



DYNAMICS AND STOCK OF FINE ROOT

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Manaus, April 2014



Fine root

- Diameter ≤ 2 cm¹
- Water and nutrients^{2,3,4}
- Carbon dynamics in forests.
 - 30-50% of Primary Production²
 - Fine root grows rapidly.
 - Fine root dies rapidly too.



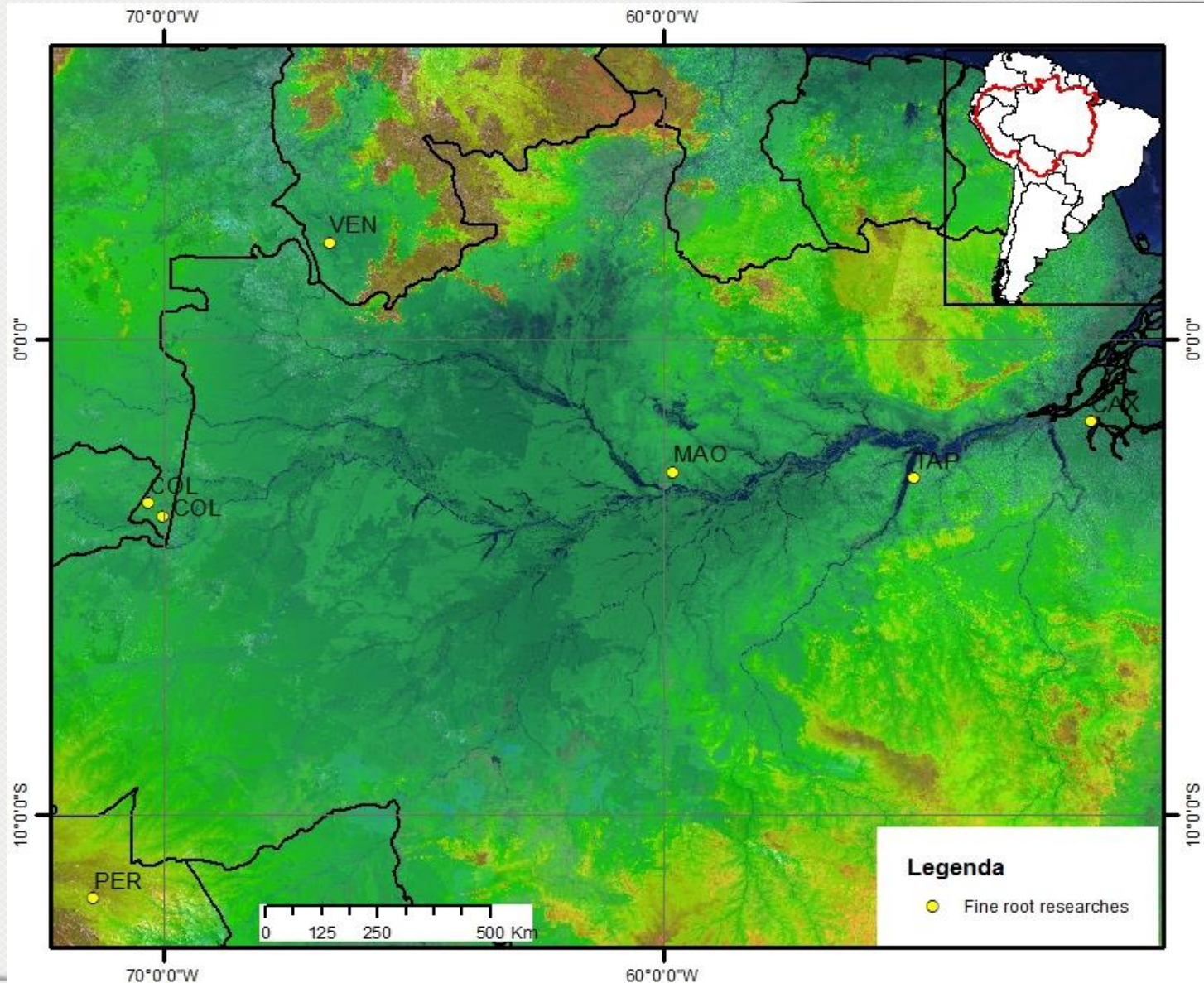
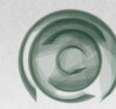
Fine root

- **Small contribution to the carbon stock of the forests.**
- **Technical difficulty on the fine root research.**

“Fine roots of less than 2mm diameter are often excluded because these often cannot be distinguished empirically from soil organic matter or litter”.

