

Effects of landuse change on soil organic carbon: a pan-tropic study

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Outline

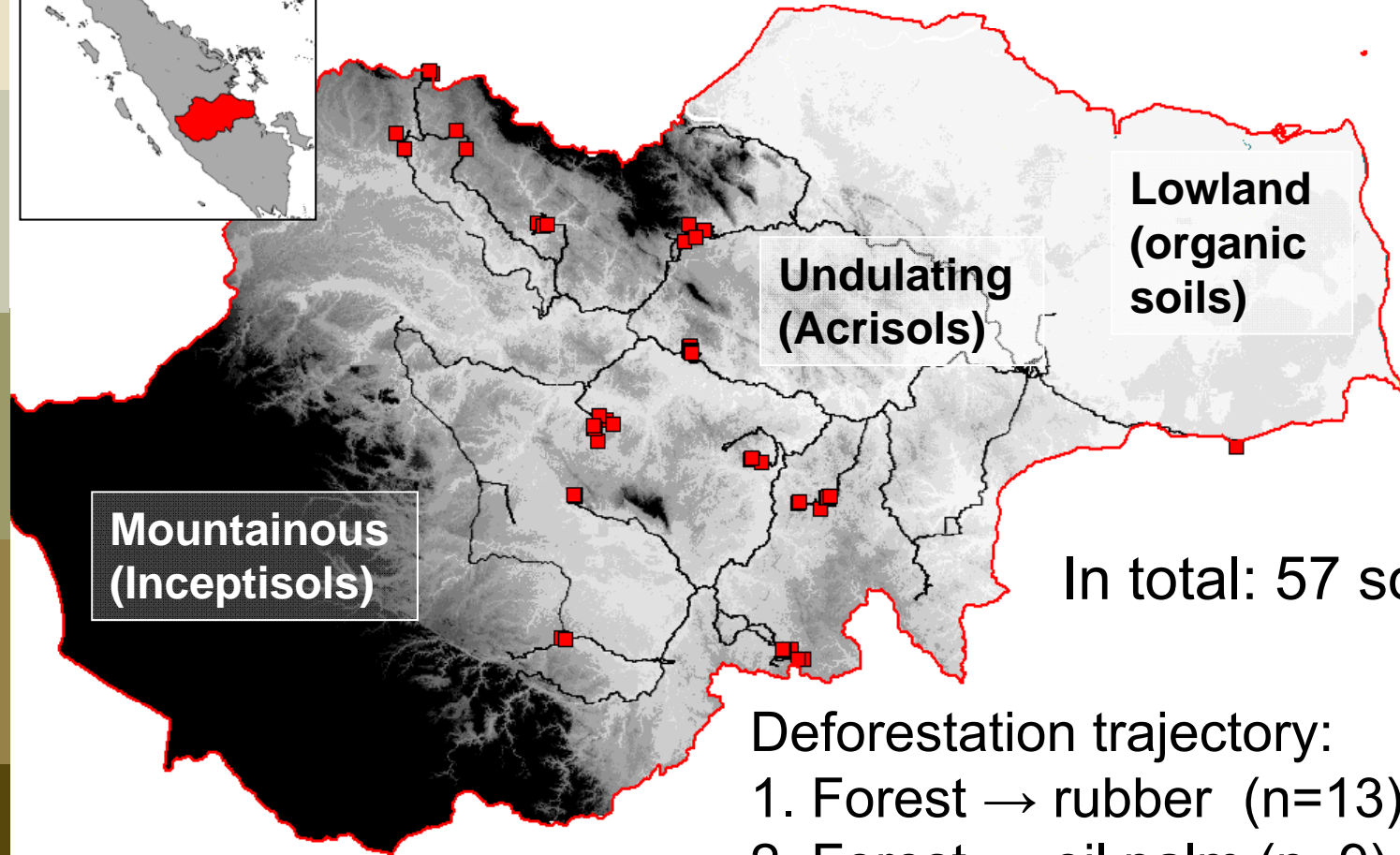
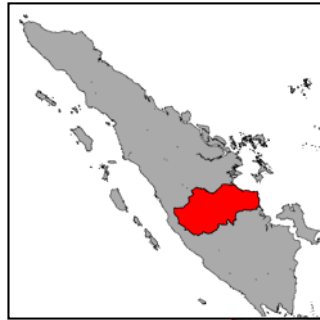
1. Quick summary of methods
2. Progress in the three case study sites
3. Preliminary results from Indonesia and Peru
4. Timeline

Sampling protocol:

- Clustered sampling design
- Bulk density
 - (10, 20, 40, 75, 100, 150 and 200cm)
- Soil pit samples:
 - C, N, CEC, pH, texture
- 12 composite samples:
 - C, N
- Root biomass in top 1 m



Jambi, Indonesia



Mountainous
(Inceptisols)

Undulating
(Acrisols)

Lowland
(organic
soils)

In total: 57 soil pits dug

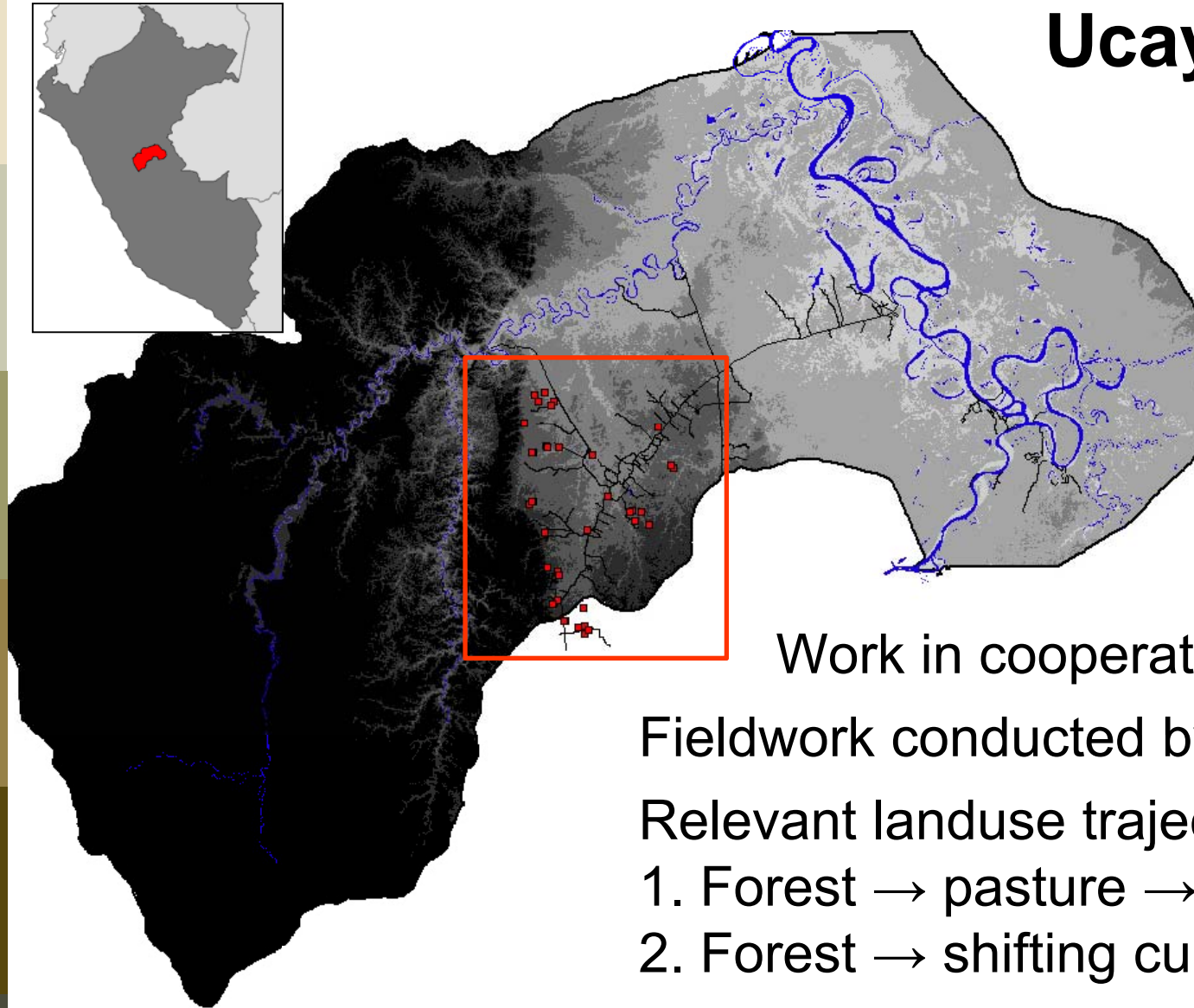
Deforestation trajectory:

