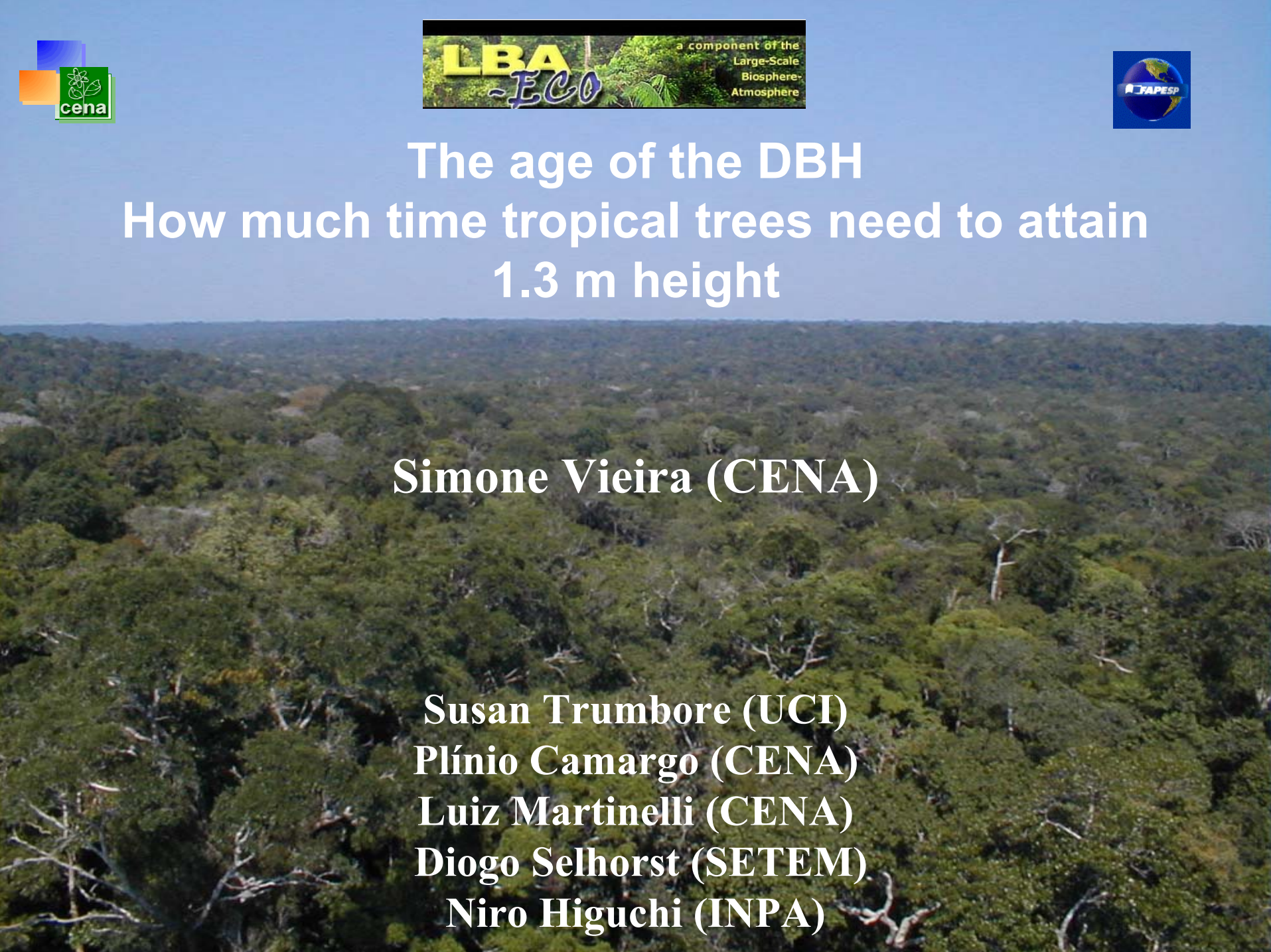
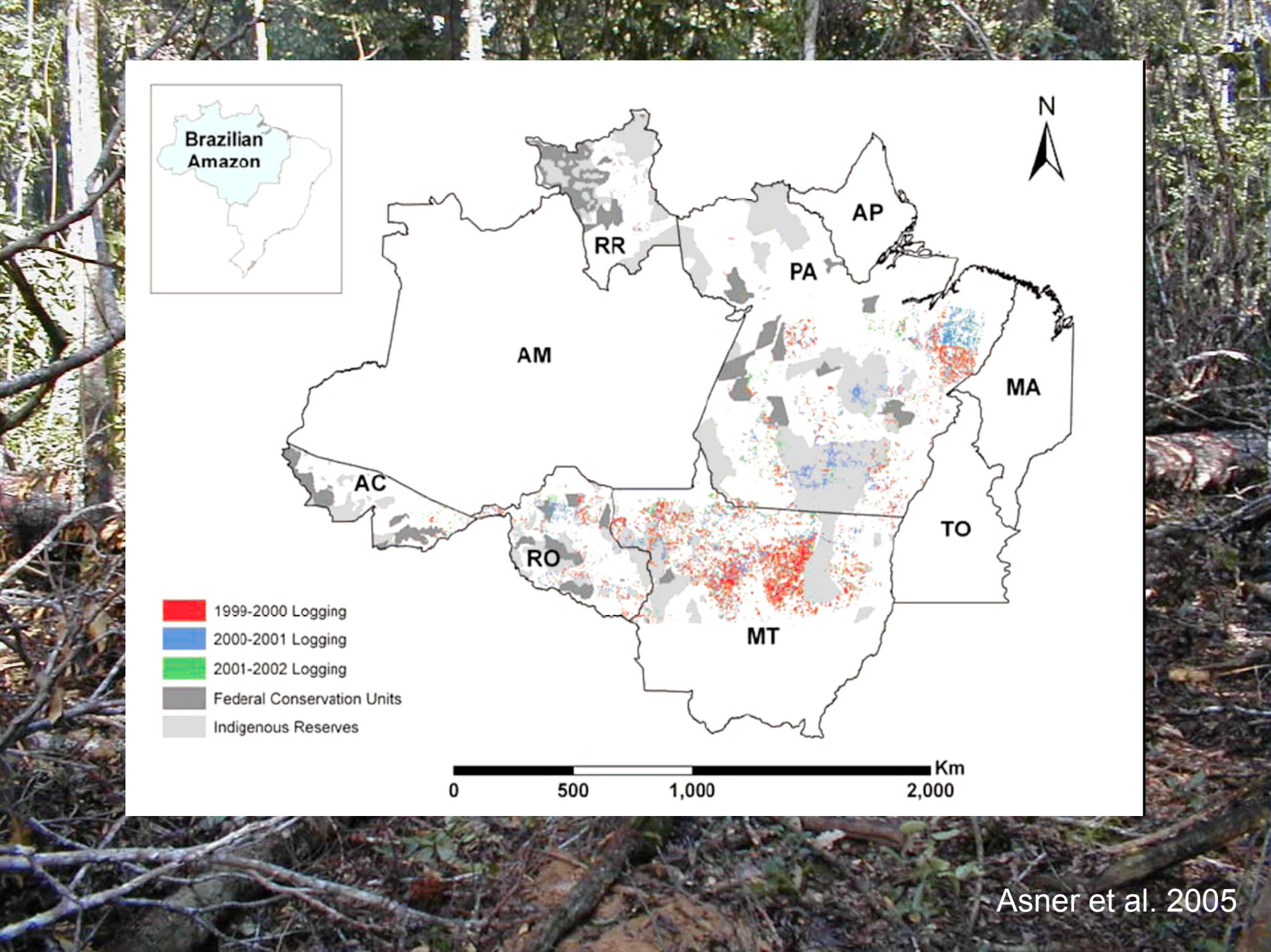


The age of the DBH
How much time tropical trees need to attain 1.3 m height

Simone Vieira (CENA)

Susan Trumbore (UCI)
Plínio Camargo (CENA)
Luiz Martinelli (CENA)
Diogo Selhorst (SETEM)
Niro Higuchi (INPA)



