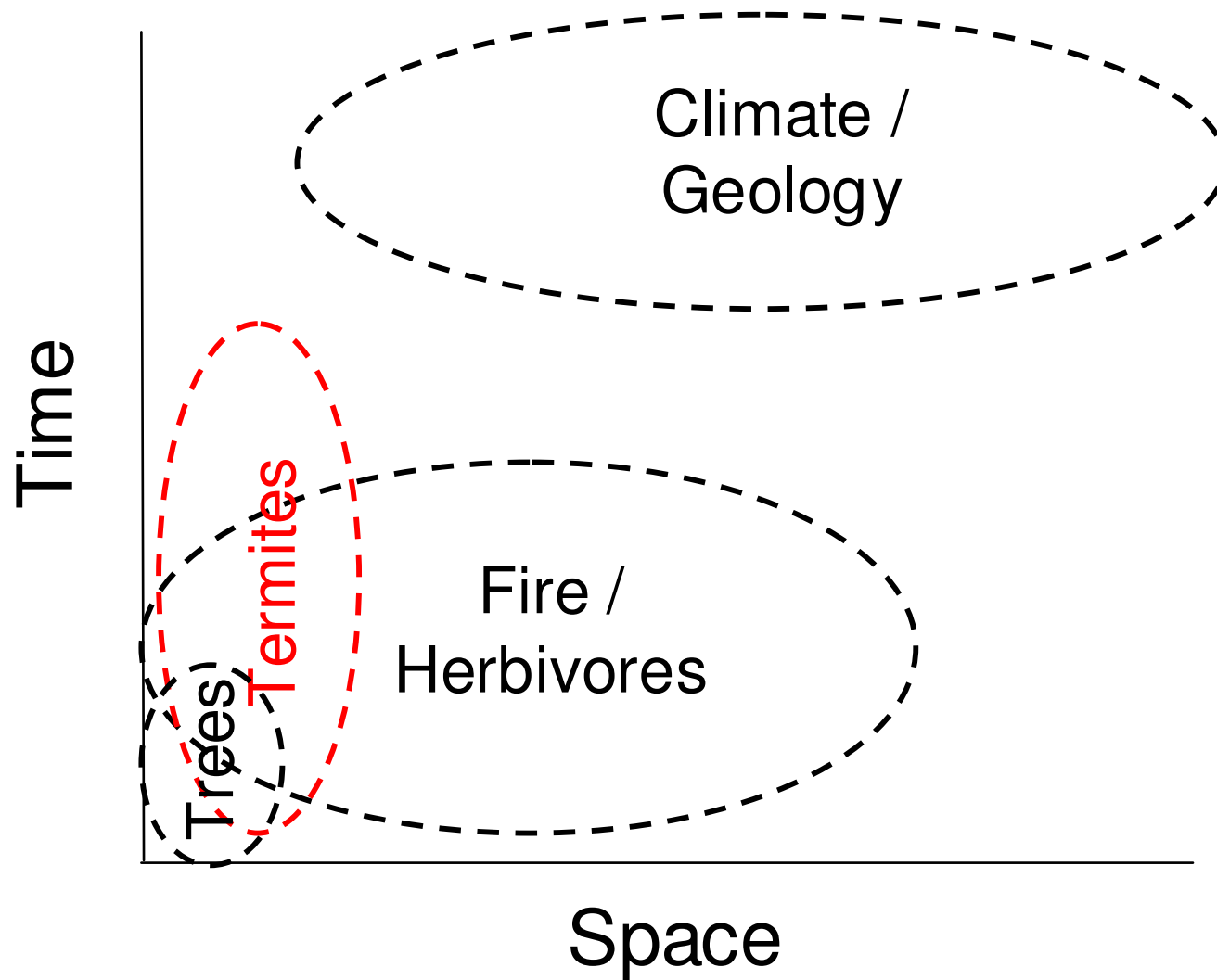


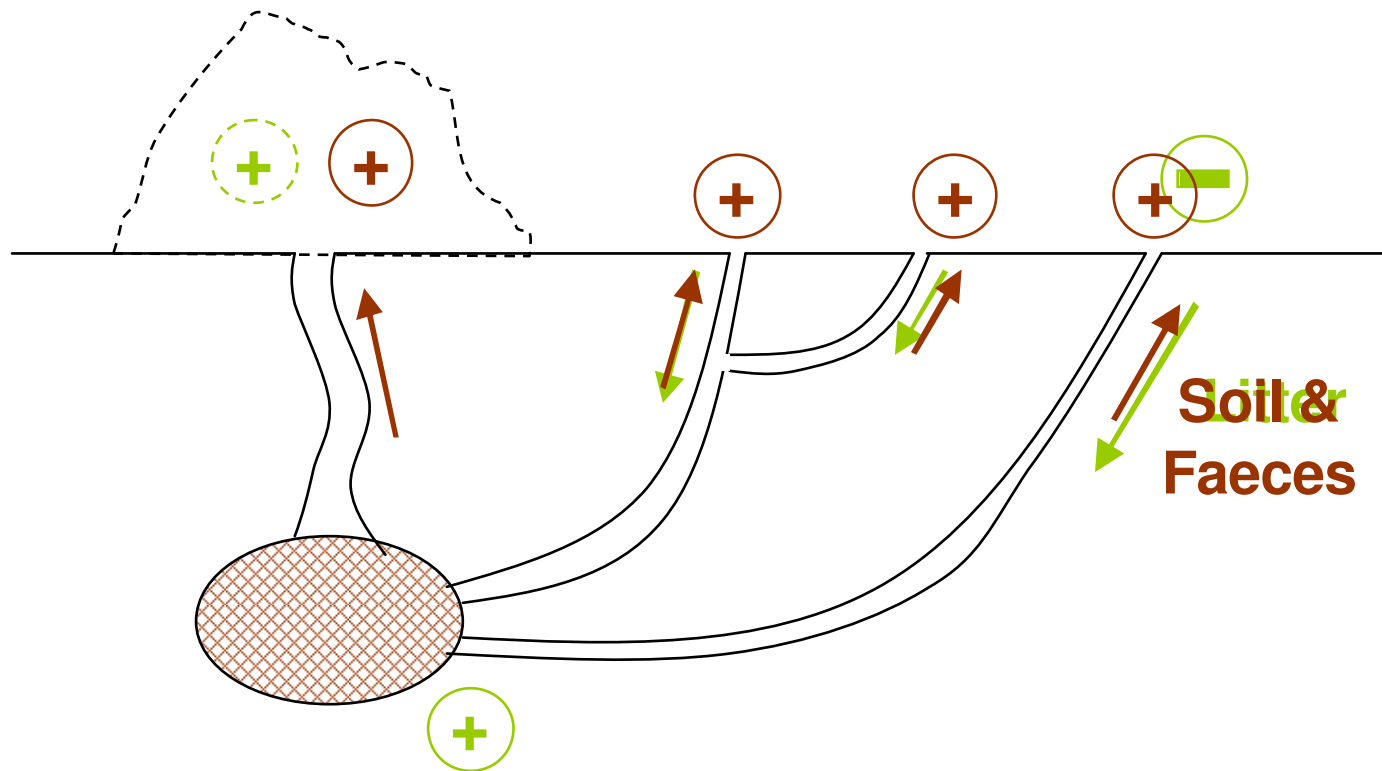
# Termite activity across spatial scales

Robert Buitenwerf, Nikki Stevens, Cleo Gosling, Han Olf

# Drivers of Heterogeneity in Savannas



# Nutrient fluxes in a litter-feeding termite colony



1. Movement of material
2.  $N_2$  fixation (by prokaryotic gut symbionts)
3. Respiration ( $CO_2$  by termites,  $CH_4$  by bacteria)