IPCC guidelines Vol. 4 (1996)

- Few reports are available on fine root biomass in Amazonian forest.



Topics of the research CADAF Project

- Dynamics of the fine root biomass
 - How much is the production of fine root?
 - How fast is their turn-over time?
- Variation of biomass stock of fine roots in Amazonian forests
 - How much is the stock of fine root ?

➤ **Methods**

Methods for fine root study

Dynamic



In-growth core

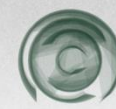


Flat-bed scanner

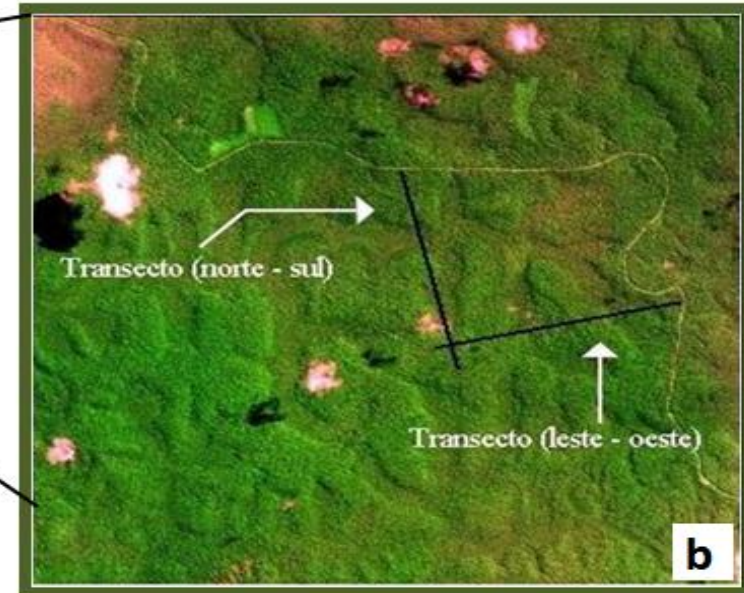
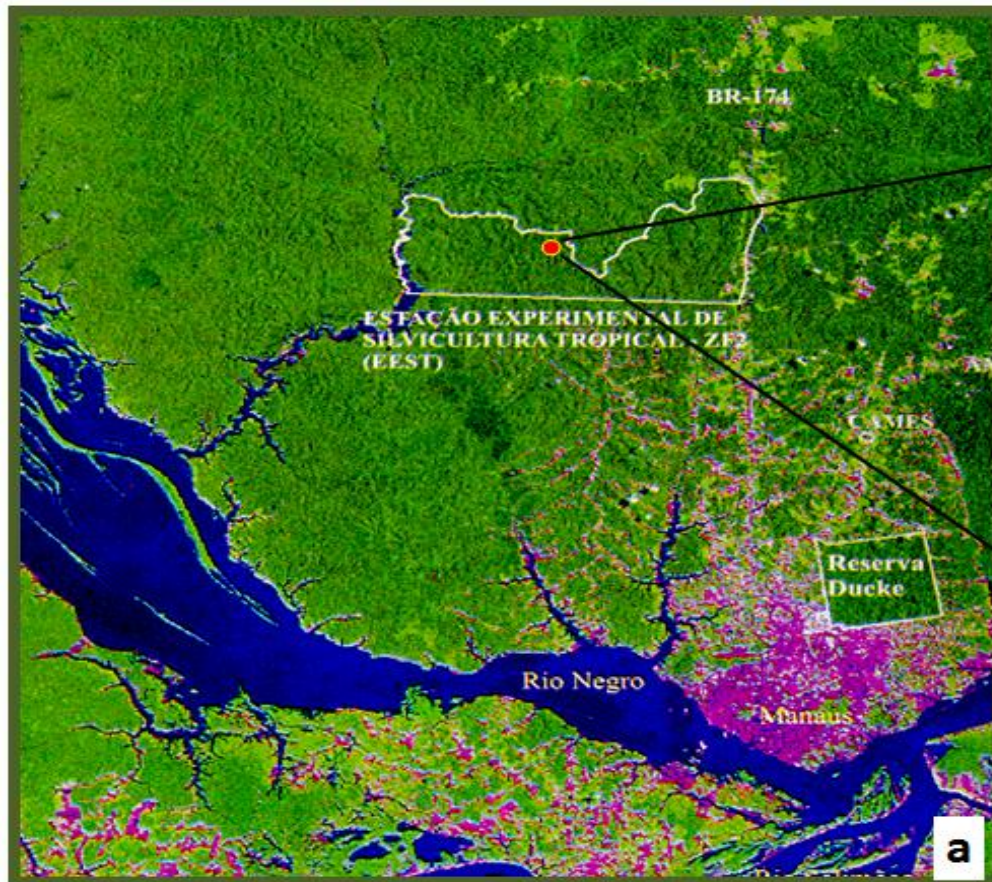
Stock