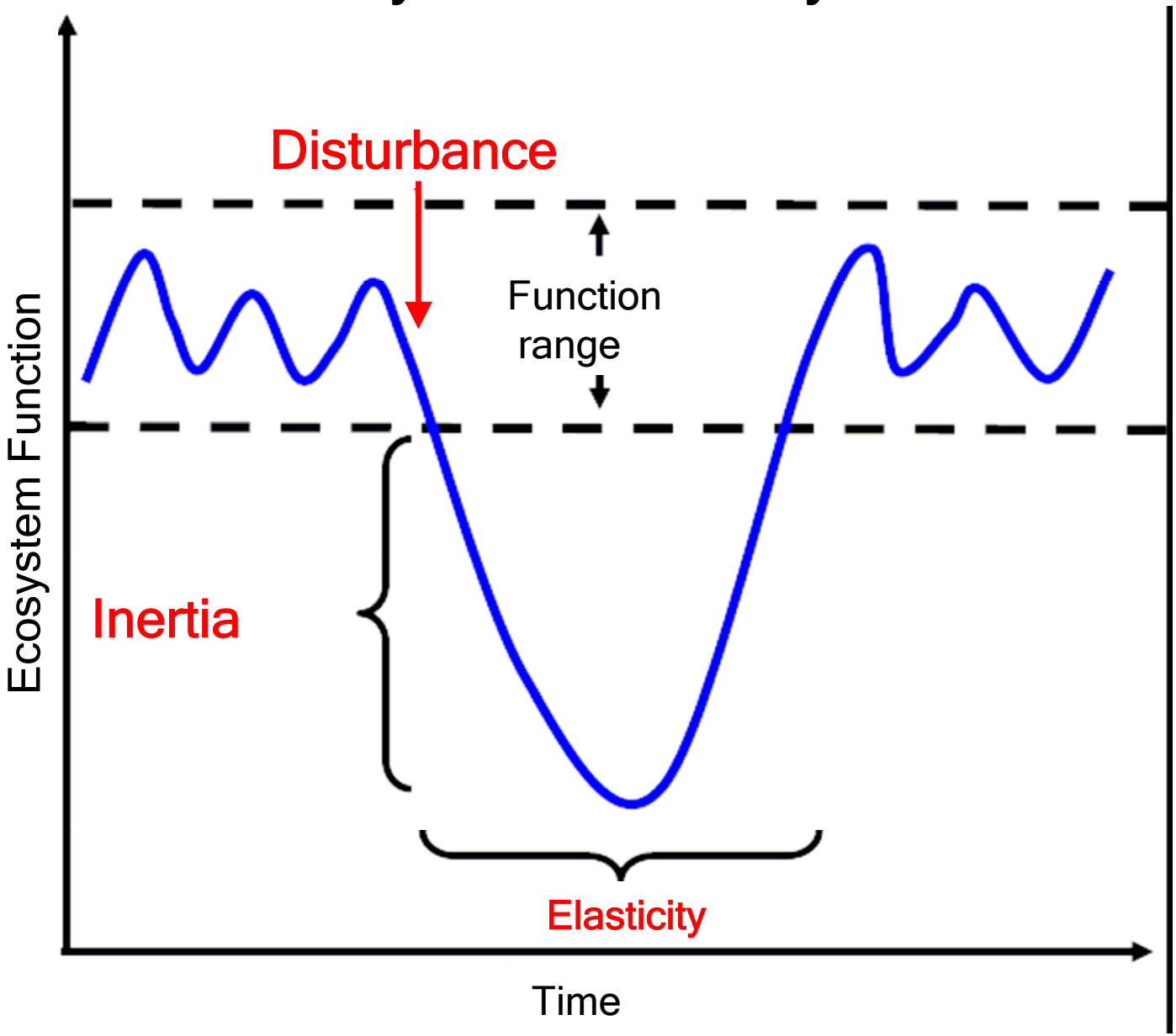
Asner et al. 2005

Table 1. Selective-logging rates from 1999–2002 in five major timber-producing states of the Brazilian Amazon, with comparison to the deforestation rates reported by the INPE (*18*).

State	1999–2000 rates (km^2 $year^{-1}$)		2000–2001 rates (km^2 $year^{-1}$)		2001–2002 rates (km^2 $year^{-1}$)	
	Logged	Deforested	Logged	Deforested	Logged	Deforested
Acre	64	547	53	419	111	727
Mato Grosso*	13,015	6,176	7,878	7,504	7,207	6,880
Pará	5,939	6,671	5,343	5,237	3,791	8,697
Rondônia	773	2,465	923	2,673	946	3,605
Roraima	32	253	55	345	20	54
Total	19,823	16,112	14,252	16,178	12,075	19,963

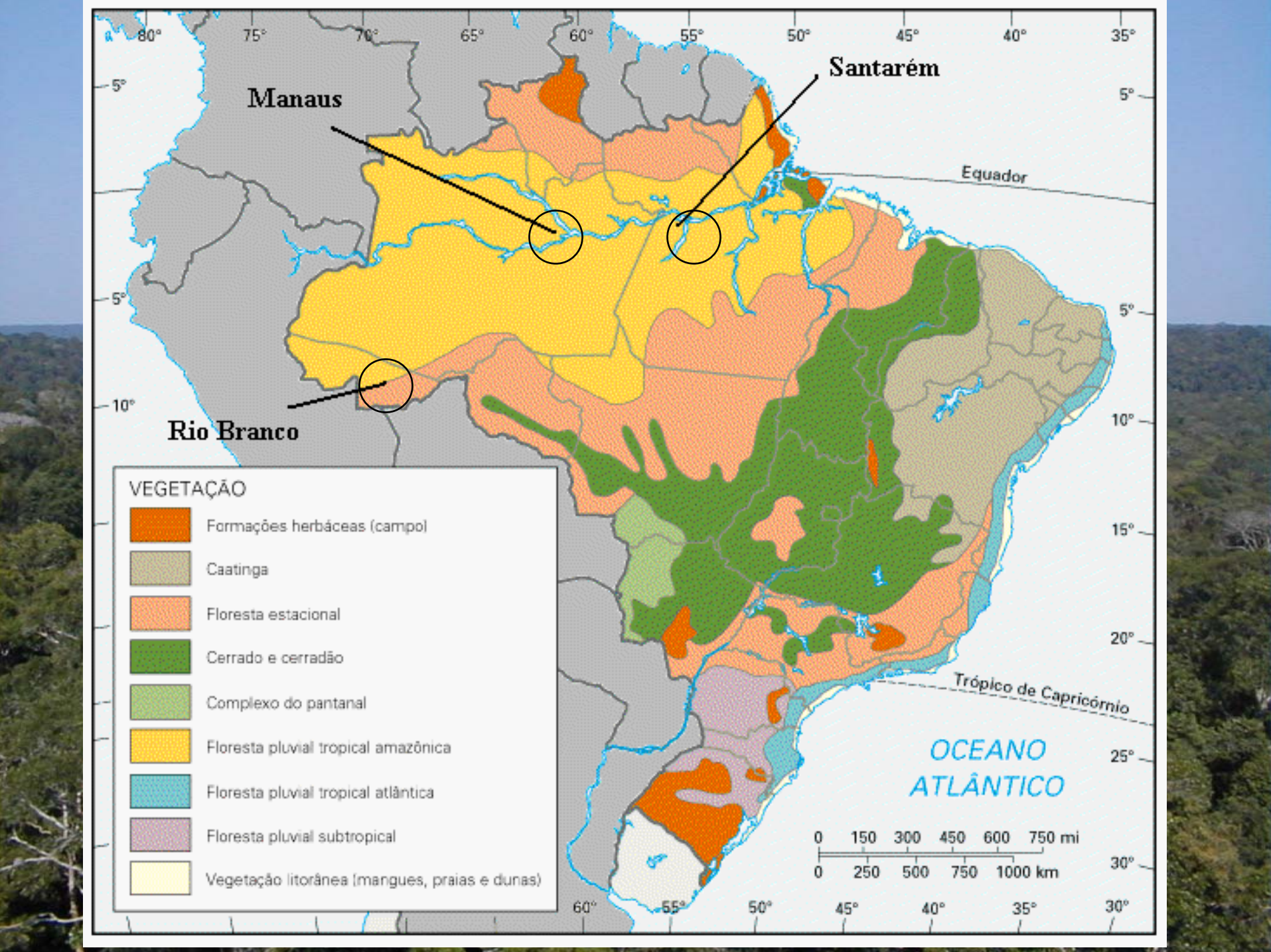
*Only the northern 58% of Mato Grosso containing forested lands was included in the analysis.