1. Forest → rubber (n=13)
2. Forest → oil palm (n=9)

Landuse intensification trajectory:

3. Rubber agroforestry → oil palm (n=5)

Ucayali, Peru



Work in cooperation INIA

Fieldwork conducted by Katrin Wolf

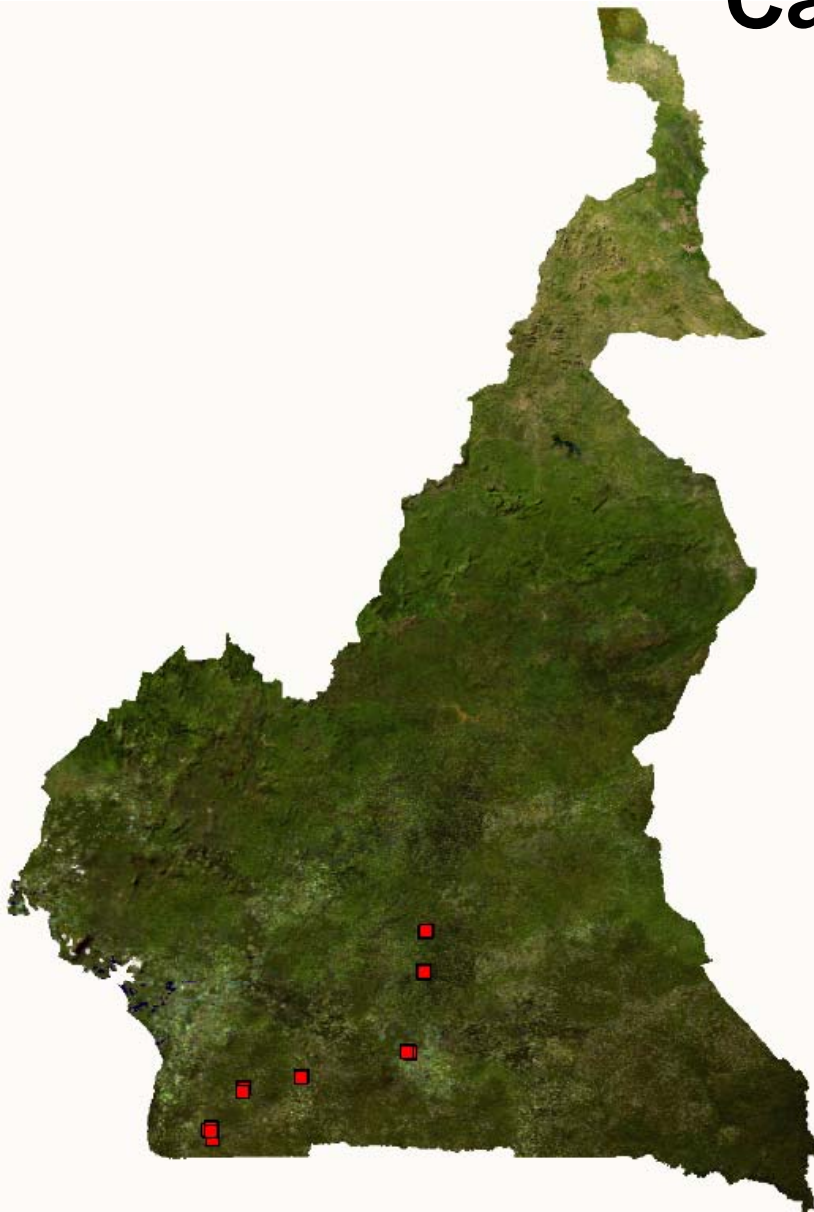
Relevant landuse trajectories:

1. Forest → pasture → oil palm (n=6)
2. Forest → shifting cultivation (n=6)

In total: 48 soil pits dug

0 25 50 Kilometers

Cameroon



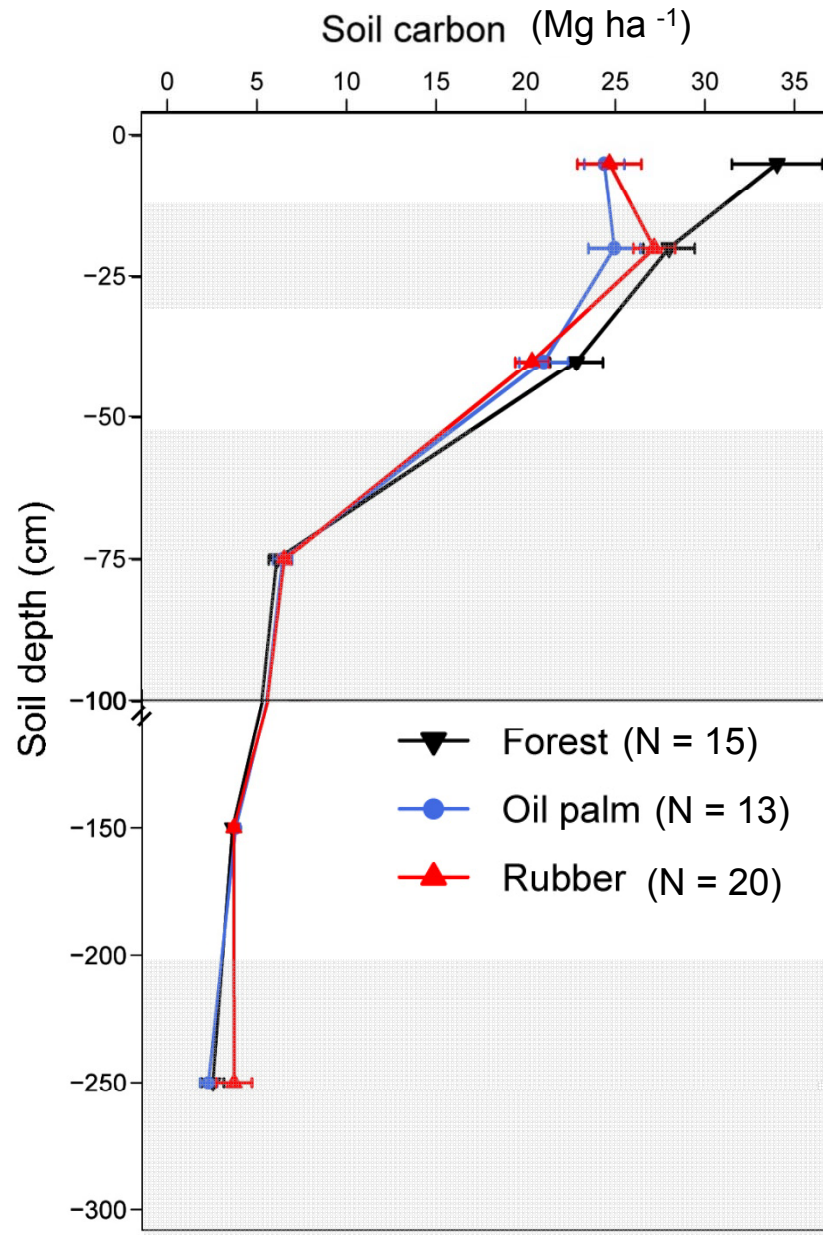
Work with Martin from IRAD

We will sample at the same 6 villages used for WP2

Relevant landuse trajectories:

