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Relation entre bilan de biomasse et structure forestière en forêt tropicale

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Relation entre bilan de biomasse et structure forestière en forêt tropicale

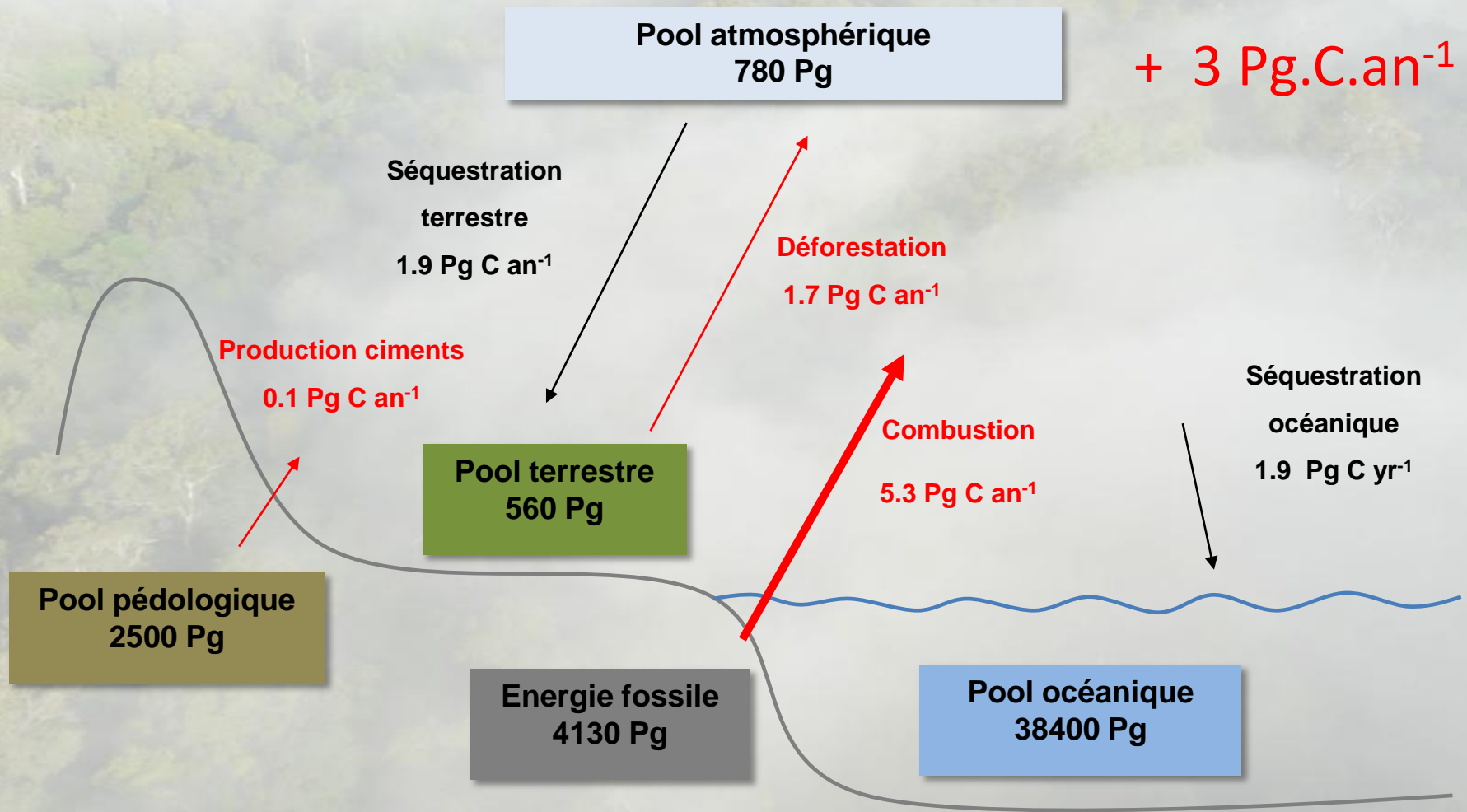
Ervan RUTISHAUSER

**Lilian Blanc (CIRAD)
Eric Nicolini (CIRAD)
Daniel Barthélémy (INRA)**

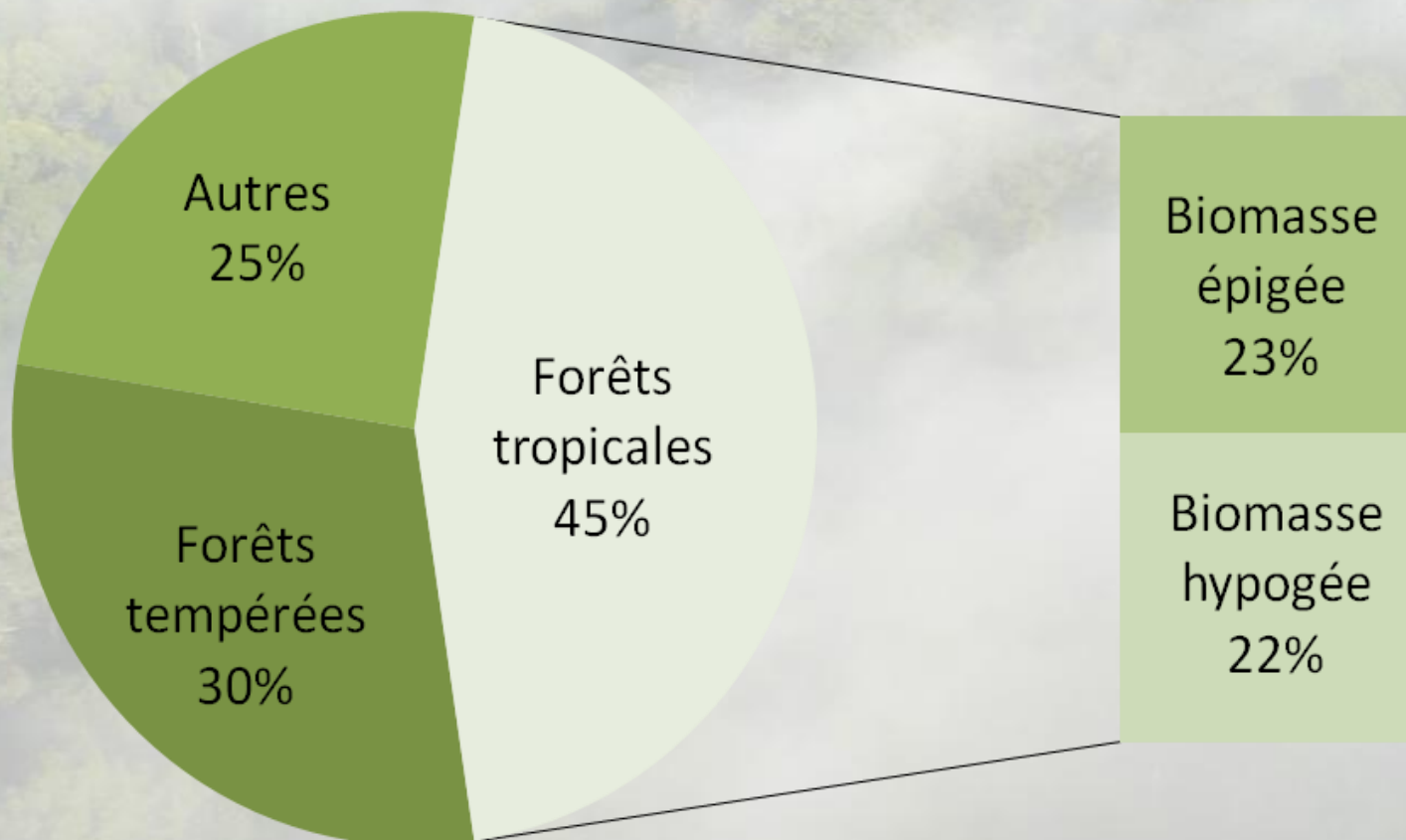
Ecologie 2010 - Montpellier



Cycle du carbone



Carbone terrestre



Evolution récente