System stability

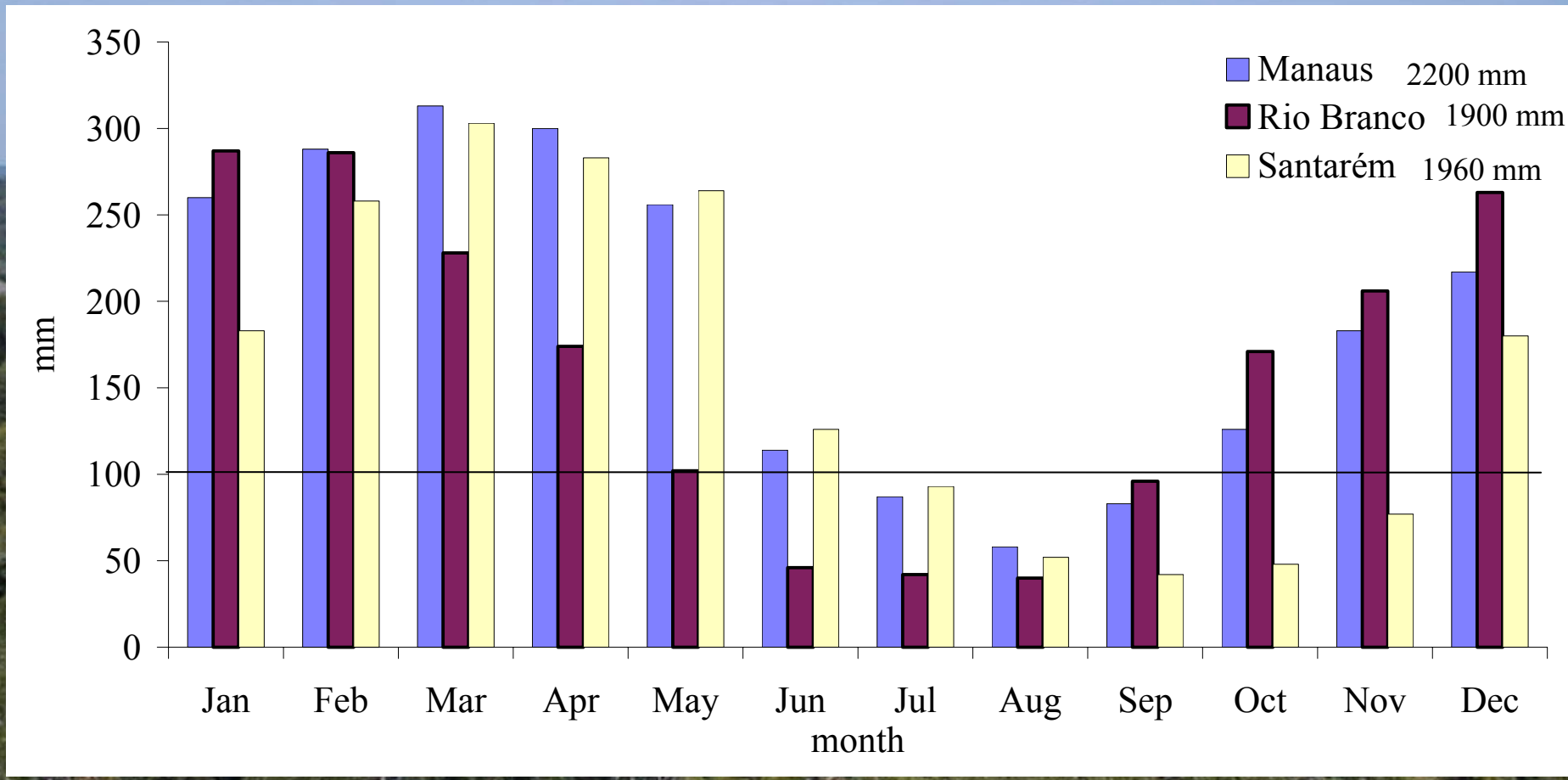


- Forest Structure and dynamics
- Age structure

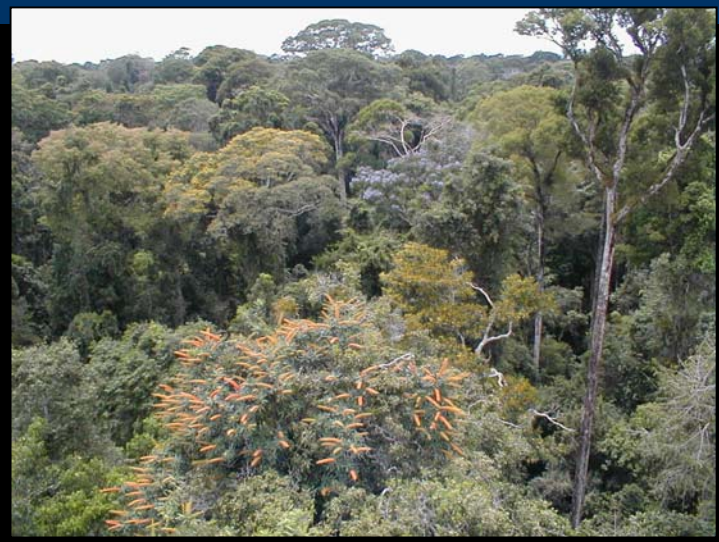
Background


Manaus
Santarém
Rio Branco
Equador
Trópico de Capricórnio
OCEANO ATLÂNTICO
VEGETAÇÃO
Formações herbáceas (campo)
Caatinga
Floresta estacional
Cerrado e cerradão
Complexo do pantanal
Floresta pluvial tropical amazônica
Floresta pluvial tropical atlântica
Floresta pluvial subtropical
Vegetação litorânea (mangues, praias e dunas)
0 150 300 450 600 750 mi
0 250 500 750 1000 km

