SOIL NUTRIENT STOCKS AND LITTER INPUT IN PRIMARY FOREST UNDER SELECTIVE LOGGING, BRAZILIAN AMAZONIA

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UCDAVIS

OUTLINE

- Overview on Amazonia
  - Sustainability?
  - Research question
- Material and Methods
- Results
- Conclusion

Amazonia Basin in the world

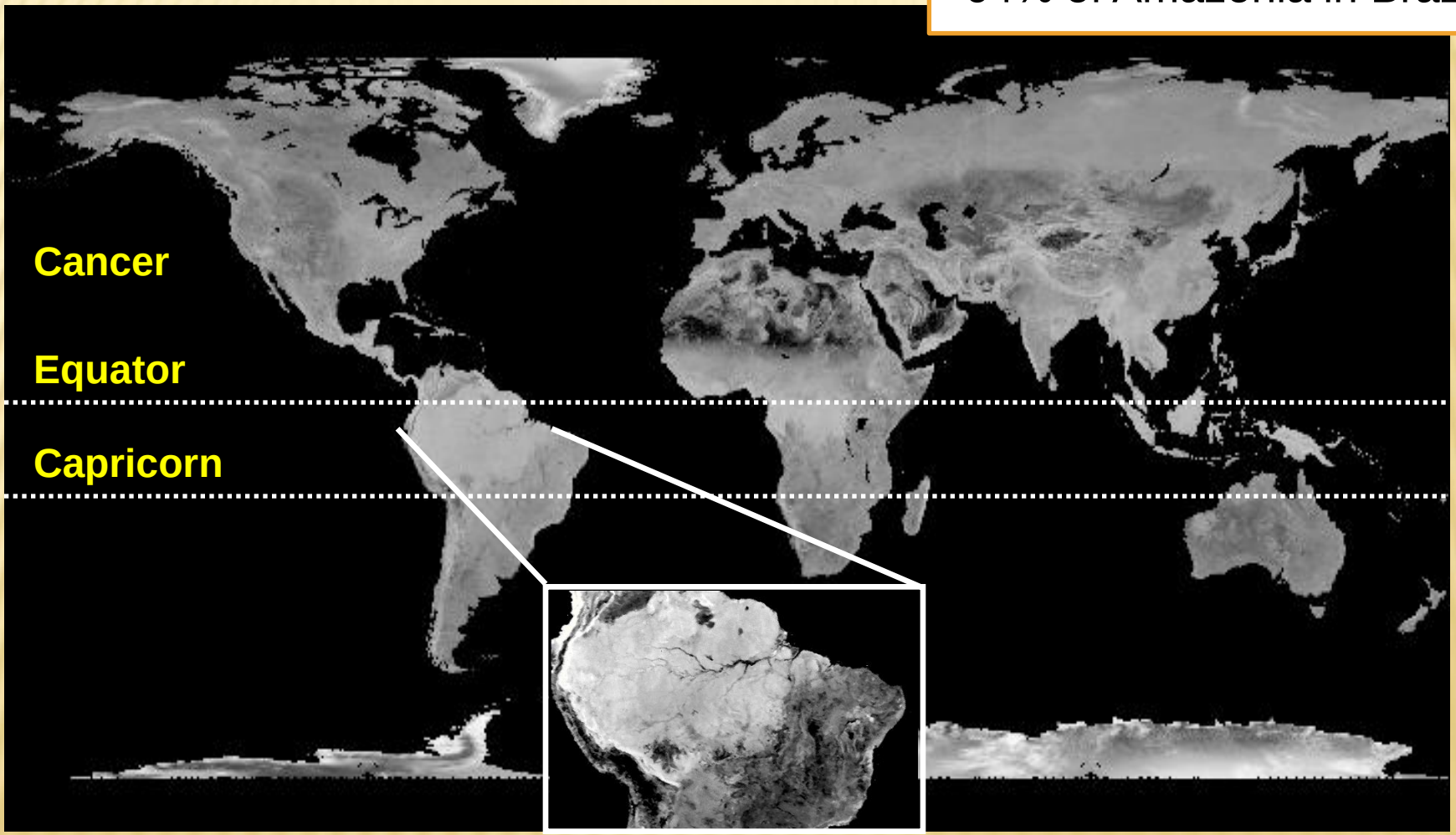
- north region of South America
- tropical region

Geography

6,300,000 km²

USA: ~9,900,00 km²

64% of Amazonia in Brazil



http://www.mers.byu.edu/Amazon.html

SUSTAINABILITY IN AMAZONIA?