Changements de structure forestière

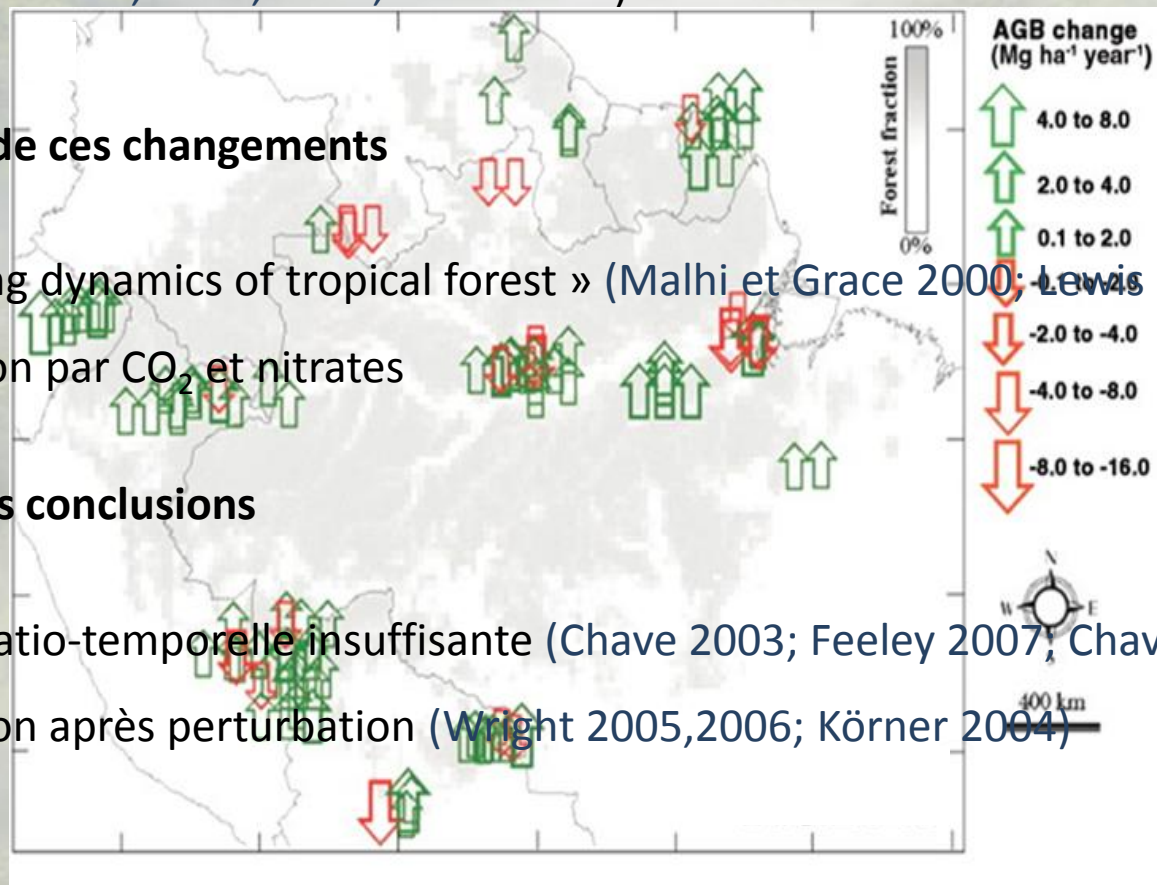
- accroissement de la biomasse aérienne ligneuse (AGB) en forêts néotropicales (Phillips et al. 2002, 2004, 2009; Baker 2004)

Hypothèse de ces changements

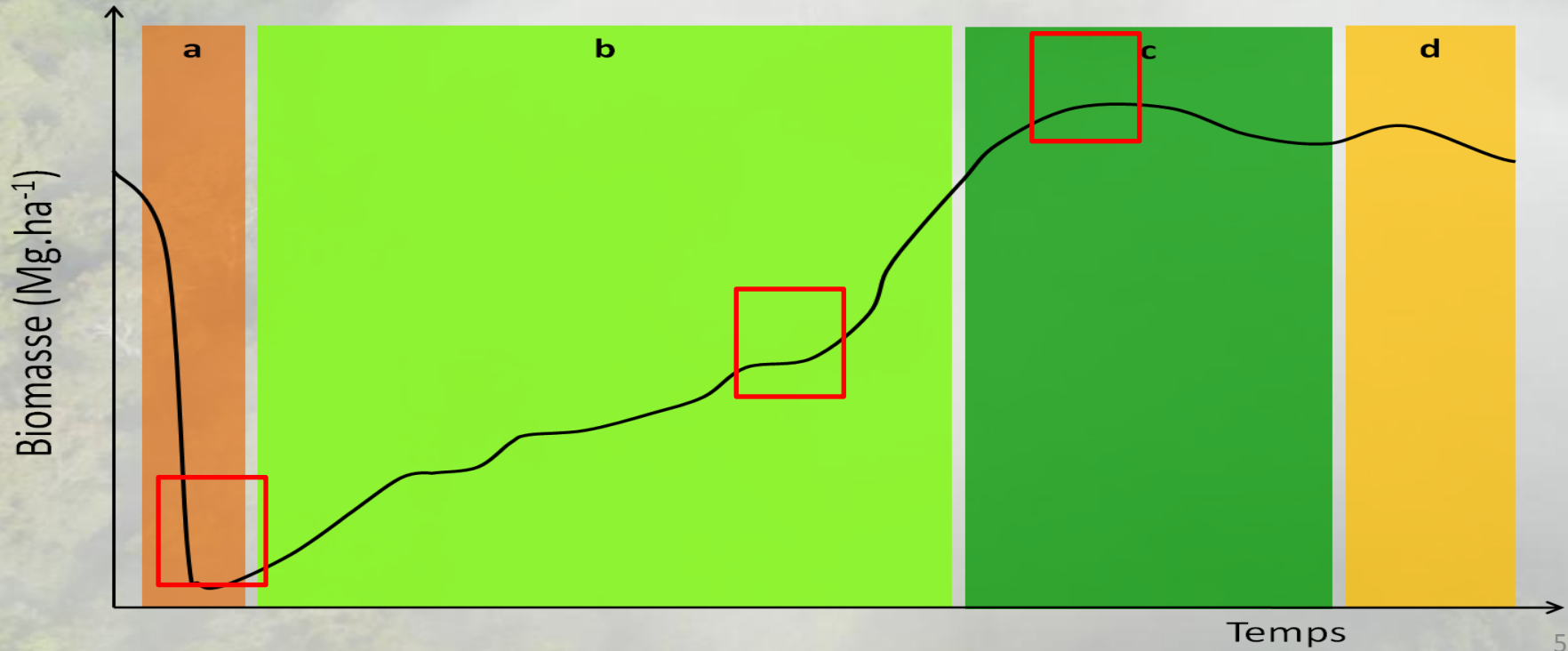
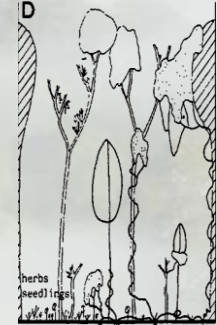
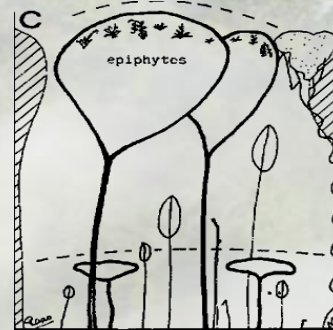
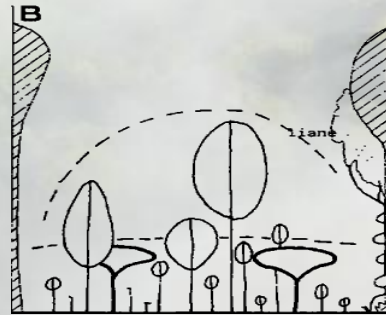
- « Changing dynamics of tropical forest » (Malhi et Grace 2000; Lewis 2006)
- fertilisation par CO₂ et nitrates