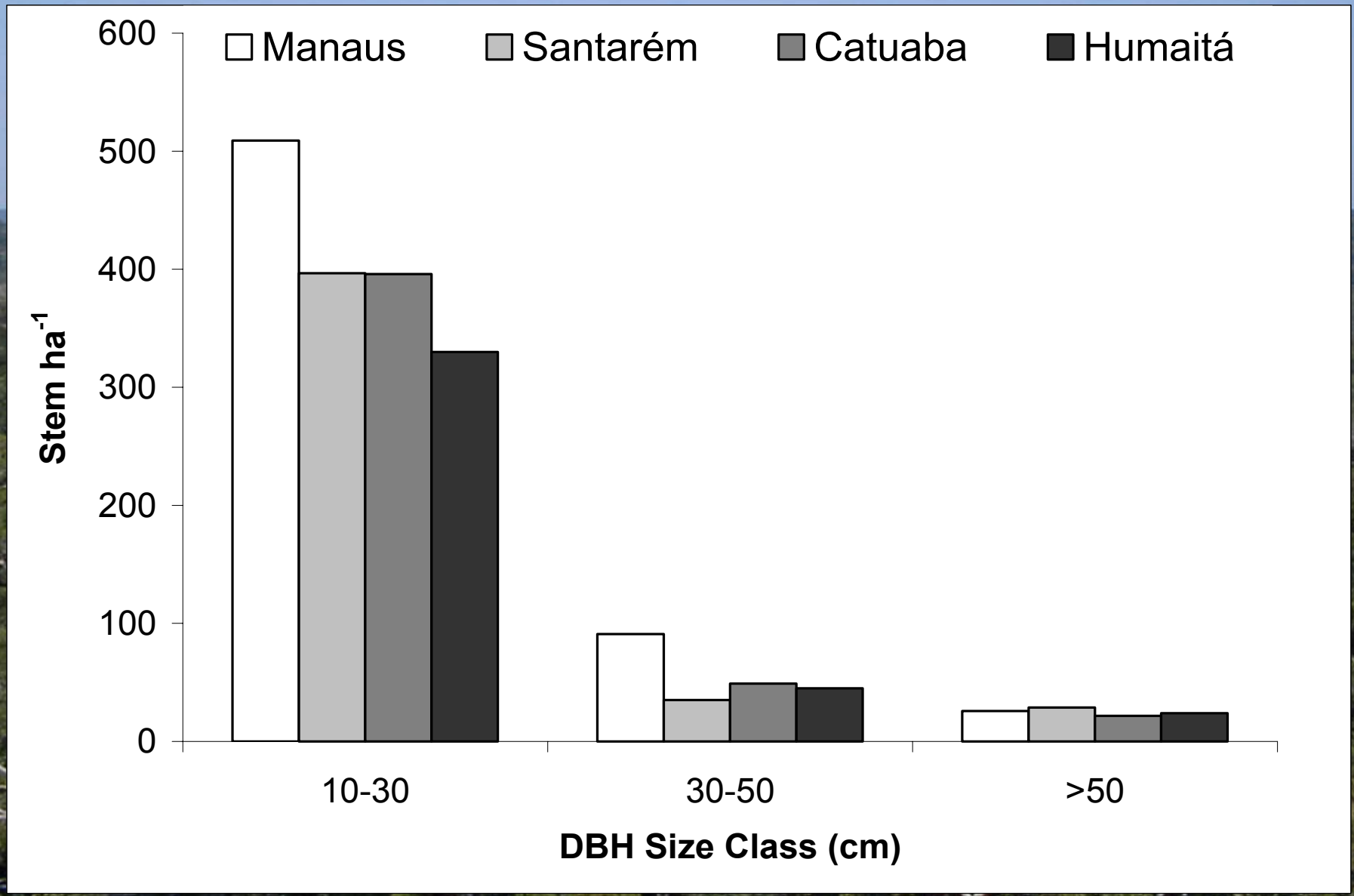
Precipitation



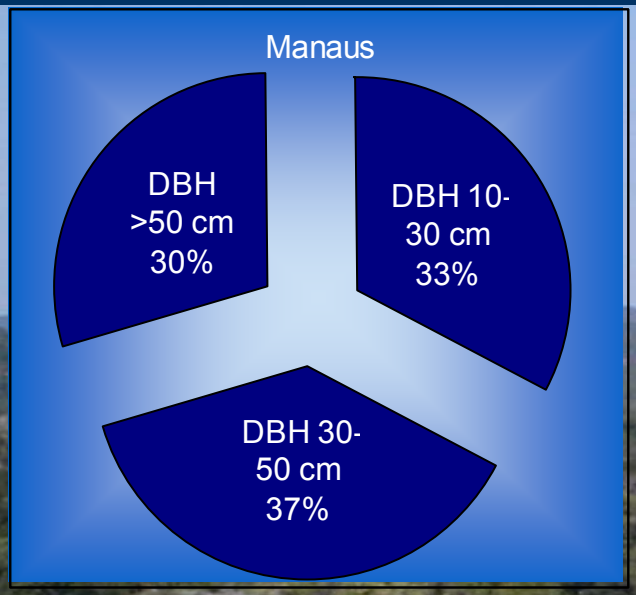
Differences between forests

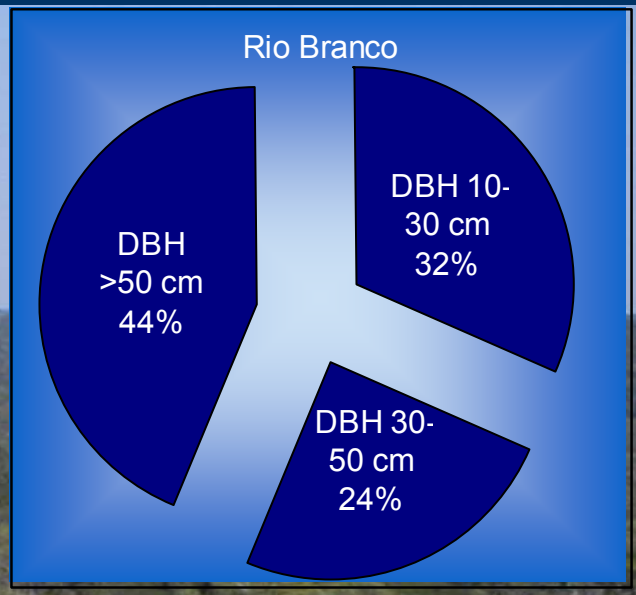


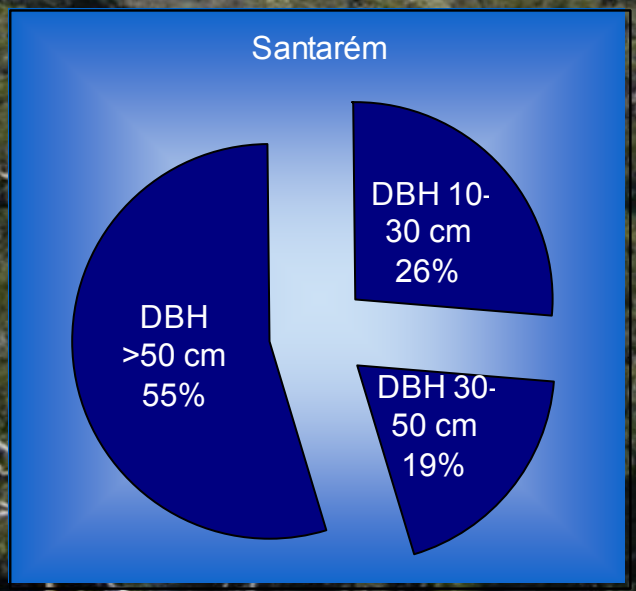
Forest structure

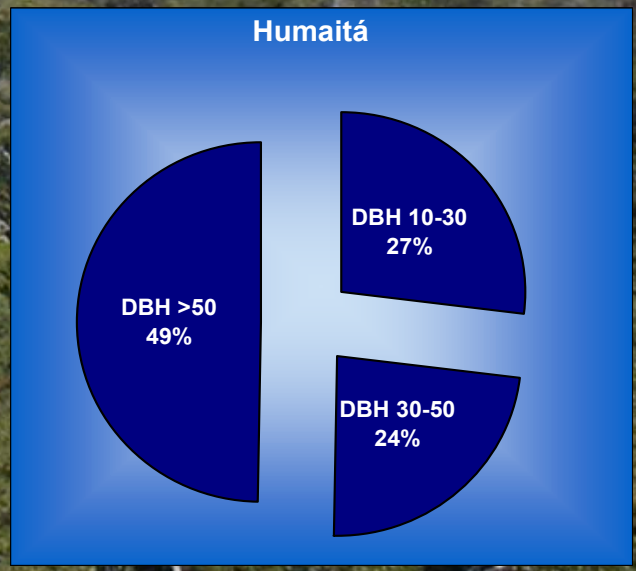


Manaus has more biomass overall, in smaller trees, than sites with a more pronounced dry season





