

Nitrous oxide emissions from dung, urine and dairy pond sludge applied to pasture

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Objectives

- evaluate the potential of nitrapyrin to reduce direct emissions from animal waste deposition in particular urine
- emissions for dung deposition and sludge application
- effect of season of deposition on emissions from dung and urine

Emissions studies undertaken

Automated system

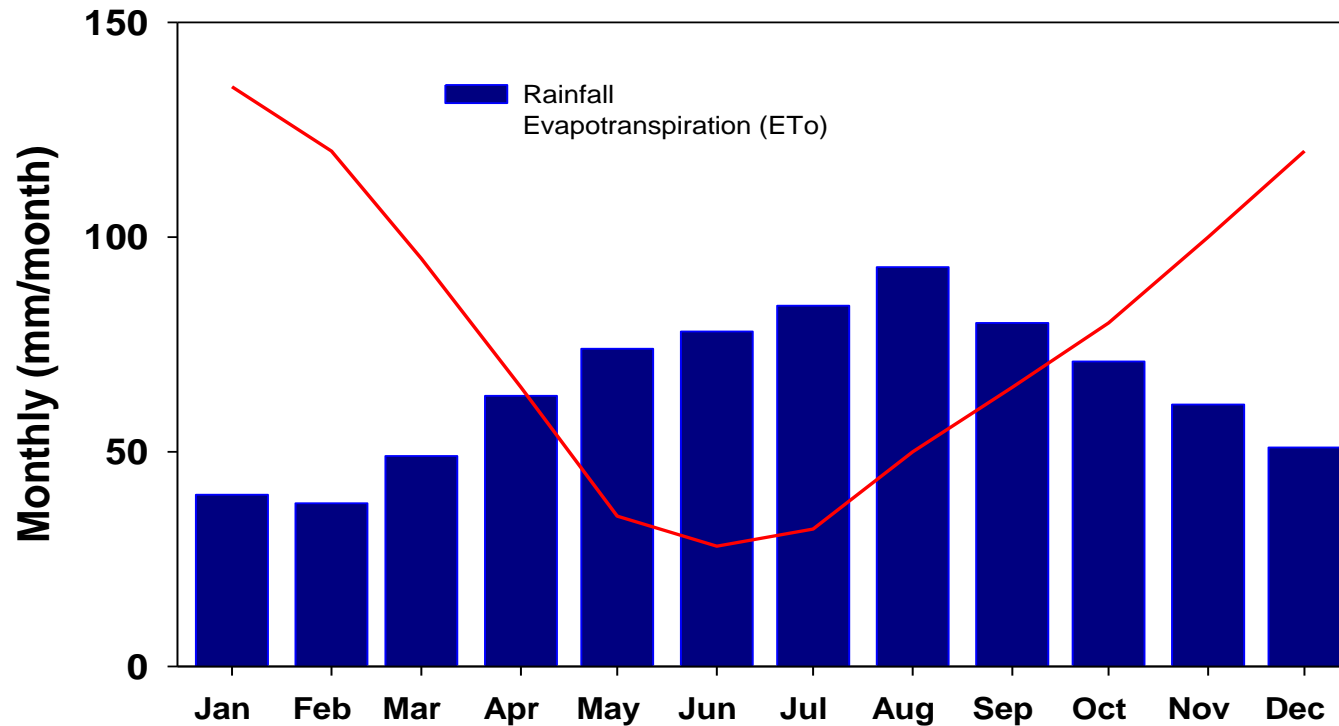
- Emissions from dung and urine plus effects of inhibitor on emissions from urine
- Emissions from dung and sludge plus effects of inhibitor on emissions from sludge

