Greenhouse gas fluxes and land use in savanna ecosystems

Sam Grover, Stephen Livesley,
Lindsay Hutley, Stefan Arndt,
Jason Beringer

Australian Government
Australian Research Council

Outline

- Project details
- Results
  - seasonality, fire and conversion to pasture
  - environmental drivers: soil temperature, soil water content, soil nitrate and ammonia
- Average values and conclusions
- Acknowledgements:Hizbullah Jamali, Bianca Baldiserra, other authors

Project Outline

CH_4, N_2O, CO_2
GHG dynamics and nutrient cycling in north Australian savannas

Spatial and temporal variability

Land use change

Mechanisms controlling emissions
Physical, chemical and biological soil properties

Effect of Fire

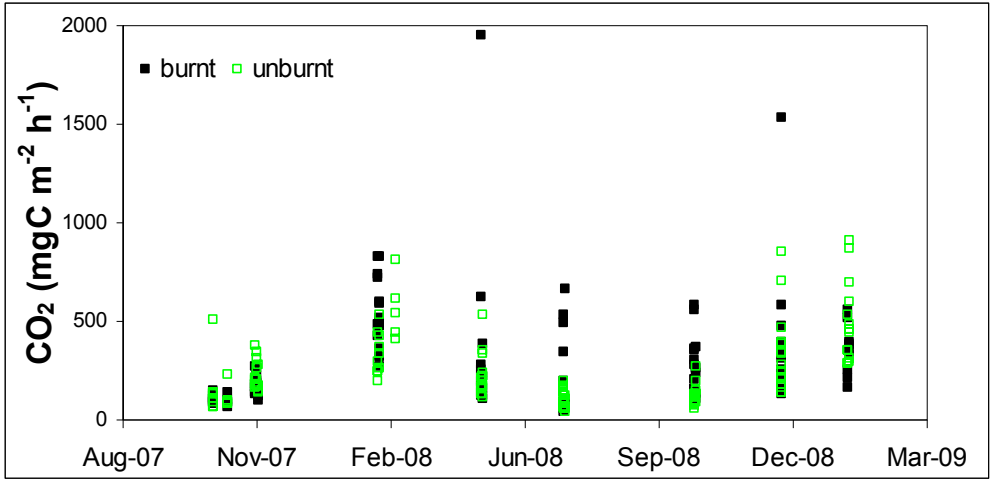
Contribution of termites

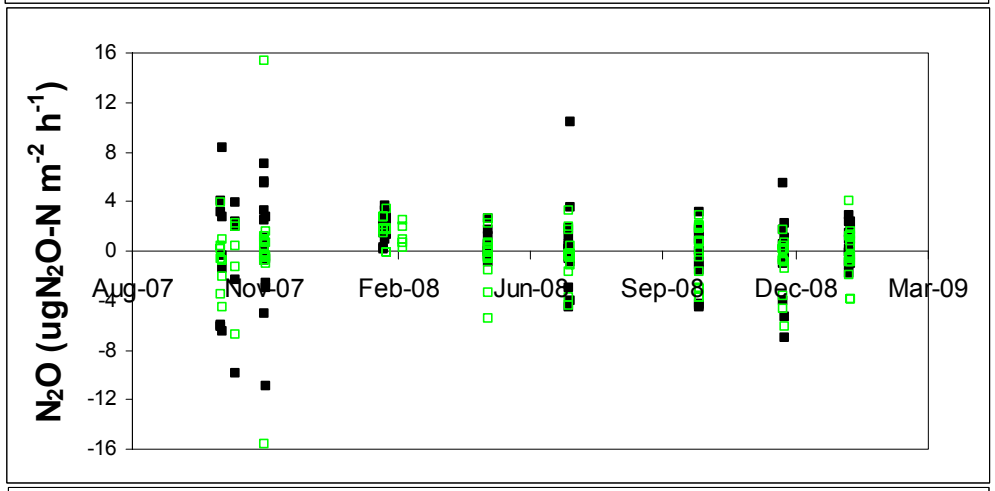
Eddy-covariance towers
Automated trace gas system
Manual trace gas chambers
Soil nutrients and moisture
Modelling (NCAS, DNDC)

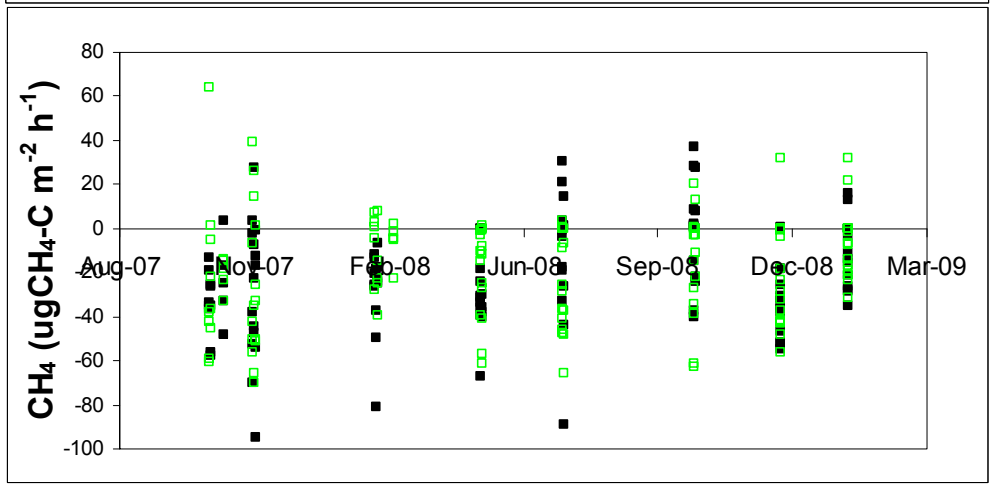
ARC LP0774812

Seasonality; Fire

Howard Springs

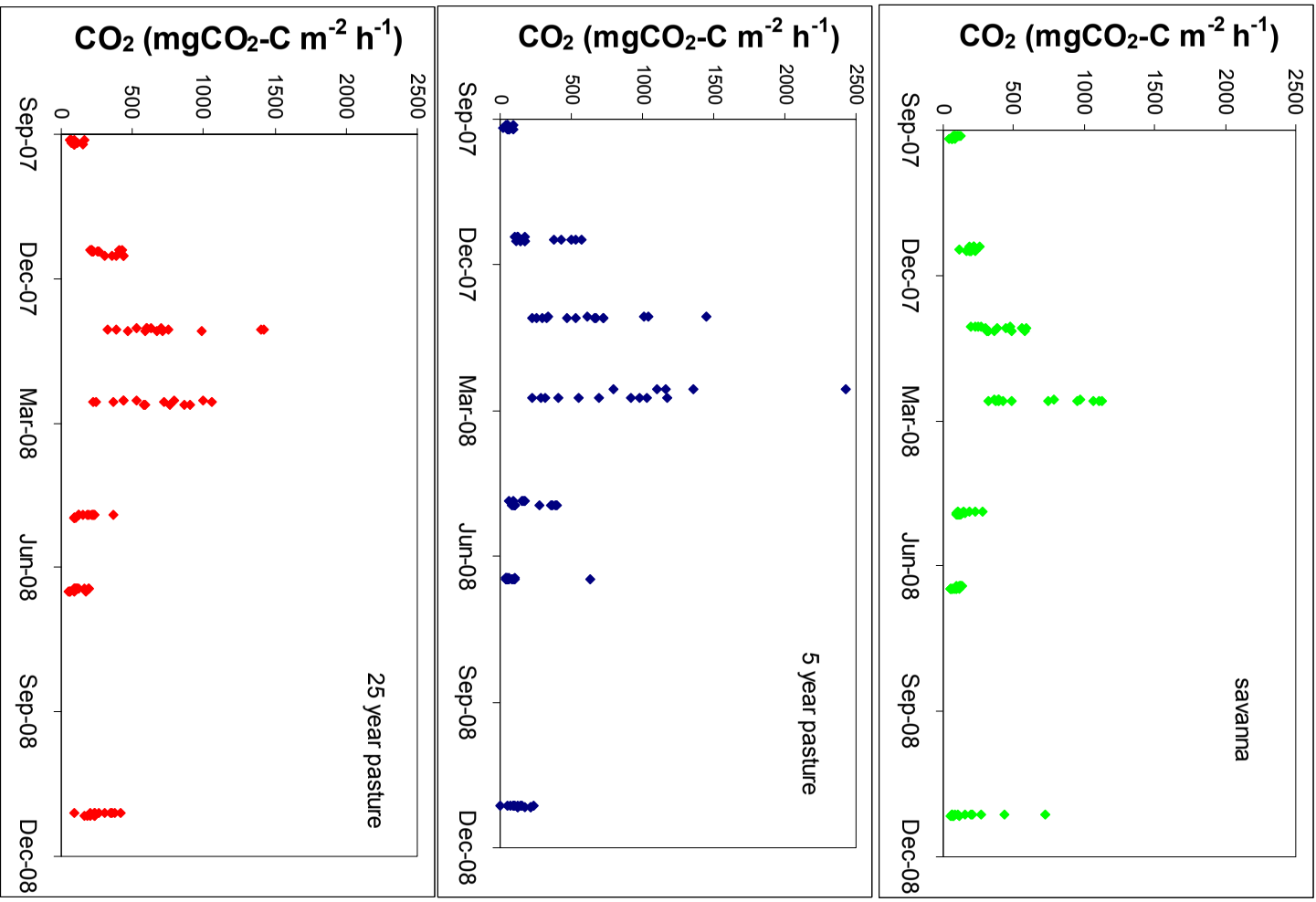






Seasonality; Conversion to pasture

Douglas Daly



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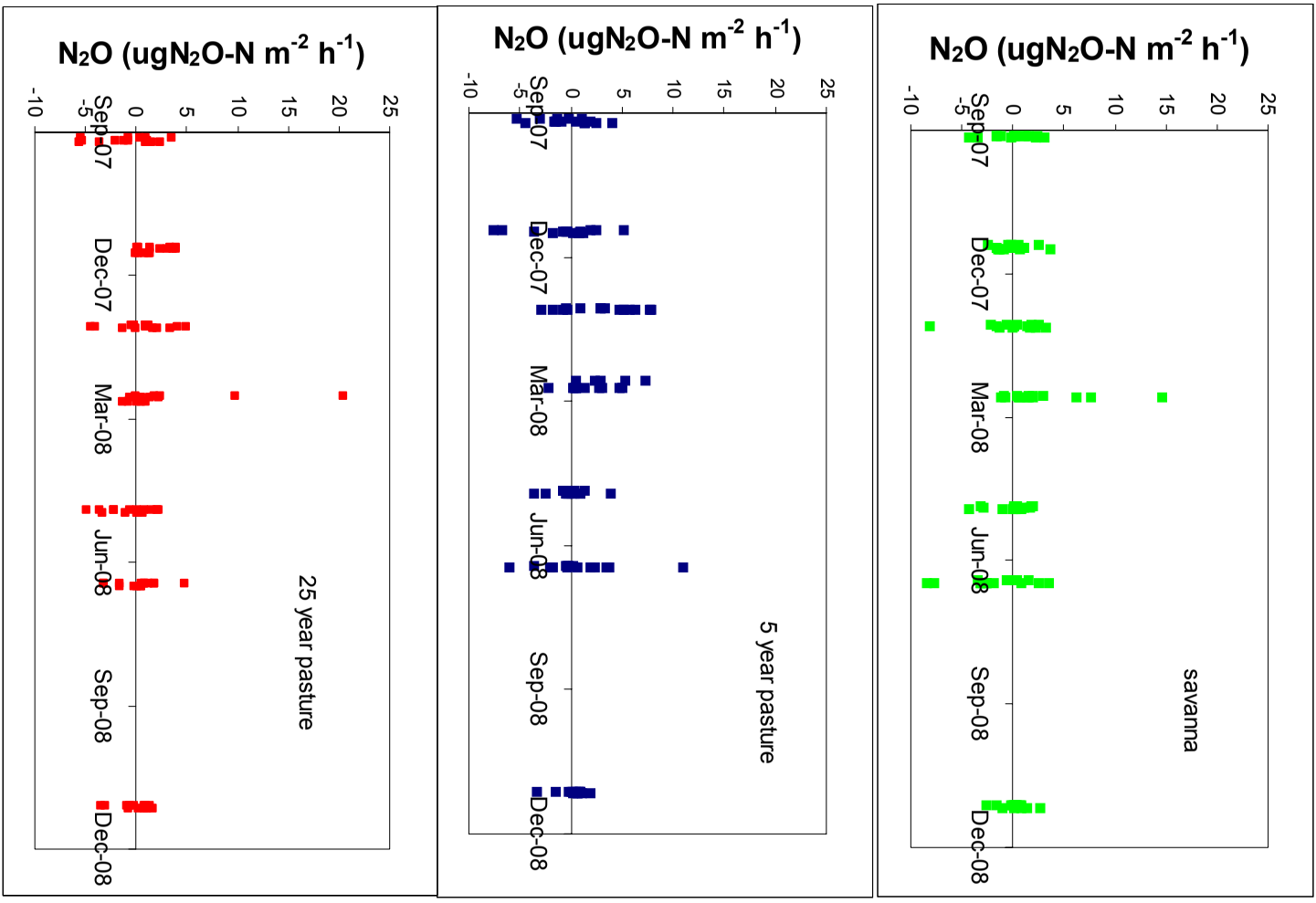