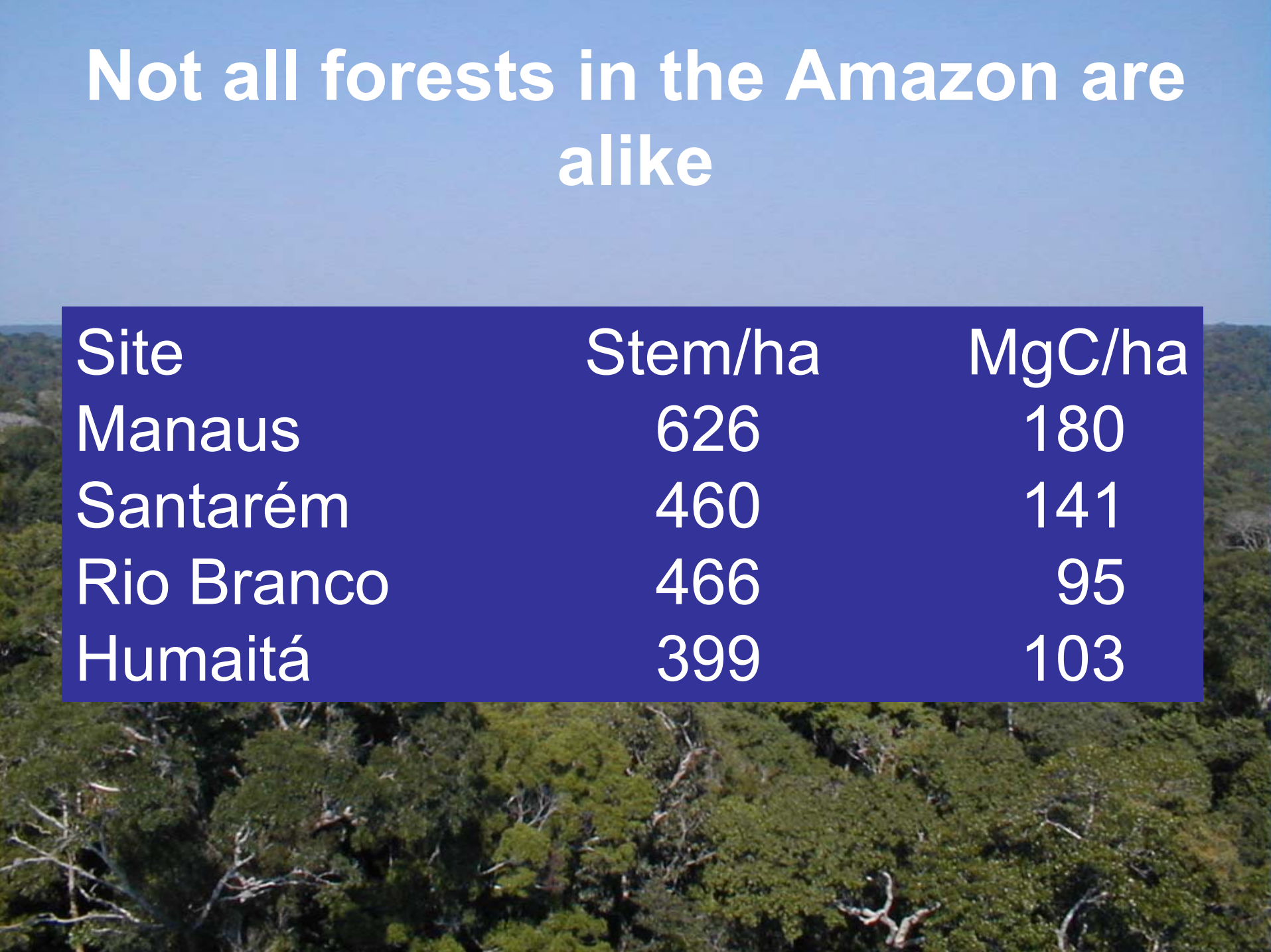




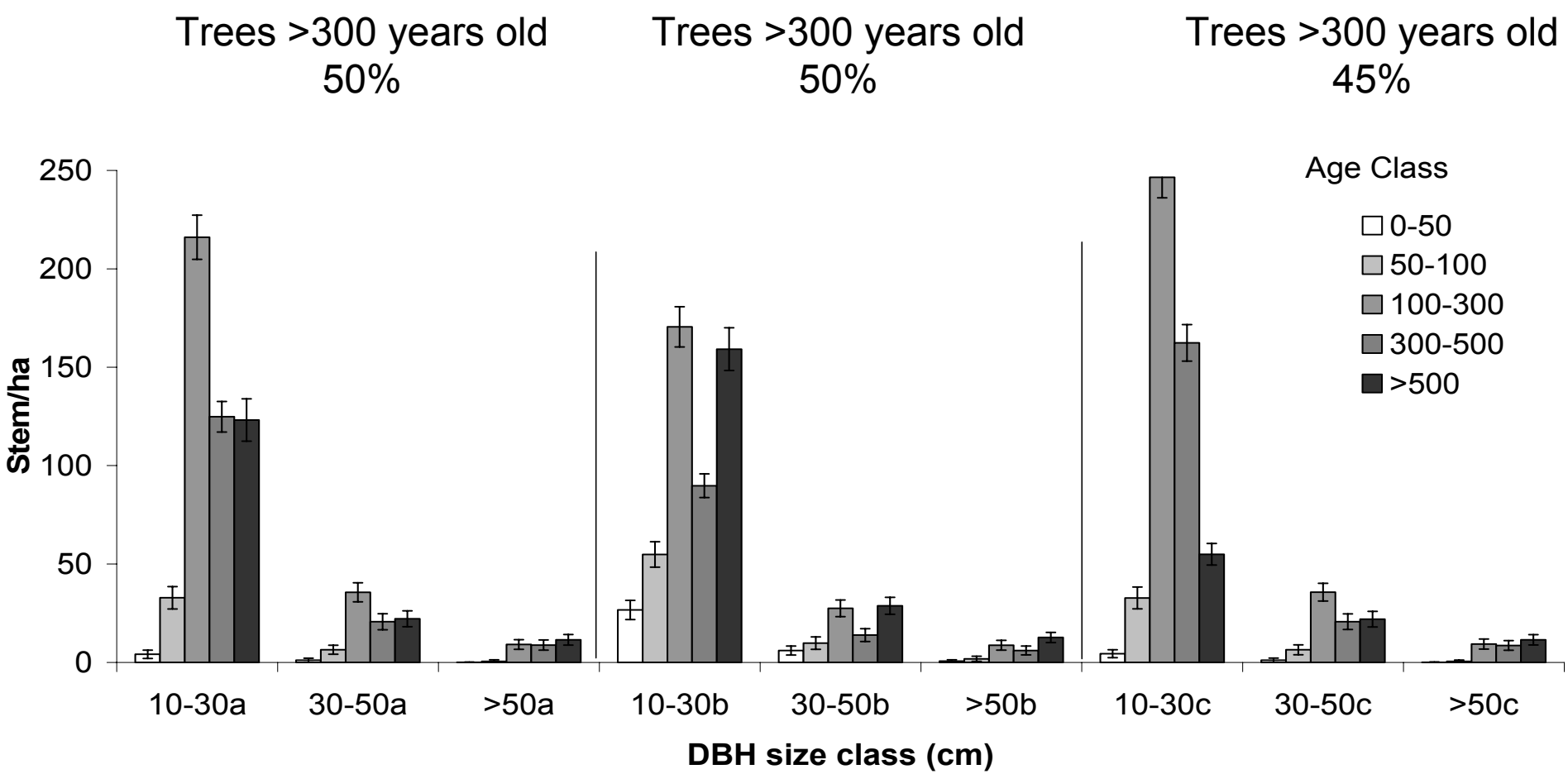
Vieira et al., 2004

Not all forests in the Amazon are alike

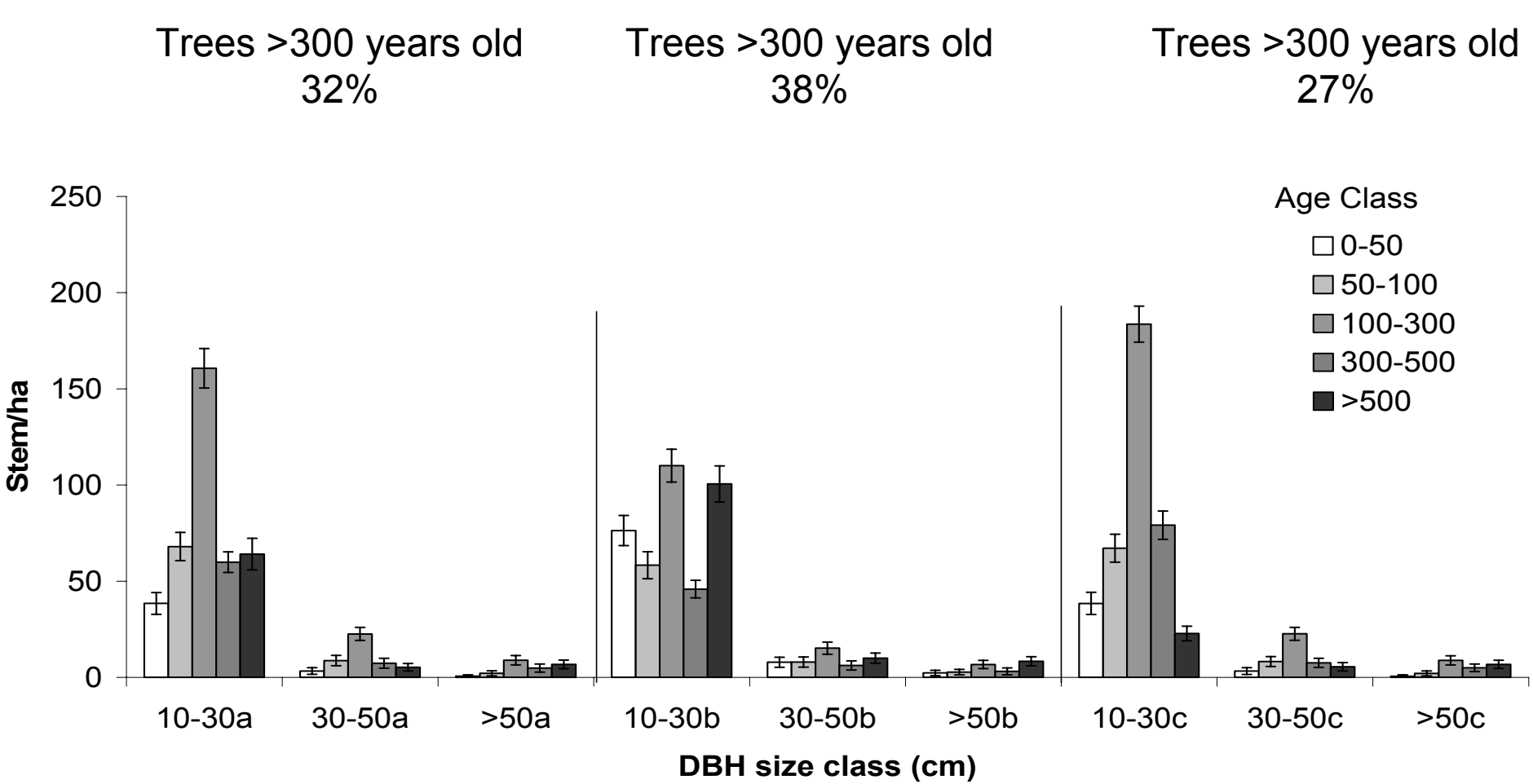
Site	Stem/ha	MgC/ha
Manaus	626	180
Santarém	460	141
Rio Branco	466	95
Humaitá	399	103