# What determines termite activity on a local scale?

## Candidates:

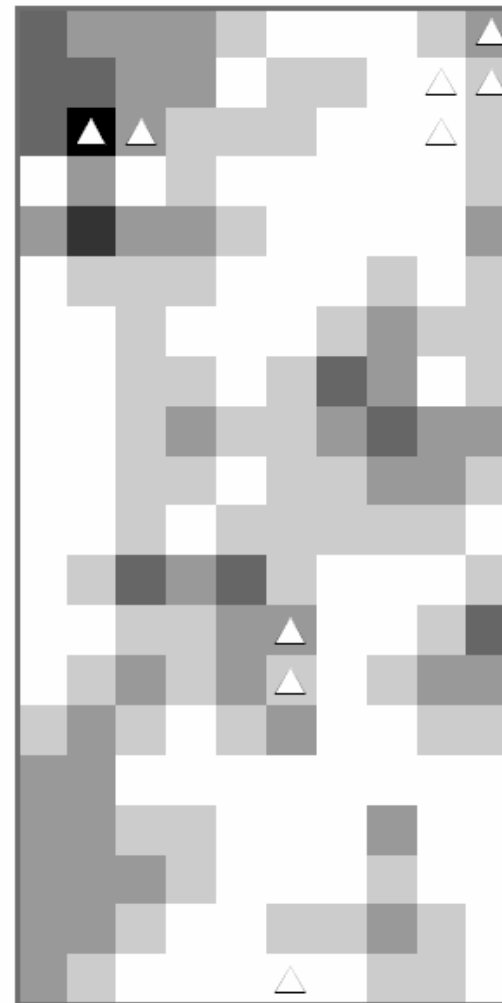
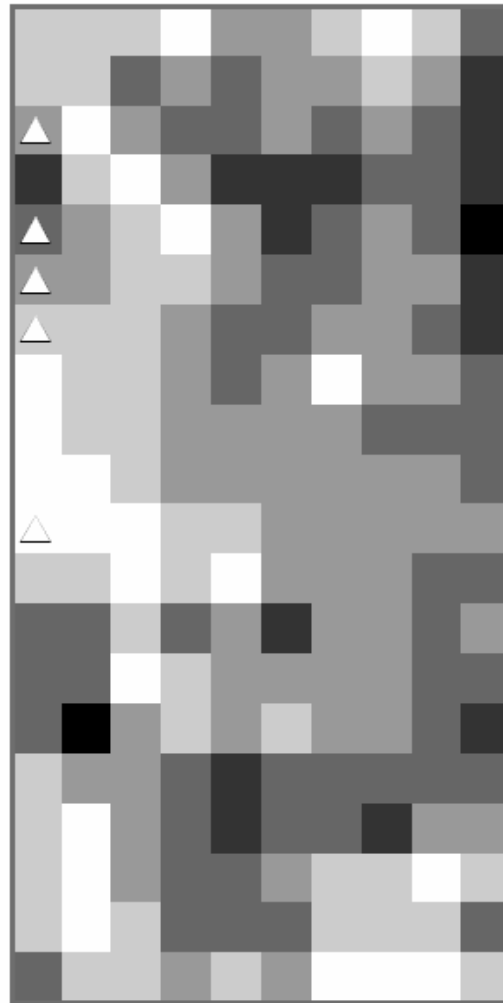
- Grass biomass
- Grass cover
- Species composition
- Woody cover
- Termite mounds
- Clay fraction





Gqoyeni grazed

Mona un-grazed



Litter removed (%)