DEFORESTATION

Natural x Anthropic

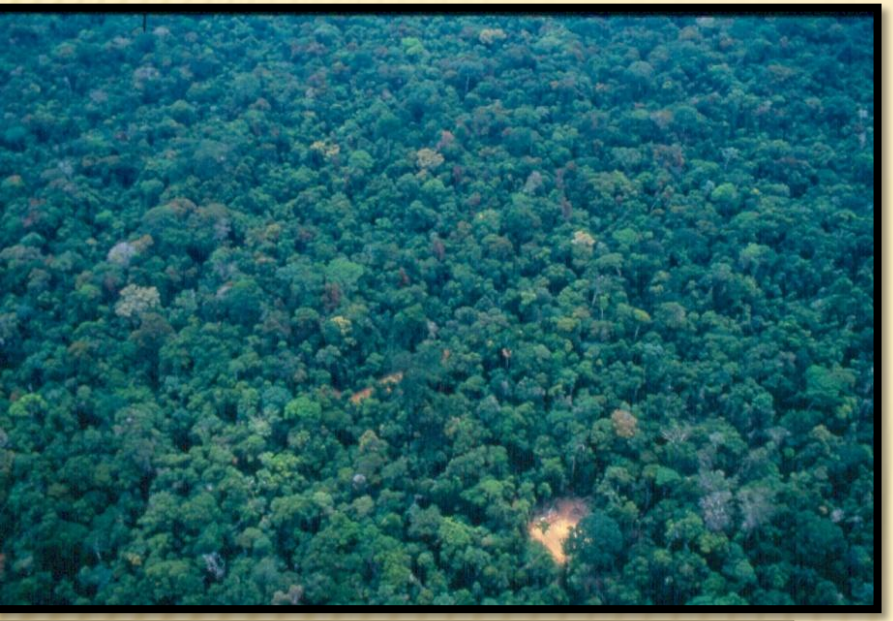
Illegal x Legal

11-12 ↓ 27% clear cutting

↑ 29% Amazonas

(INPE, 2012)

LEGAL X ILLEGAL DEFORESTATION



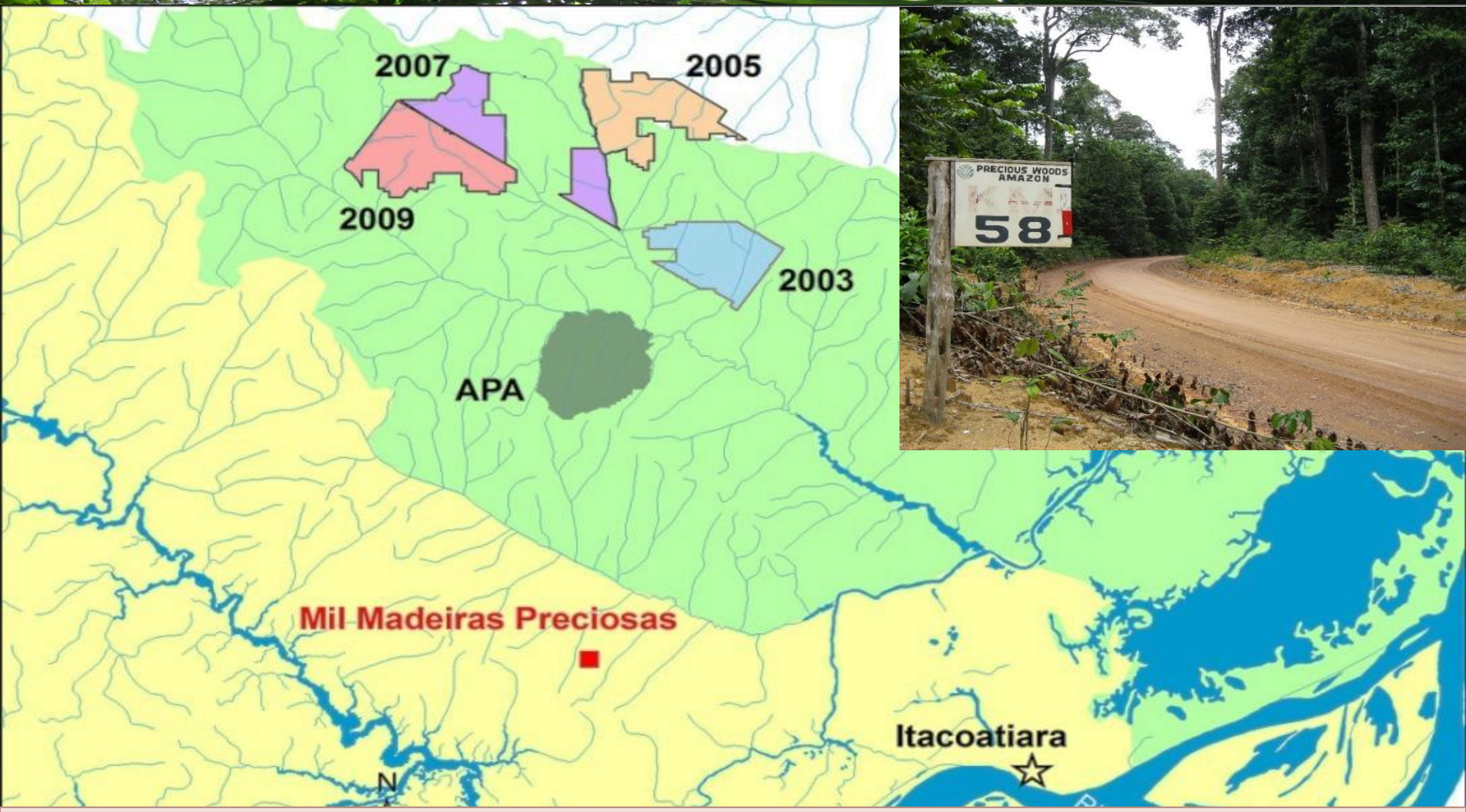
- Logging activities

can impact soils

What is the impact of selective logging on soil and nutrient stocks in forest over time?