1. Forest → cocoa
2. Forest → shifting cultivation
3. Forest → oil palm plantation
4. Forest → rubber plantation

Preliminary results: Jambi



Total soil carbon stock to 3m:

Forest: 166.4 ± 8.5 Mg ha⁻¹

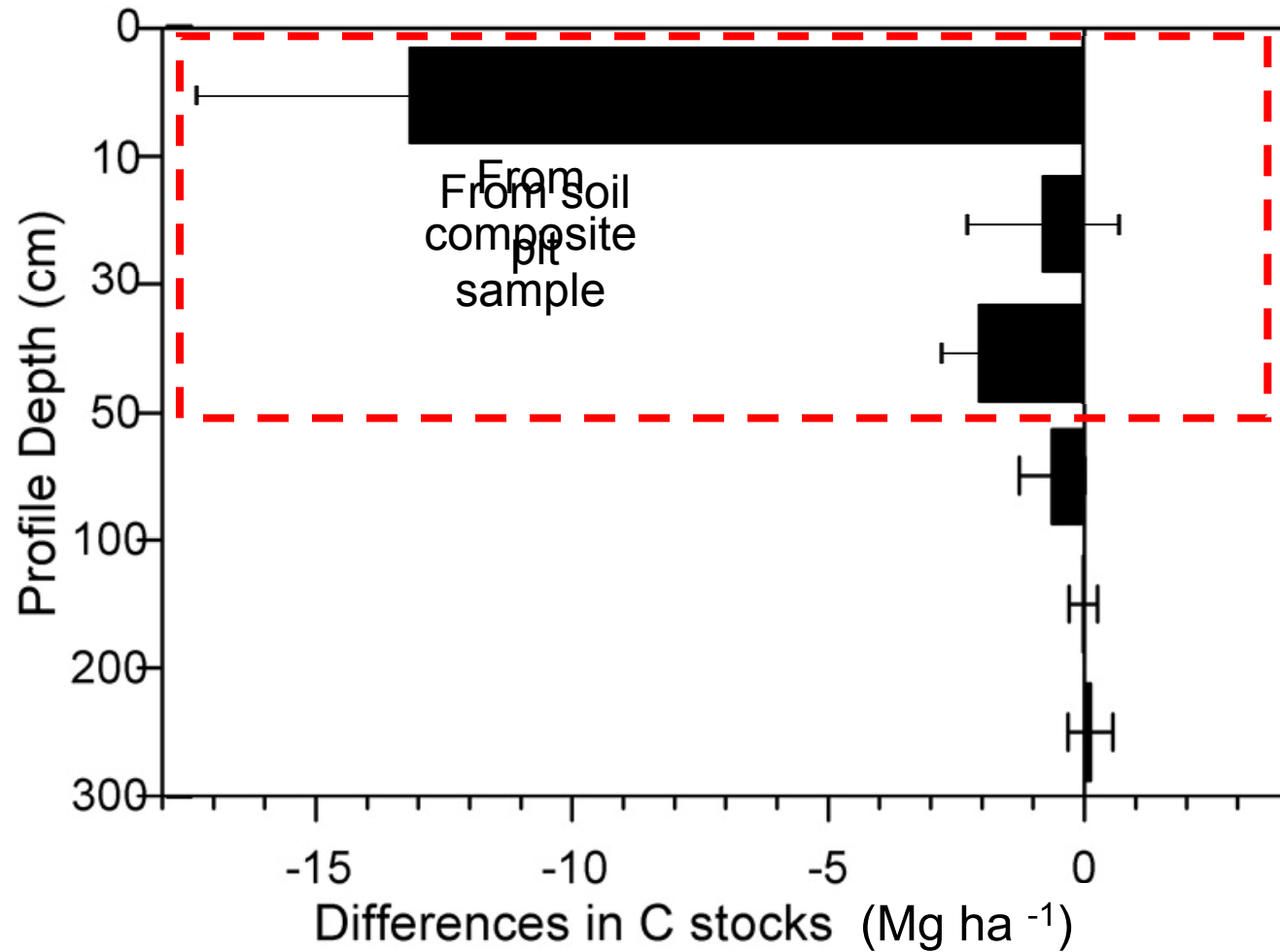
Oil palm: 172.1 ± 11.6 Mg ha⁻¹

Rubber: 159.1 ± 8.1 Mg ha⁻¹

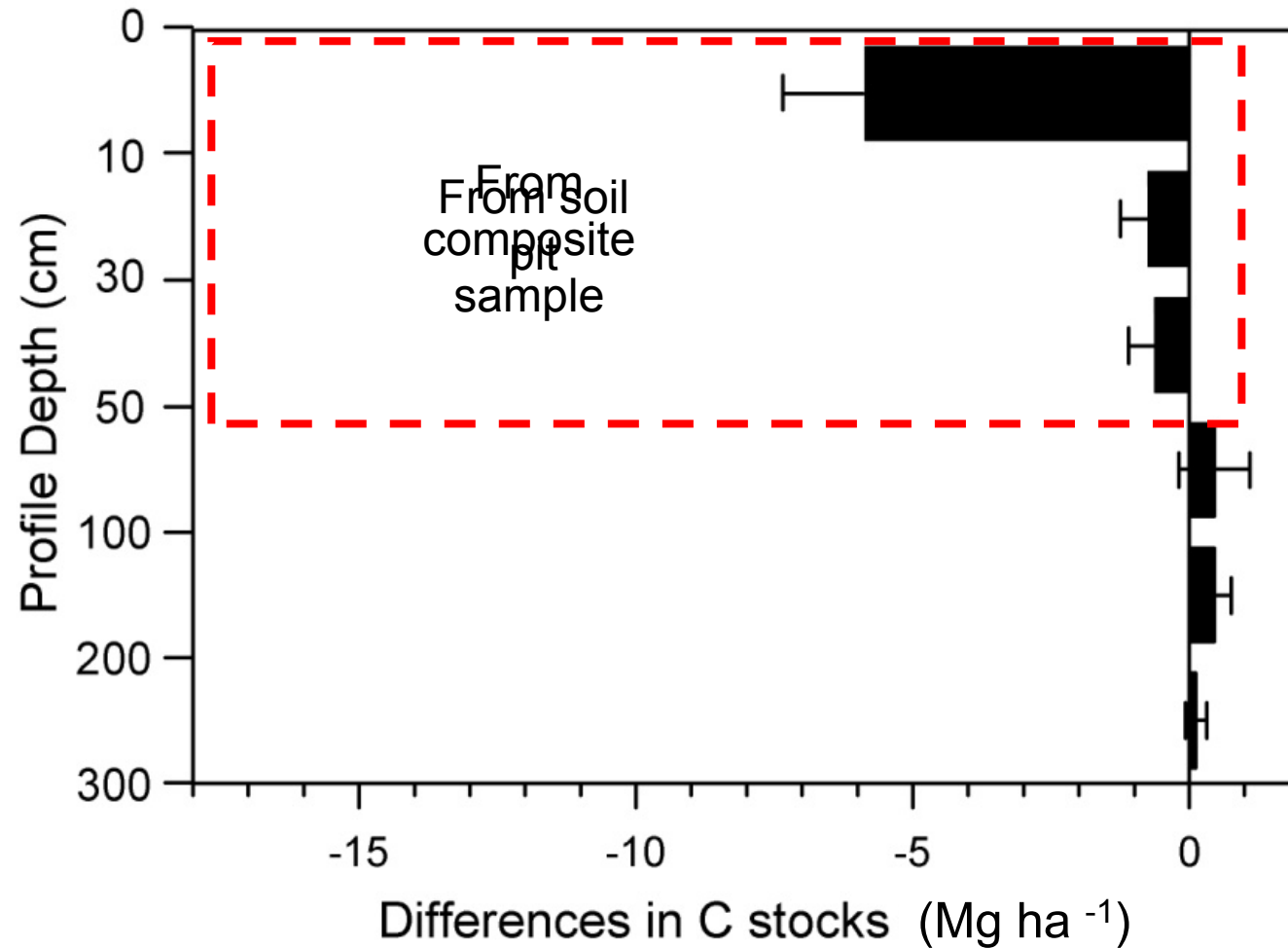
BUT differences evident at the soil surface