Soil auger



Dynamic of fine root



Permanents plots from INPA
Jacaranda project (Fase 1 e 2)

Transecto North-South (20 x 2500m)
"Quadradao" (500 x 600m)



1. In-growth core



Excavation



**Separation and
cleaning of soil**



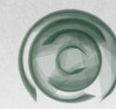
In-growth installed



After 1 year

Uncertainty about the method

- Changes the soil structure
- Trend in estimates



2. Scanner method

- ✓ Were installed 36 boxes.
- ✓ Acrylic boxes.
- ✓ Made manually.



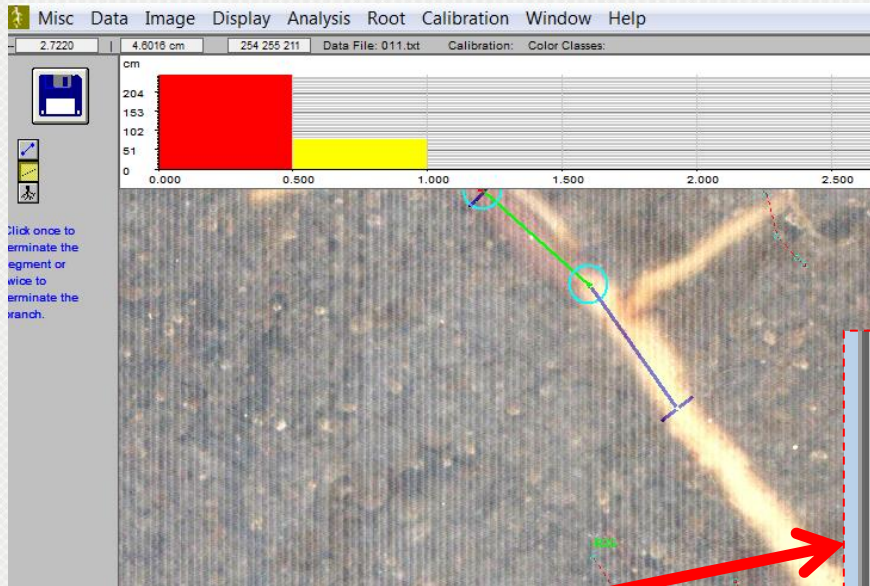
Data analysis - Check the sequence of images