0 - 15

15 - 30

30 - 45

45 - 60

60 - 75

> 75

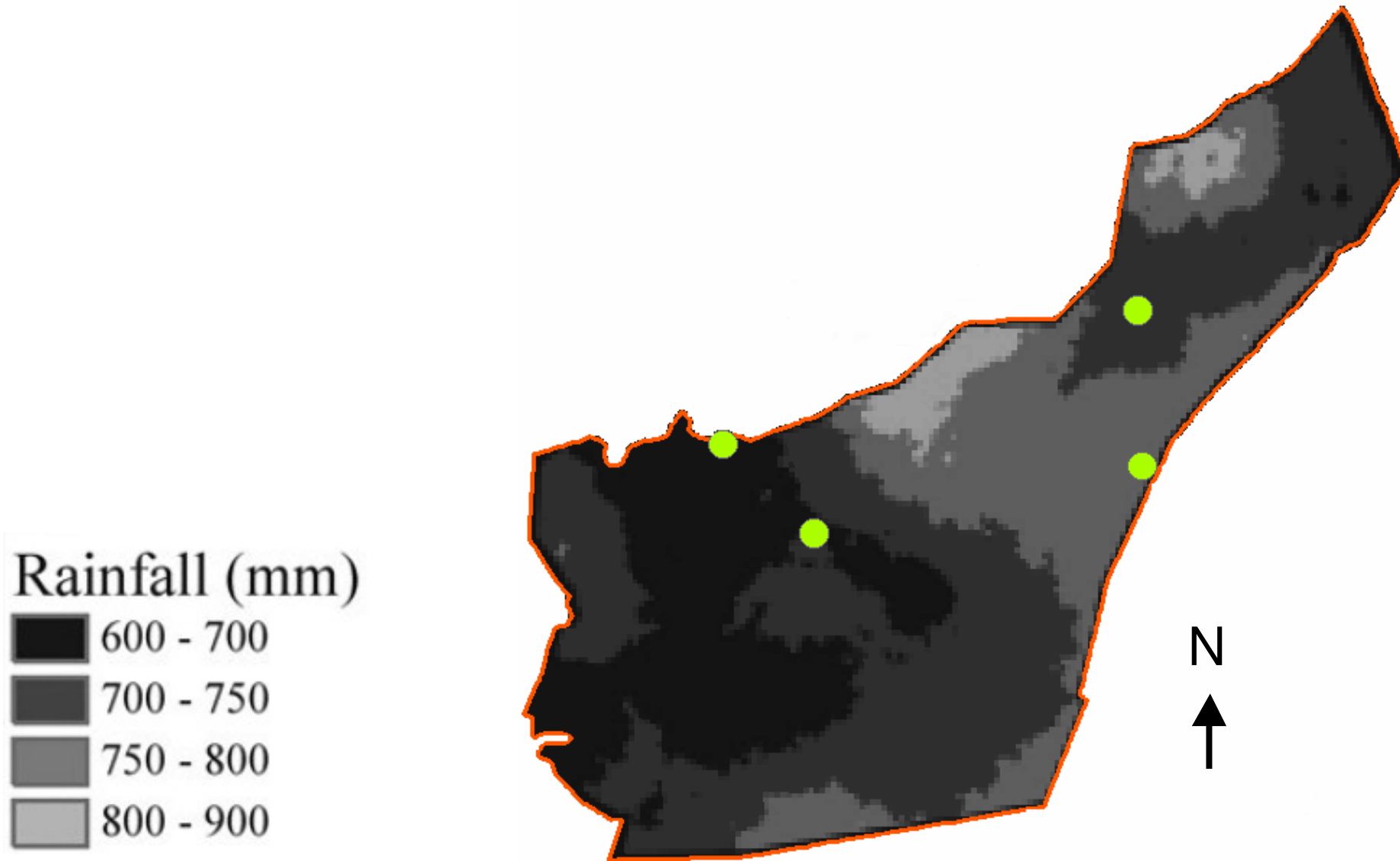


Termite mounds

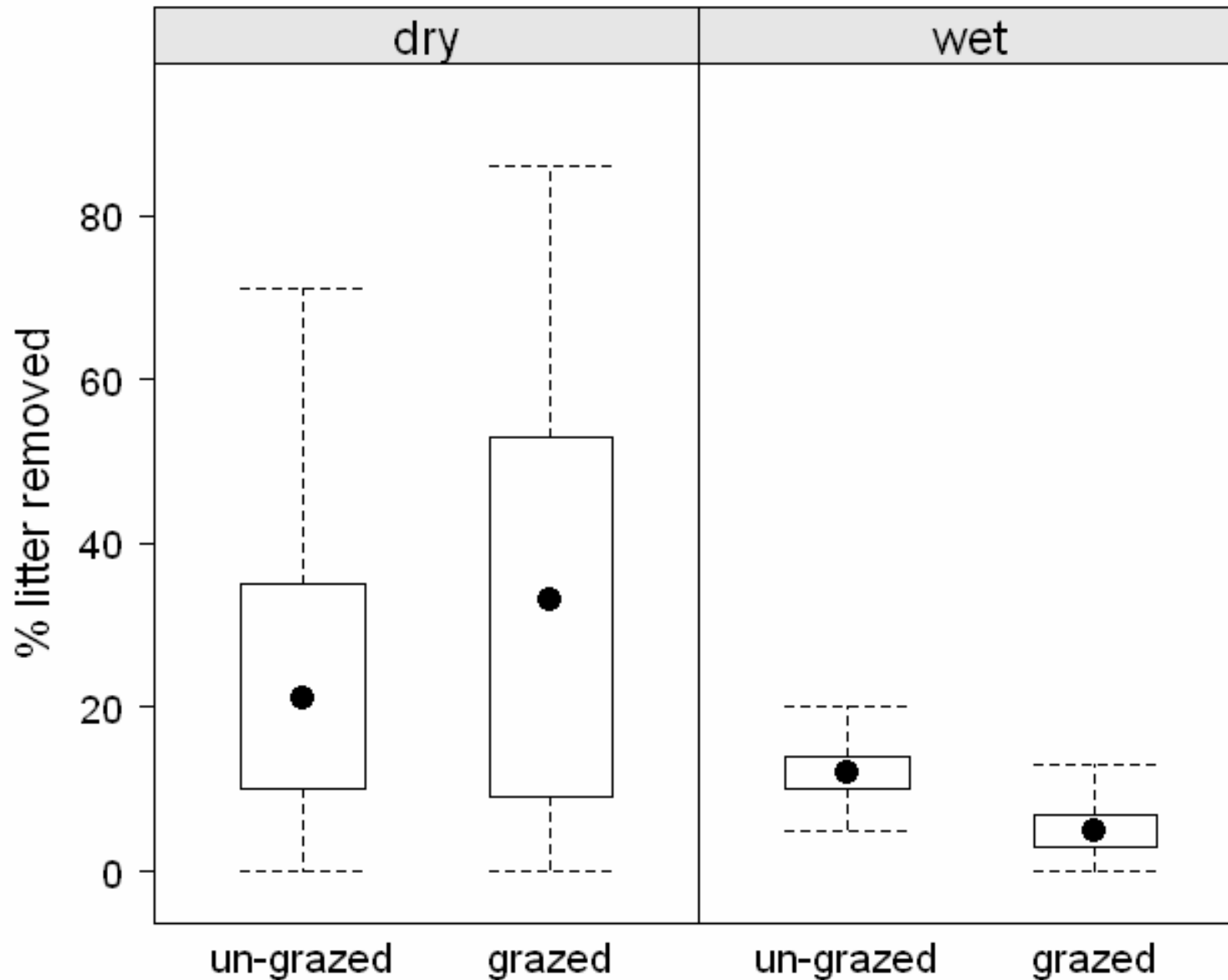
Patterns are not correlated with environmental variables  
(grass cover, biomass, woody cover, clay fraction)  
or termite mounds!