Débat sur ces conclusions

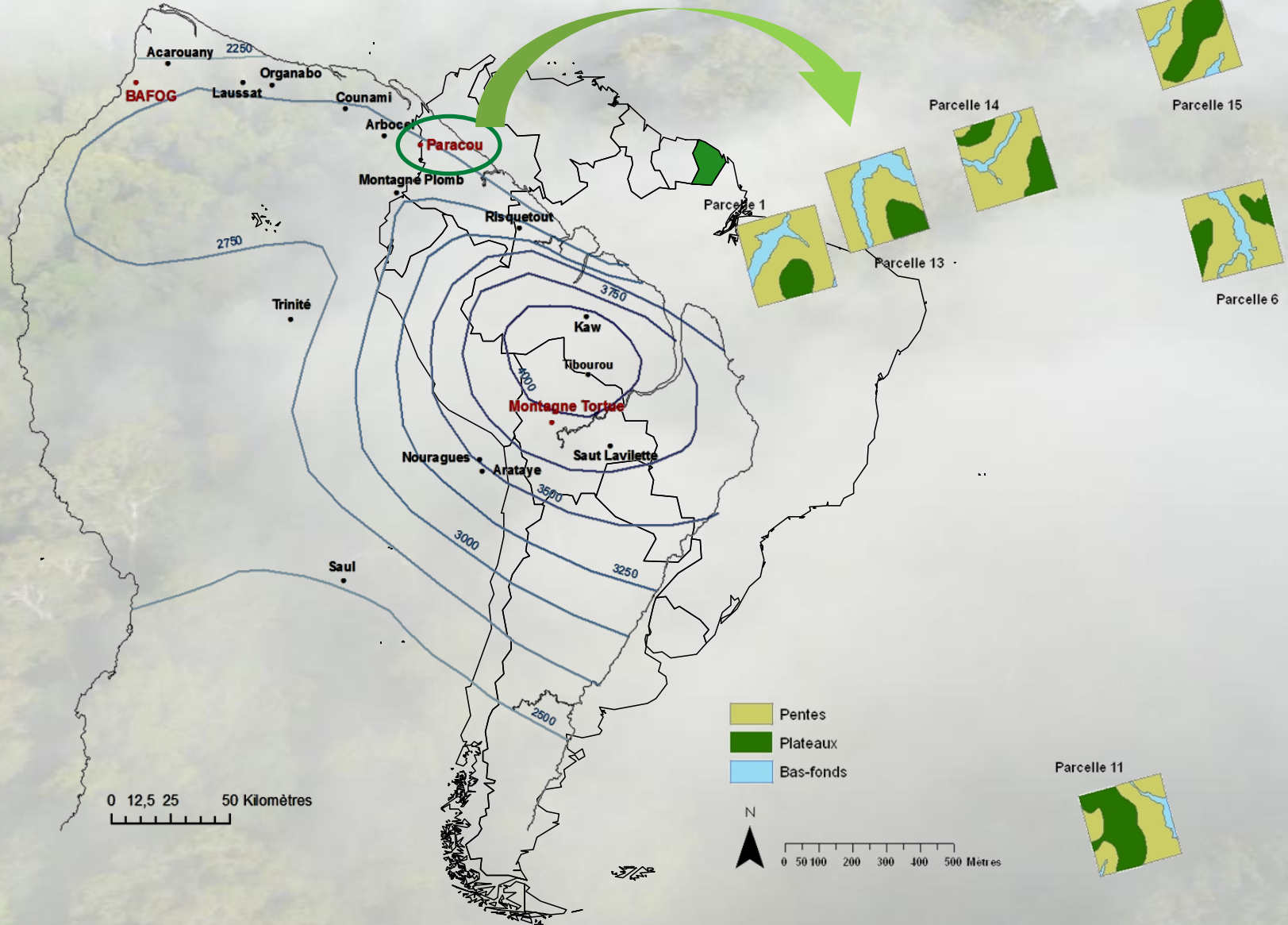
- échelle spatio-temporelle insuffisante (Chave 2003; Feeley 2007; Chave 2008)
- régénération après perturbation (Wright 2005,2006; Körner 2004)