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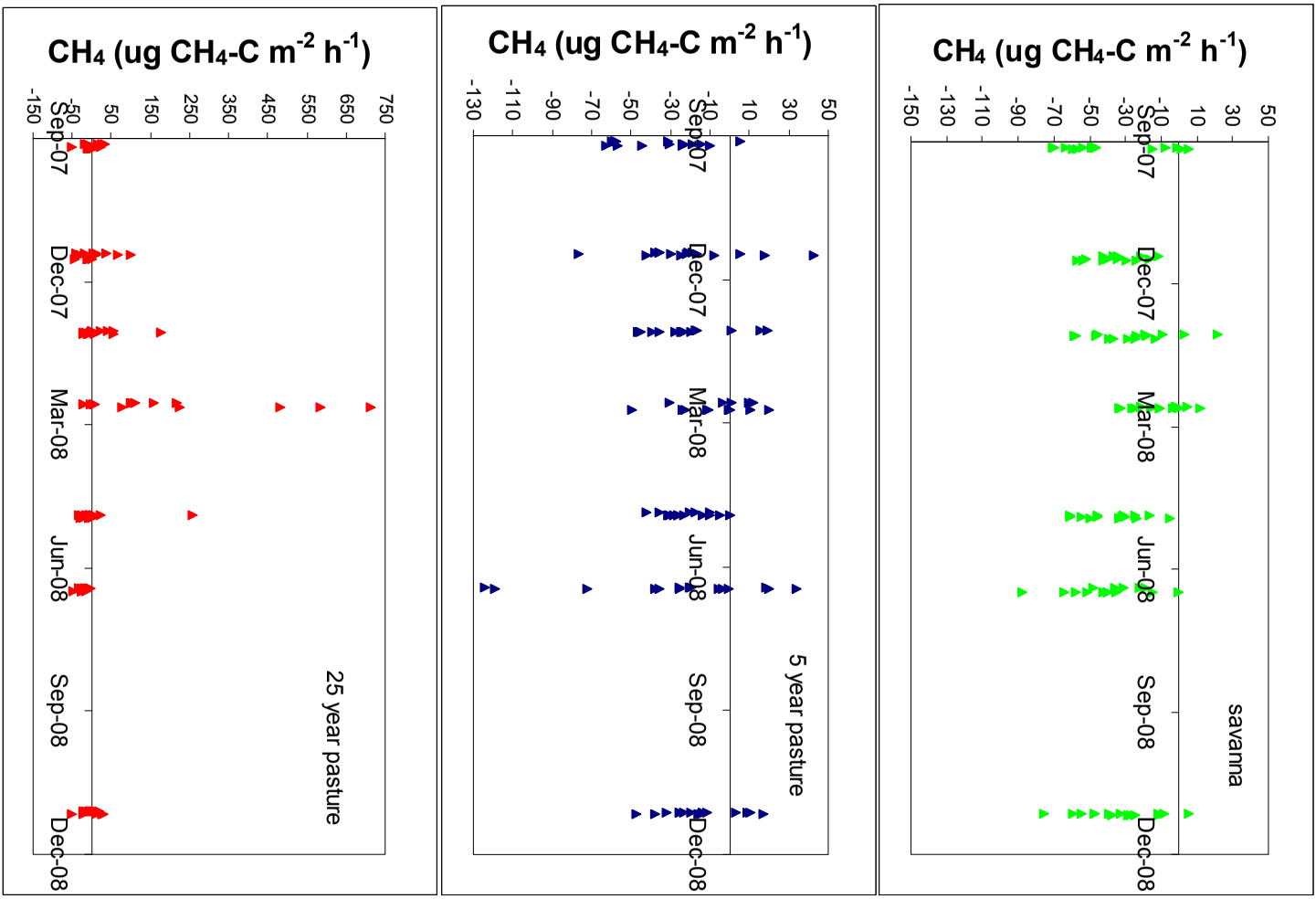
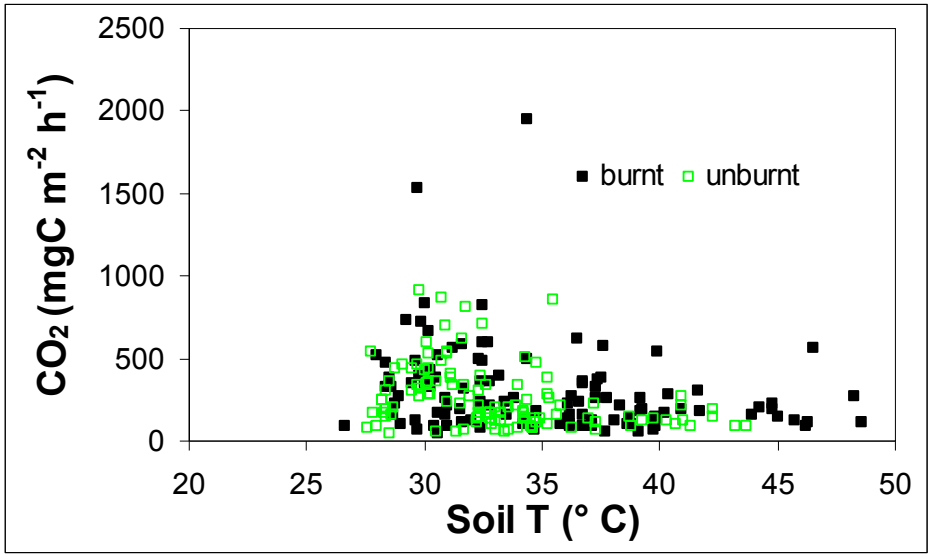
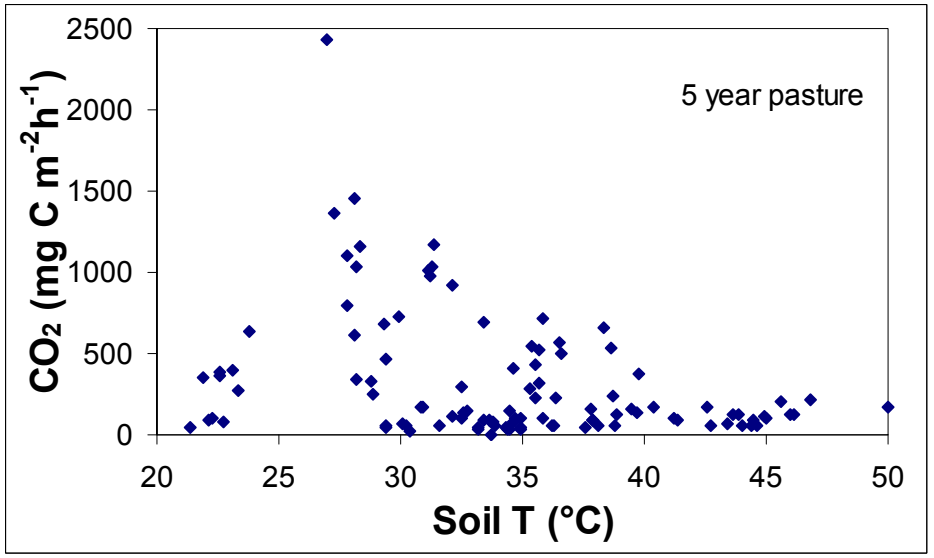
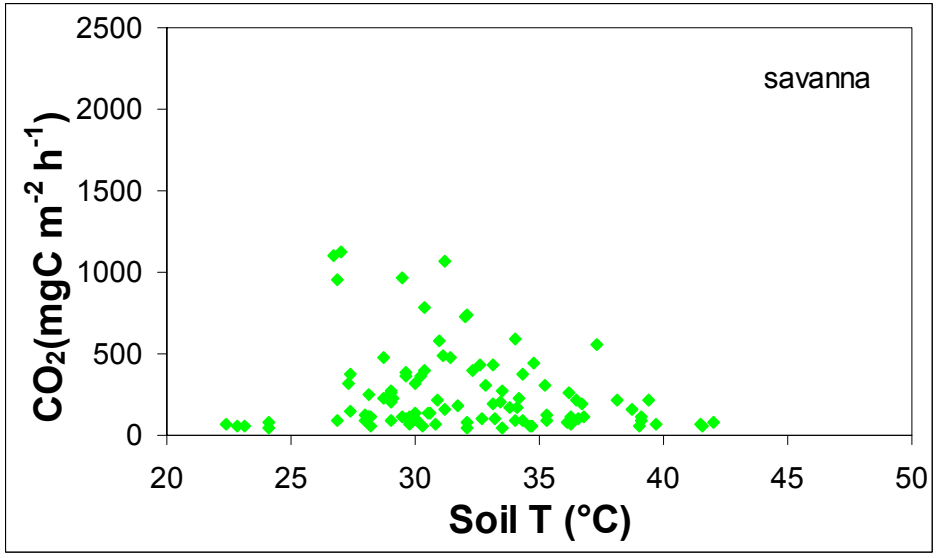
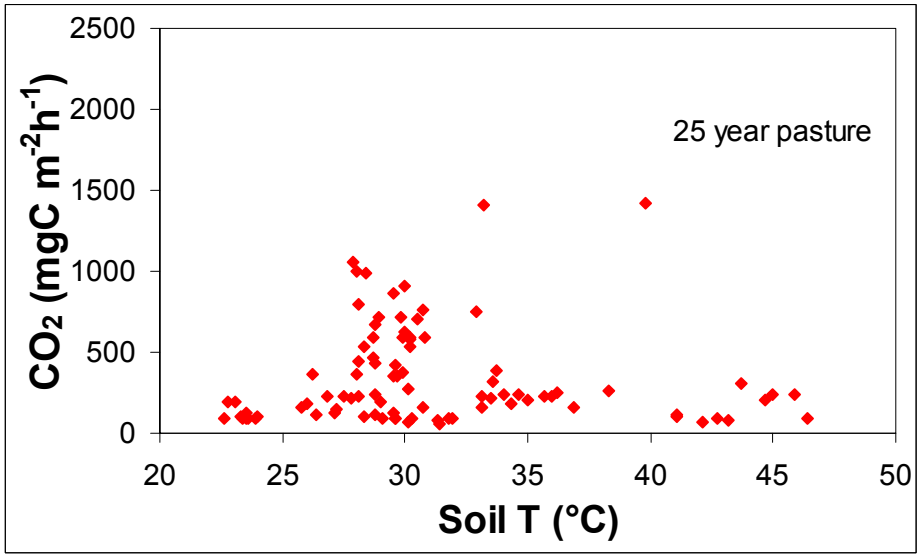


Environmental drivers: soil temperature









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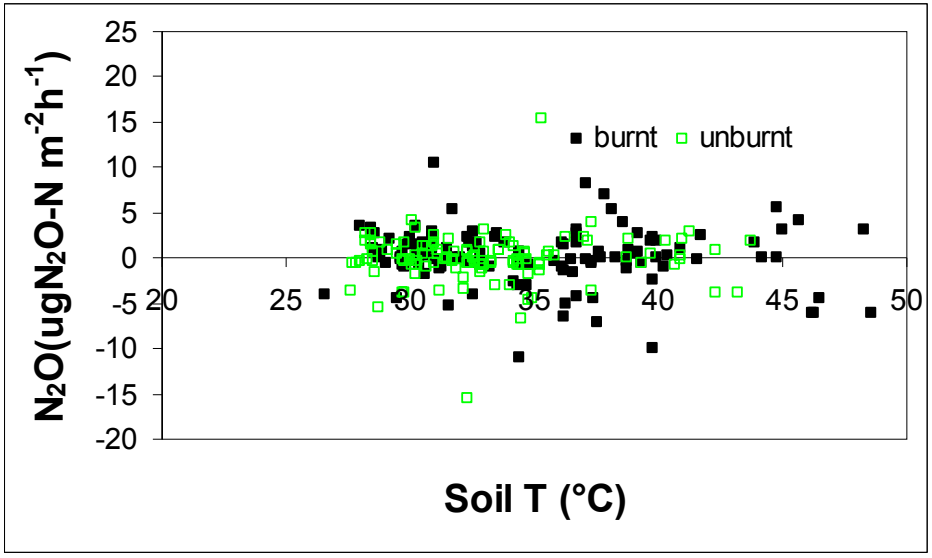