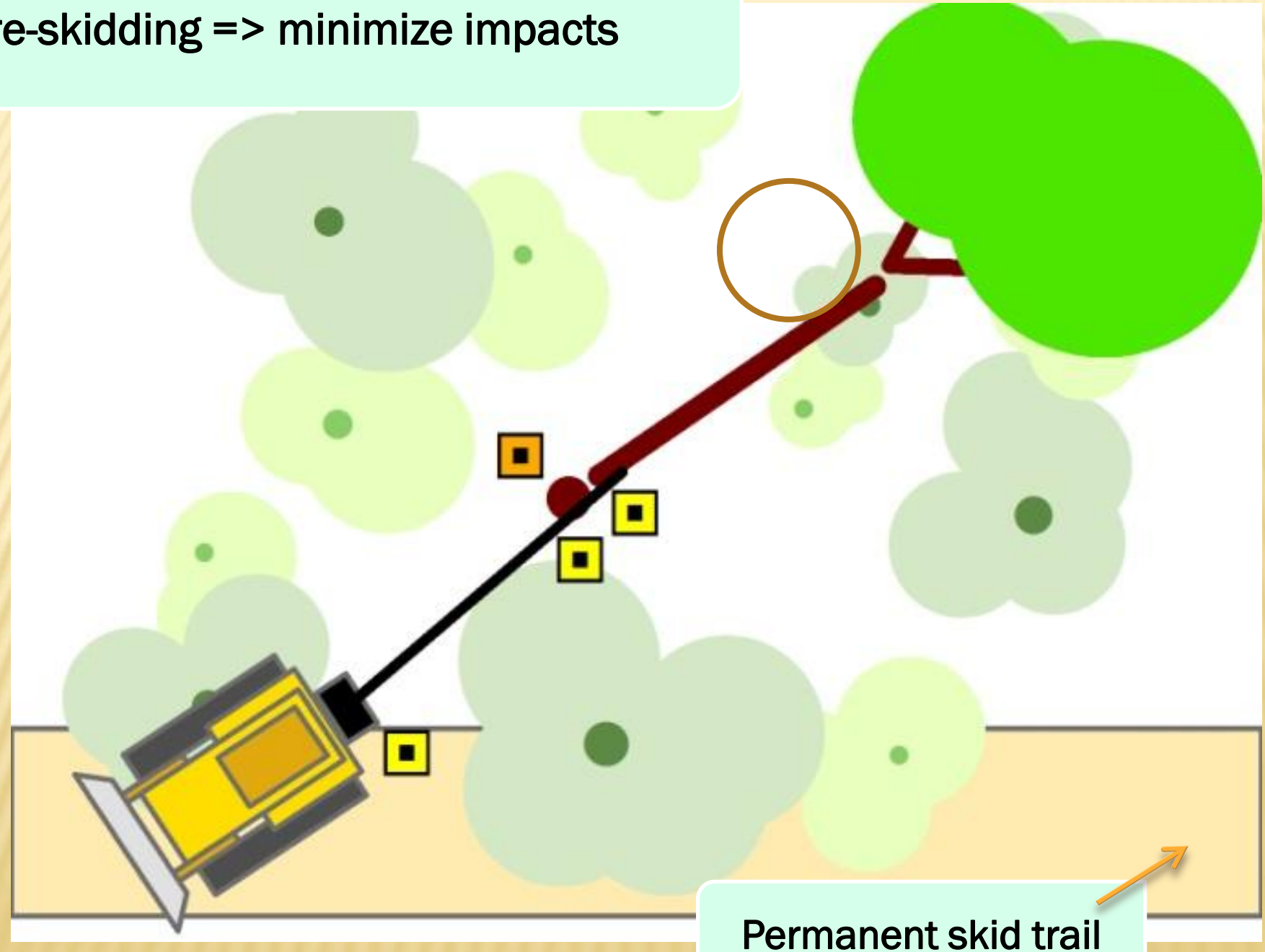
(ARNUP, 1998; NEVES et al., 2001) (Lentini/IFT, 2010

MATERIAL AND METHODS



- Amazonas State, Brazil
- 4 Upland Forest tracts (UPA) + 1 Control (APA)
- Same logging methodology and intensity => Costly and impacting

Pre-skidding => minimize impacts



Data collection

SOIL

45 composite samples

0-10, 10-30, 30-50 cm

N, P, K, Ca, Mg, S, Al, OC, pH

Standing Litter

N, P, K, Ca, Mg, S, CO (kg ha^{-1})

subplot 0.5 x 0.5 m

Soil and standing litter chemical traits

- **Multivariate analyses**
  - ✓ **Generalized mixed model in R Studio**

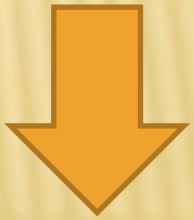
soilc<- lme (fixed = SOC ~ cUPA+I((cUPA - mean(cUPA))^2))*depth, random = ~1|UPA/PLOT, data)