# Scaling up

What determines termite distribution at a larger scale?



# Litter removal



## **Linear mixed-effects model:**

Rain x Grazing  
 $p < 0.0001$

30 % of variance  
between plots,  
89% of that is  
explained by rain  
and grazing

## **Nested ANOVA**

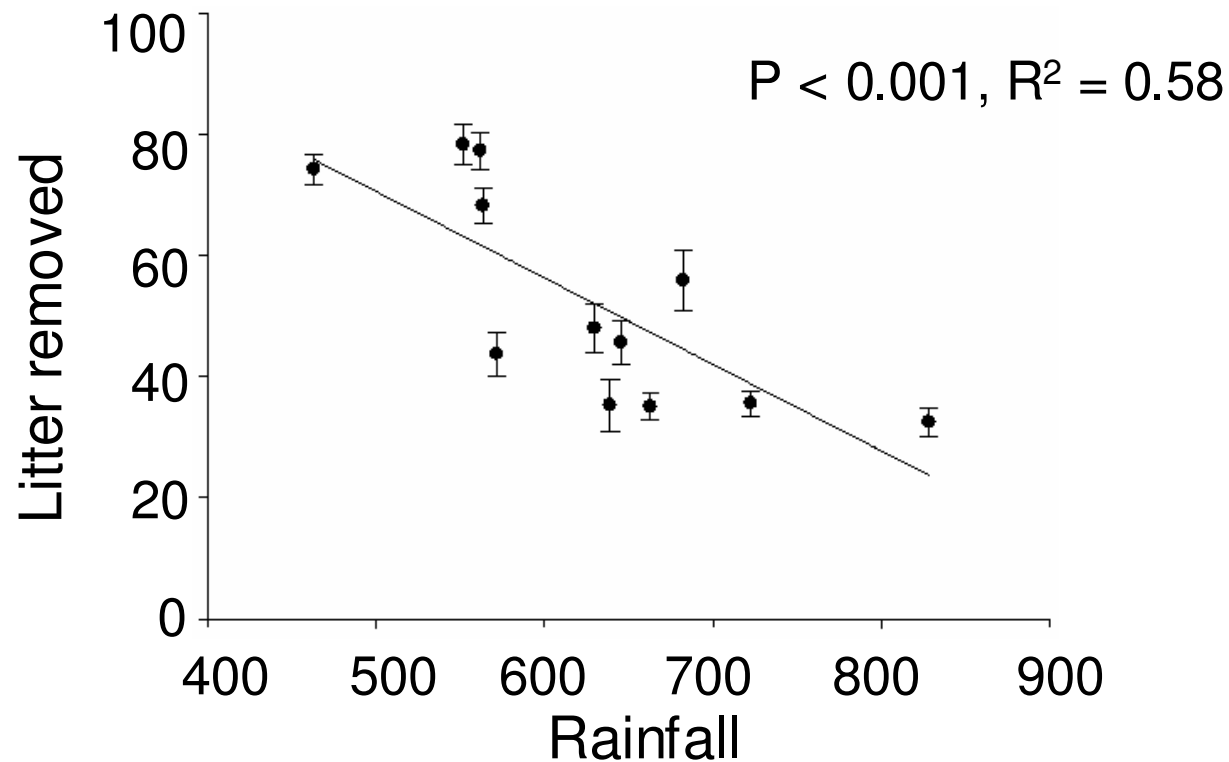