Manual chambers

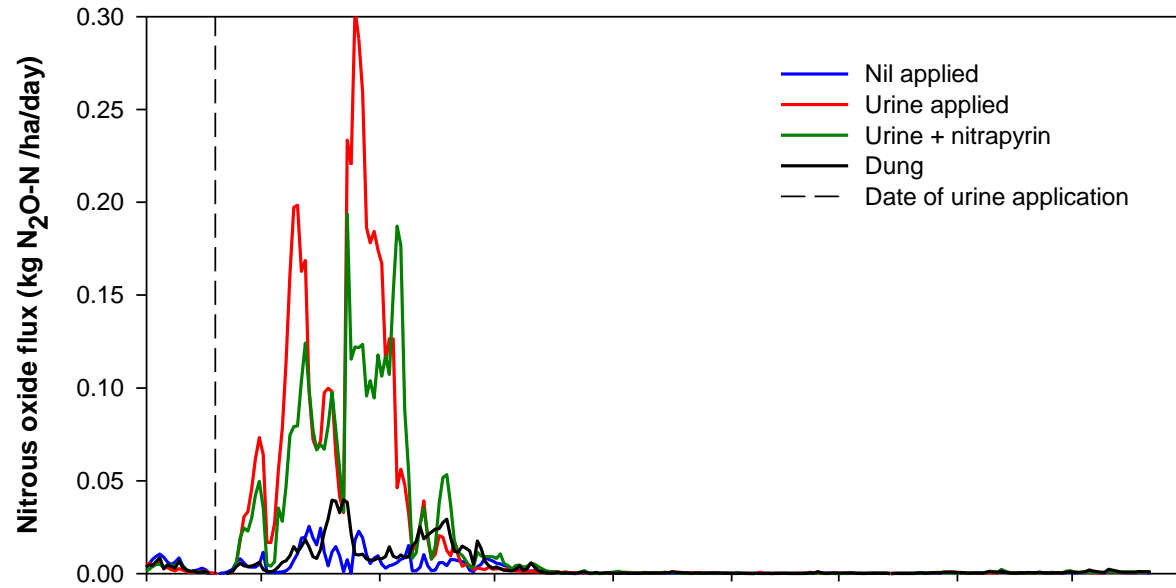
- Effect of inhibitor on emissions from dung and urine (seasonal short term study)

Locations

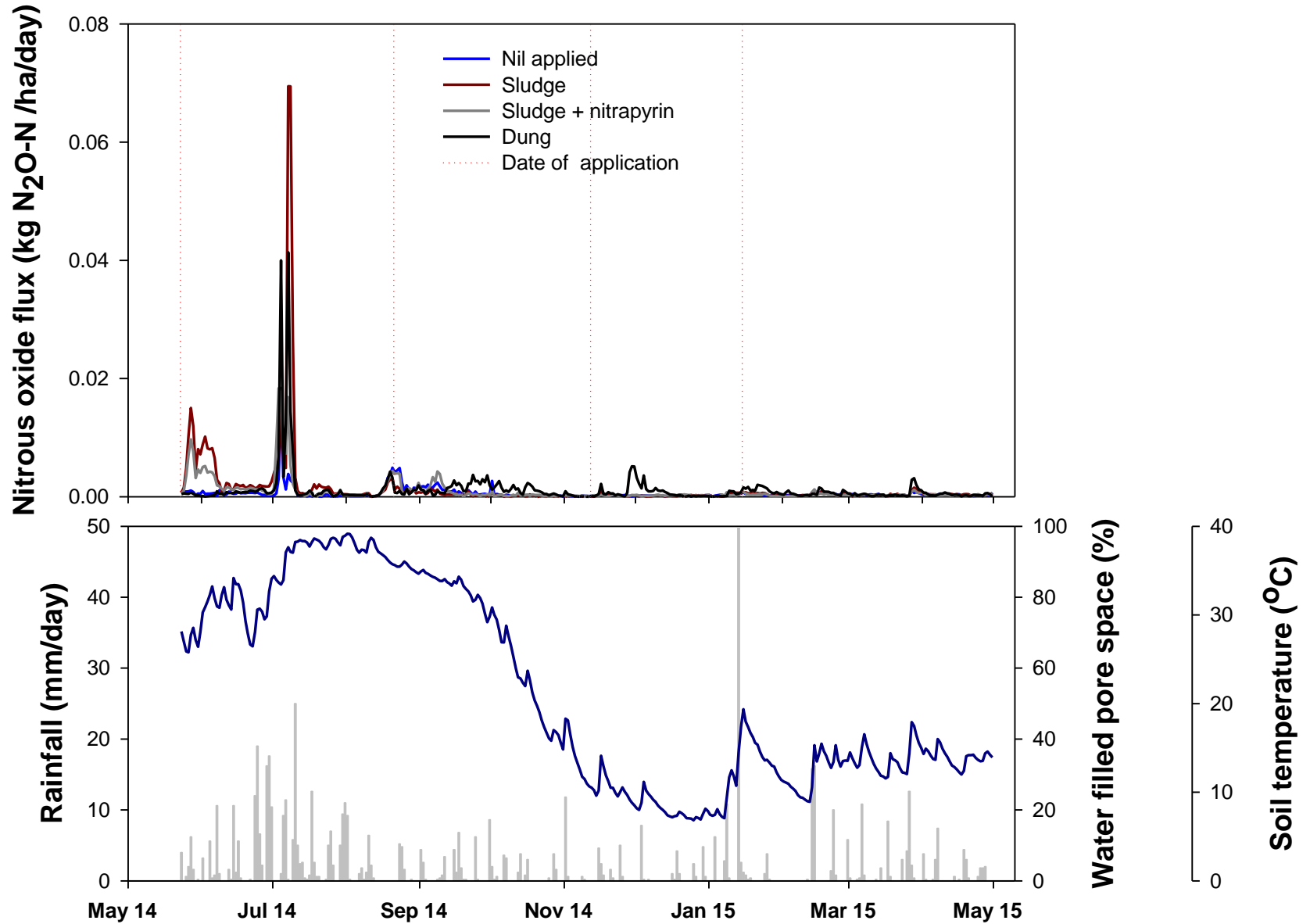
Location	Terang	Glenormiston
	38° 14'S, 142° 55'E	38° 10'S, 142° 58'E
Annual rainfall	780 mm	725 mm
Annual ETo	920 mm	970 mm
Soil type	Chromosol, basalt origin	Dermosol, volcanic ash origin