39 ± 1% of soil carbon is below 1m

Change in soil carbon: Forest to oil palm (based on 13 pairs)

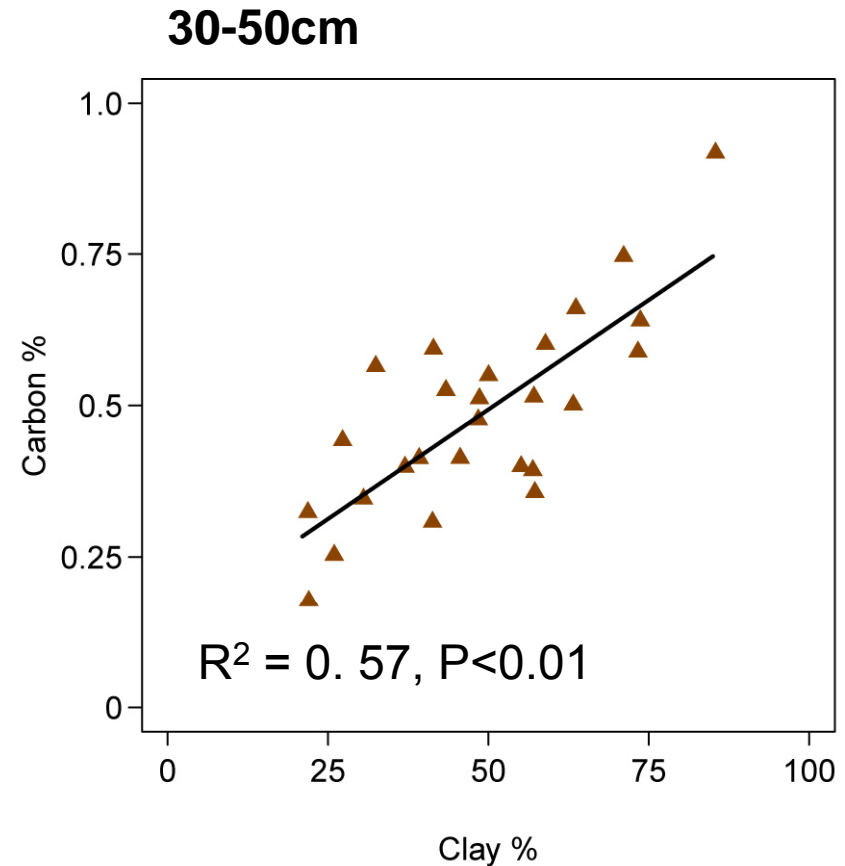


Change in soil carbon: Forest to rubber (based on 19 pairs)



Relating carbon concentrations to soil characteristics

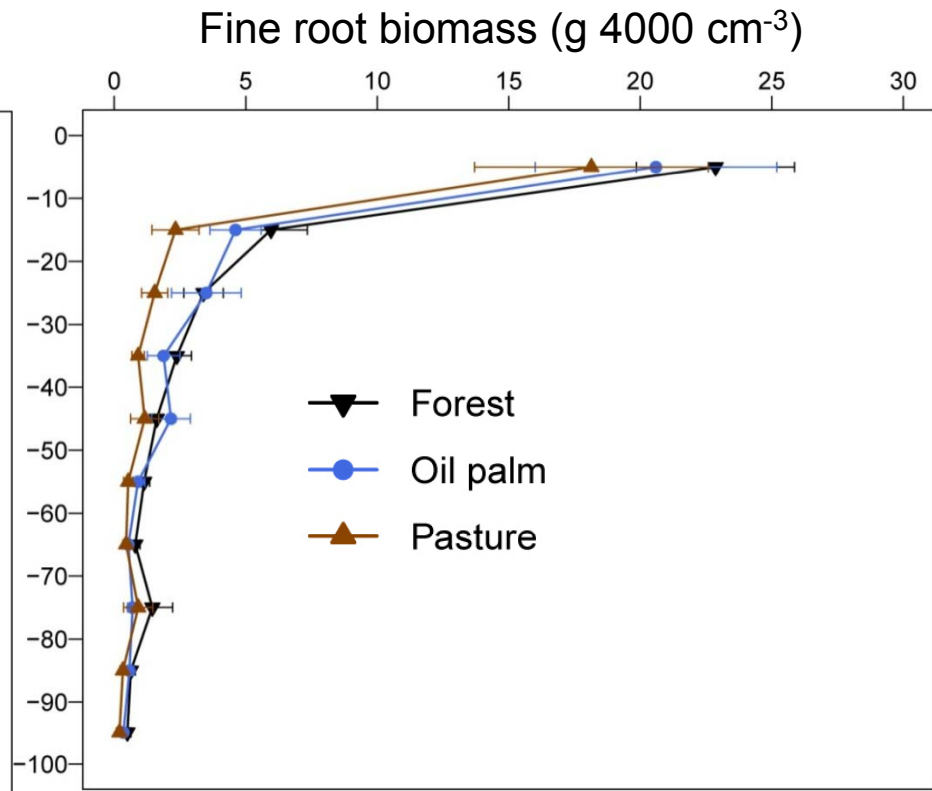
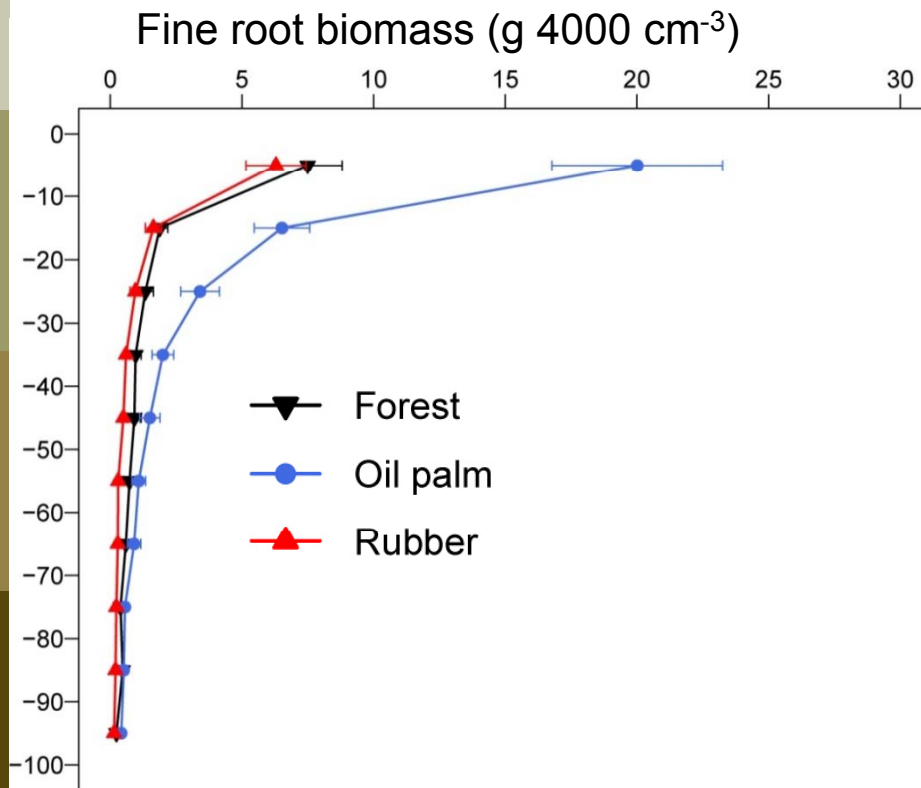
- No data available yet on CEC, pH (data anticipated soon)
- Soil texture:
 - Strong positive correlations with clay% at all depth below 10cm