Régénération en FT

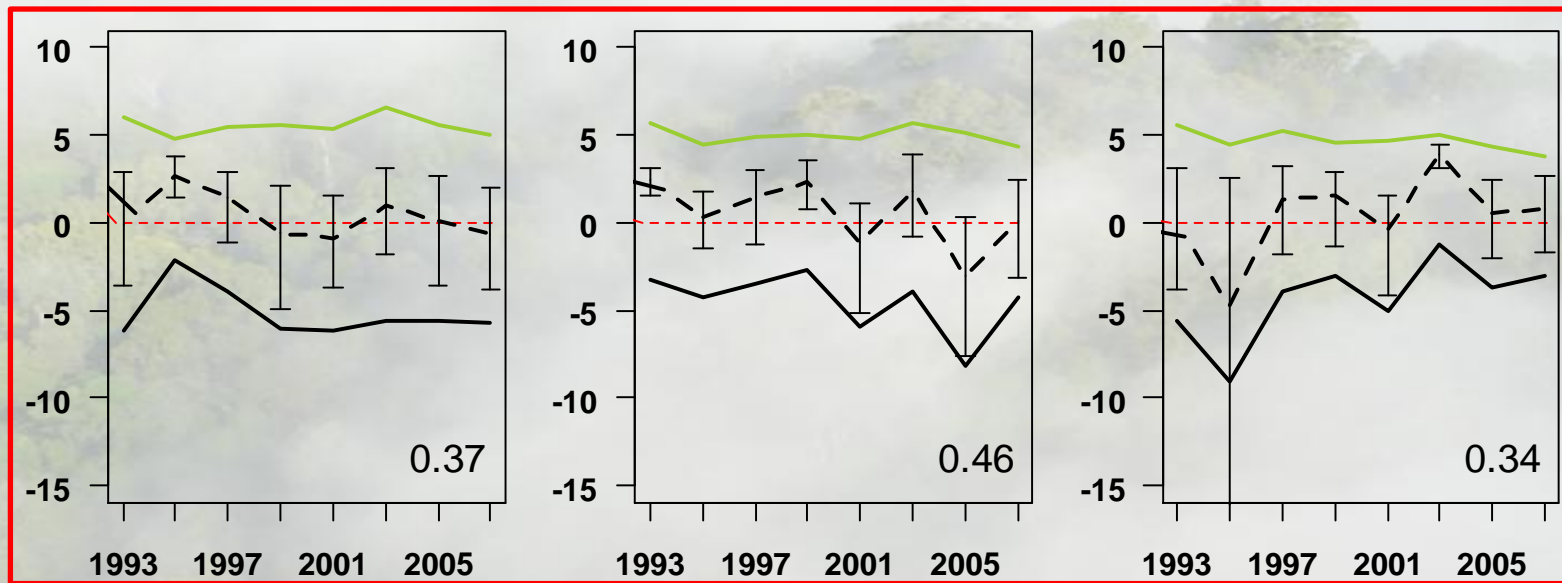


Site d'étude : Paracou

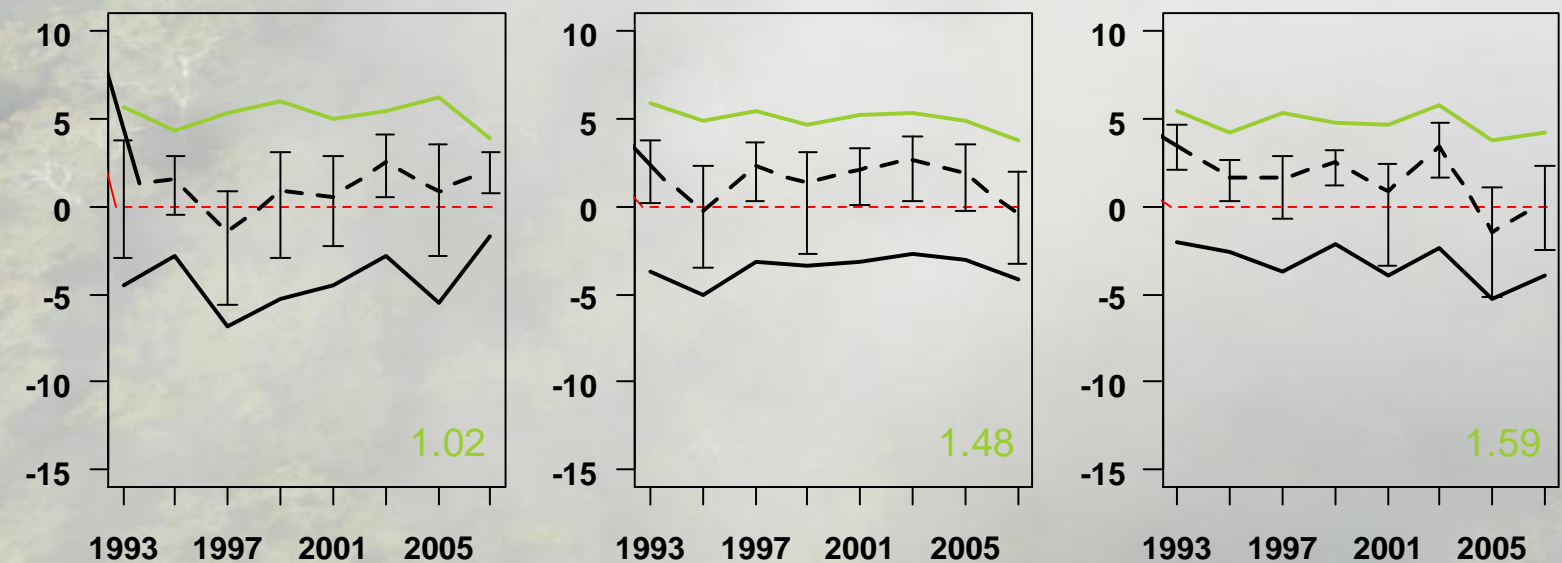


Etat des lieux

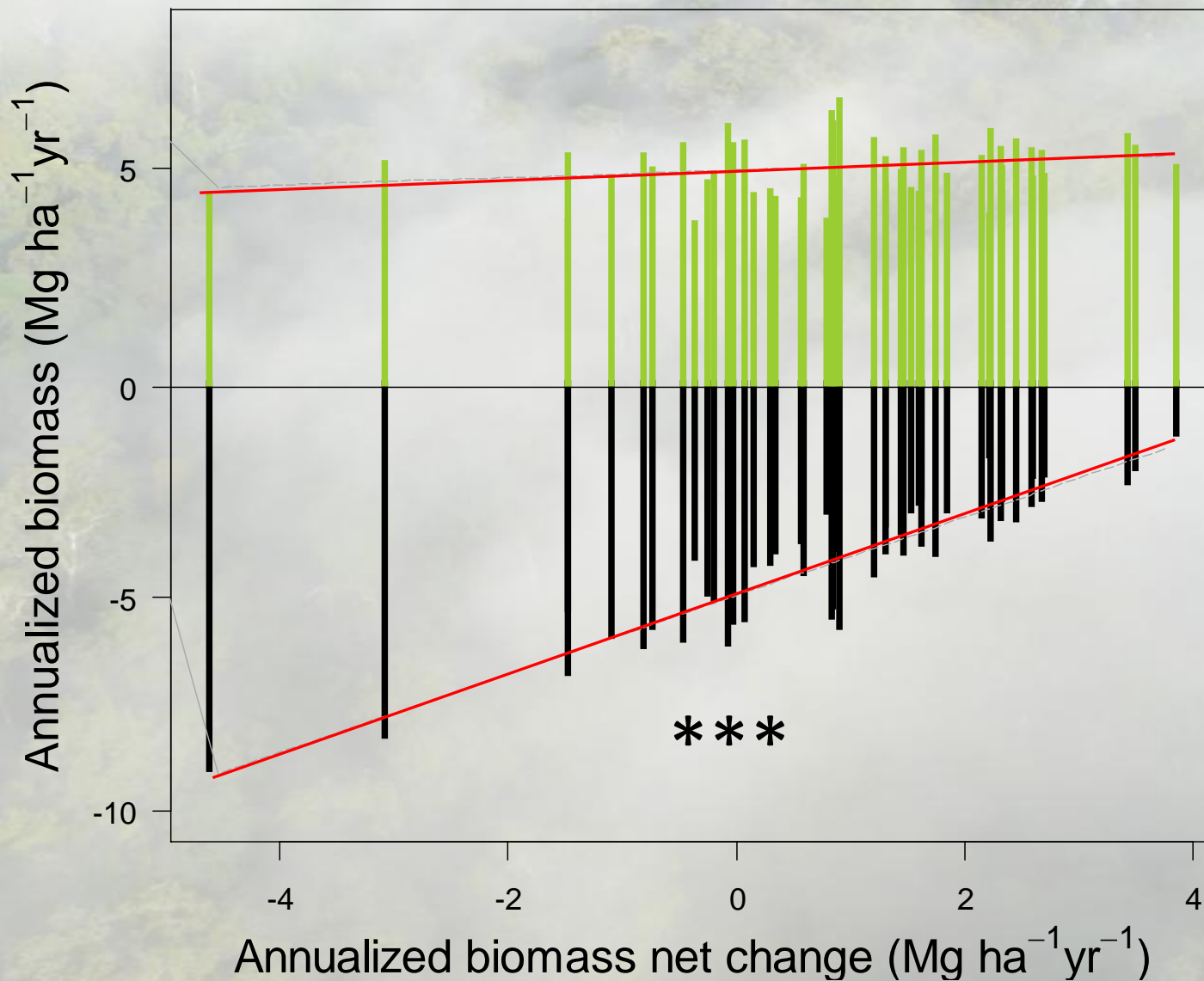
Biomass (Mg.ha⁻¹.yr⁻¹)