Daily nitrous oxide emissions dung and urine



Daily nitrous oxide emissions dung and sludge



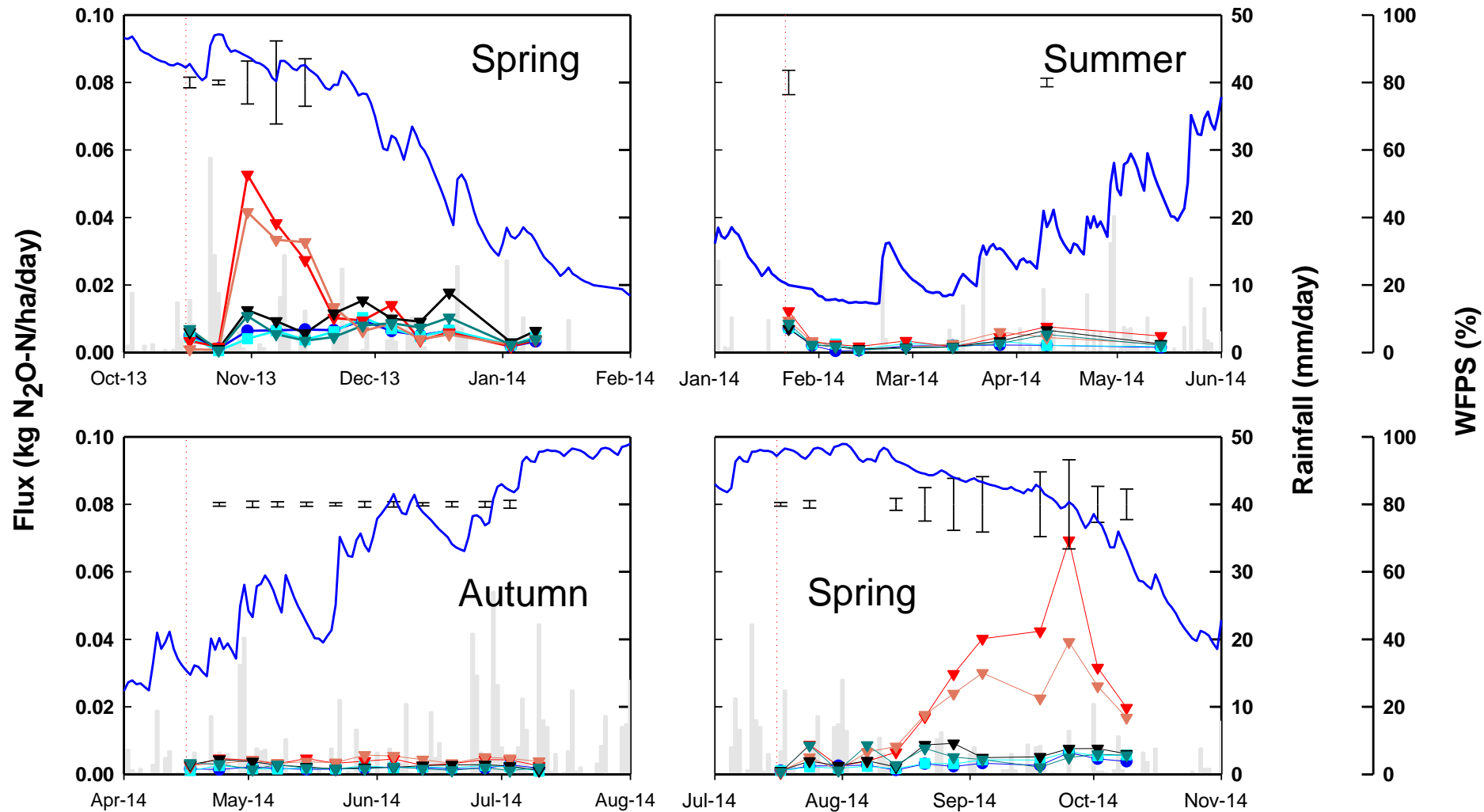
Summary N₂O emissions - Terang

	Days	Nil	Urine	Urine +	Dung
N ₂ O-N (kg N/ha)	245	0.60	5.35	4.15	1.02
Emission factor			0.47%	0.35%	0.09%
	Days	Nil	Sludge	Sludge+	Dung
N ₂ O-N (kg N/ha)	350	0.20	0.49	0.32	0.39
Emission factor			0.10%	0.05%	0.03%