Fine root biomass profiles

Jambi, Indonesia

Ucayali, Peru



Current status & anticipated time requirements

Timeline presented by Edzo in 2010 in Peru ...

	2010	2011				2012				2013	
	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	2nd Qtr	3rd Qtr	4th Qtr	1st Qtr	1st Qtr
Indonesia	Fieldwork	Lab analysis		Data analysis & write up							
Cameroon Peru		Fieldwork		Lab analysis		Data analysis & write up					
Peru Cameroon					Fieldwork		Lab analysis		Data analysis & write up		

Today

Highlights:

- we are basically on schedule according to initial time plan
- But without an extension we will have difficulties to complete anticipated deliverables



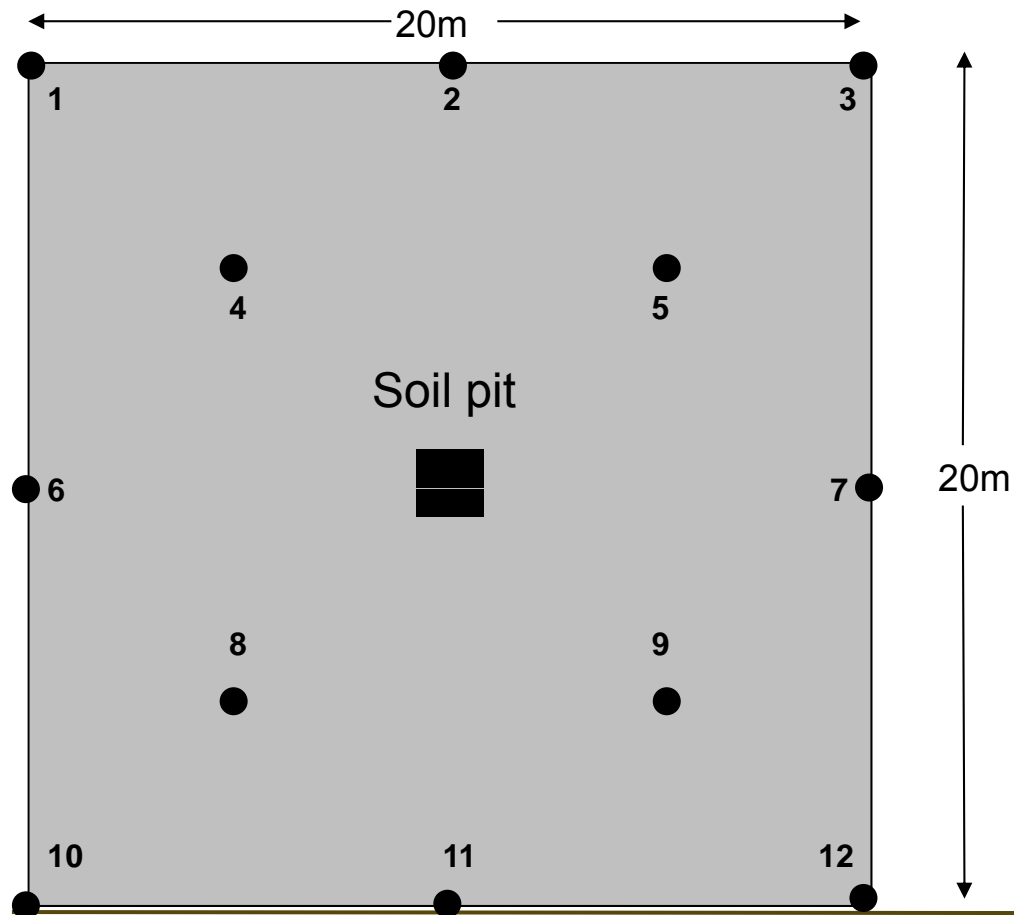
Thanks you for your attention!

Financial support
kindly acknowledged
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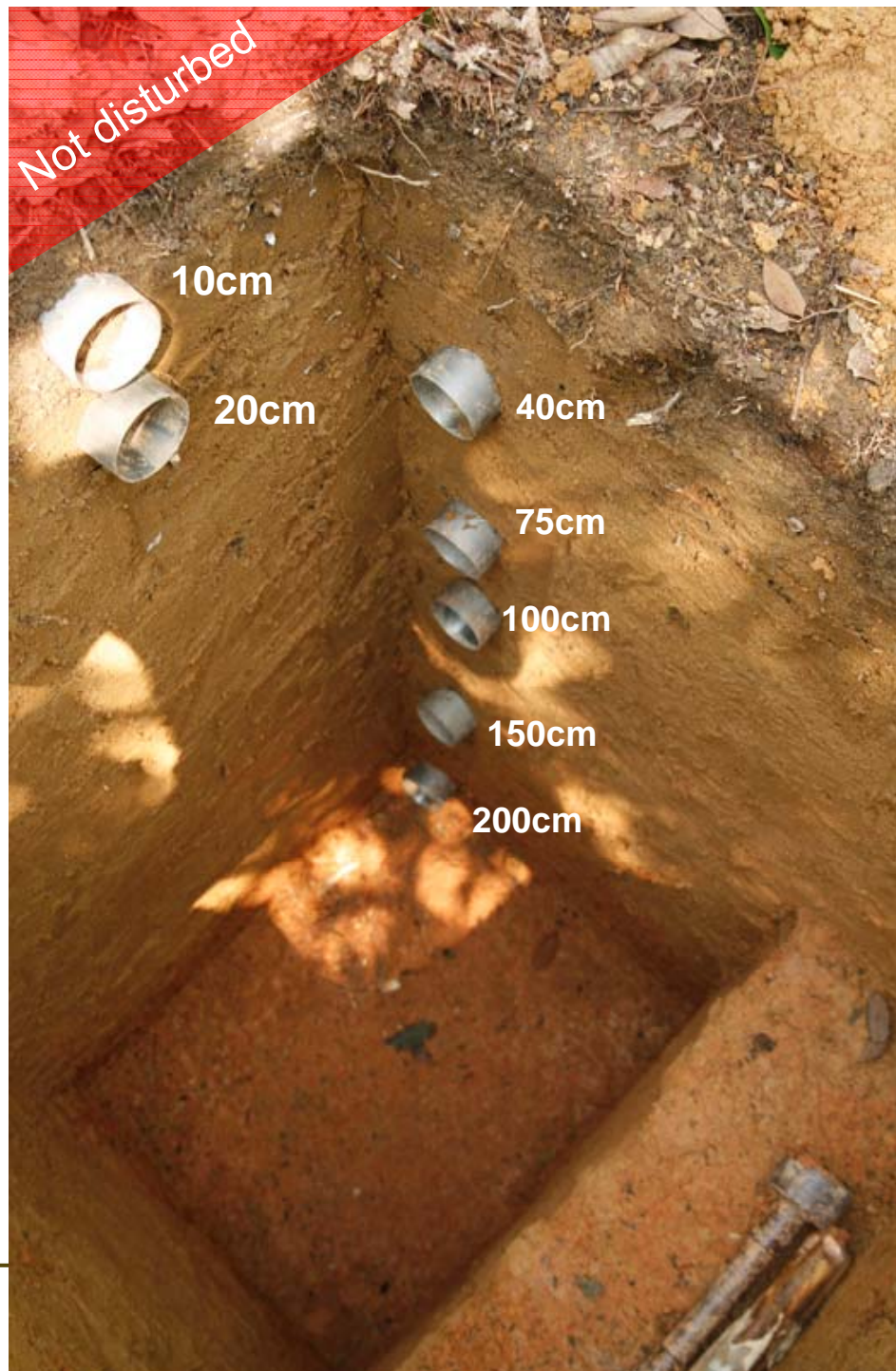