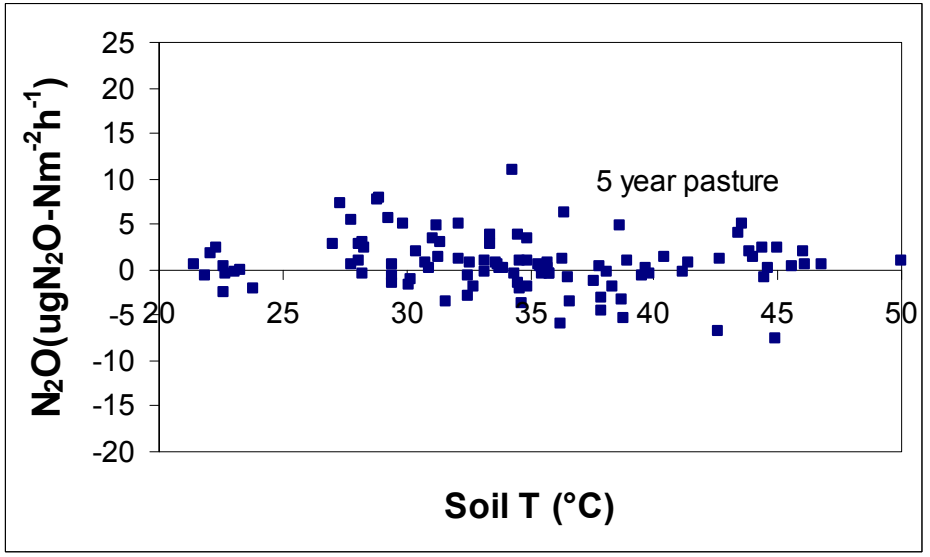

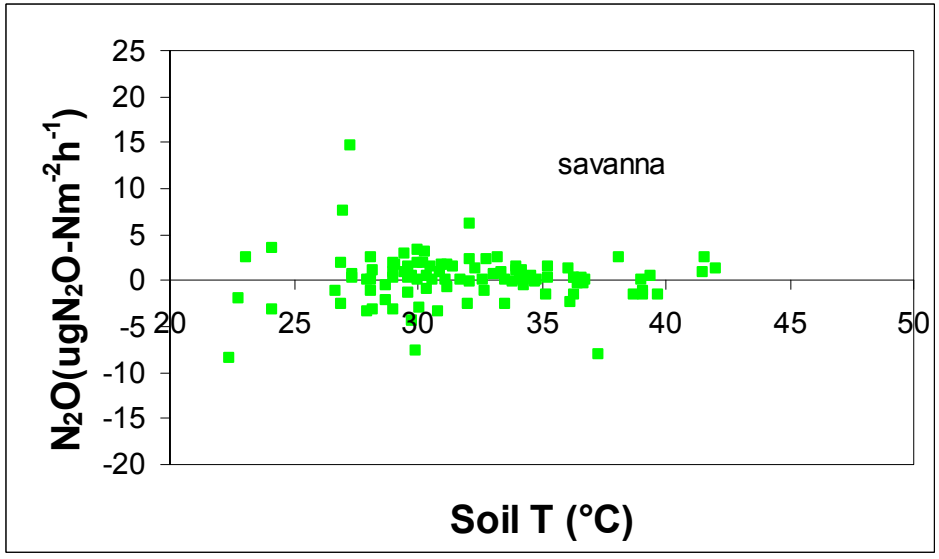

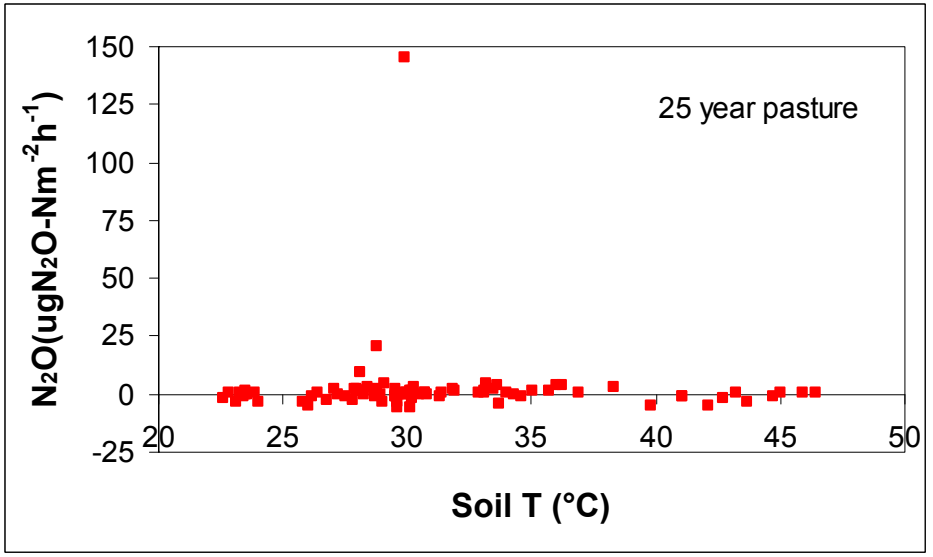

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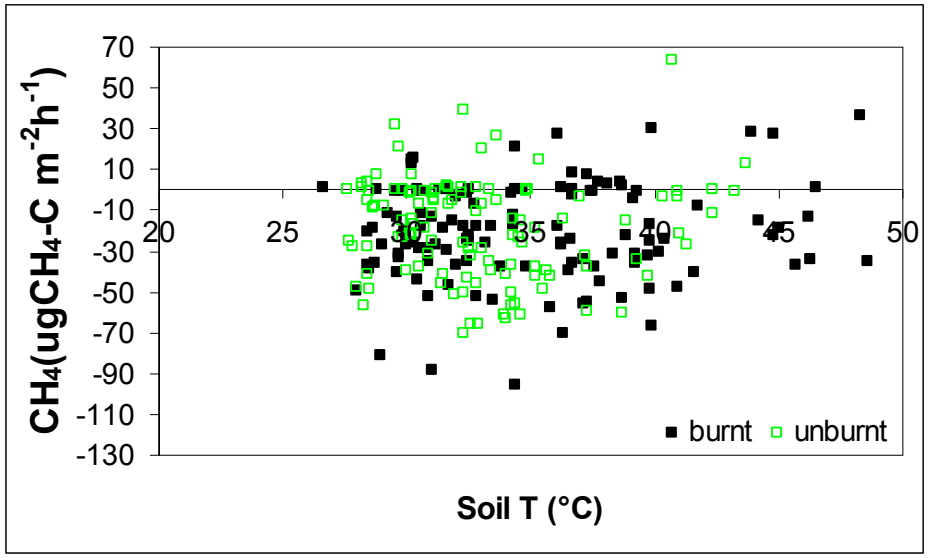
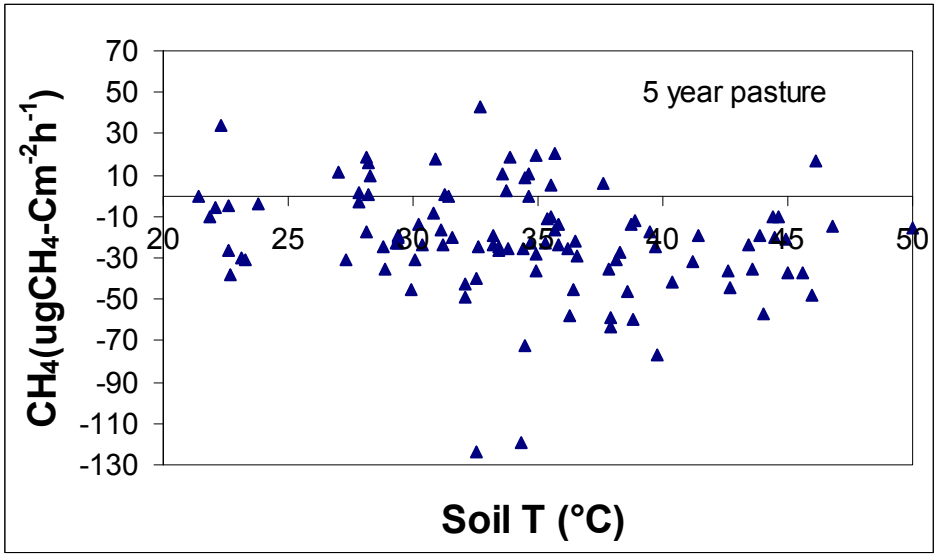
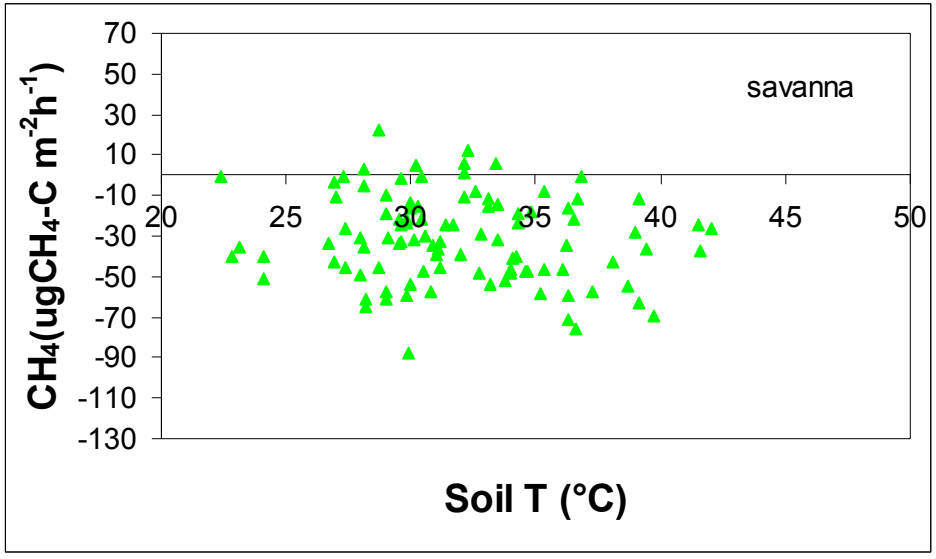
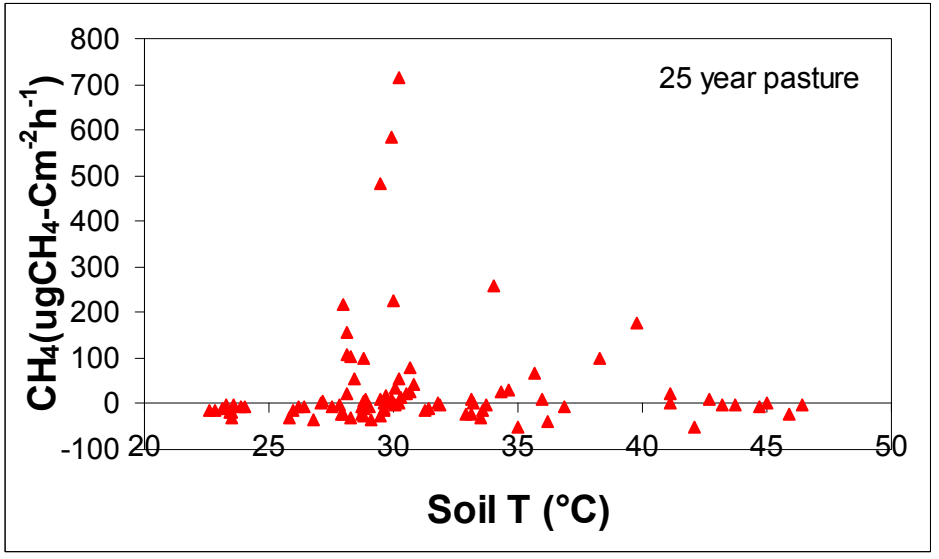
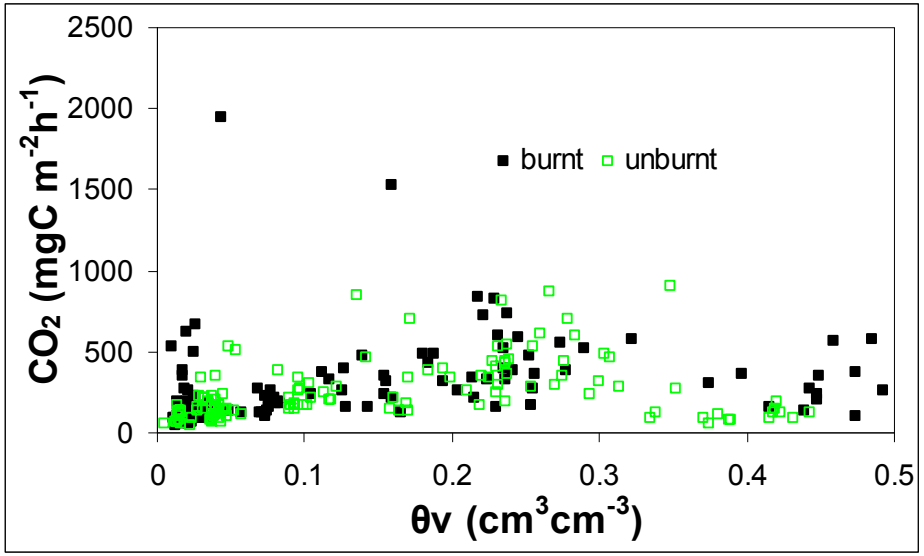