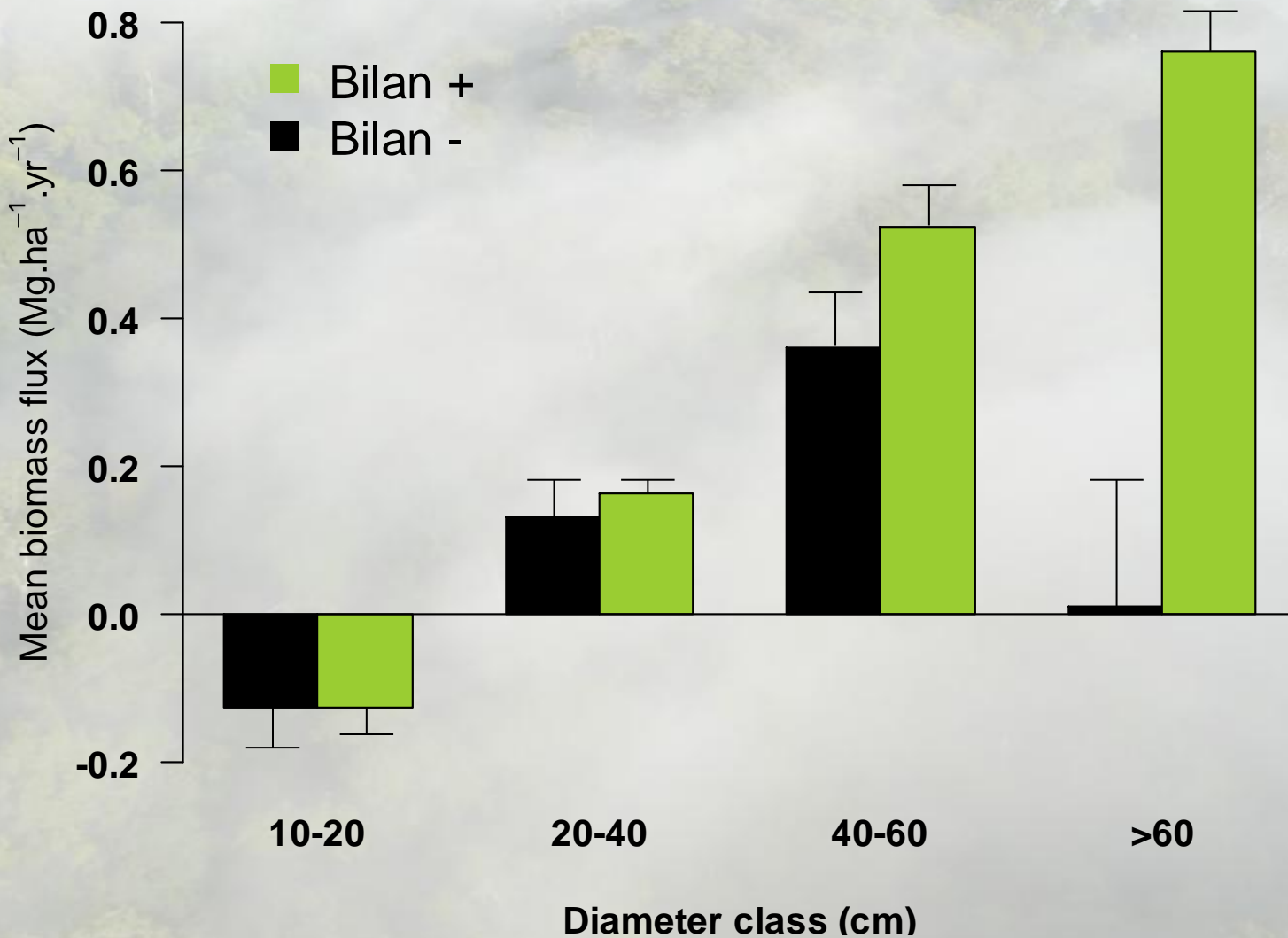
- Gains
- Pertes
- - Bilan



Origine des variations



Stockage par classe de diamètres



Variables structurales

Est-ce que la structure forestière renseigne sur la dynamique de biomasse?

5	10	15	20	25
4	9	14	19	24
3	8	13	18	23
2	7	12	17	22
1	6	11	16	21

Biomasse ($\text{Mg} \cdot \text{ha}^{-1}$)

Densité (Nbr. de tiges. ha^{-1})

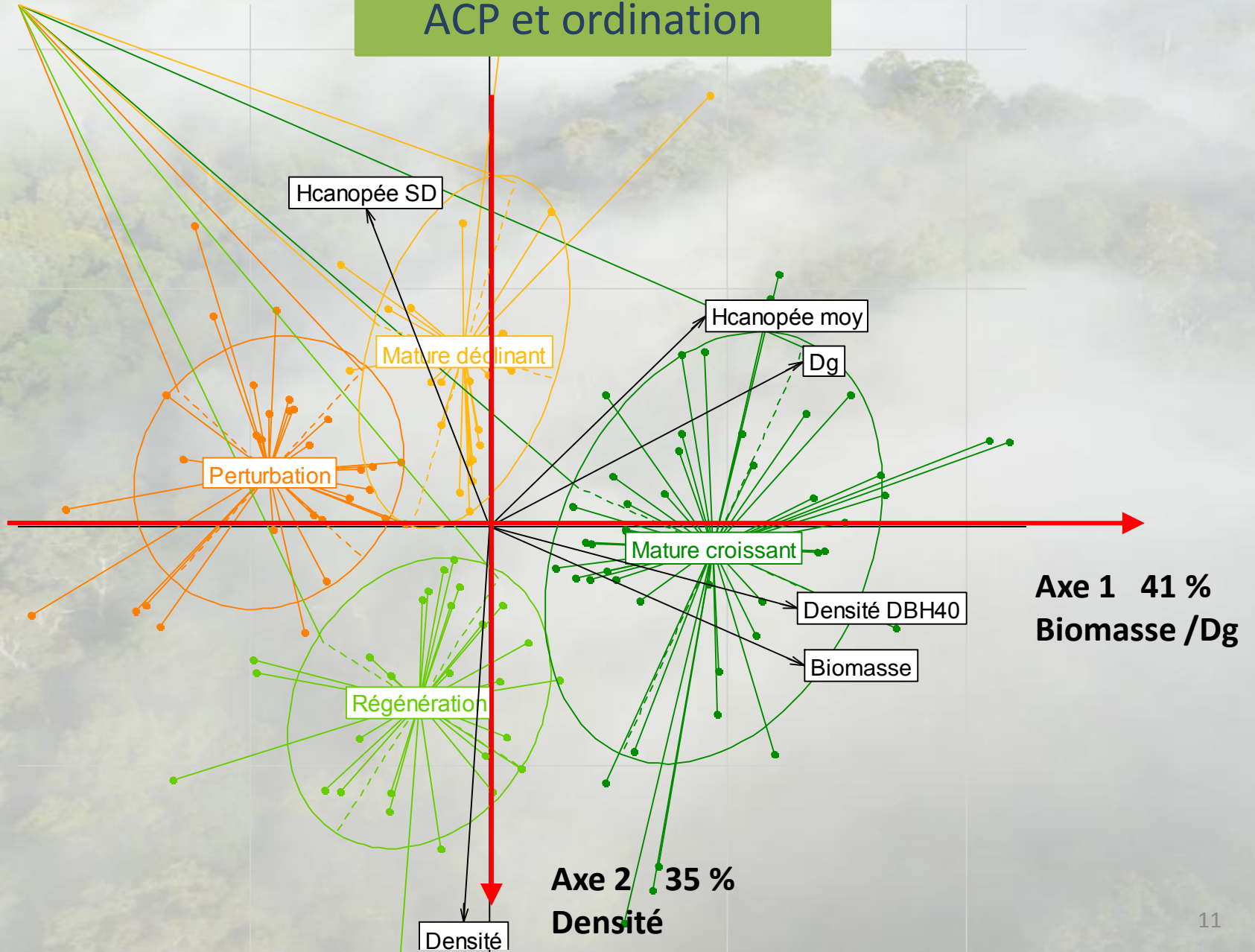
Densité d'arbres DBH > 40 cm (Nbr. de tiges. ha^{-1})

Diamètre quadratique moyen (cm)