Composite sample

- 12 x composite soil samples (0-10, 10-30, 30-50cm)



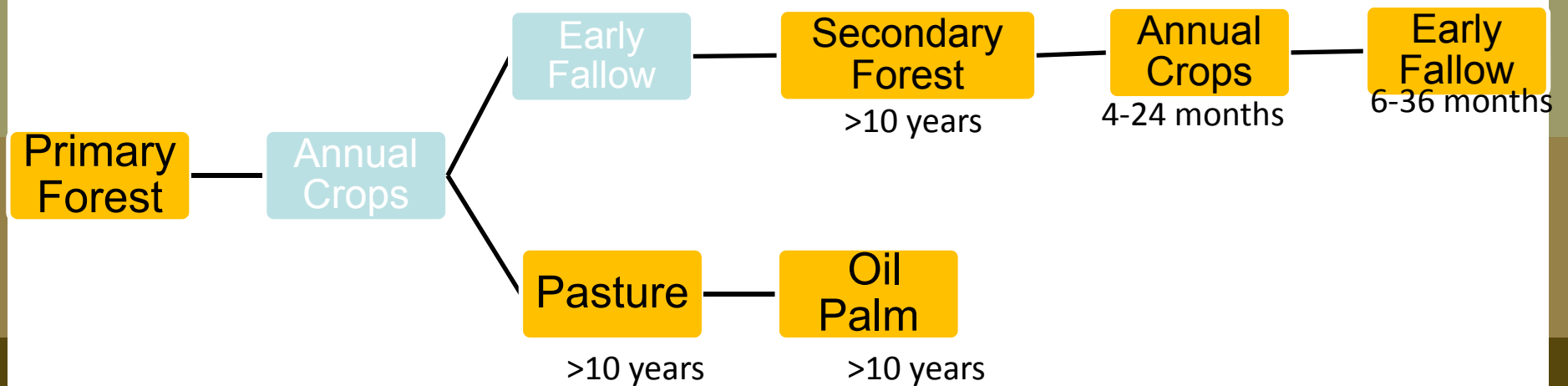
Bulk density



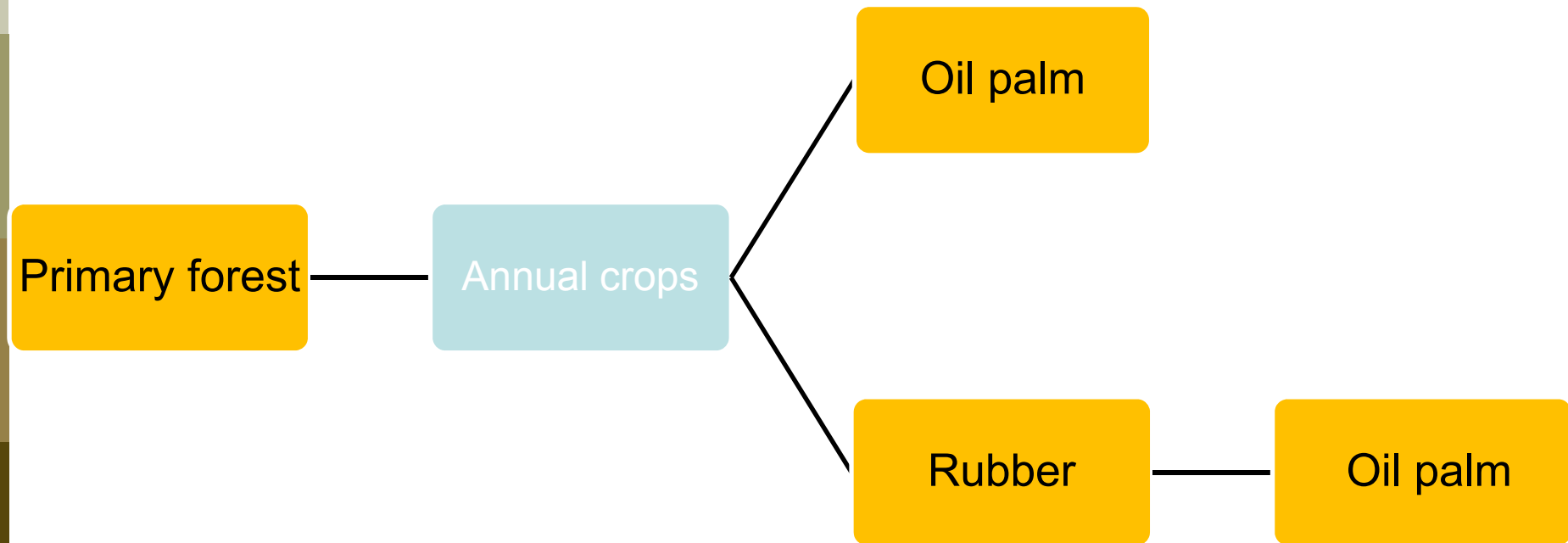
Fine and coarse root biomass estimation