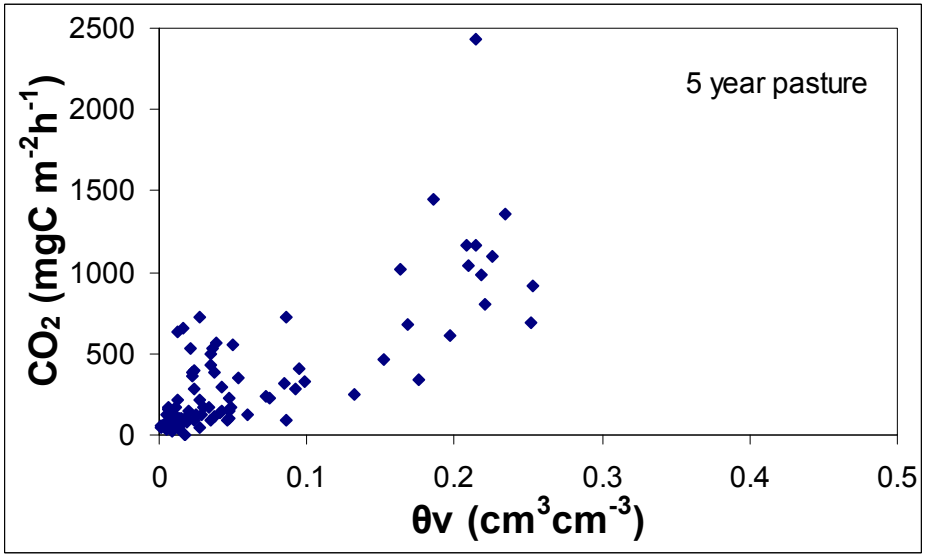


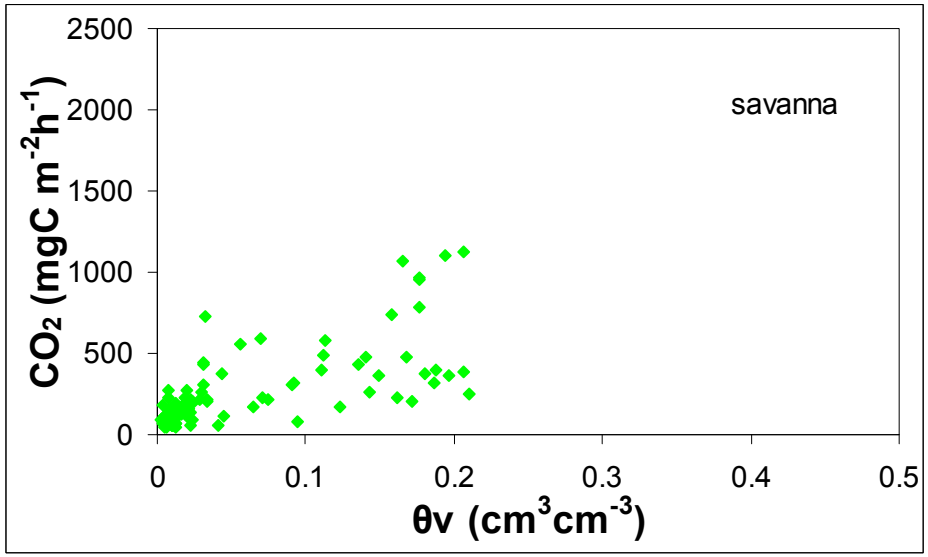


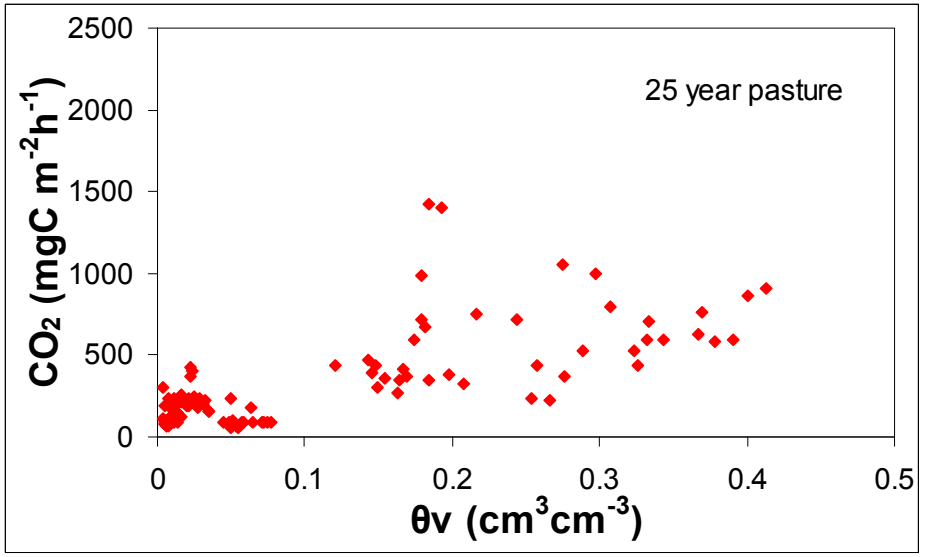


Environmental drivers: soil water content









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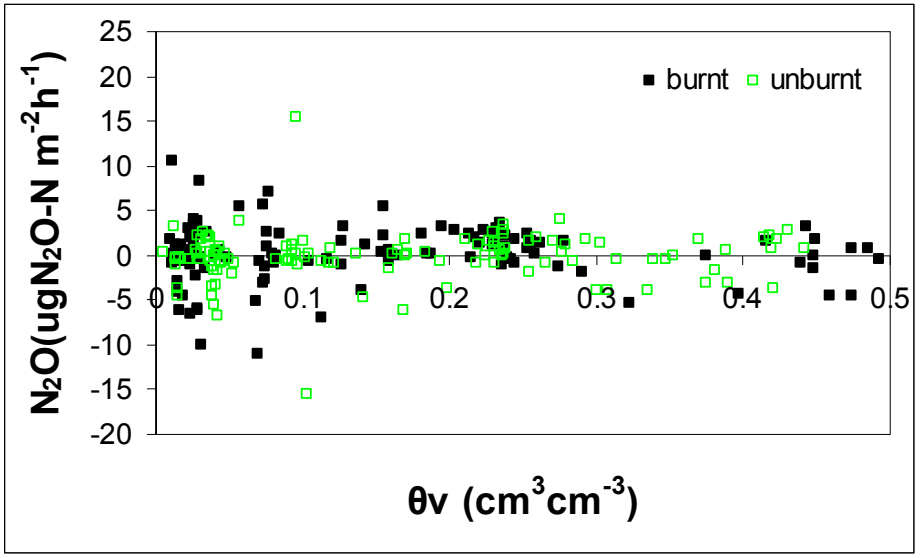