Rain x Grazing:  
 $p < 0.05$

Termite density/abundance/activity generally increases with  
rainfall

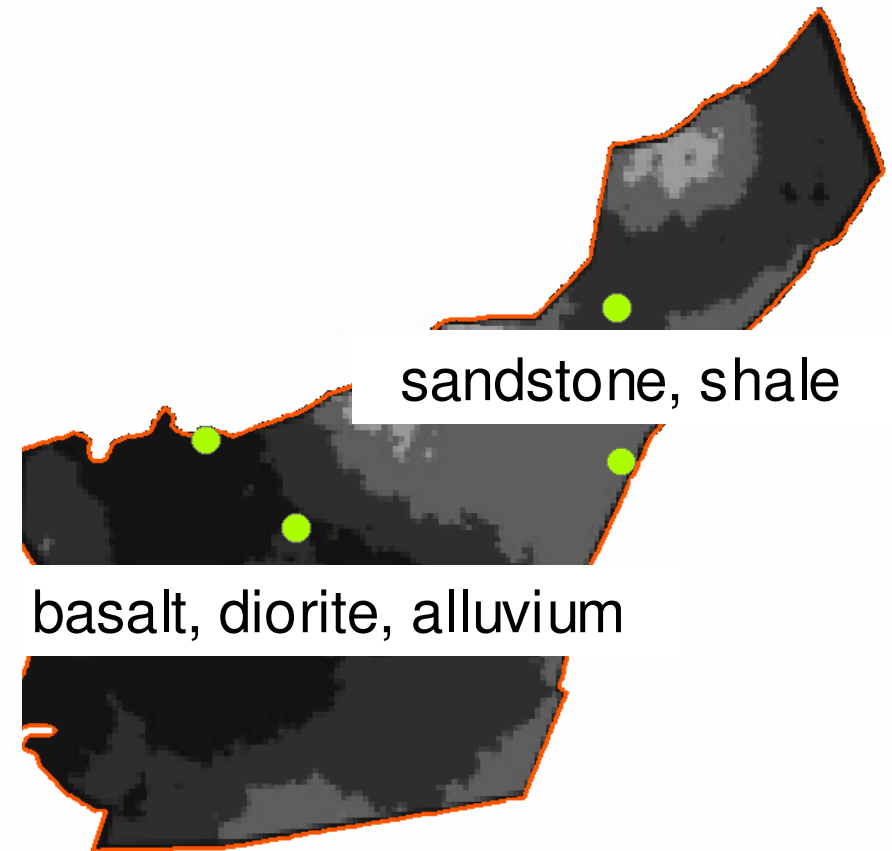
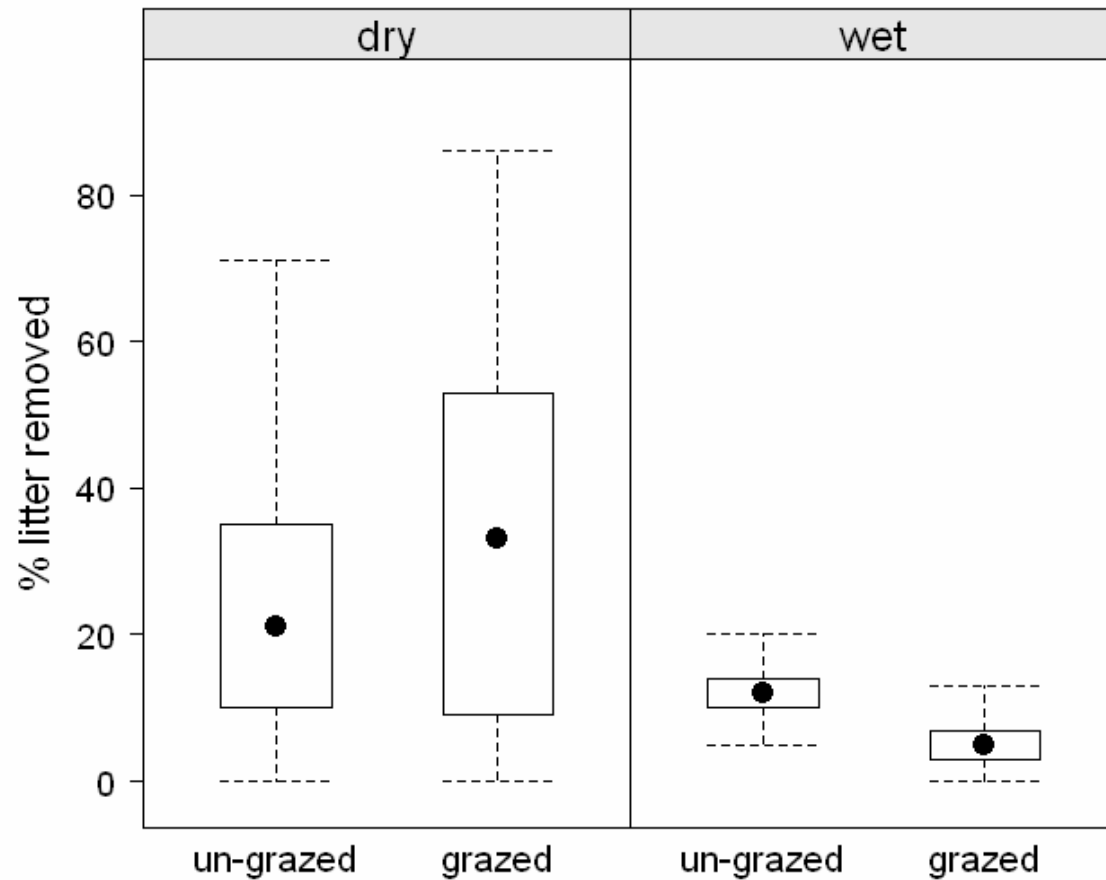
(Bodine & Ueckert 1975, Pomeroy 1978, Buxton 1981, Deshmukh 1989, Picker et al. 2007)