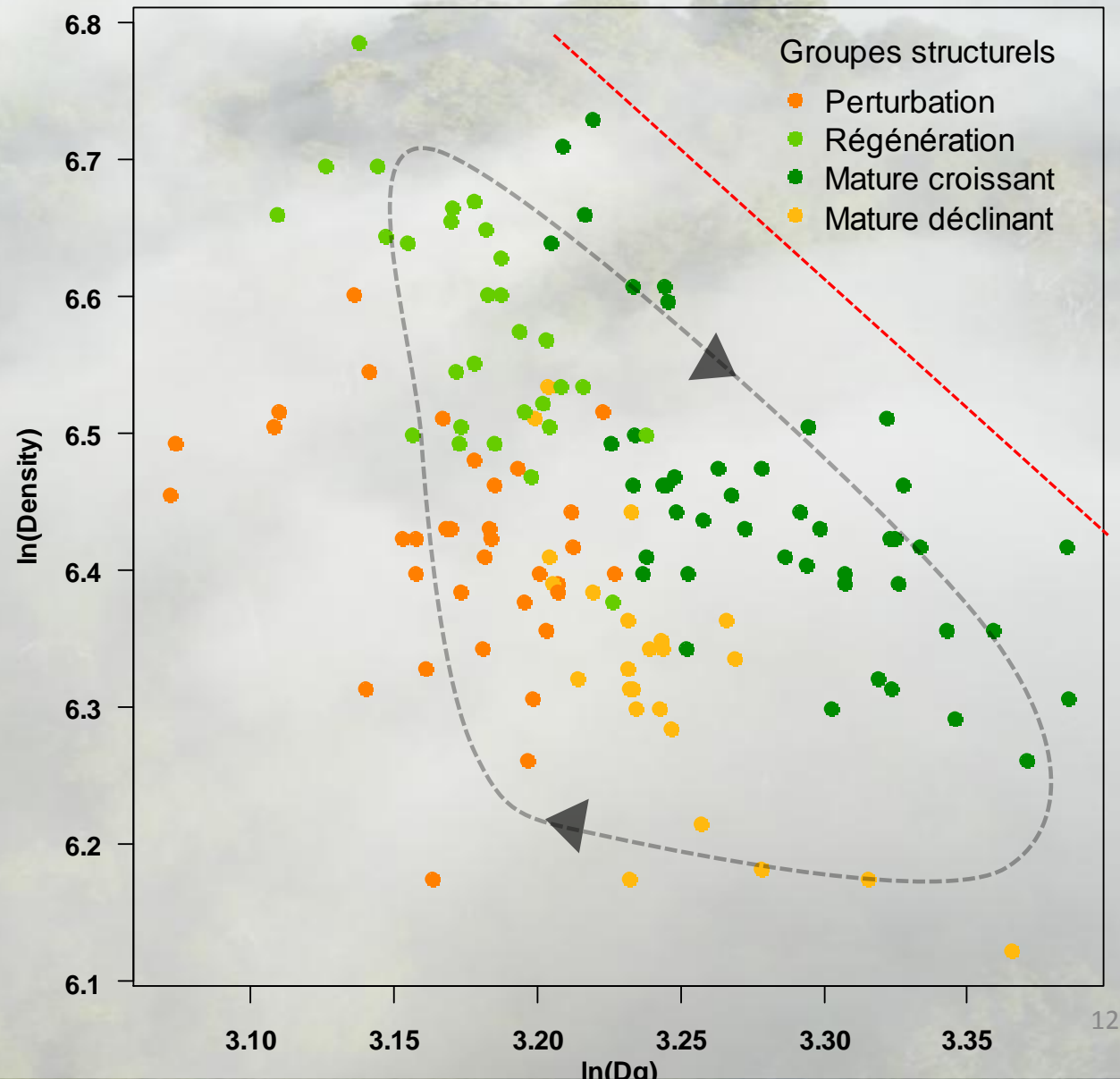
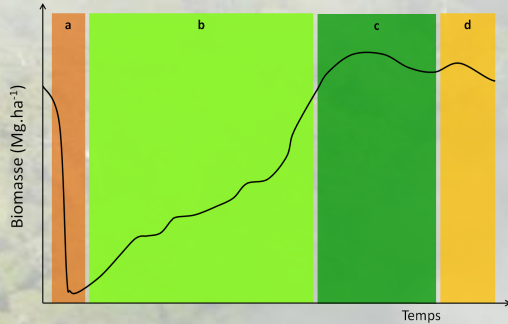
Hauteur moyenne de la canopée (mètres)

Variance de hauteur de canopée

ACP et ordination

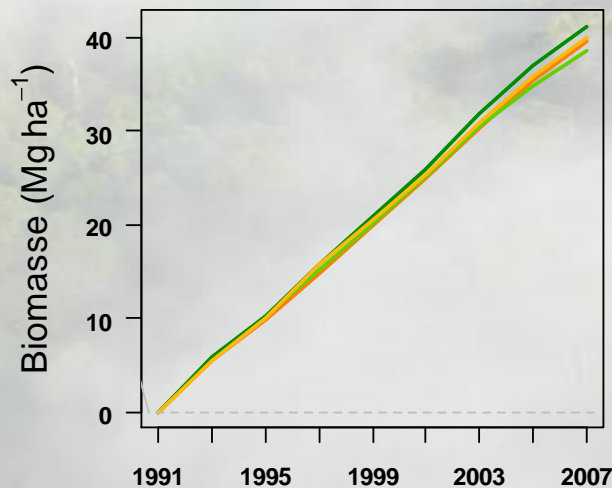


Droite d'auto-éclaircie

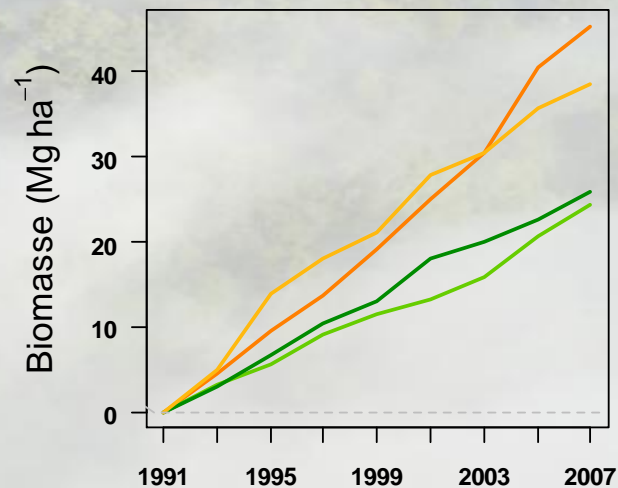


Dynamique

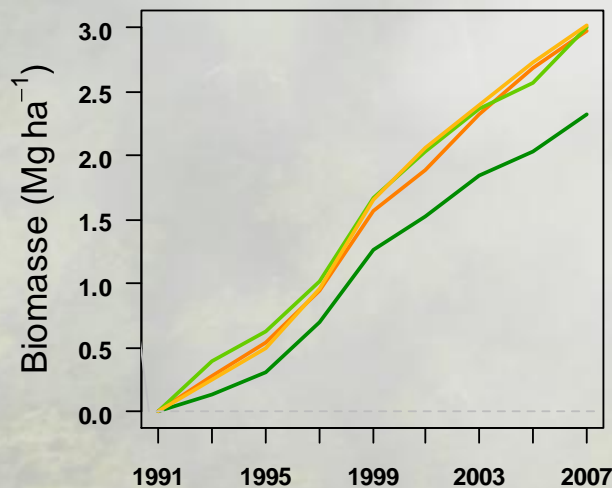
Croissance
(somme cumulée)



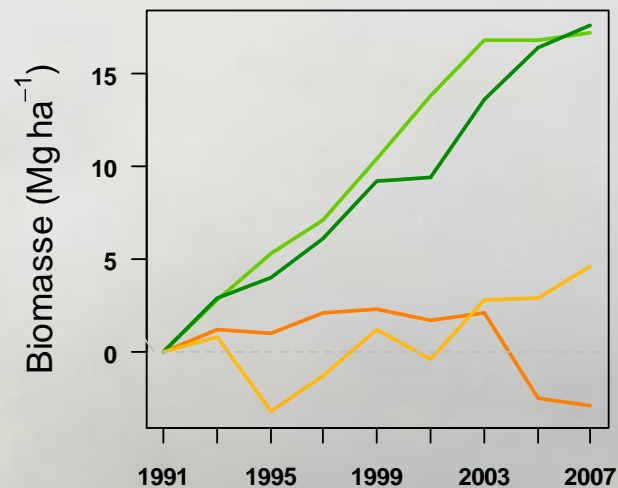
Pertes
(somme cumulée)



Recrutement
(somme cumulée)

