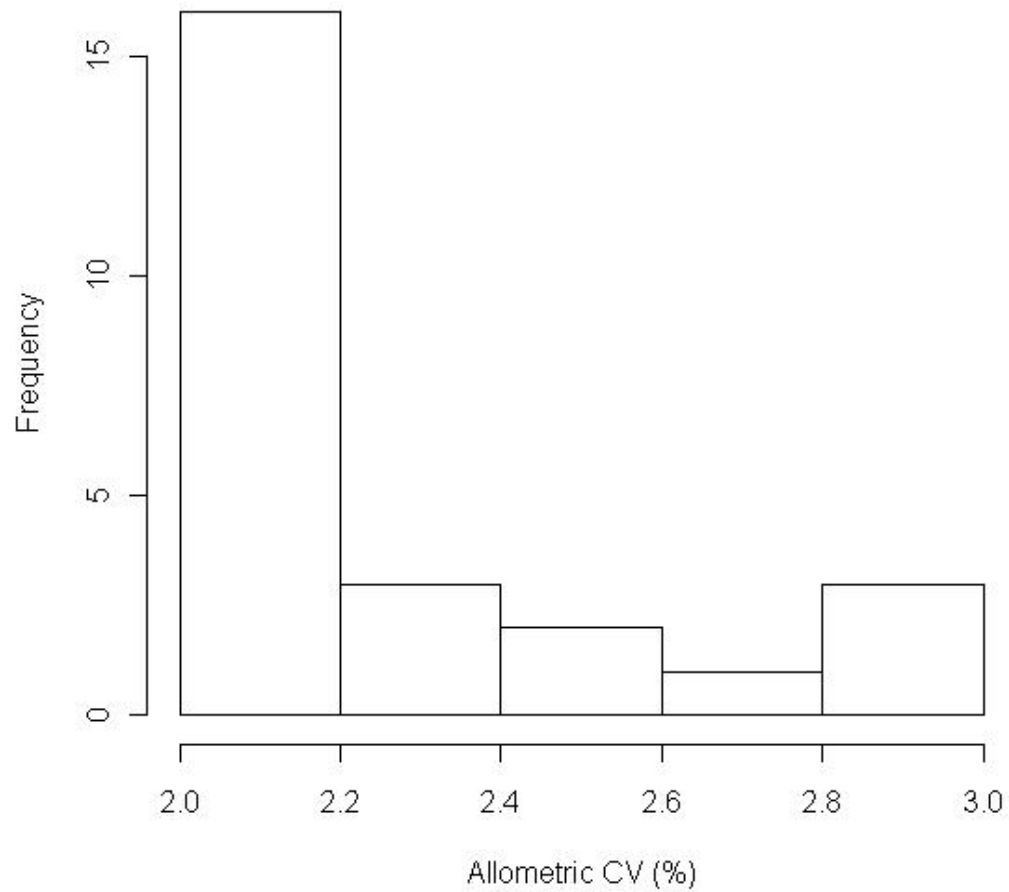
1000
randomizations

1,000 allometric
biomass
equations

Test performed both with
the 2005 allometry and with
the new one

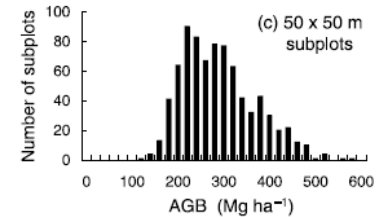
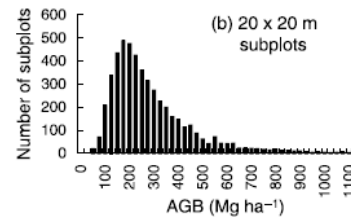
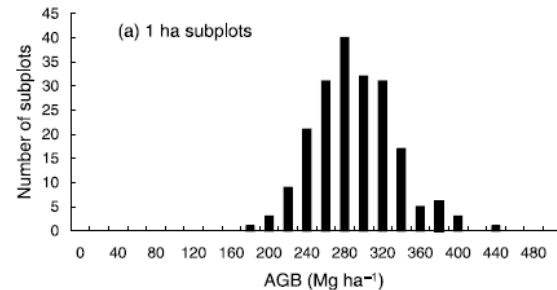
(Chave & Réjou-
Méchain *in prep*)