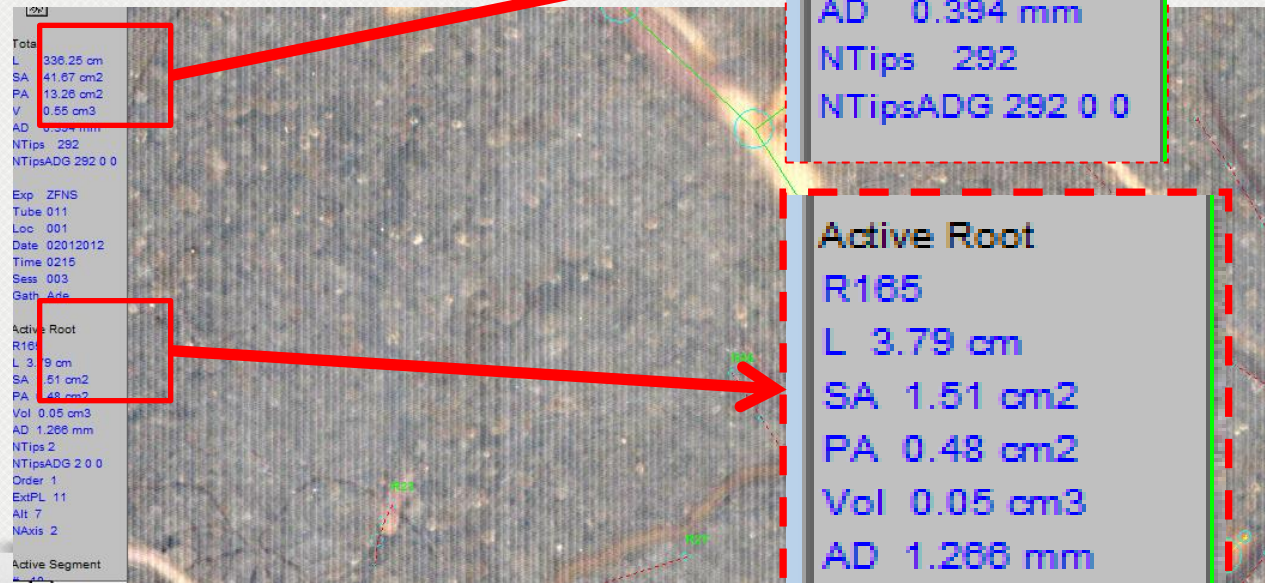
TREATMENT OF IMAGES:

- Brightness and contrast;
- cut

Vectorization of images