  - ✓ **PCA**
  - ✓ **Cluster Analysis**

SOIL PCA

Organic Carbon

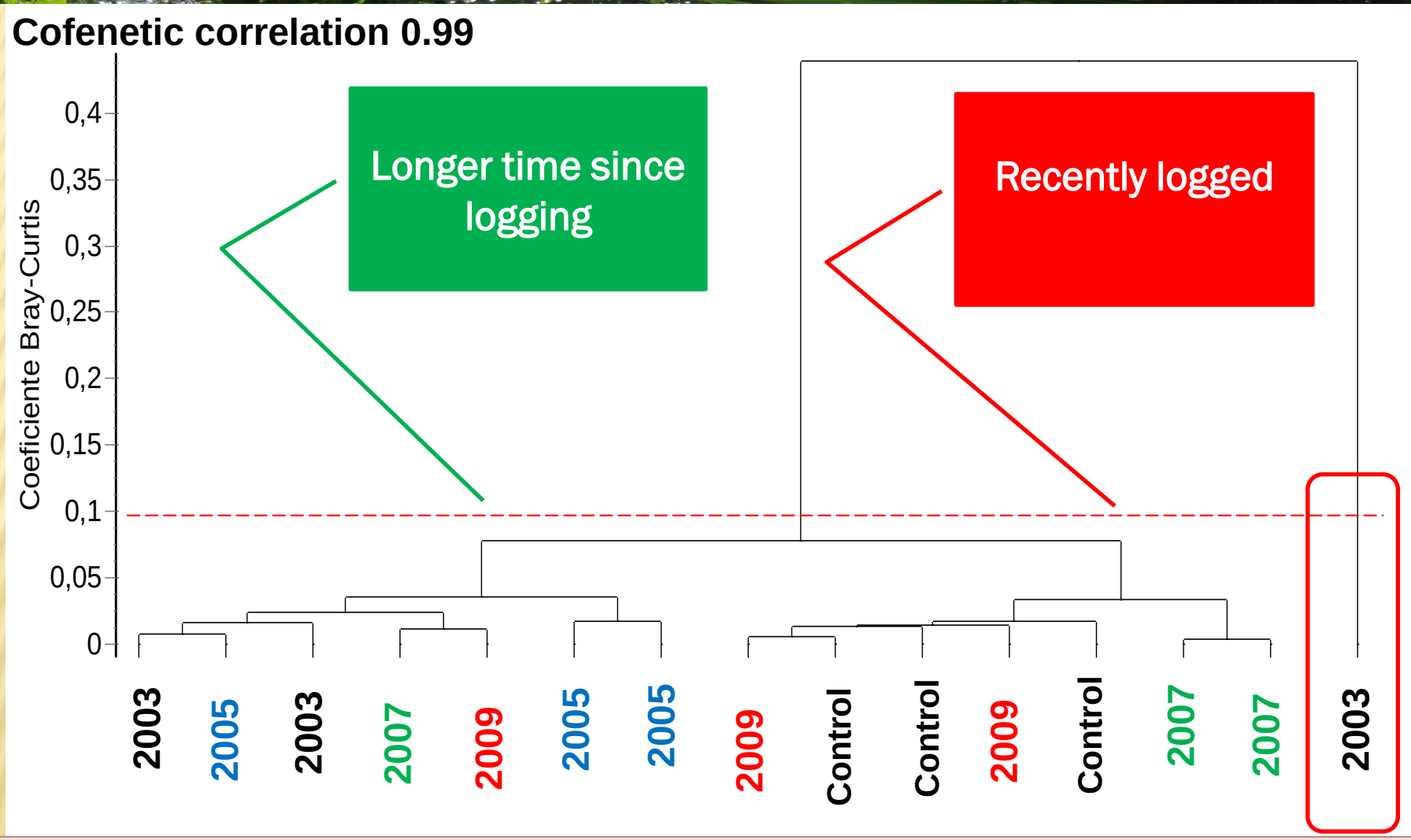
LITTER PCA



Litter layer, Mg , S
N, P, OC

Results

Classification of sites

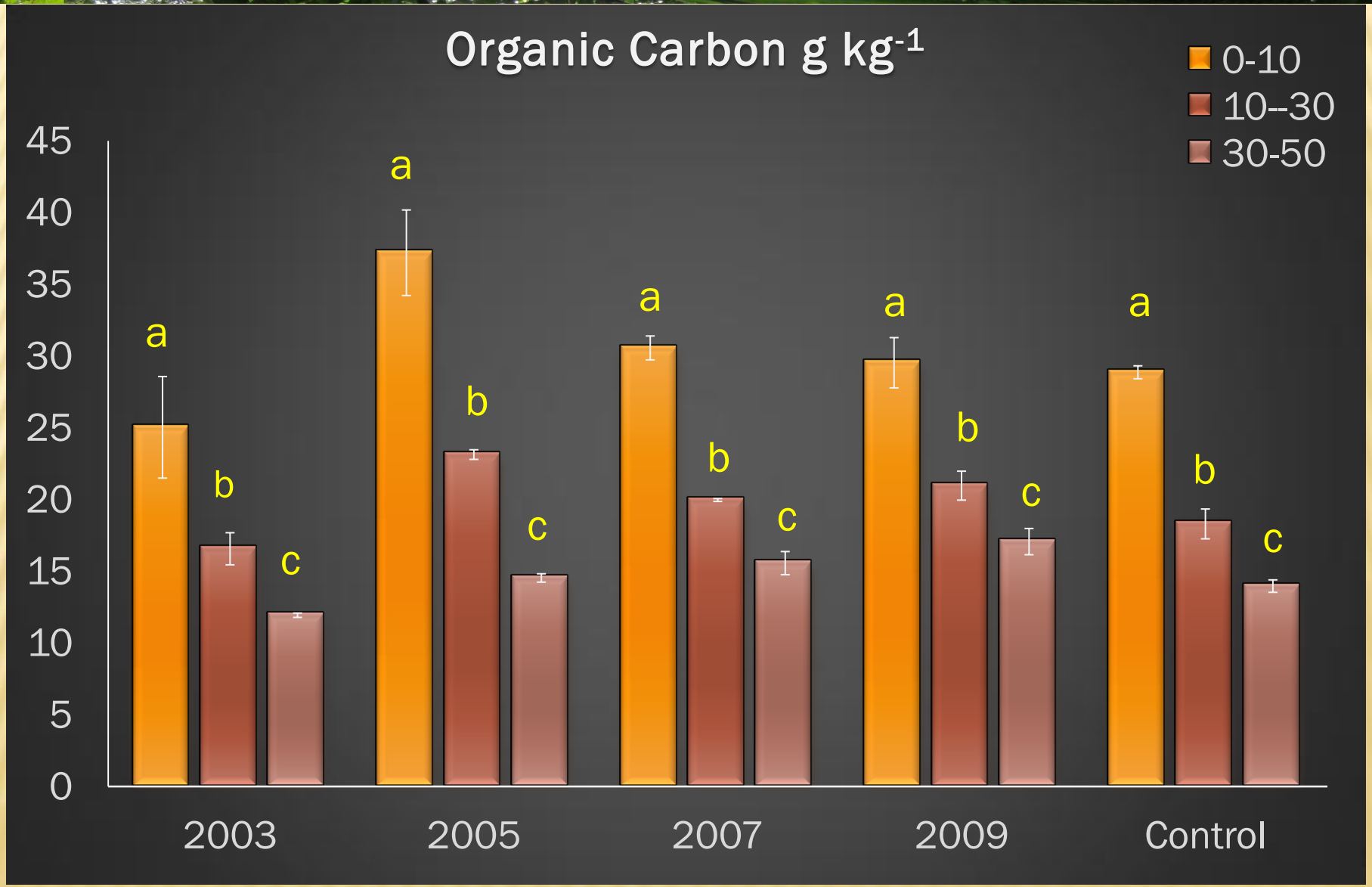


LOW DISSIMILARITY (< 25%) BETWEEN SITES

SOME OF THE REASONS....