Age structure simulated - Manaus



Age structure simulated - Rio Branco



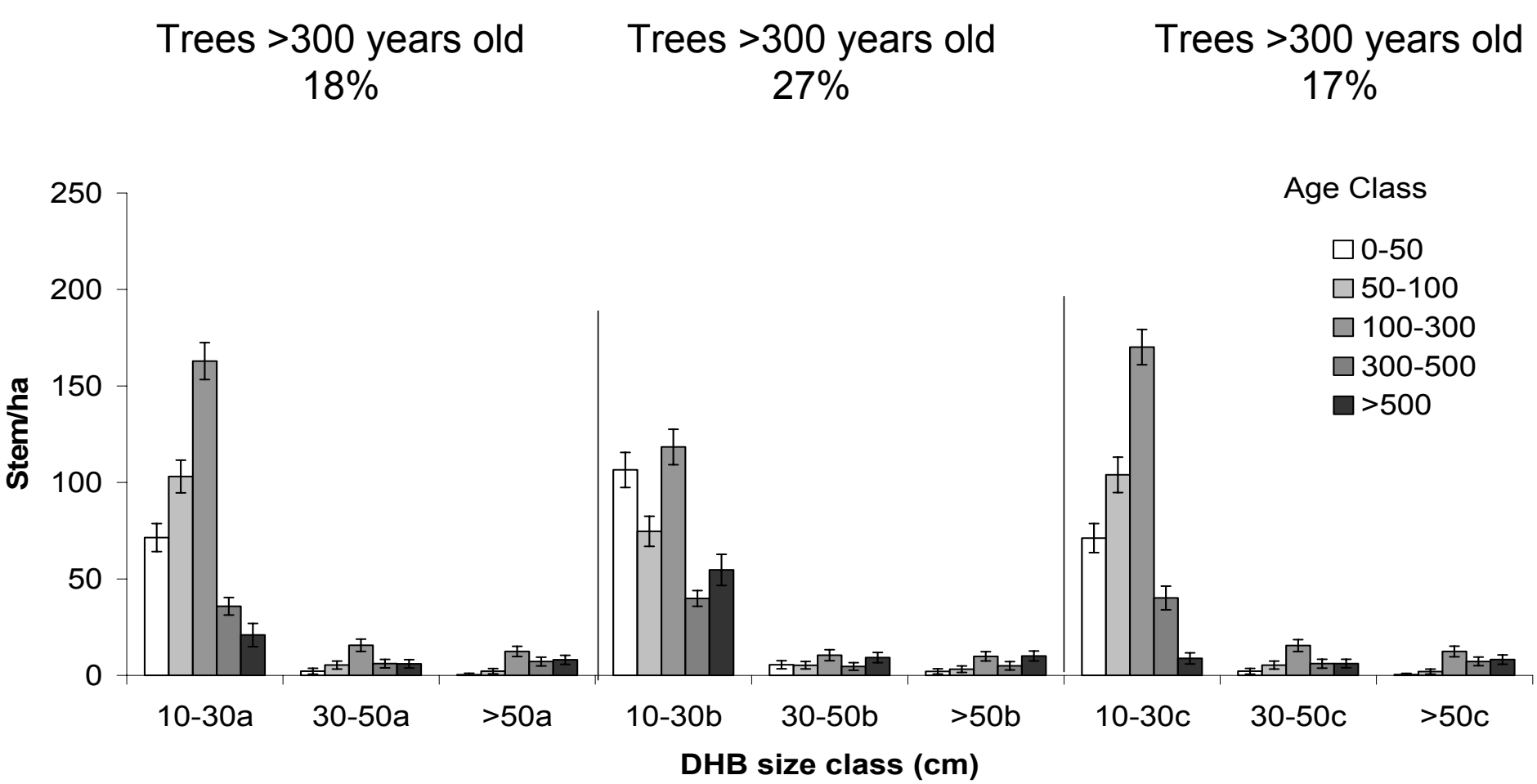
0.02cm/year
0.65* stdev

0.02cm/year
stdev

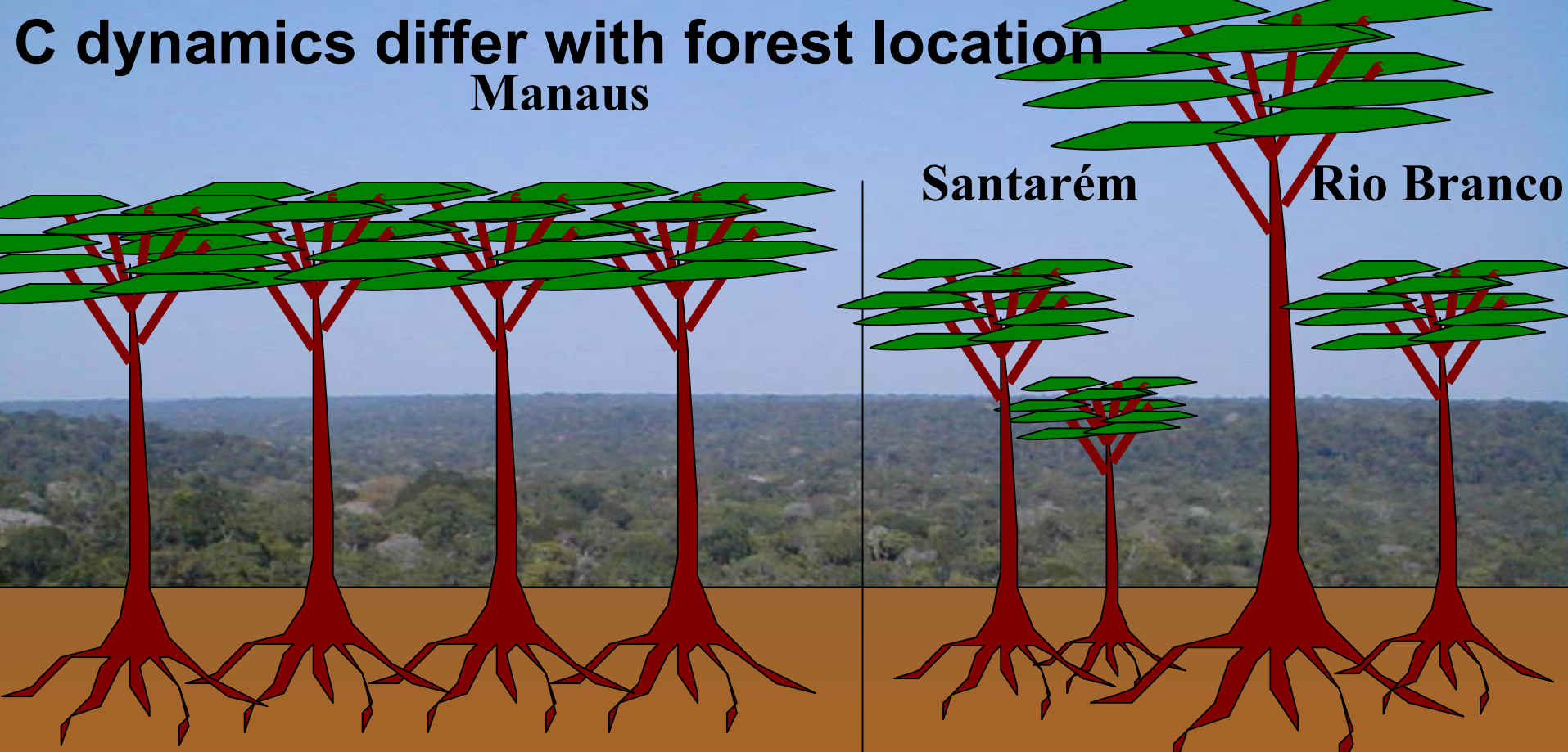
0.04cm/year
0.65* stdev

Vieira et al. 2005

Age structure simulated - Santarém



C dynamics differ with forest location

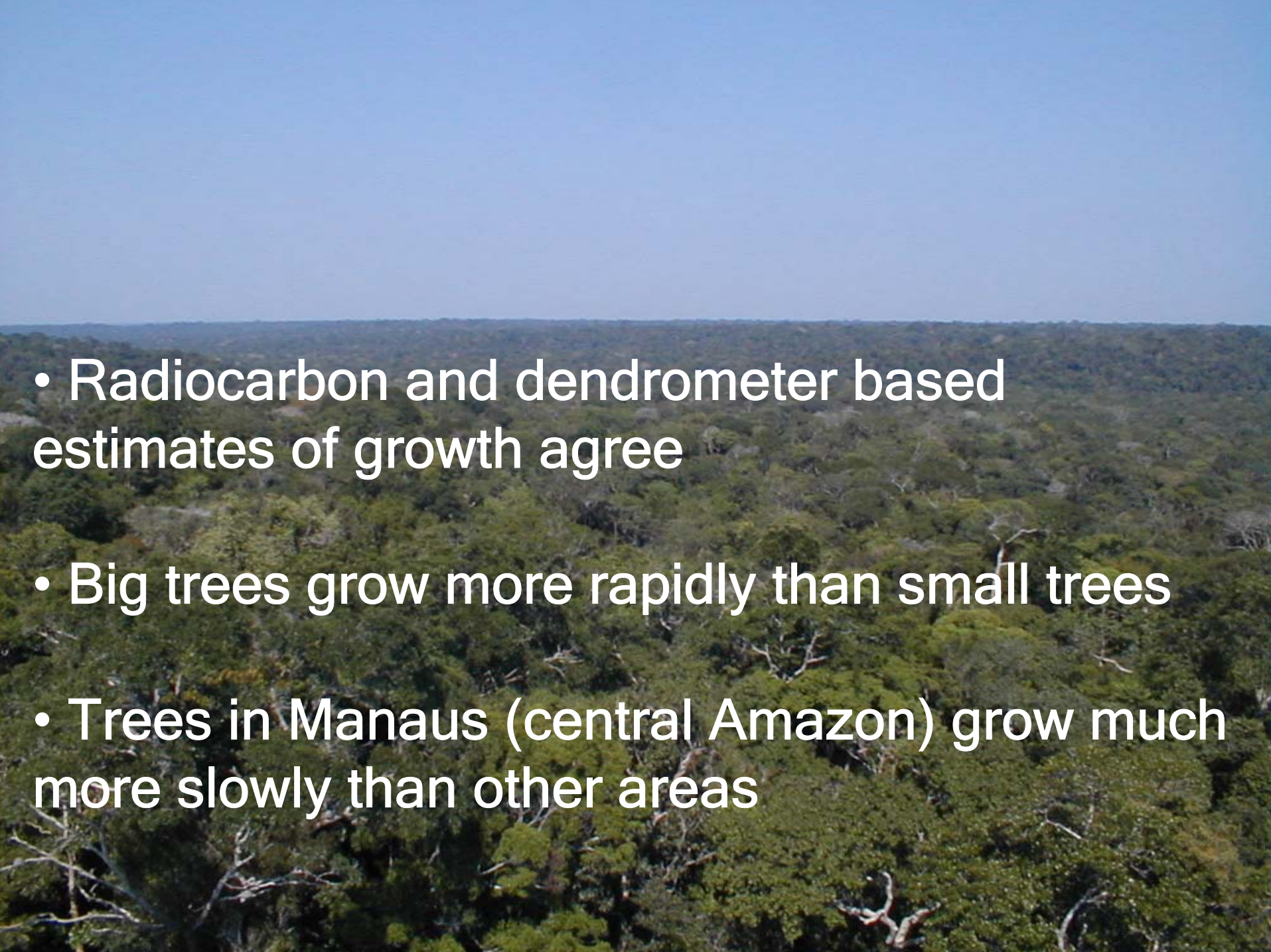


	Manaus	Santarém	Rio Branco
Individuals/ha	626	460	466
Biomass C MgC/ha	180	141	95
Growth MgC/ha/yr	1.6-2.1	2.2 -3.0	3.3-3.4
Mean age of C (yr)*	119	103	80
MRT of C (stock/growth)**	95	37	94
Mean Tree Age (yr)*	422	332	255