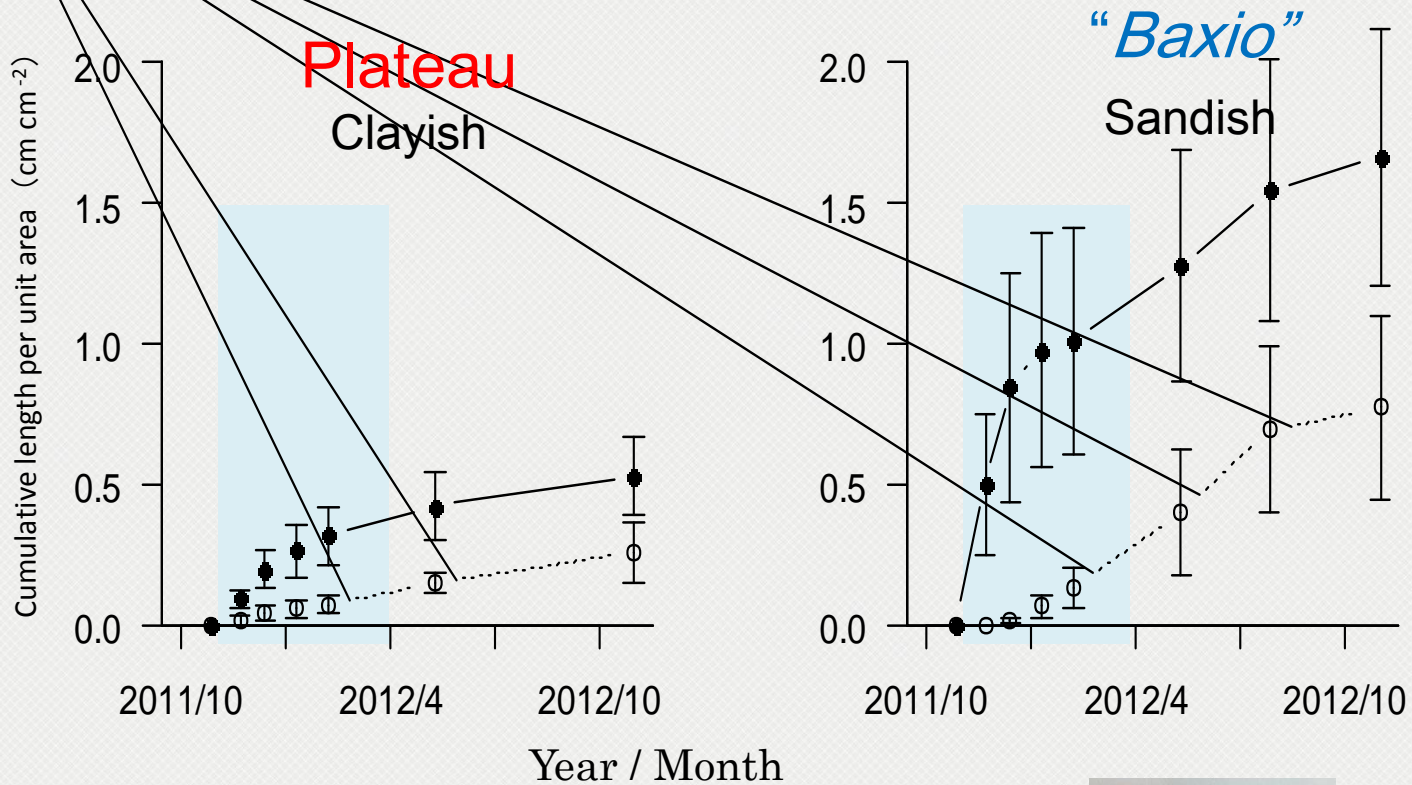
Total	
L	336.25 cm
SA	41.67 cm ²
PA	13.26 cm ²
V	0.55 cm ³
AD	0.394 mm
NTips	292
NTipsADG	292 0 0