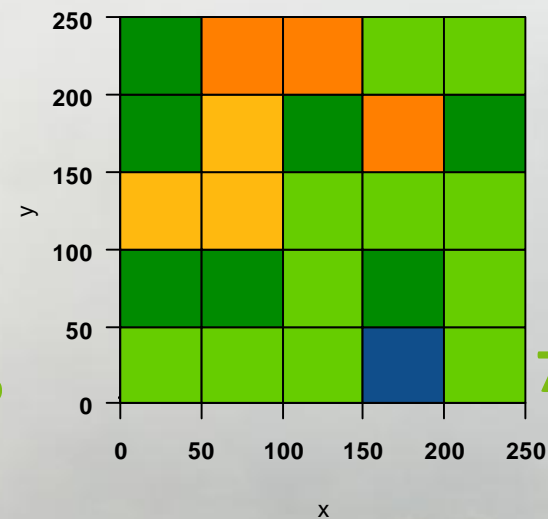
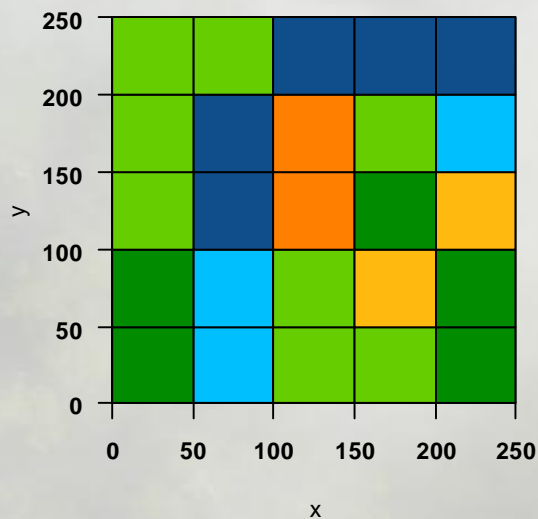
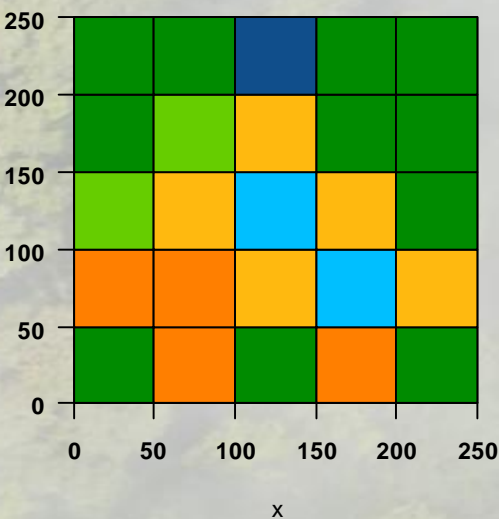
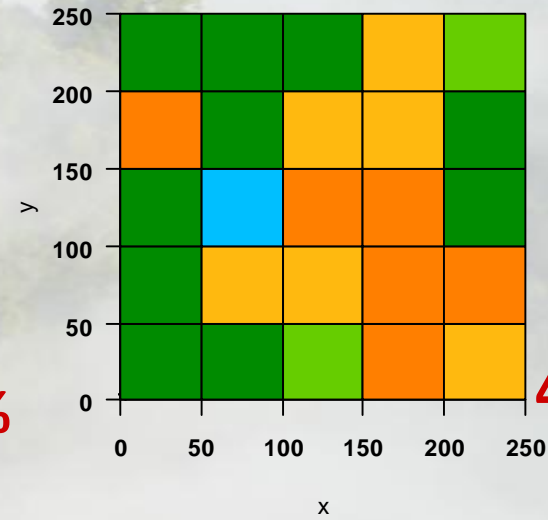
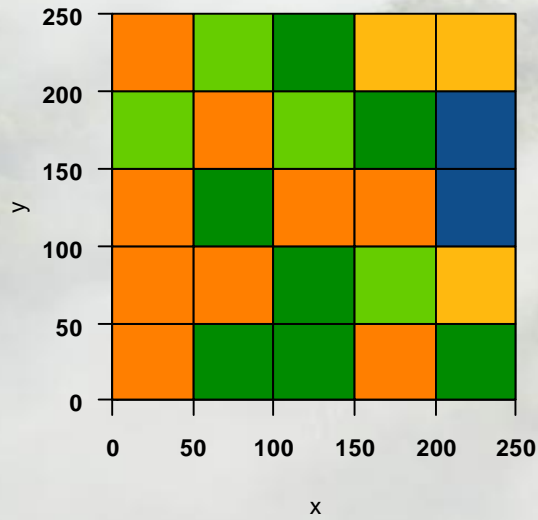
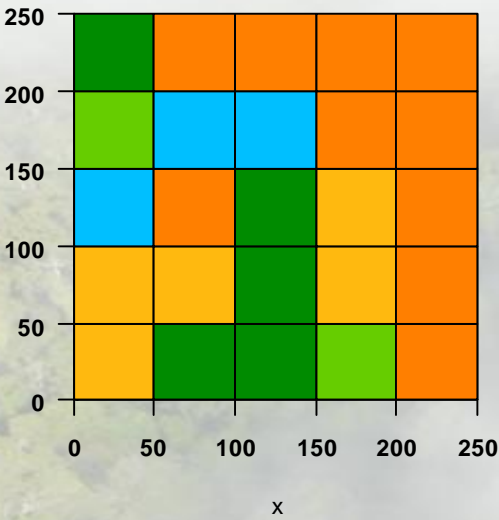


Bilan
(somme cumulée)



— Perturbation
 — Régénération
 — Mature croissant
 — Mature déclinant

Mosaïque forestière



- Perturbation
- Régénération
- Mature croissant
- Mature déclinant
- Bas-fond I
- Bas-fond II

Conclusion

Importance de la structure et de l'état de maturité des forêts

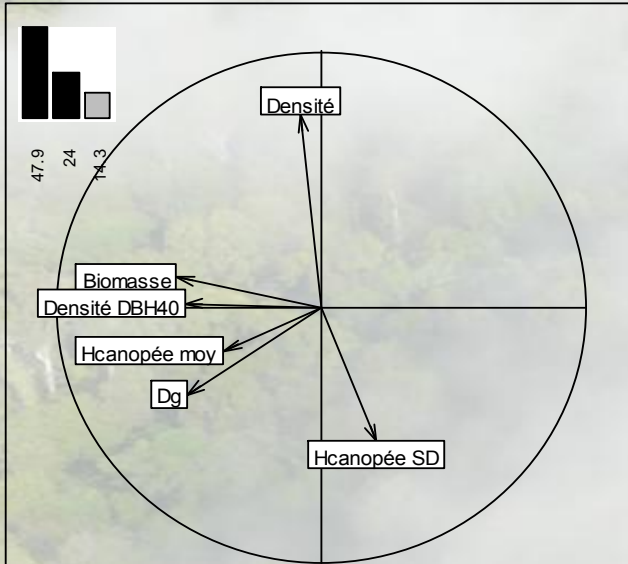
Représentativité des parcelles d'études dans un contexte régional

Réponse des forêts tropicales à l'augmentation du CO₂ ?