* From monte carlo simulations

**biomass-weighted

Data from Vieira et al. 2004

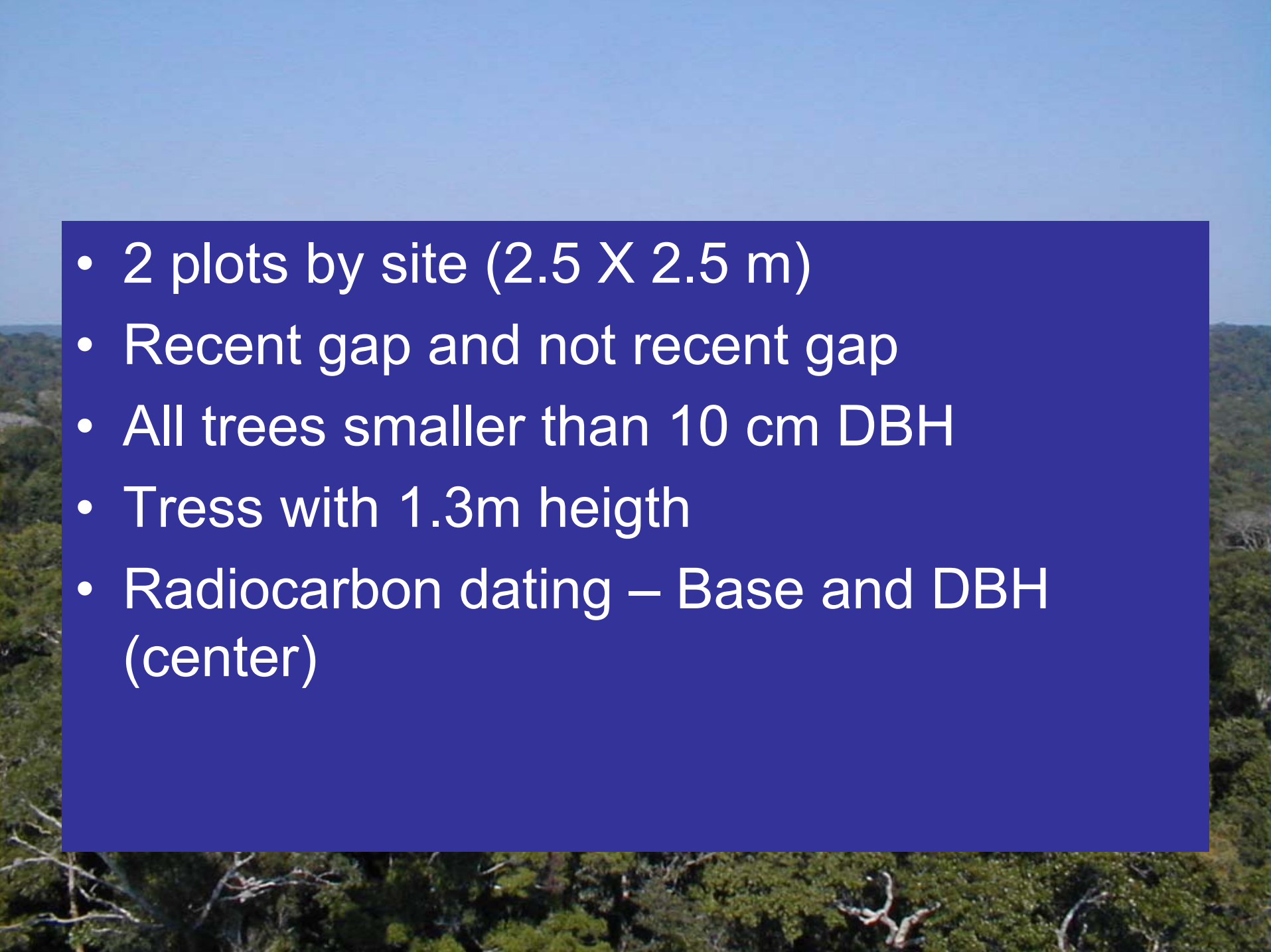


- Radiocarbon and dendrometer based estimates of growth agree
- Big trees grow more rapidly than small trees
- Trees in Manaus (central Amazon) grow much more slowly than other areas

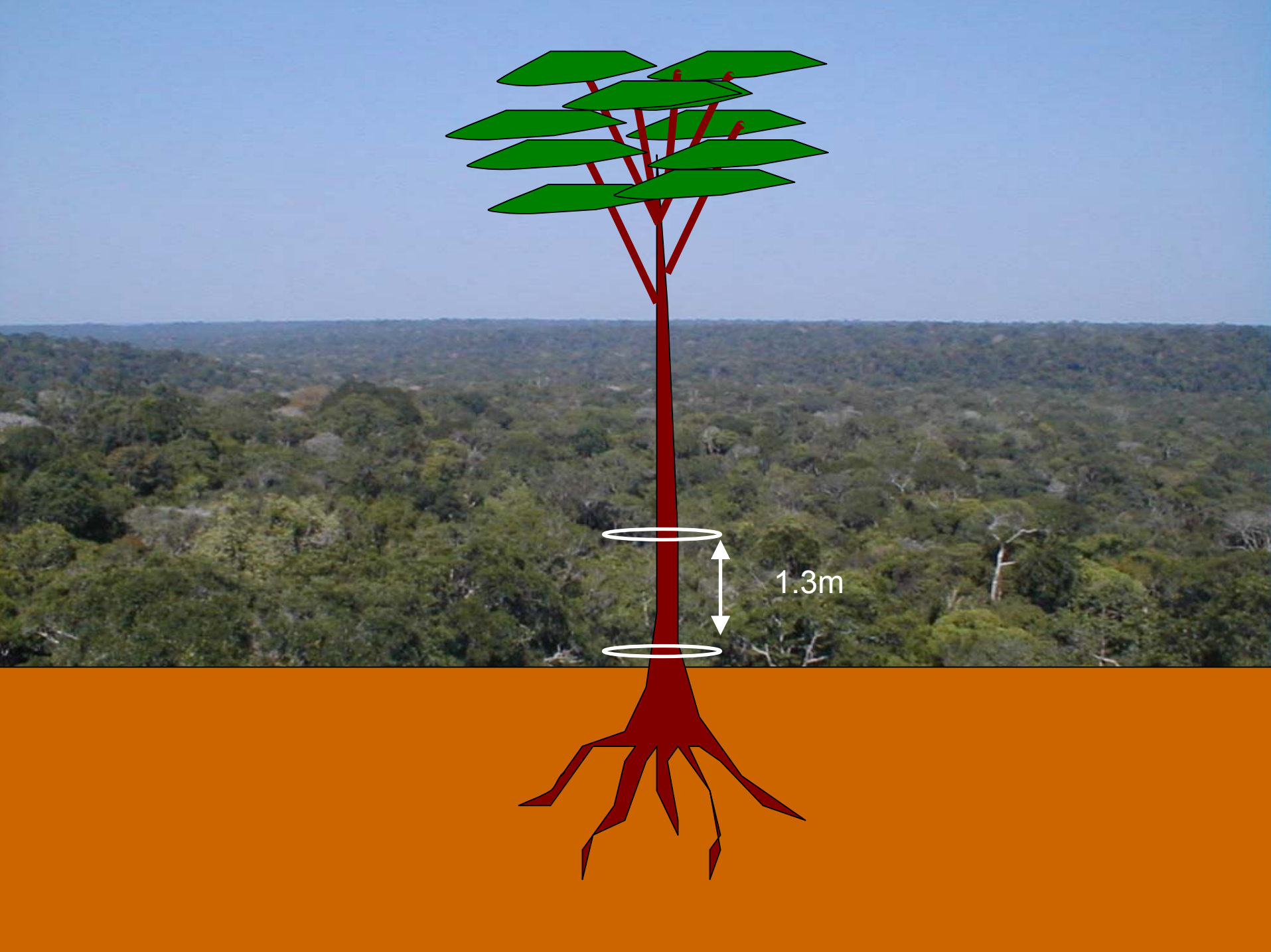
Field sites

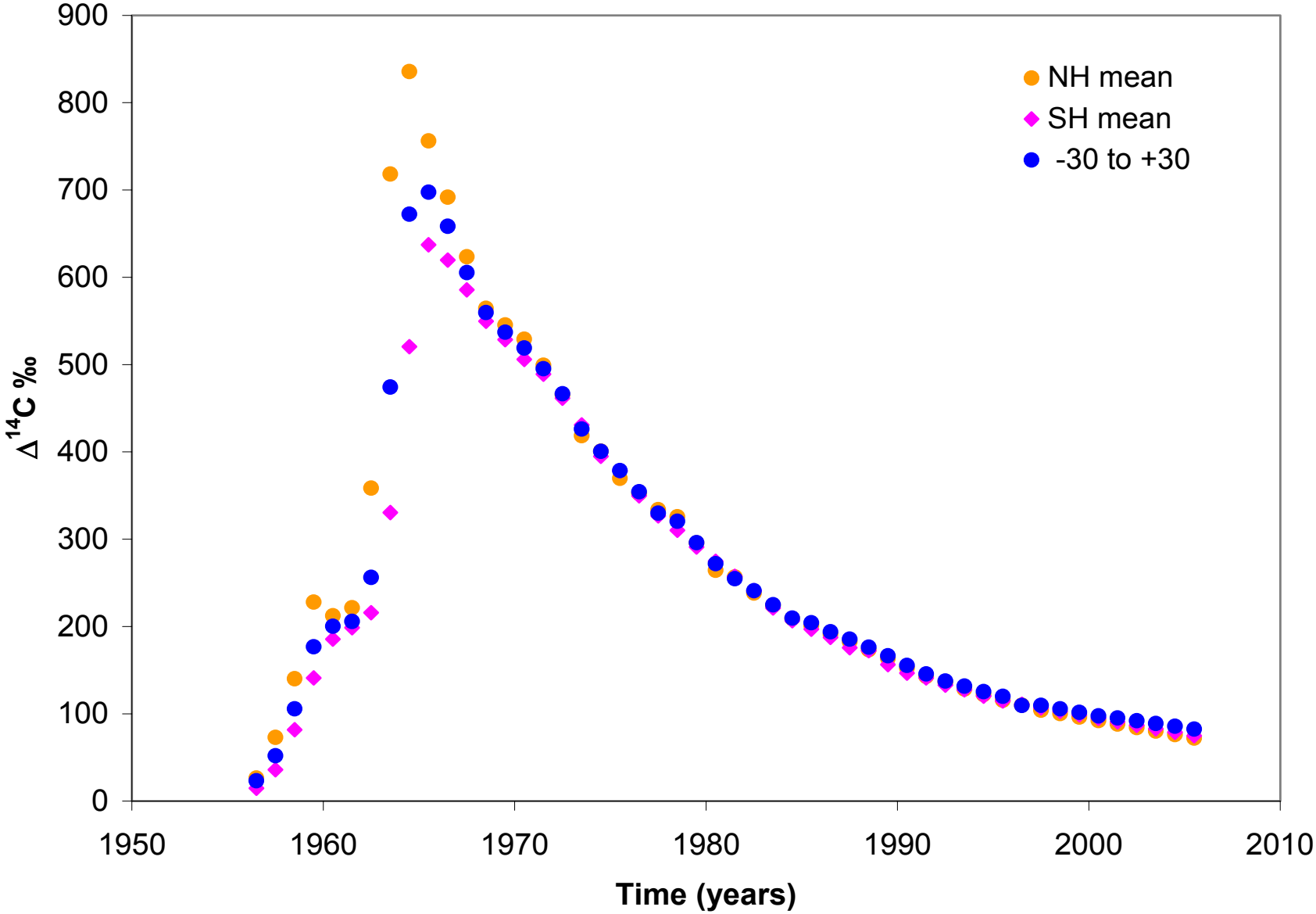
- Terra firme forest
- Oxisols (Distrophic and Eutrophic)
- Variation in dry season length
- Shortest in Manaus, longer in Rio Branco (Catuaba and Humaitá), Santarém
- Water Table – Deep (Manaus, Santarém)
  – Shallow (Acre)