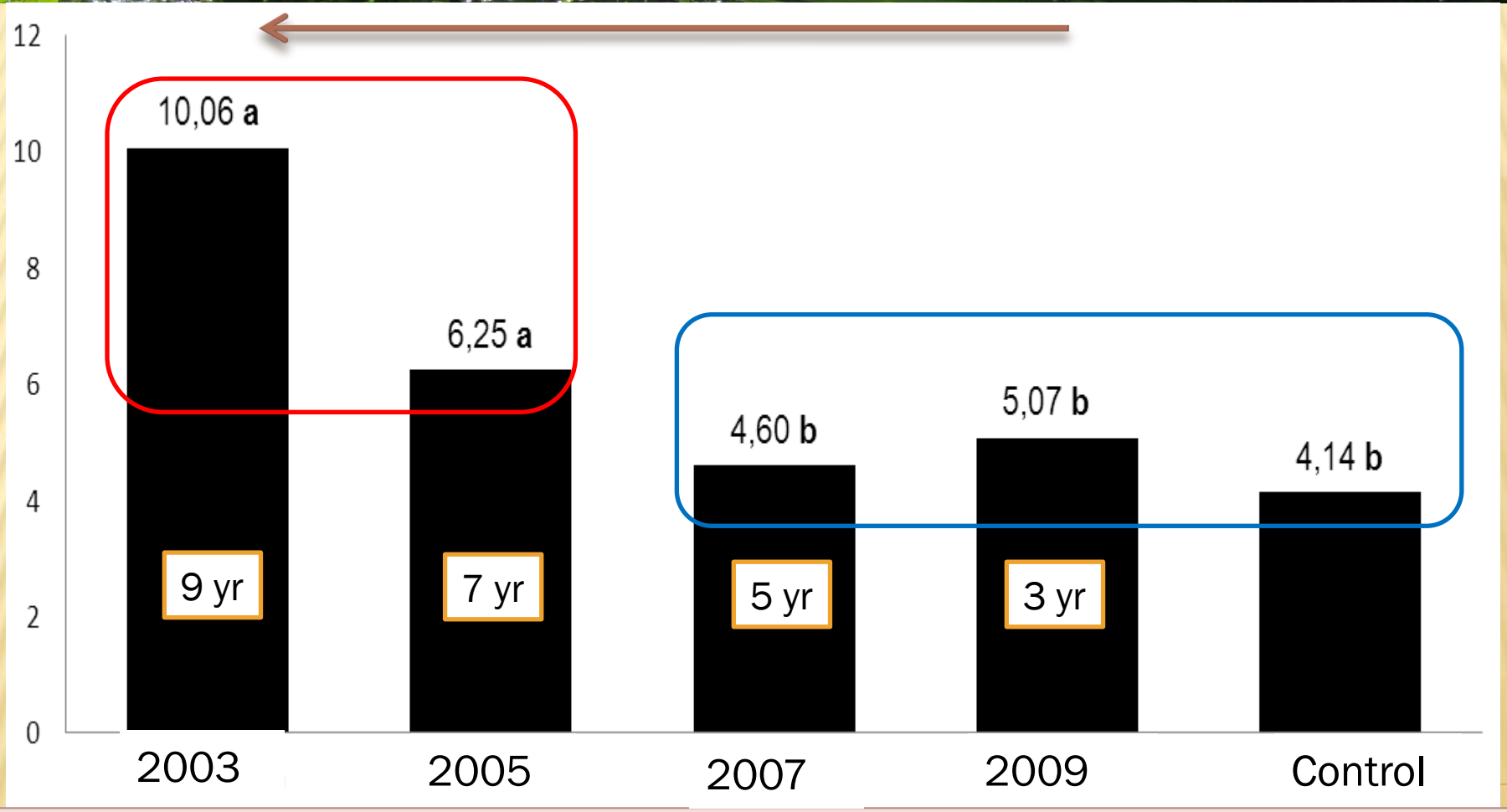
Results

ORGANIC CARBON – most important in soil



Results

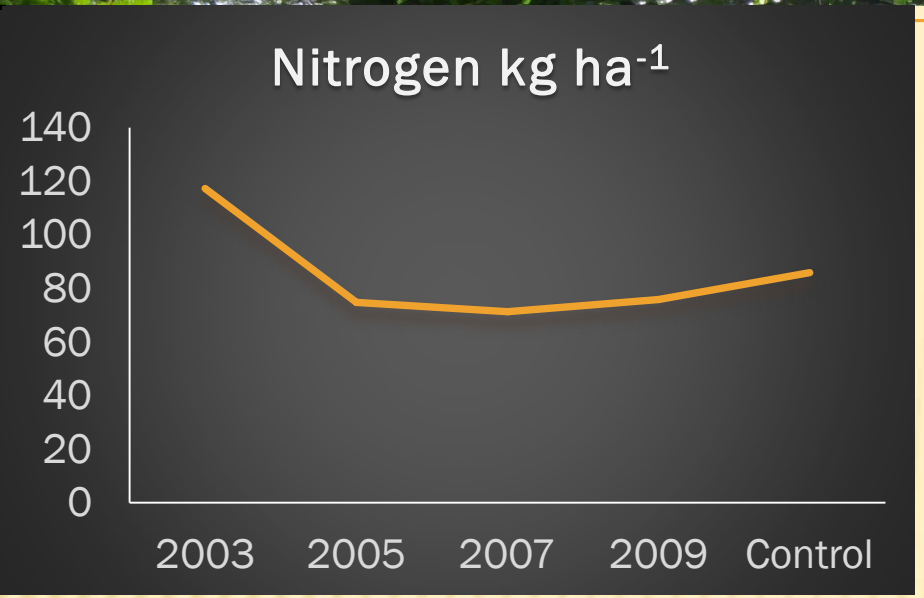
Standing Litter stock – Mg ha^{-1}

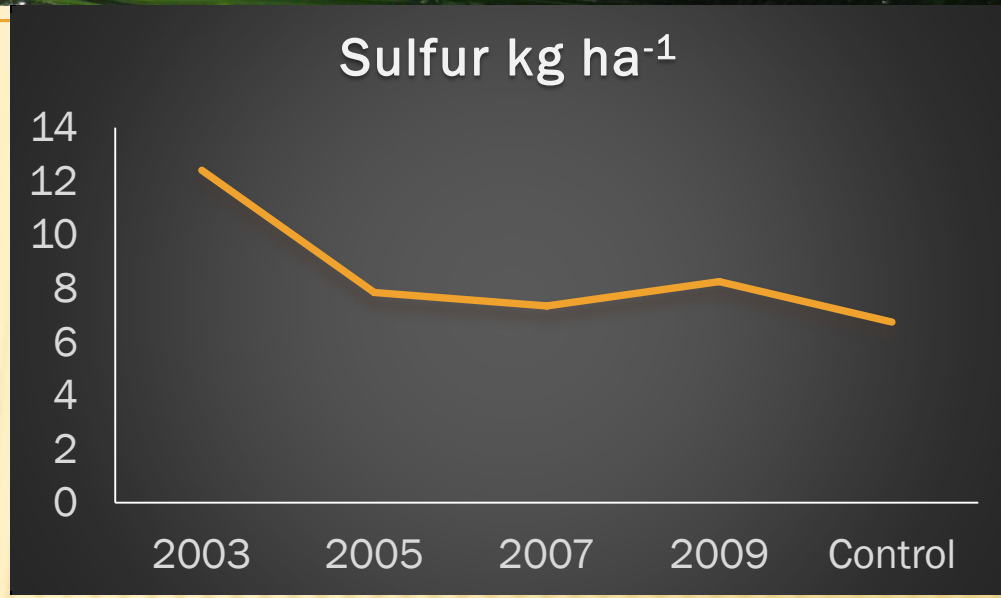