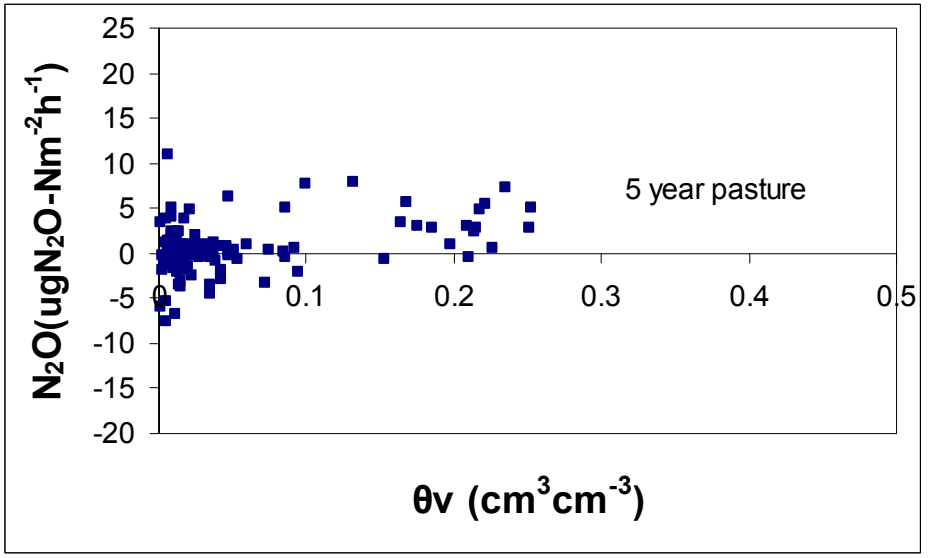

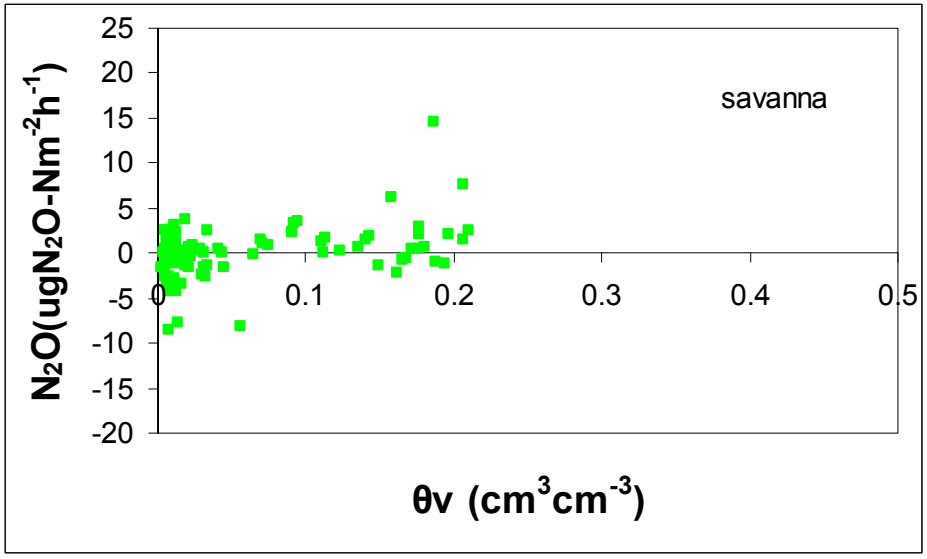

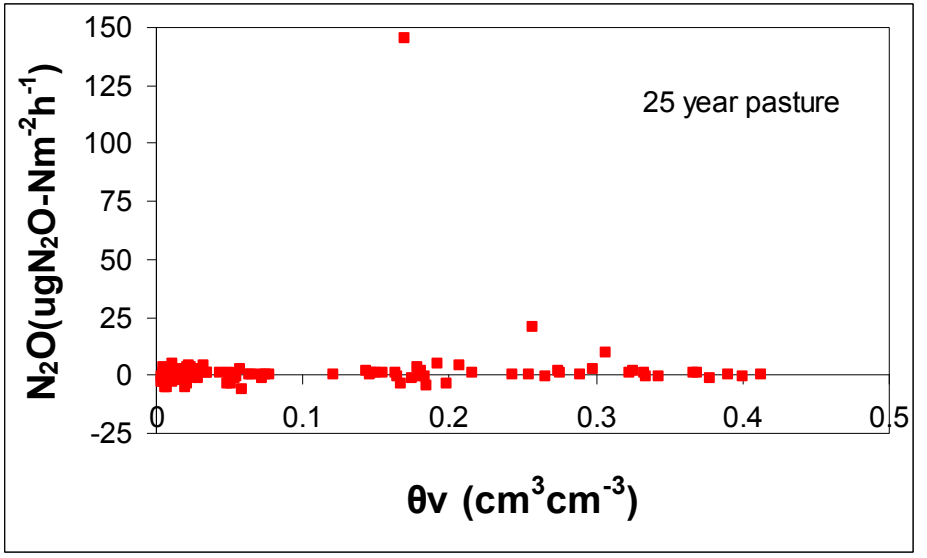

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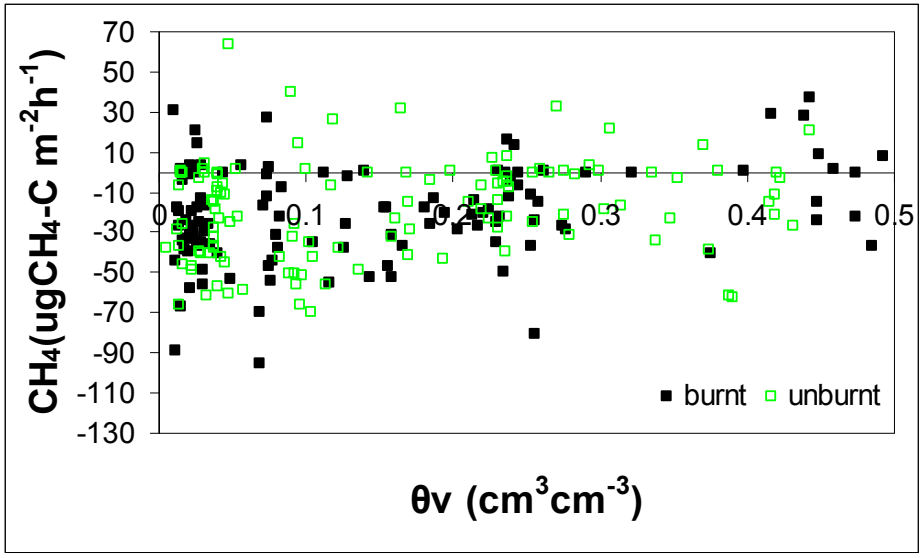
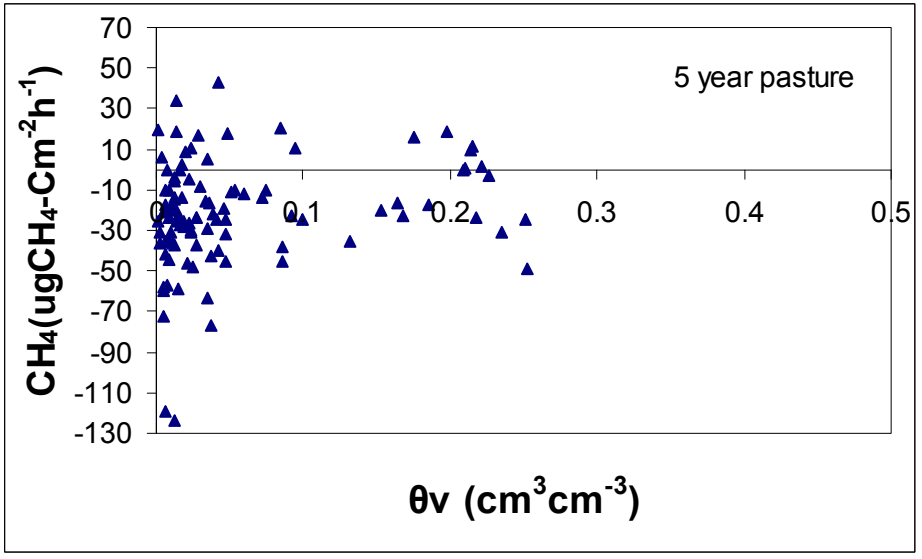
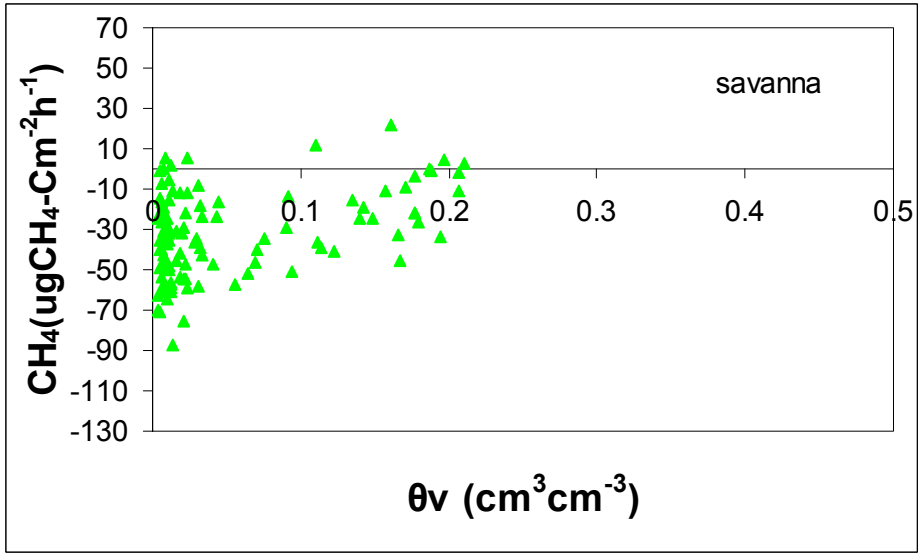
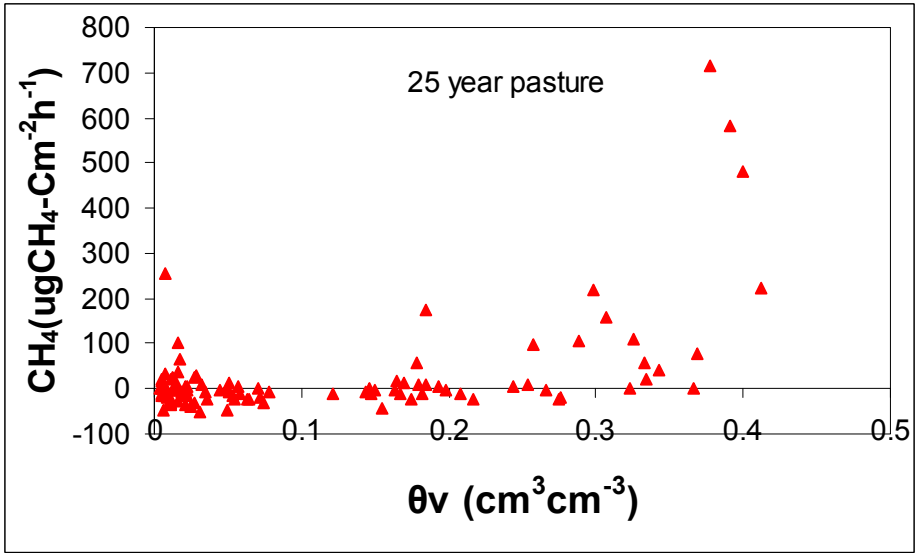
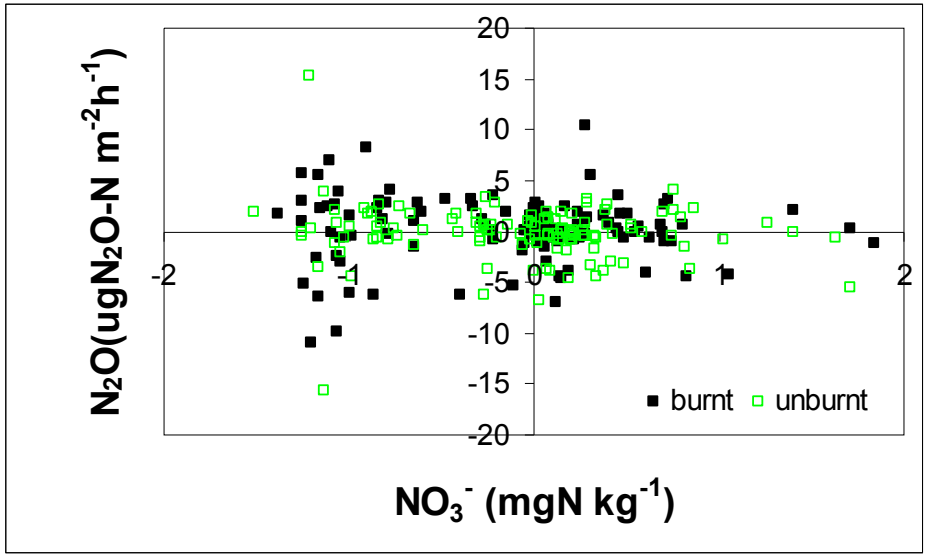