Active Root	
R165	
L	3.79 cm
SA	1.51 cm ²
PA	0.48 cm ²
Vol	0.05 cm ³
AD	1.266 mm

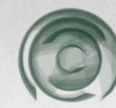
**Program
Win Rhizo-tron**

Fine root growth and mortality in two topographic positions



Solid lines: Growth of fine roots
Dotted lines: Mortality of fine roots





Fine root stock biomass in the forest inventory CADAFA project



Fine root stock in inventory

- Sampling
 - First plot in forest inventory
 - » 5 samples for plot
 - Soil auger and metal cilindrer.

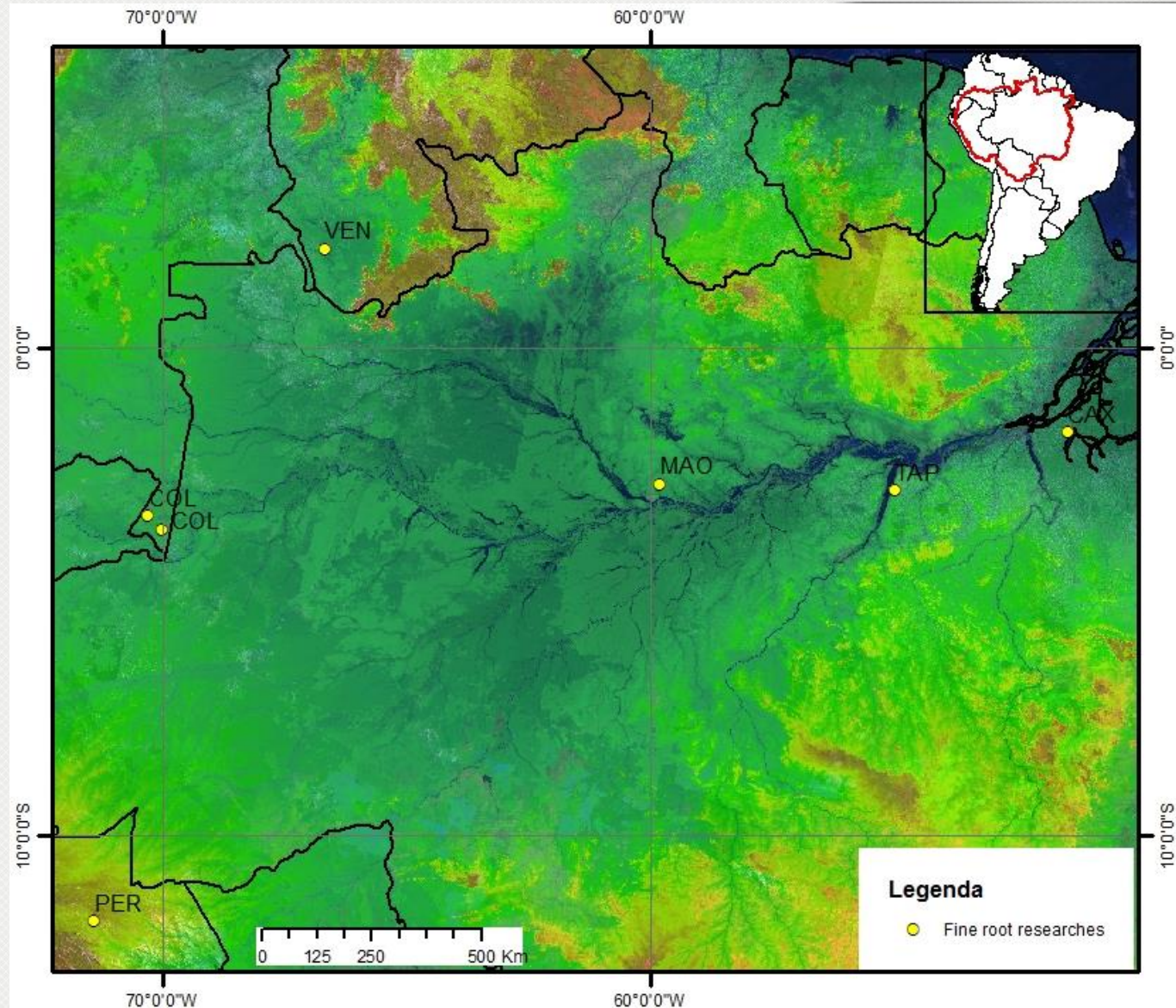
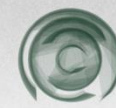
- Depth
 - » 0-5, 5-10, 10-20, 20-30, 30-40 cm