Propagating error sources: allometry



Propagating error sources: spatial size

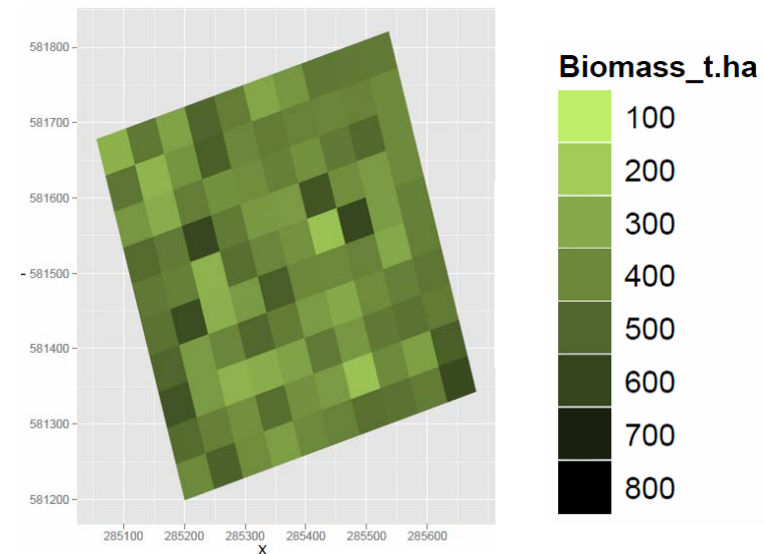
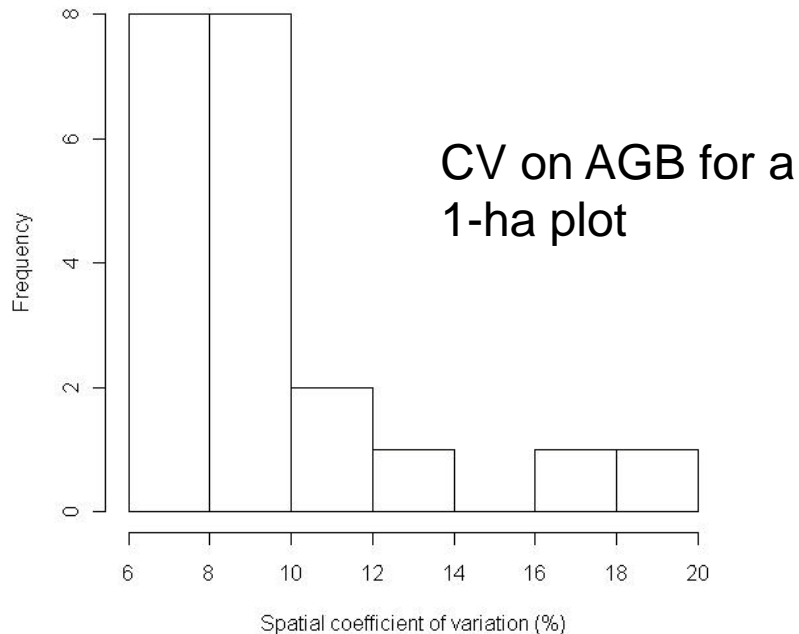
- Assumption: for subplots > 0.25 ha, AGB distribution across subplots is normally distributed (Chave et al 2003)
- Therefore, the error structure should be as
(where A is plot size (in ha), and b is the CV of 1-ha subplots)



$$CV = \frac{b}{\sqrt{A}}$$

Propagating error sources: spatial size

- Computing b: AGB for 50x50 m subplots, $b = CV/2$



50 X 50 m

plot 16 paracou (500 X 500 m)

Overall AGB error assessment

For an average plot of size A:

$$CV_{total} = \left(CV_{allom}^2 + \frac{b^2}{A} \right)^{1/2}$$

$$\overline{CV_{allom}} = 2.35$$

$$\overline{b} = 9.46$$