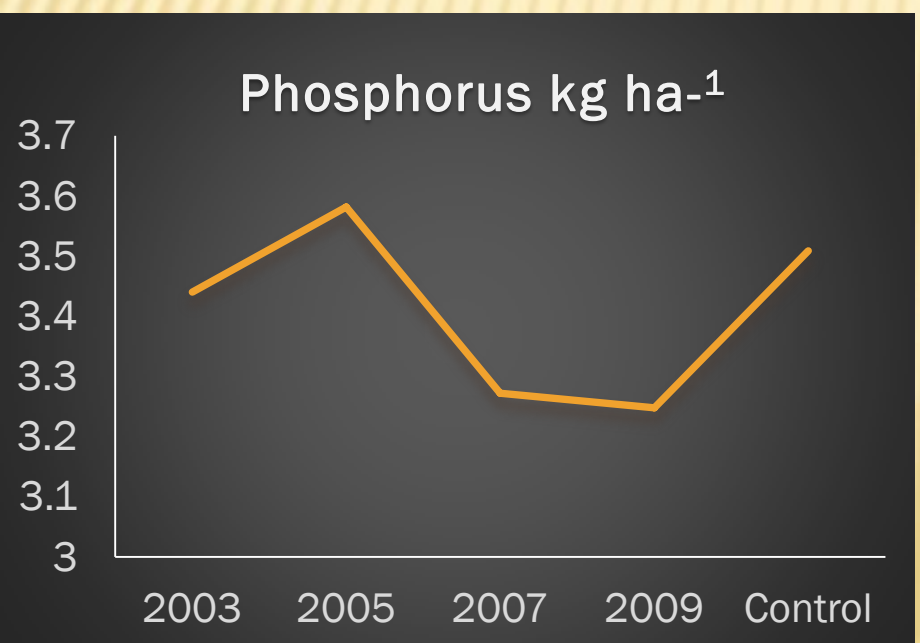
- Control: < Selva et al. (2007) – 11.8 Mg ha^{-1} primary upland forest
- > 9 yr – higher sand content in soil – higher accumulation
- Gaps in sites recently logged - higher rate litter decomposition