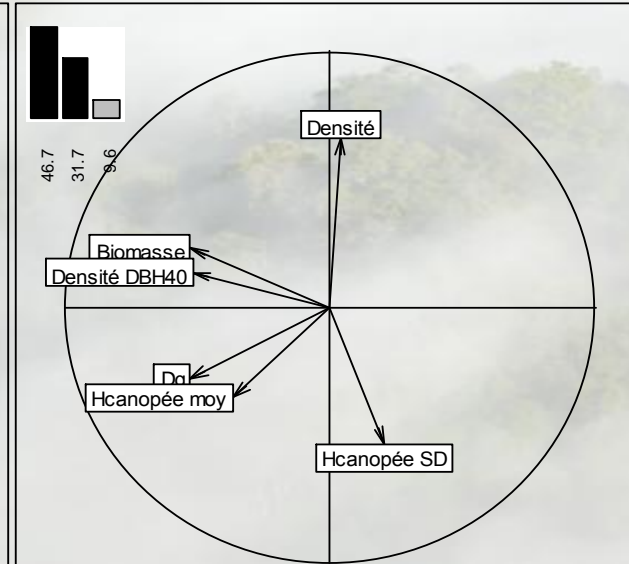
**Merci de
votre attention**



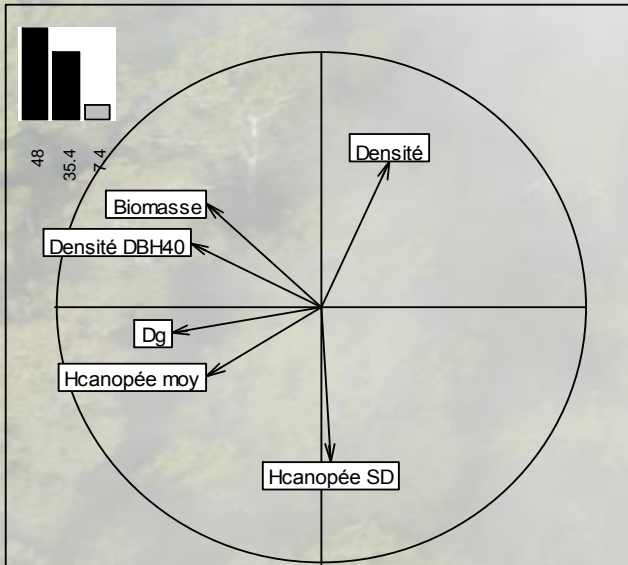
Changement d'échelle



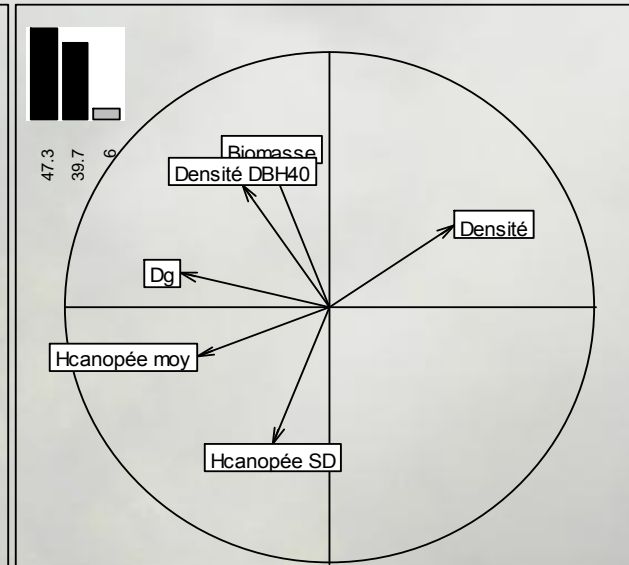
Maille 25 m Axe1= 47.9 % Axe2= 24 %



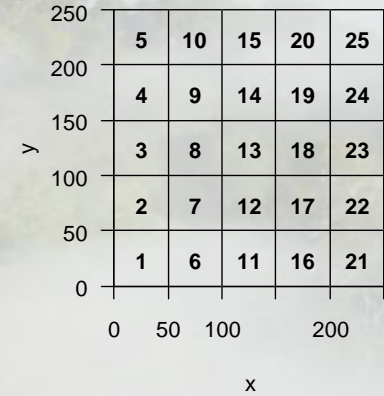
Maille 50 m Axe1= 46.7 % Axe2= 31.7 %



Maille 88.3 m Axe1= 48 % Axe2= 35.4 %



Maille 125 m Axe1= 47.3 % Axe2= 39.7 %



RV	25 m	50 m	88.3 m	125 m
25 m	1	0.01	0.01	0.02
50 m	0.96	1	0	0
88.3 m	0.9	0.98	1	0
125 m	0.79	0.93	0.97	1

Coefficient de variation des paramètres

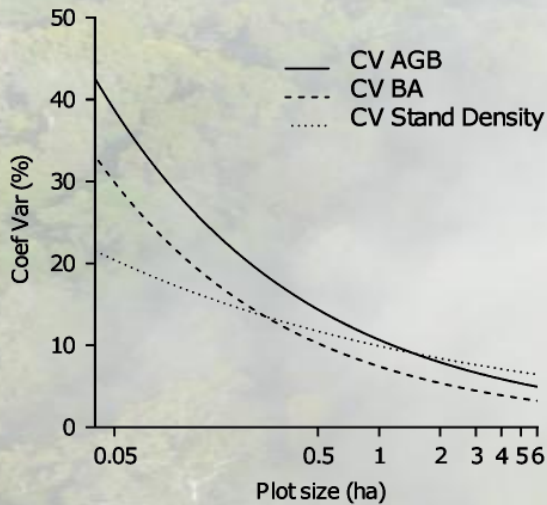
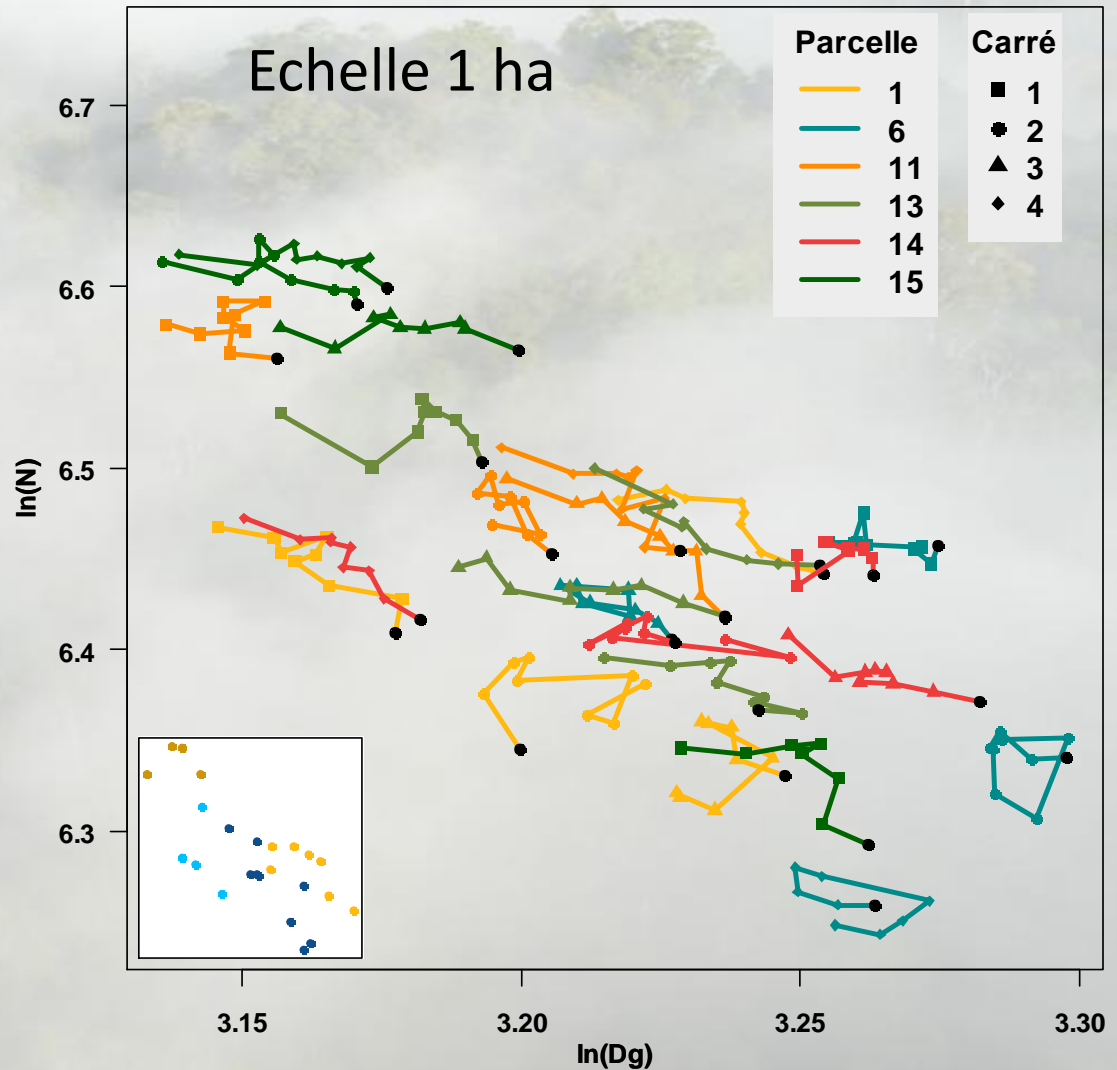


FIGURE 1. Coefficient of variations (CVs) of forest structure descriptors as a function of plot size. $\log(\text{CV}) = \log(\alpha) - (\beta \log(S)) + \log(\varepsilon)$, with S the plot size, α and β the fitted model parameters and ε the model residuals.



Tiré de Wagner F., Rutishauser E., Blanc L. & Herault B. (2010). Assessing effects of plot size and census interval on estimates of tropical forest structure and dynamics. *Biotropica*, published online 12th August 2010.