Sampling

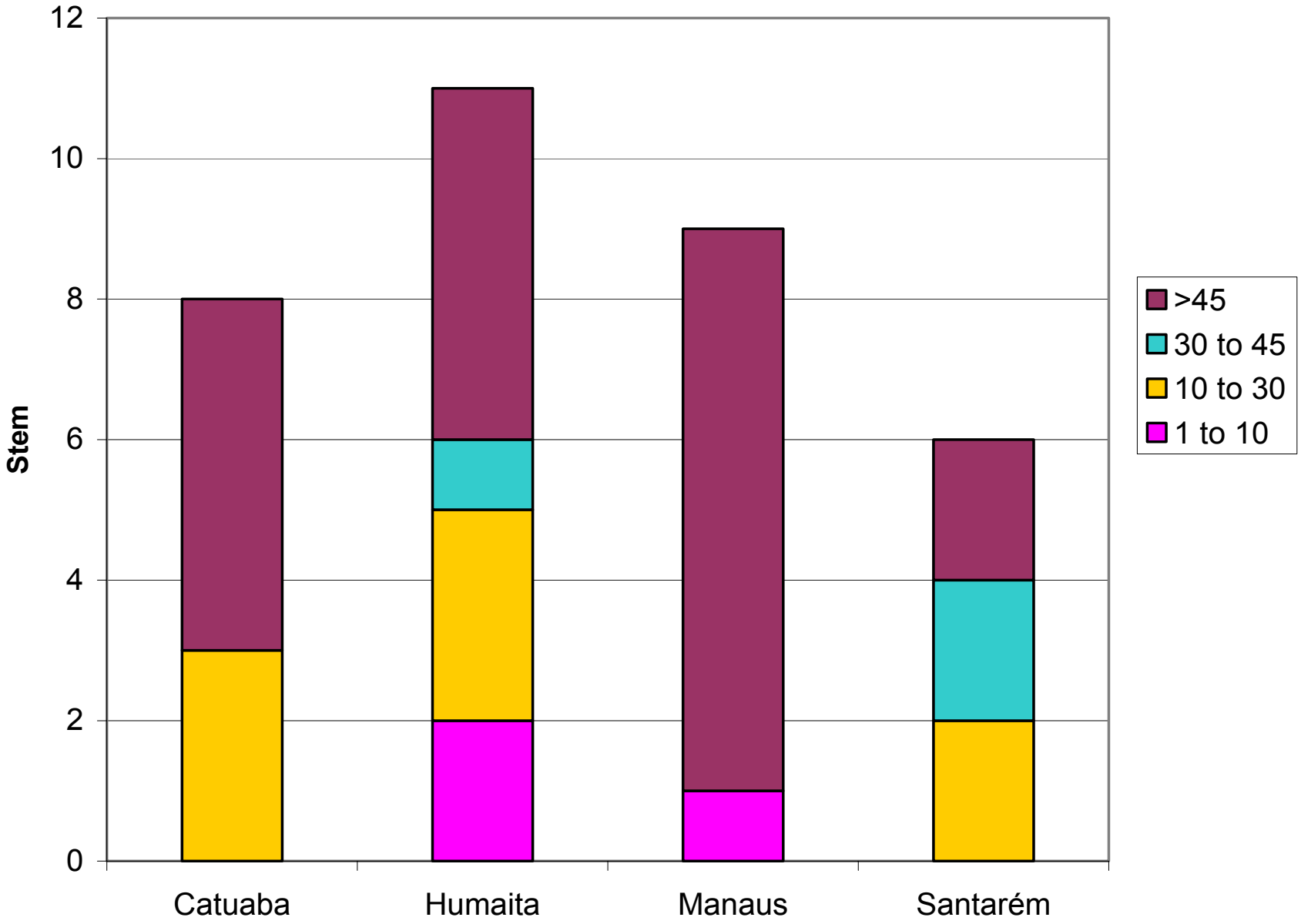


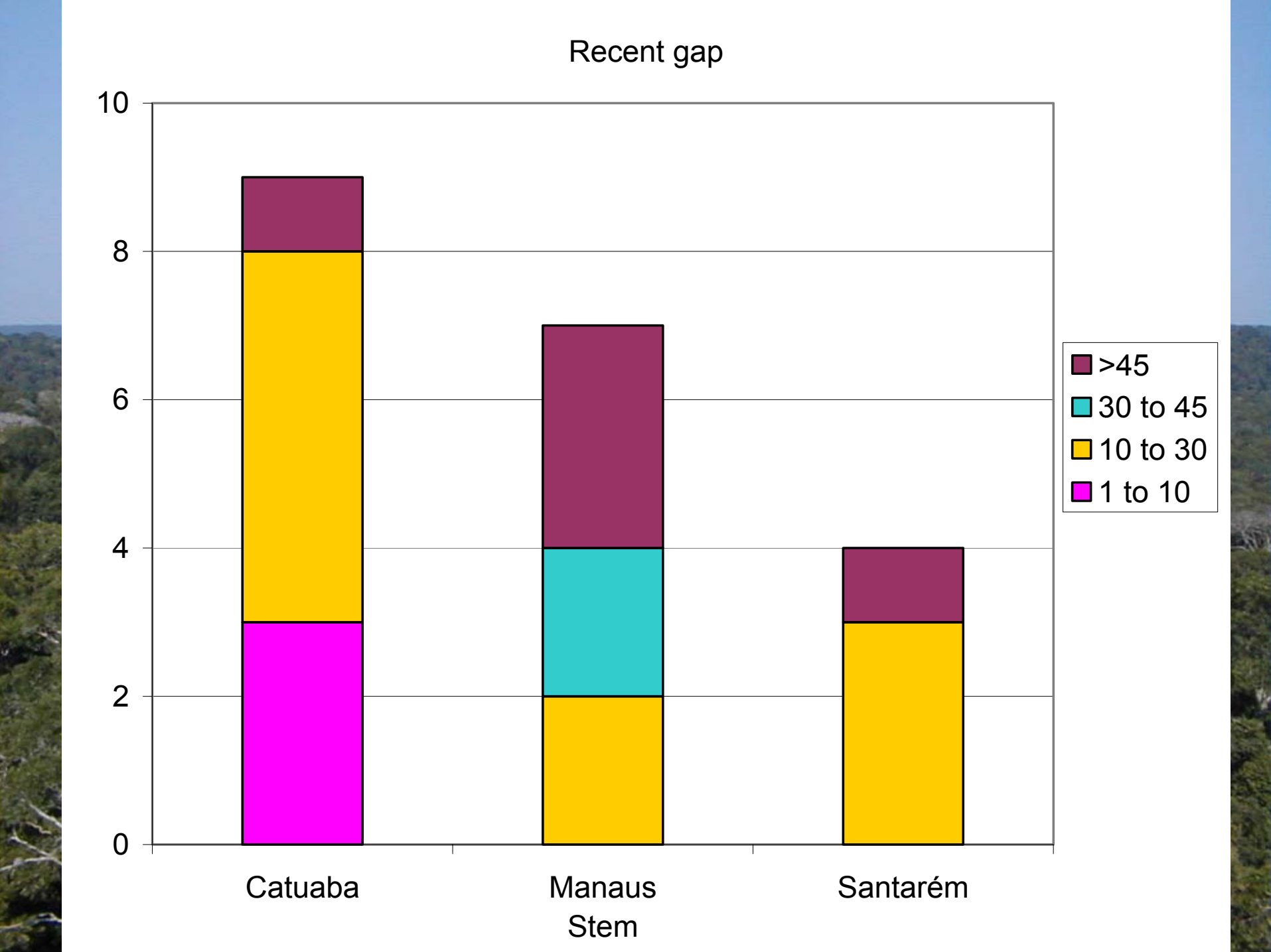
- 2 plots by site (2.5 X 2.5 m)
- Recent gap and not recent gap
- All trees smaller than 10 cm DBH
- Tress with 1.3m heigth
- Radiocarbon dating – Base and DBH (center)


1.3m


900
800
700
600
500
400
300
200
100
0
Δ14C ‰
1950
1960
1970
1980
1990
2000
2010
Time (years)
NH mean
SH mean
-30 to +30

No recent gap ~ 14000 stem/ha




Recent gap
10
8
6
4
2
0
Catuaba
Manaus
Santarém
Stem
>45
30 to 45
10 to 30
1 to 10

Implications of low growth rates:

- Although biomass may recover quickly through fast-growing pioneer species, slow growing species (therefore biodiversity) will take centuries to recover from disturbance