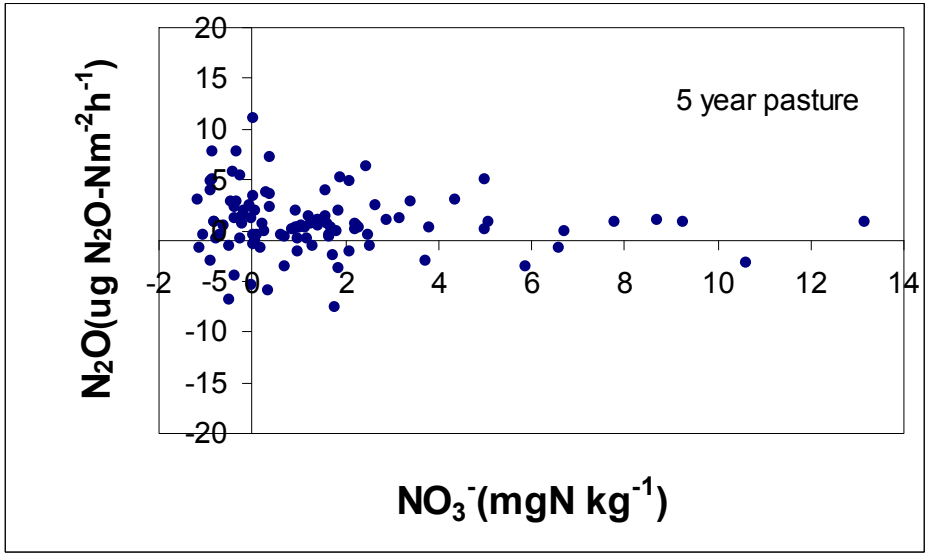


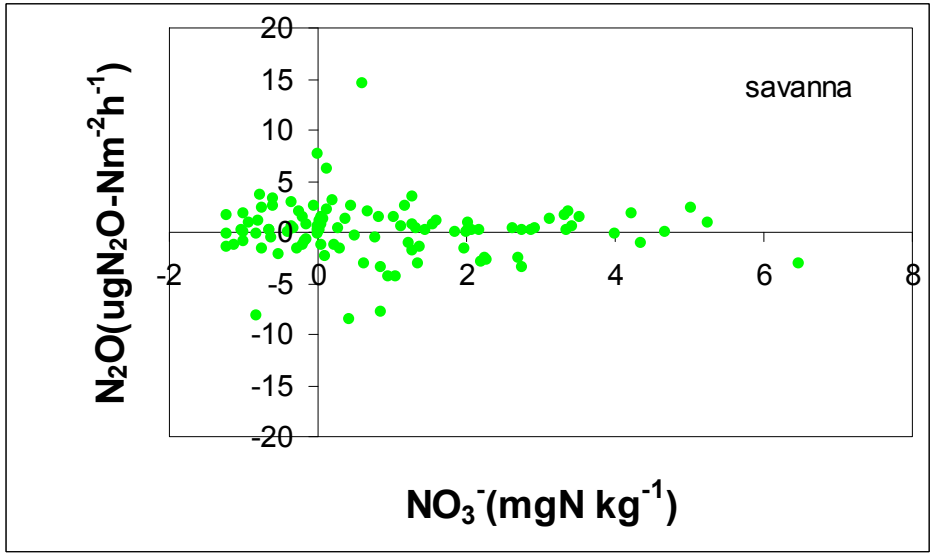


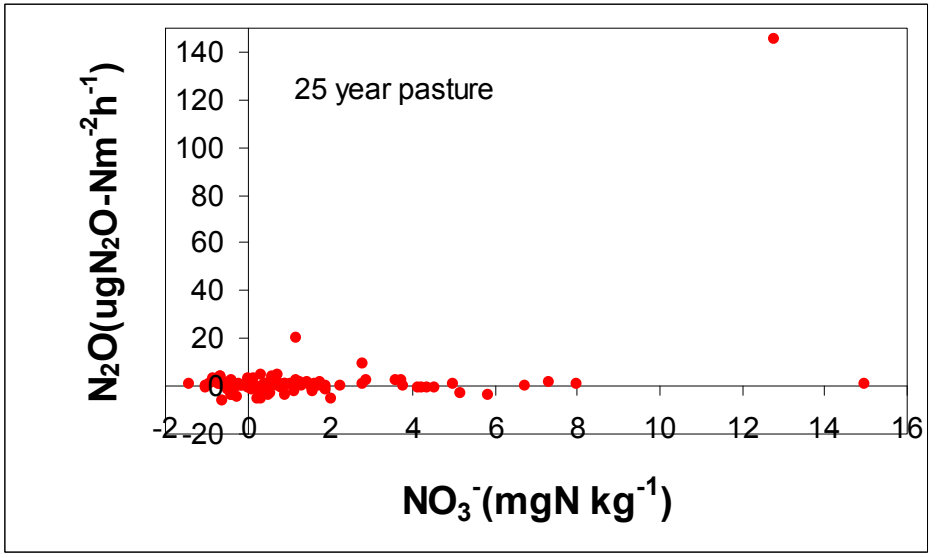


Environmental drivers: soil nitrogen









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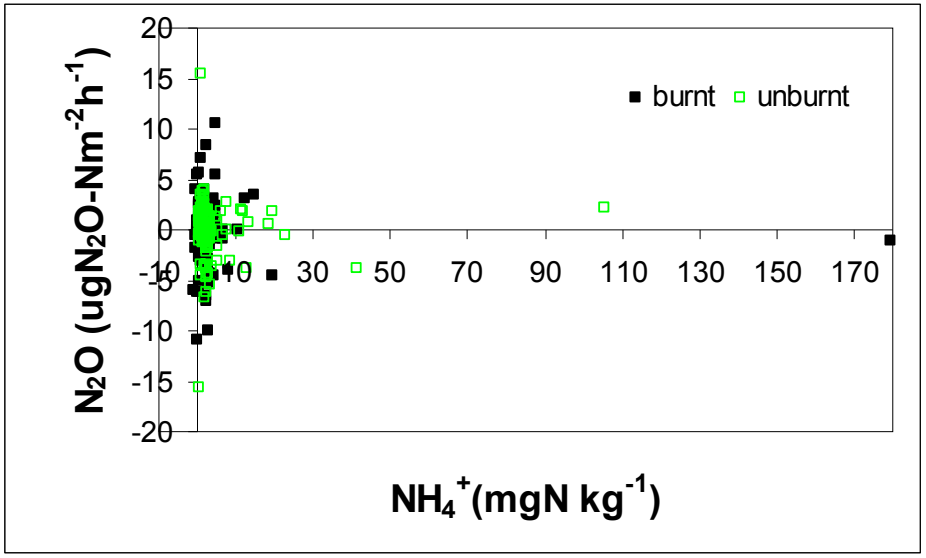
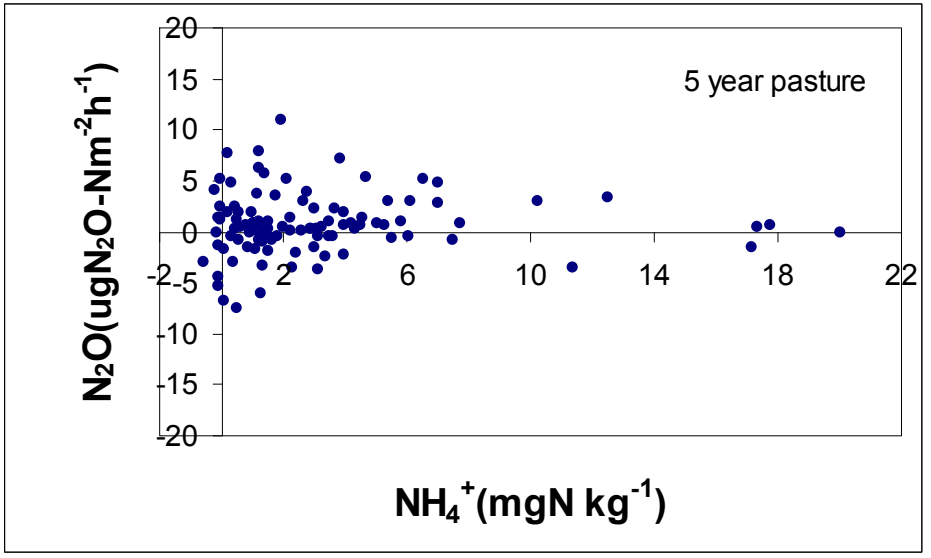
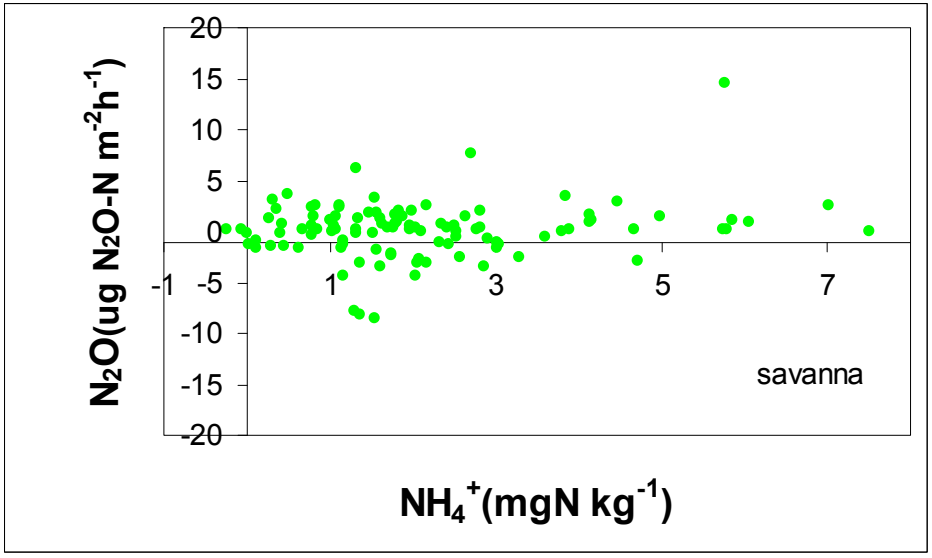
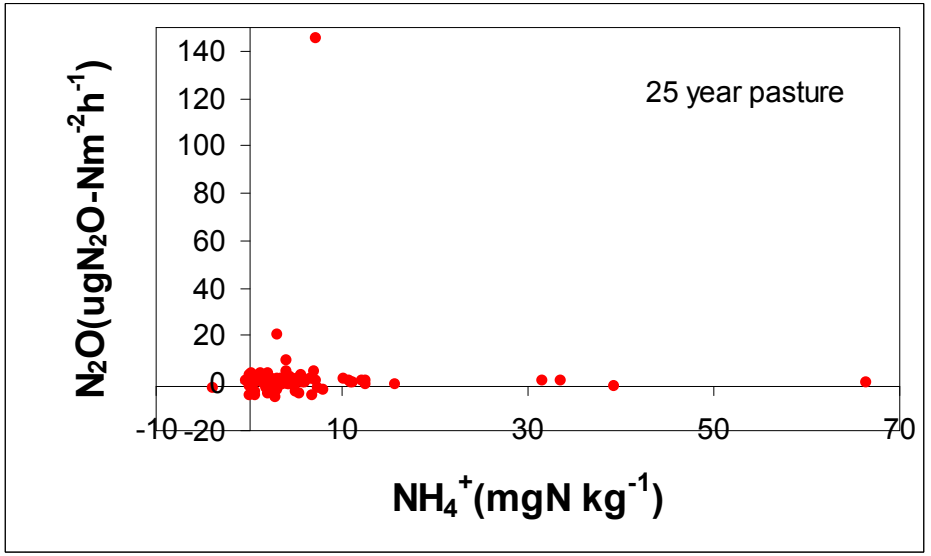








Seasonal Averages
Howard Springs: no effect of fire

	CO_2 ($mgCm^{-2}h^{-1}$)	N_2O ($\mu g\ N_2O\text{-}N\ m^{-2}h^{-1}$)	CH_4 ($\mu g\ CH_4\text{-}C\ m^{-2}h^{-1}$)
Build up	172	0	-21
Wet	422	0.4	-18
Dry	219	0	-21

Seasonal Averages
Douglas Daly: land use change

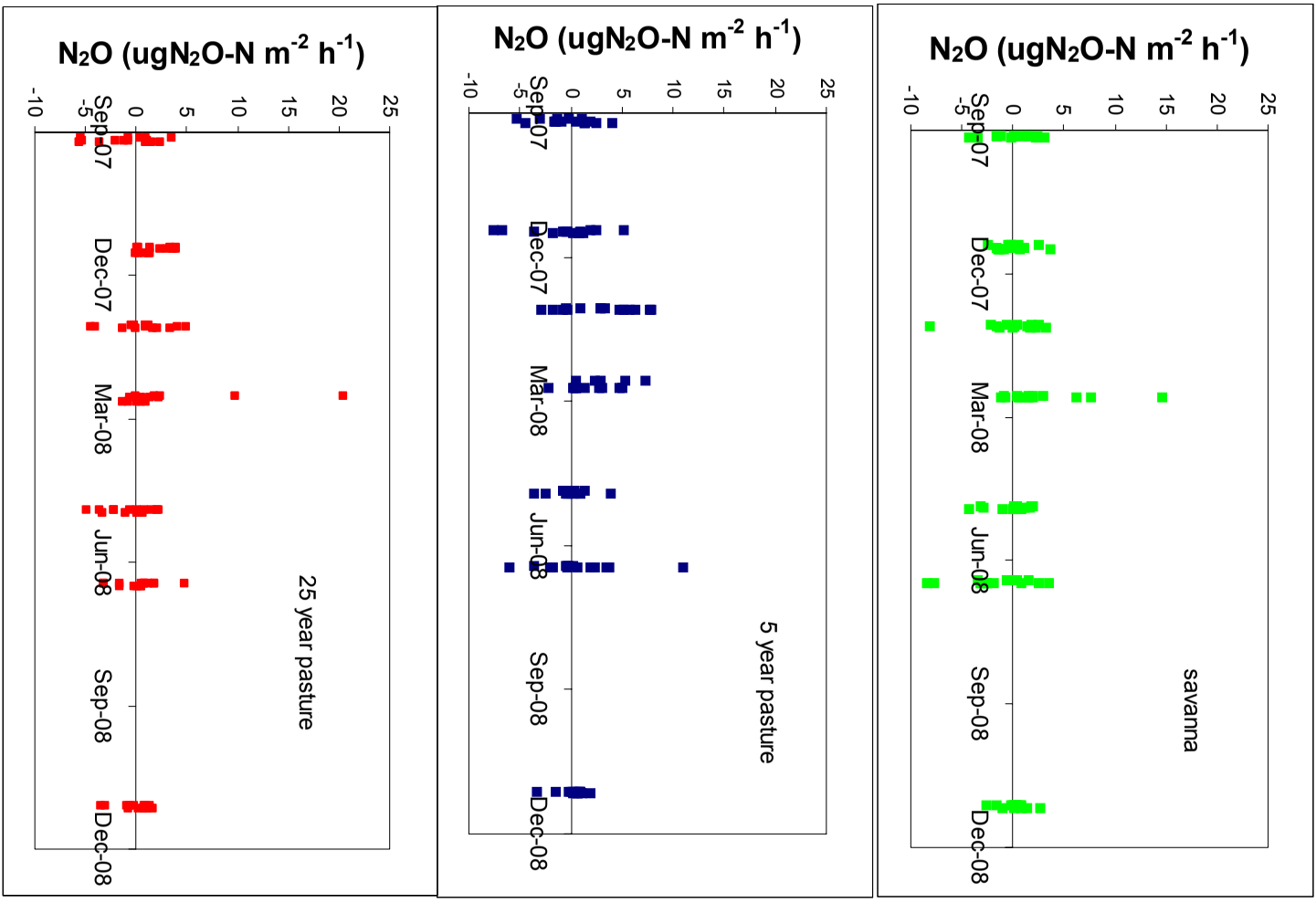
	CO_2 ($mgCm^{-2}h^{-1}$)			N_2O ($\mu g\ N_2O\text{-}N\ m^{-2}h^{-1}$)			CH_4 ($\mu g\ CH_4\text{-}C\ m^{-2}h^{-1}$)		
	savanna	5 year pasture	25 year pasture	savanna	5 year pasture	25 year pasture	savanna	5 year pasture	25 year pasture
Build up	254	334	426	0.1	0.8	3.9	-32	-19	7
Wet	659	894	633	2.6	2.3	2.4	-12	-8	182
Dry	103	117	125	0	0	0	-38	-28	-4

Conclusions

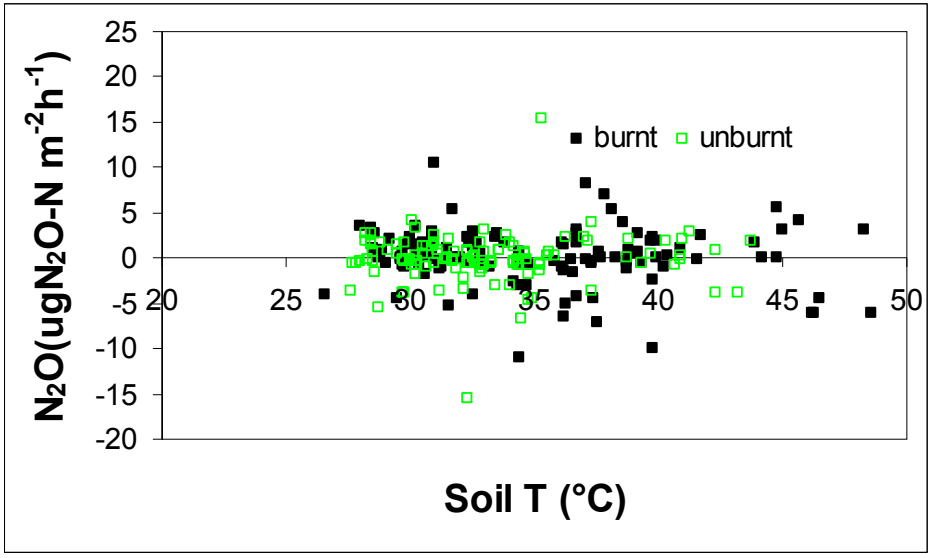
- Fire appears to have little effect on ghg emissions from savanna soils
- Conversion to pasture affects ghg emissions from savanna soils, increasing sources of CO_2 and N_2O, and decreasing sinks of CH_4
- Seasonal variation evident in fluxes
- CO_2 fluxes driven by soil temperature and water content
- N_2O and CH_4 fluxes driven primarily by soil water content