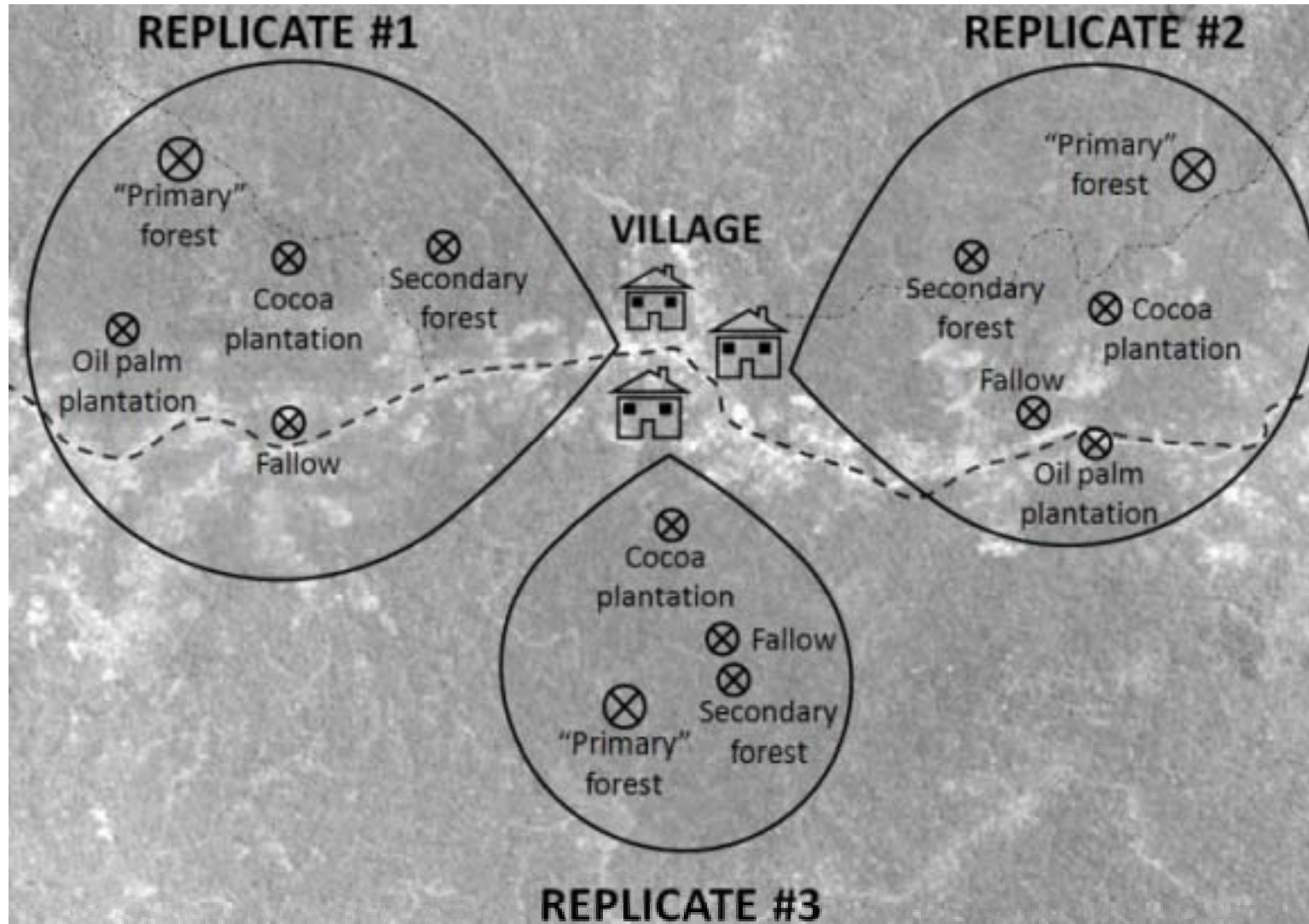
Dominant landuse trajectories in Ucayali, Peru



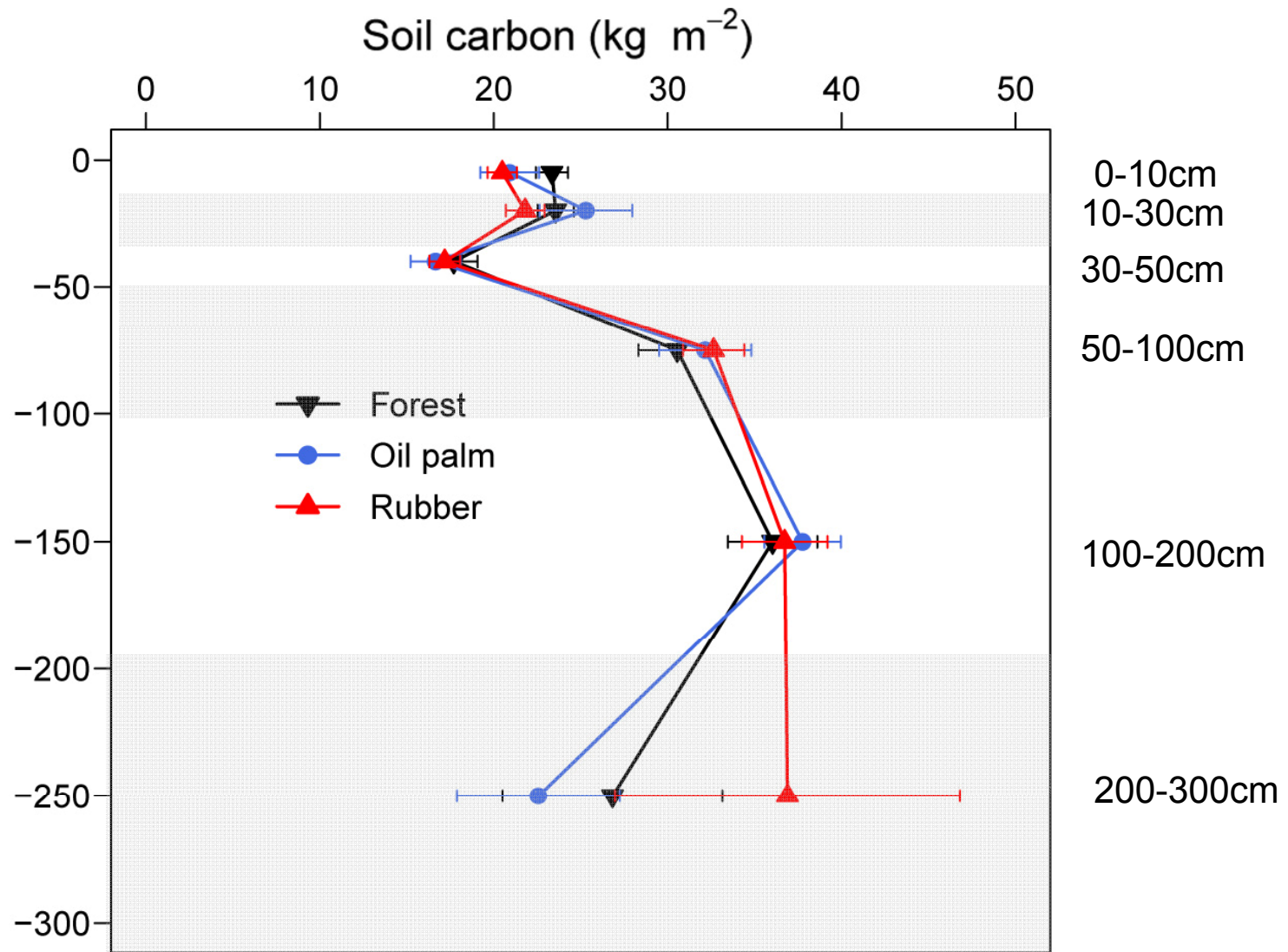
Dominant landuse trajectories in study area in Jambi, Indonesia