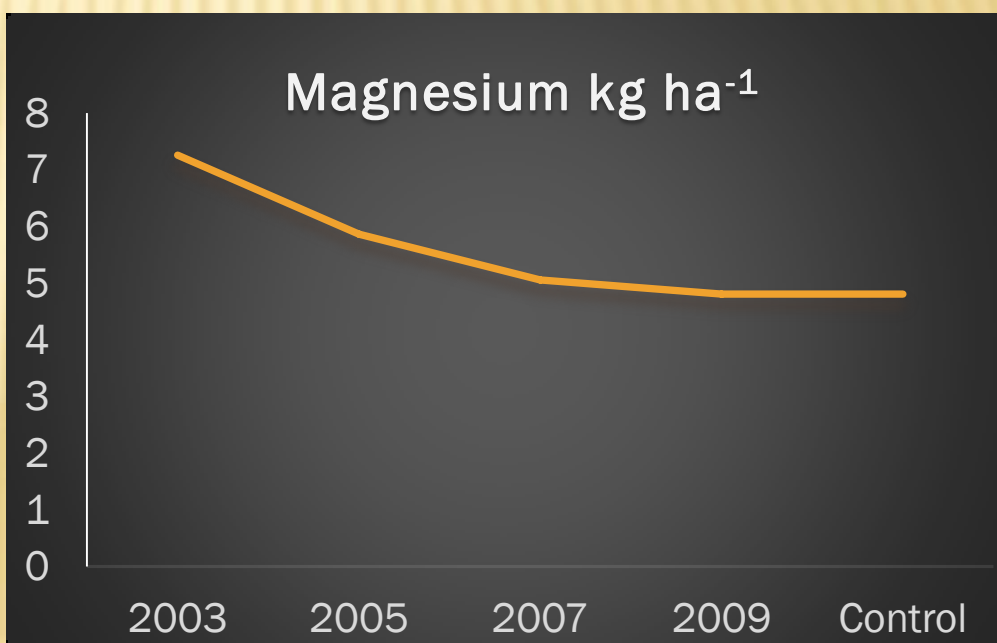
Results

S, N, P important in litter



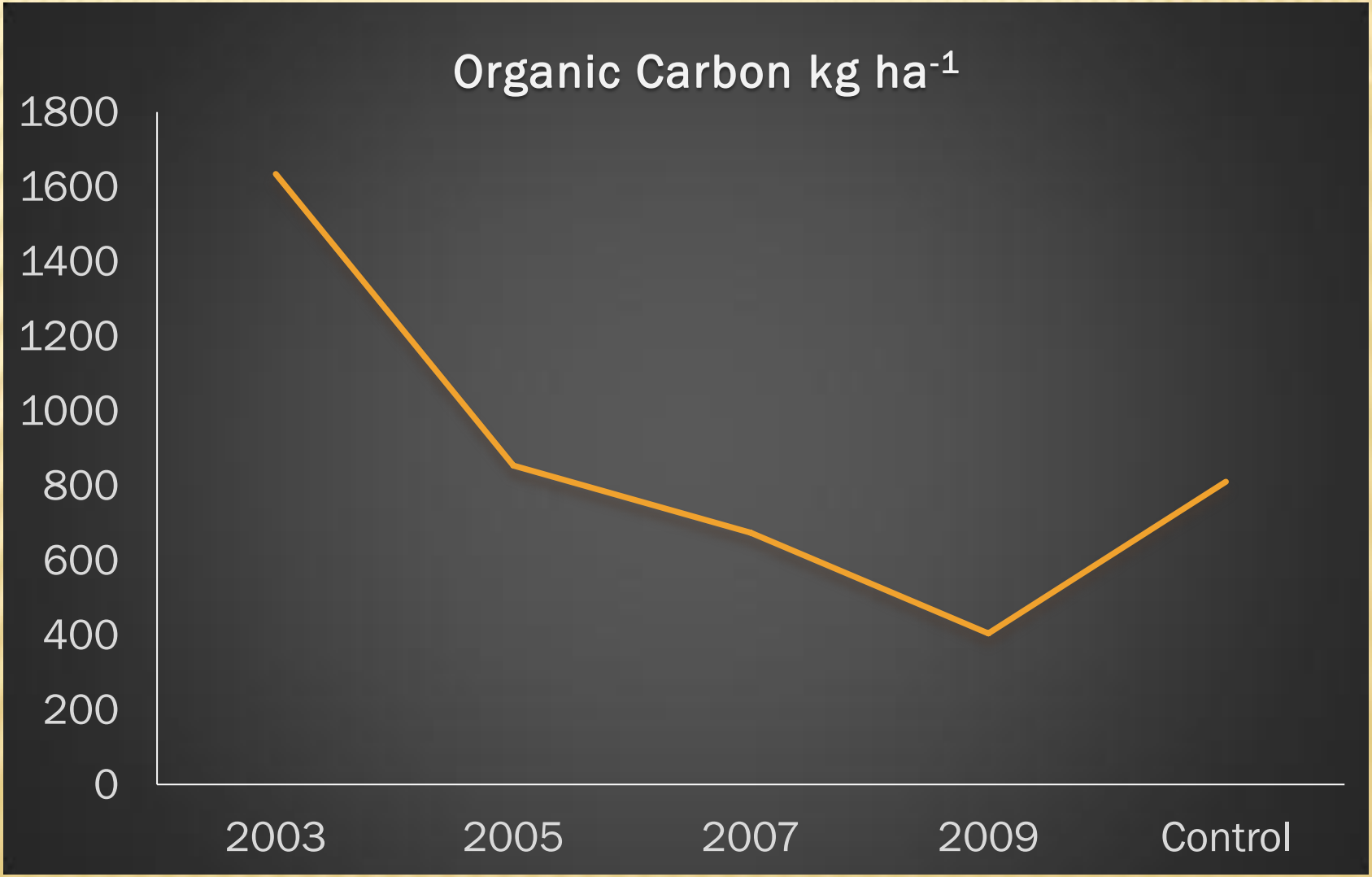






Results

Carbon Stock in litter layer

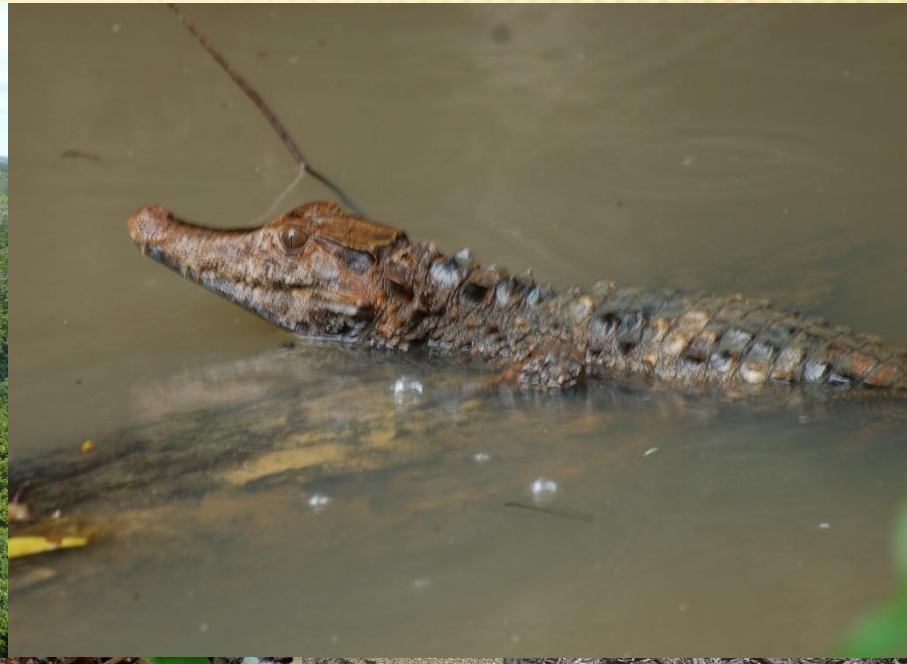


Conclusion

Logging intensity + ages of abandonment

LOW dissimilarity between logged sites and control area

Selective logging does not seem to impact soil quality and litter traits

BUT WHAT ABOUT SOIL MICROBIAL COMMUNITY?

THANK YOU!