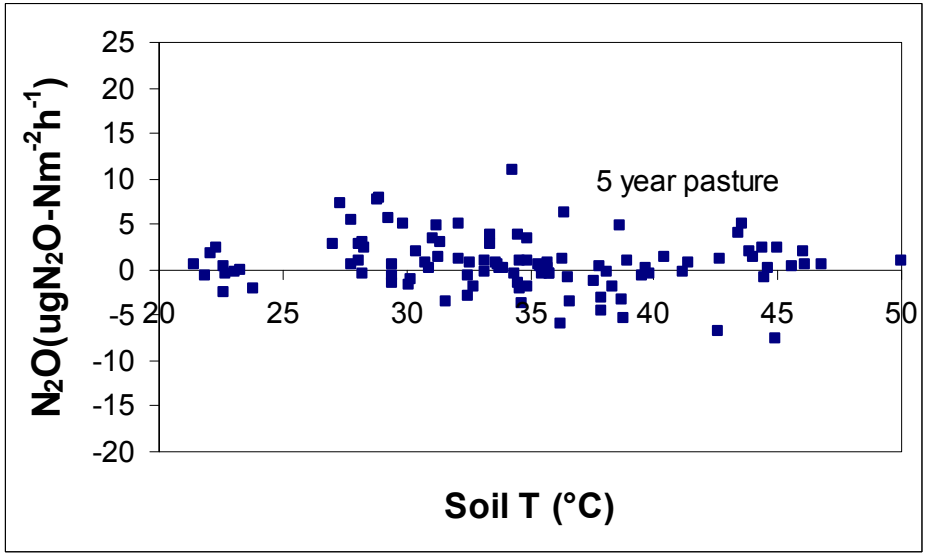
Seasonality; Conversion to pasture

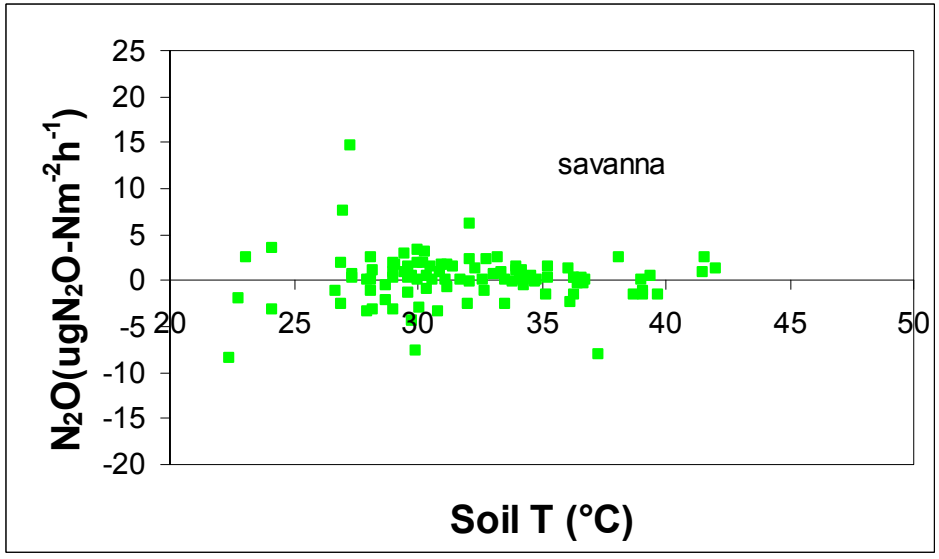
Douglas Daly

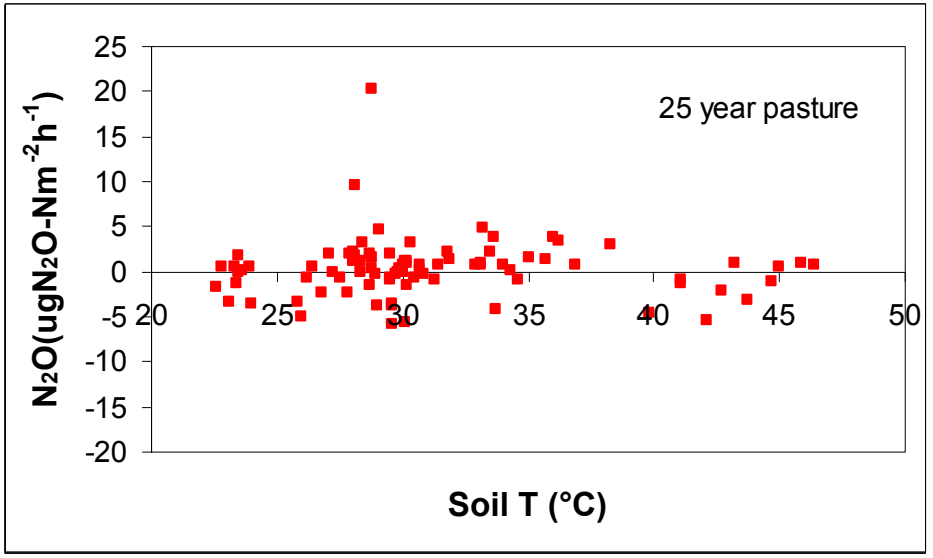


Environmental drivers: soil temperature









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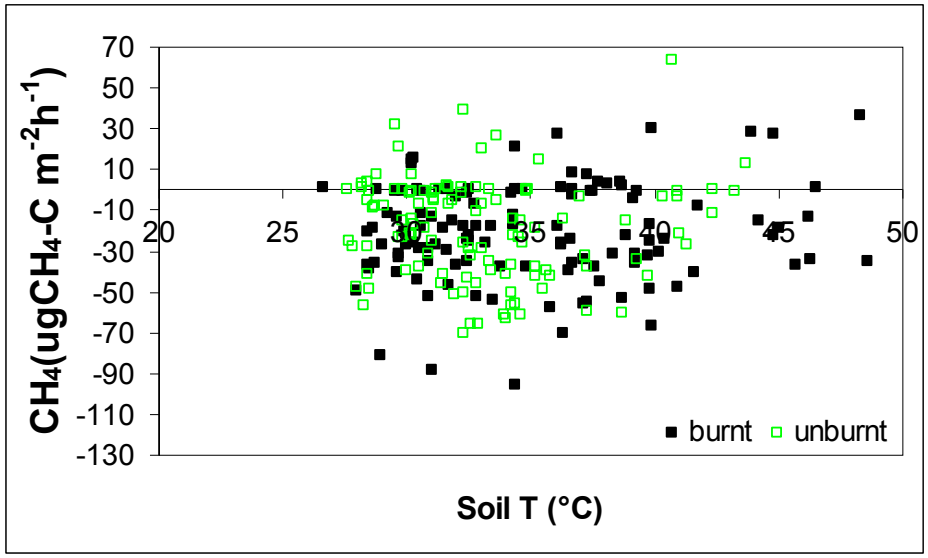
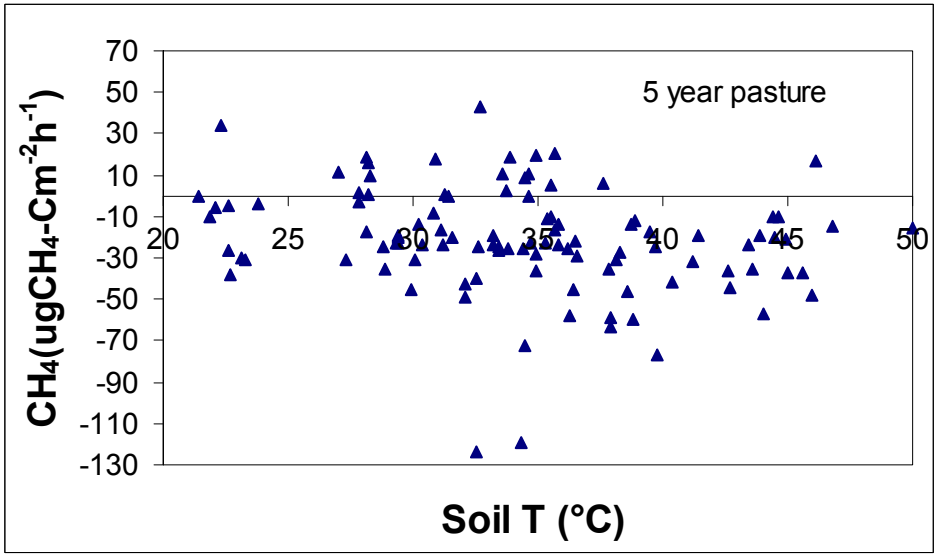
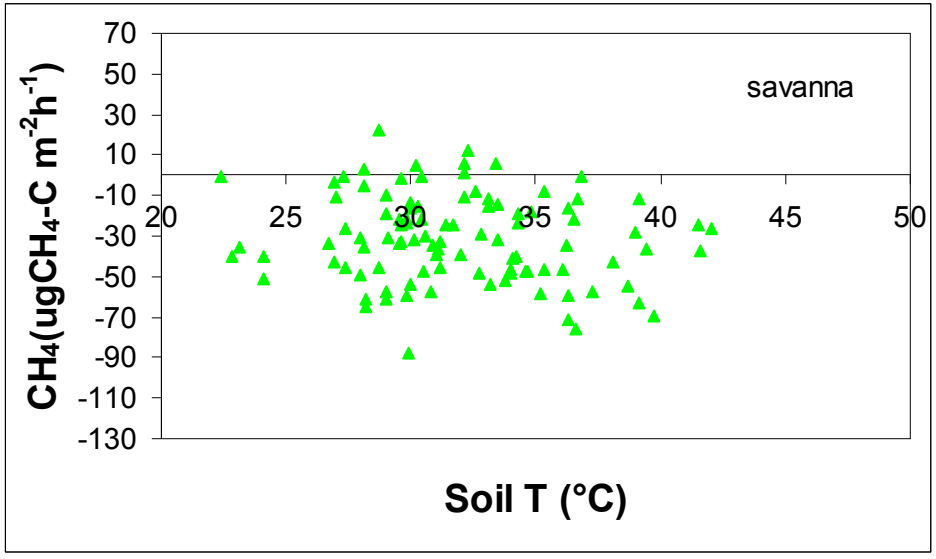
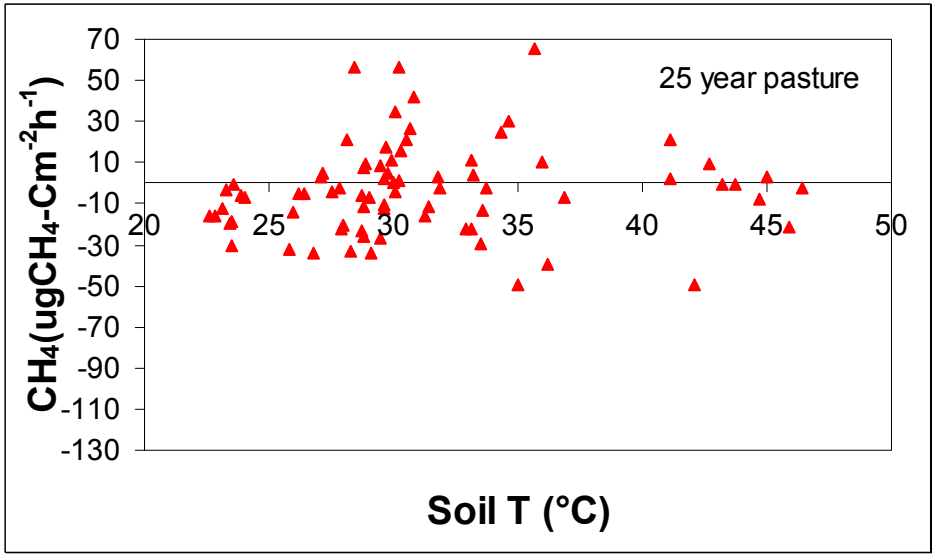
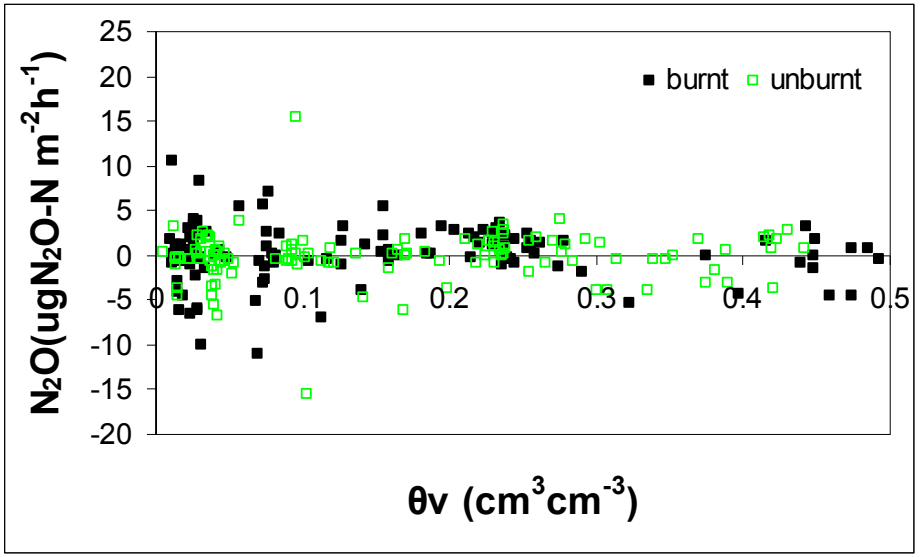