**BUT...**

We find the opposite pattern in HiP



# Why?



1. Nutrients
2. Fire frequency and intensity
3. Presence of harvester termite *Hodotermes mossambicus*

# Acknowledgements

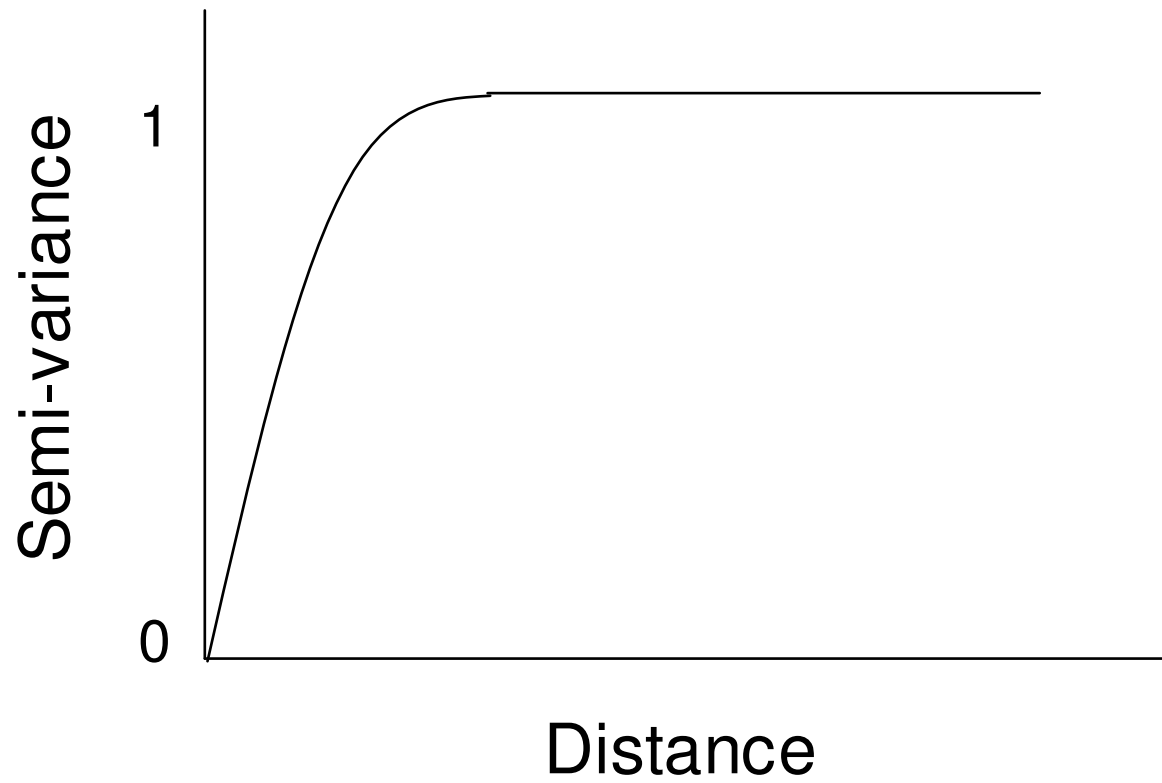
Marco Polo Fund

Groninger Universiteits Fonds

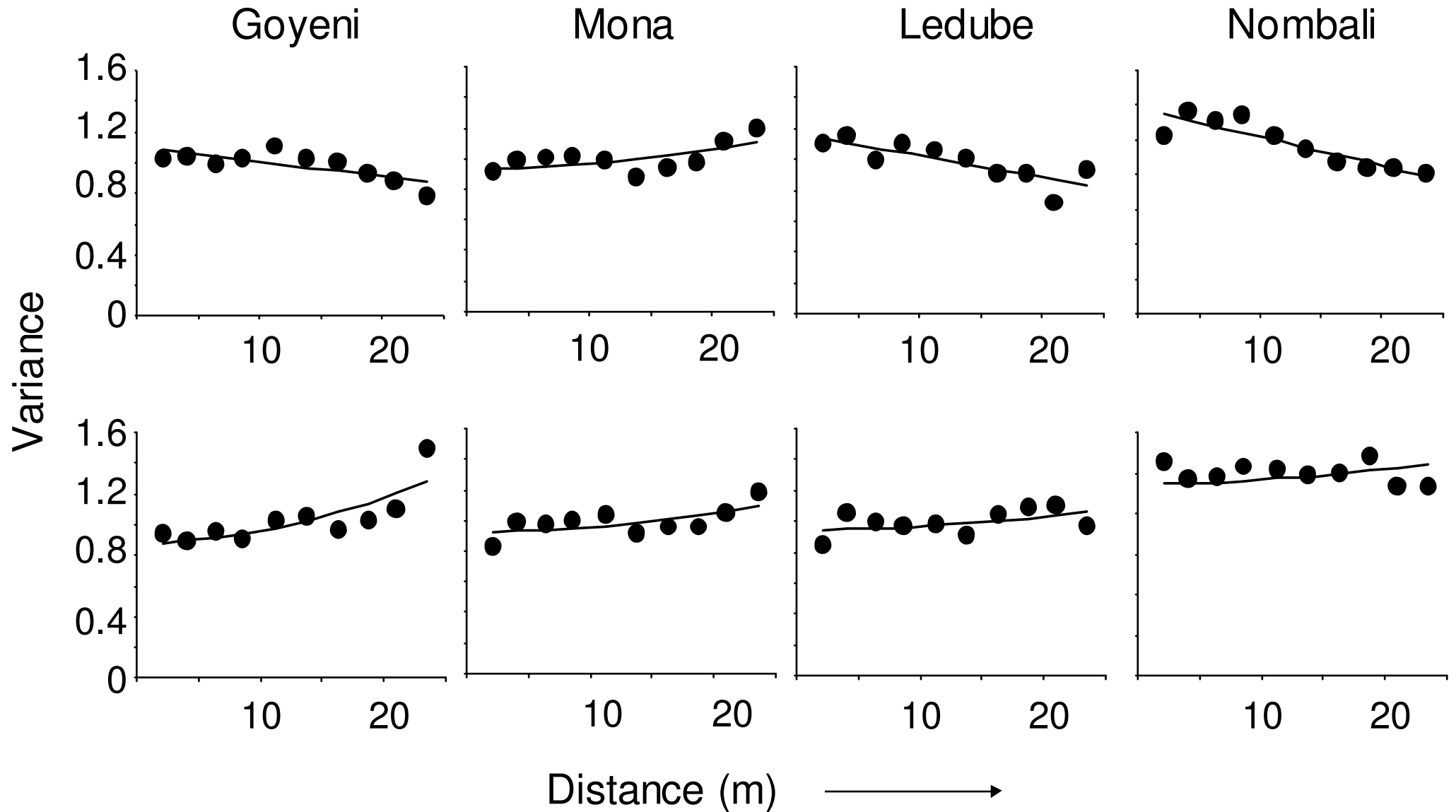
Khanyi Mpanza

Michael Anderson

# Semi-variogram



# Semi-variograms of litter removal



termite removal vs fire ( $p=0.02$ ,  $r^2$  0.35)