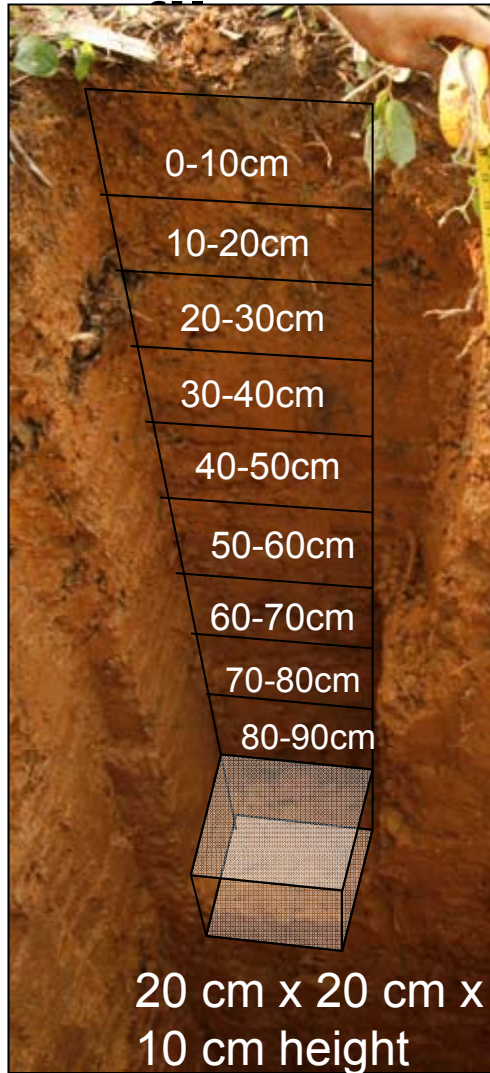
Cameroon – site clusters around villages



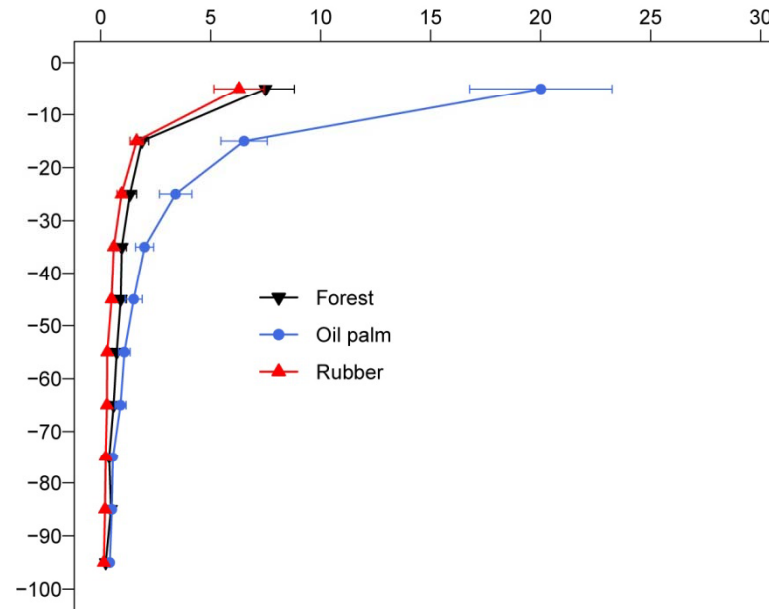
Jambi – Total soil carbon stock



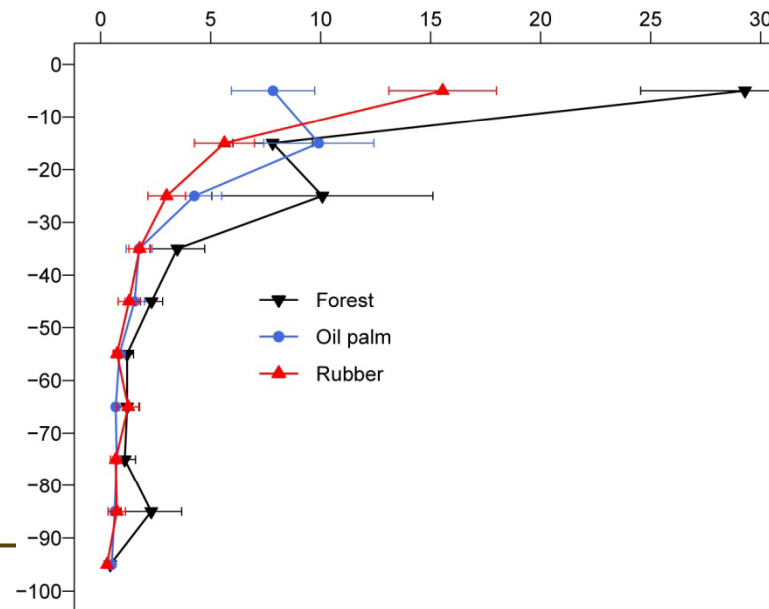
Jambi root biomass



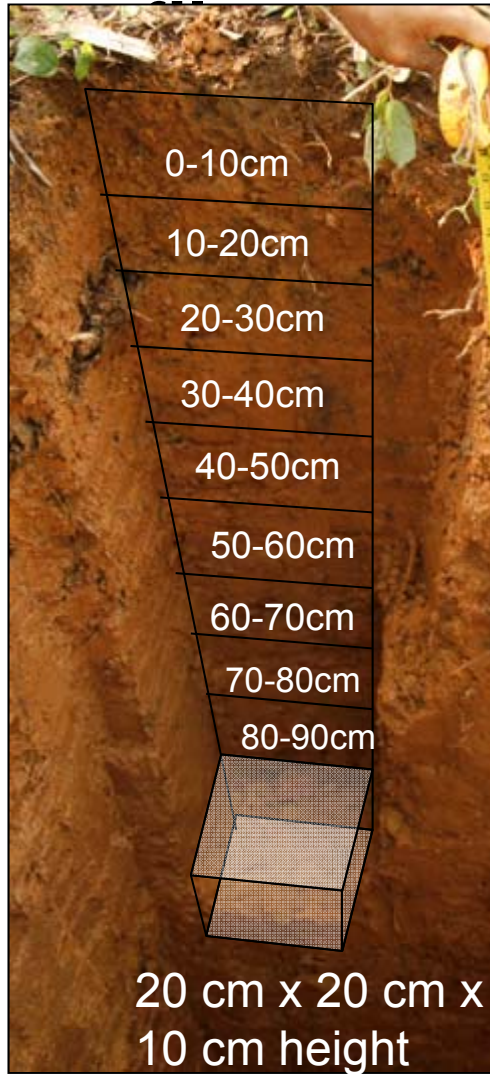
Fine root biomass (g 4000 cm⁻³)



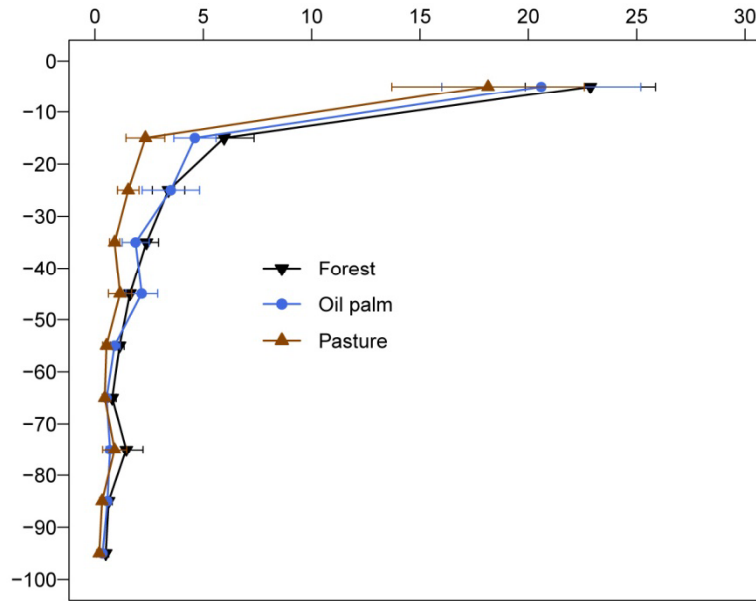
Coarse root biomass (g 4000 cm⁻³)



Peru root biomass



Fine root biomass (g 4000 cm⁻³)



Coarse root biomass (g 4000 cm⁻³)