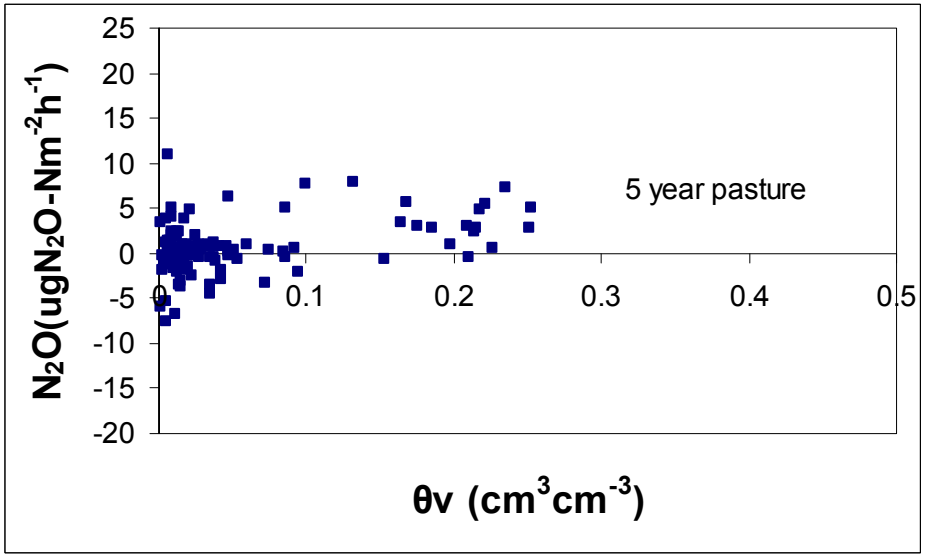


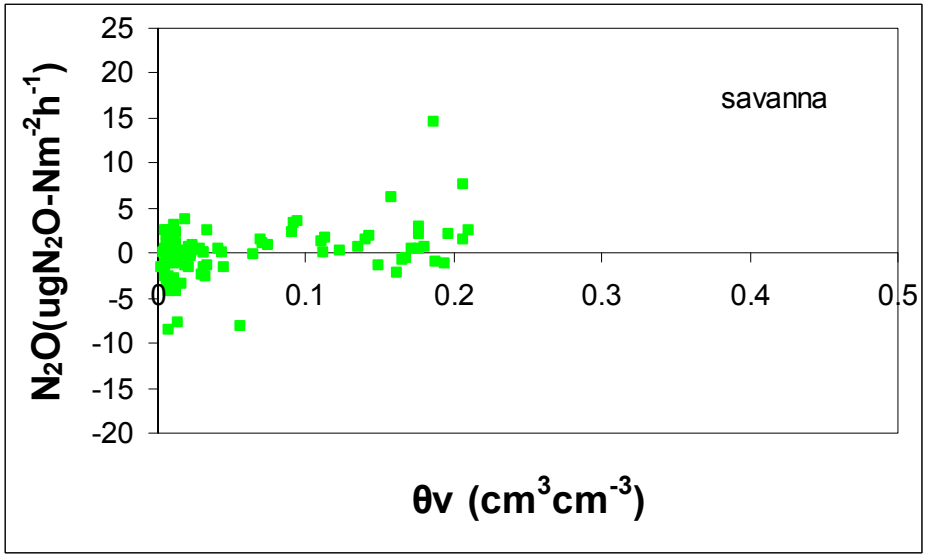


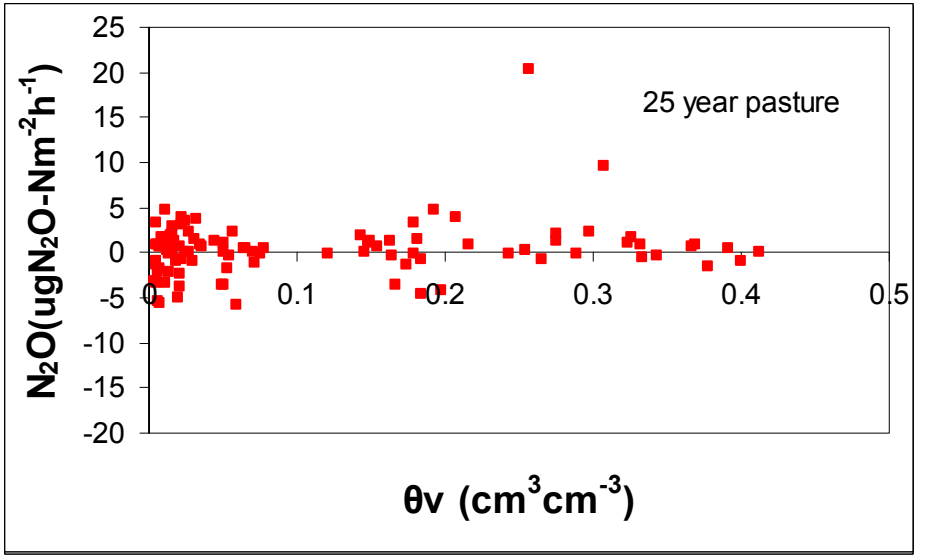


Environmental drivers: soil water content

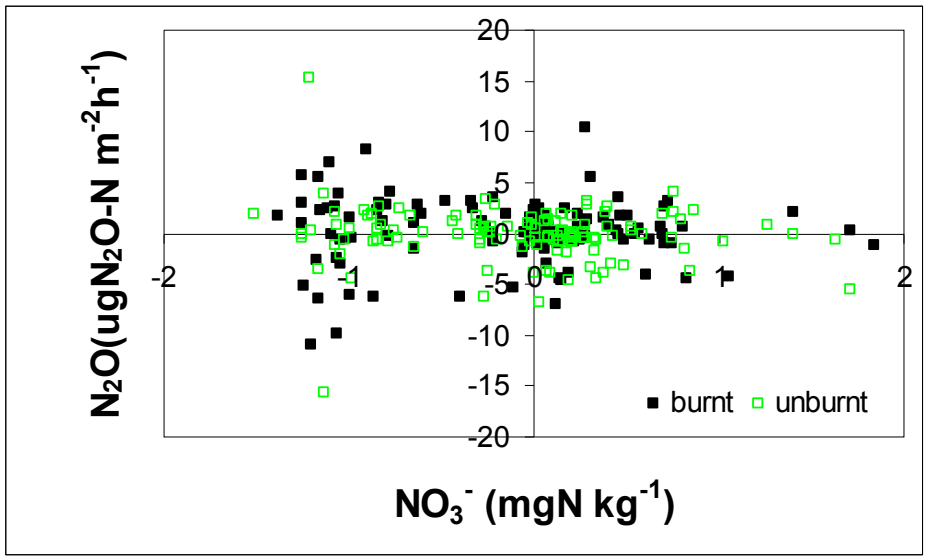


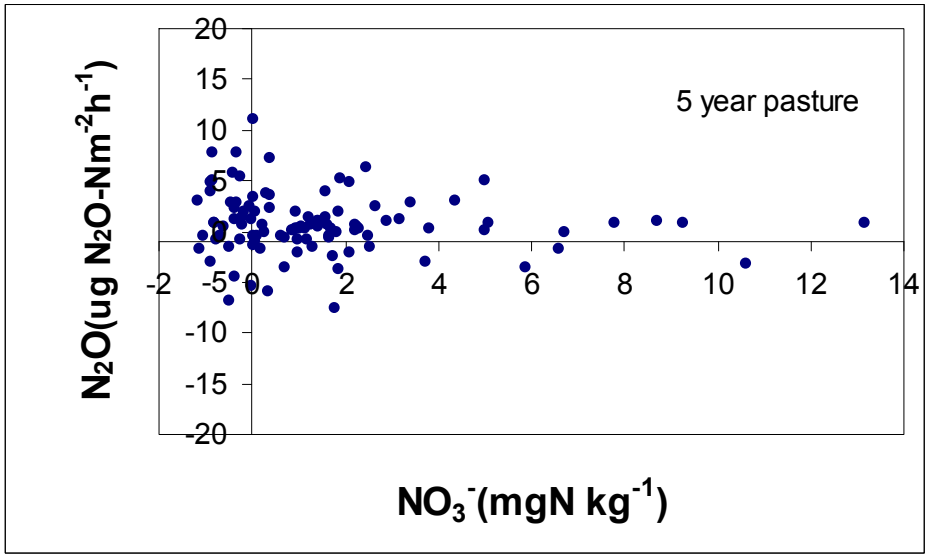


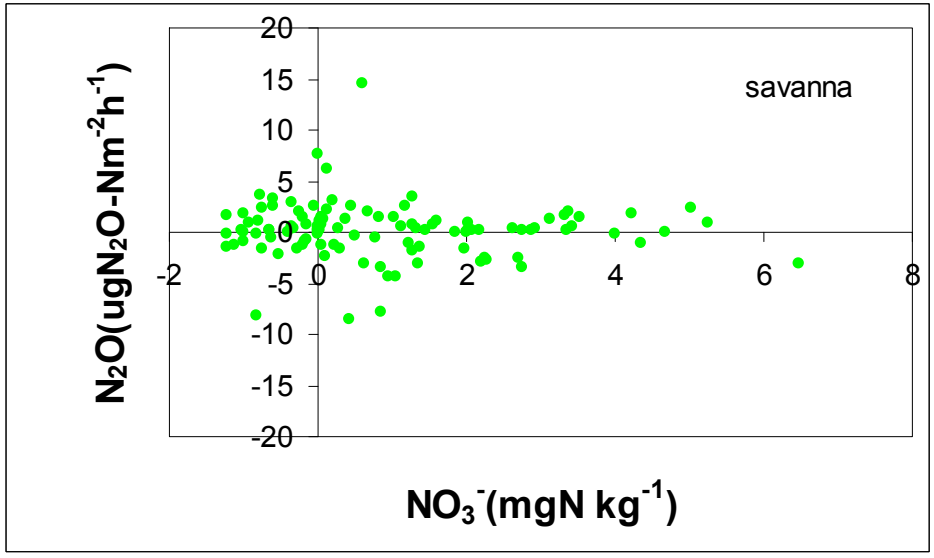


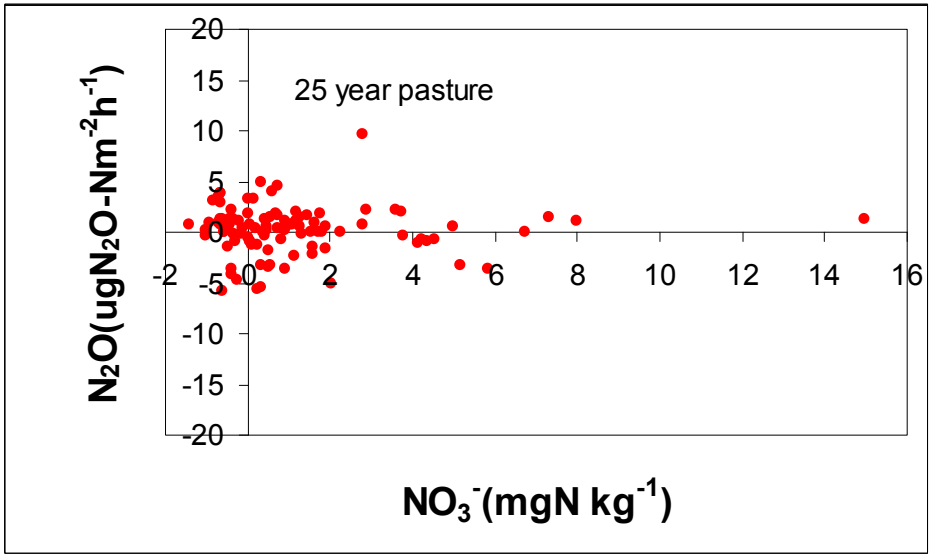


Environmental drivers: soil nitrogen









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