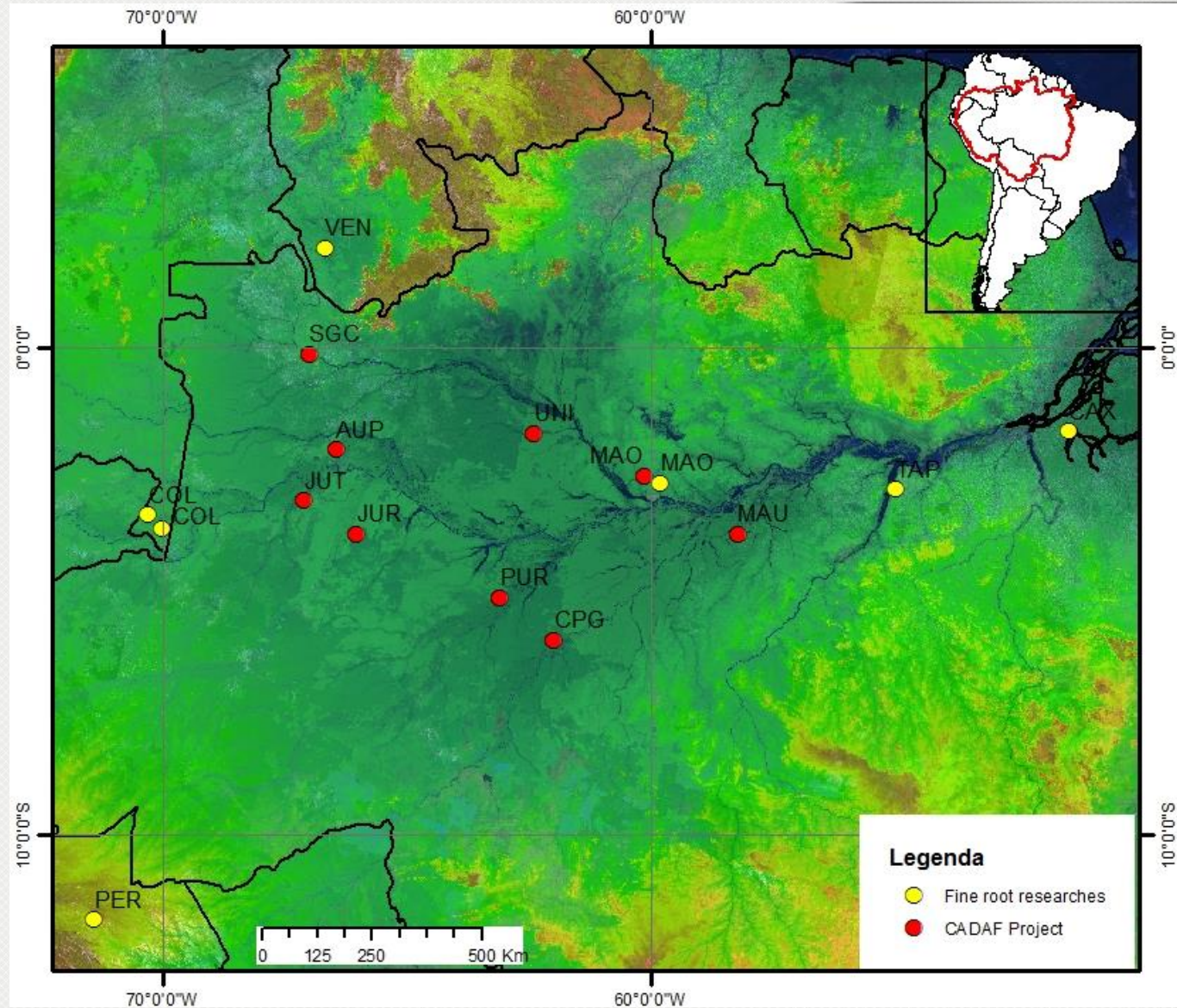
- Classification
 - » Dead and live root ($d \leq 2$ mm)



Local coleta







Stock of fine roots in the inventoried sites in CADAF project

Data Source	Year	Nº Samples	Stock (Mg . ha-1)
Manaus	2010-2013	54	5.7 ± 0.25
São Gabriel da Cachoeira	2010	66	7.02 ± 0.32
Jutaí	2011	50	5.21 ± 0.32
Rio Unini	2012	70	4.98 ± 0.21
Rio Capana Grande	2012	70	6.18 ± 0.32
Auati Paraná	2012	40	3.53 ± 0.22
Maués	2013	50	5.59 ± 0.42
Juruá	2013	70	4.8 ± 0.3
Purus (Terra firme)	2013	30	4.52 ± 0.45
Purus (Várzea)	2013	45	3.12 ± 0.38
Total		545	5.6 ± 0.42

C.I. 95%

90% fine roots until 20 centimeters

Biomass total and fine root stock

Data Source	Fine roots (Mg . ha ⁻¹)	Biomass (Mg . ha ⁻¹)	R/B(%)
Manaus	5.7	380	1.5
São Gabriel da Cachoeira	7.02	316.2	2.2
Jutaí	5.21	353	1.5
Rio Unini	4.98	299.9	1.7
Rio Capana Grande	6.18	362.3	1.7
Auati Paraná	3.53	373.5	0.9
Maués	5.59	304.9	1.8
Juruá	4.8	291.8	1.6
Total	5.6 ± 0.6	325.3 ± 10.9	1.7 %

Conclusion

- **Dynamic**

- **Scanner**

- Low cost
 - Efficient



- **In-growth core**

- Uncertainty
 - continuity



- **Stock**

- **Soil auger**

- Good estimate with low uncertainty
 - Easy operation





OBRIGADO