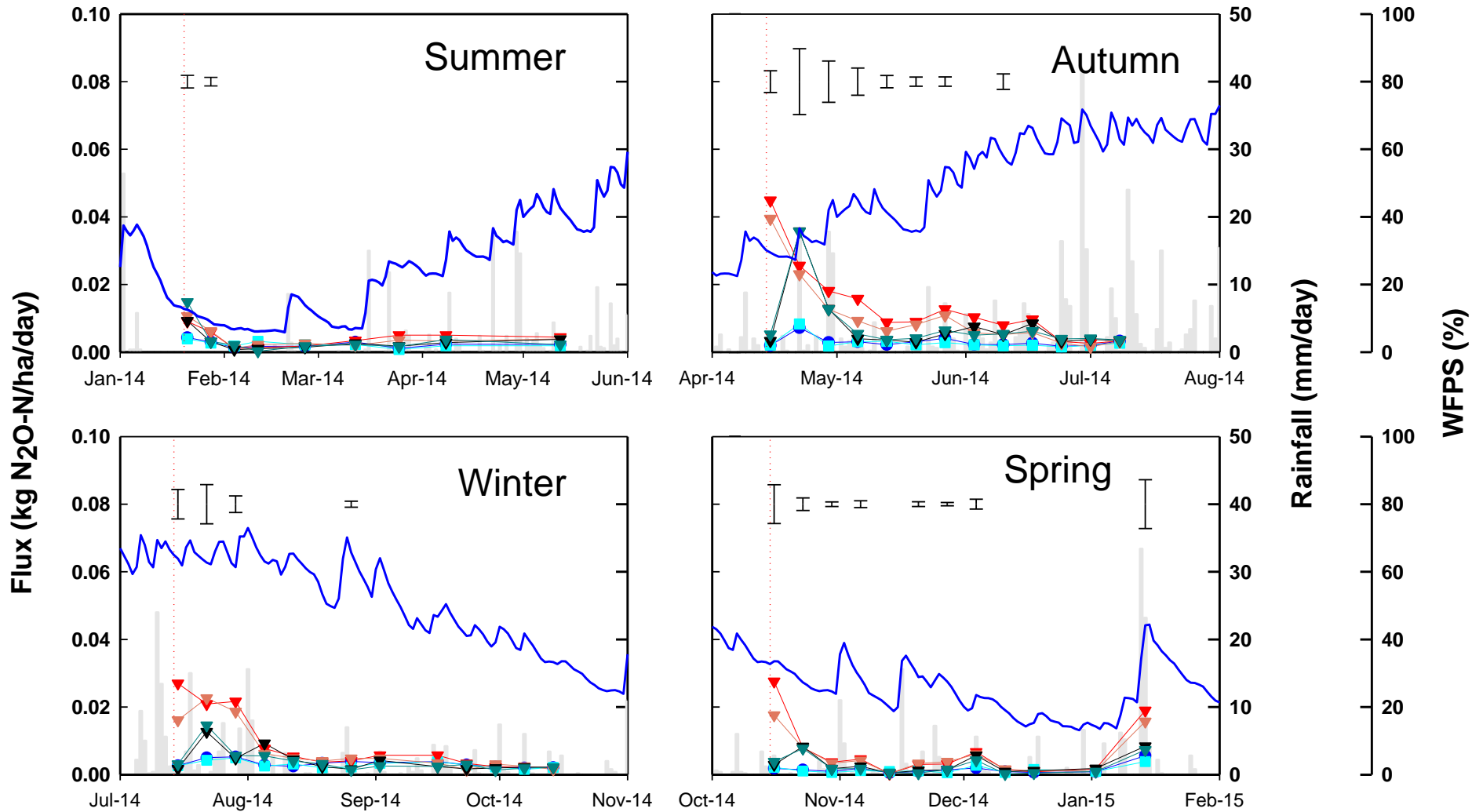
Seasonal urine and dung study

- **Treatments**
 - Nil +/- nitrapyrin
 - Urine +/- nitrapyrin
 - Dung +/- nitrapyrin
- **4 seasons at each site**
- **Manual chambers emissions (weekly for ~ 90 days)**

Nitrous oxide emissions - Terang



Nitrous oxide emissions - Glenormiston



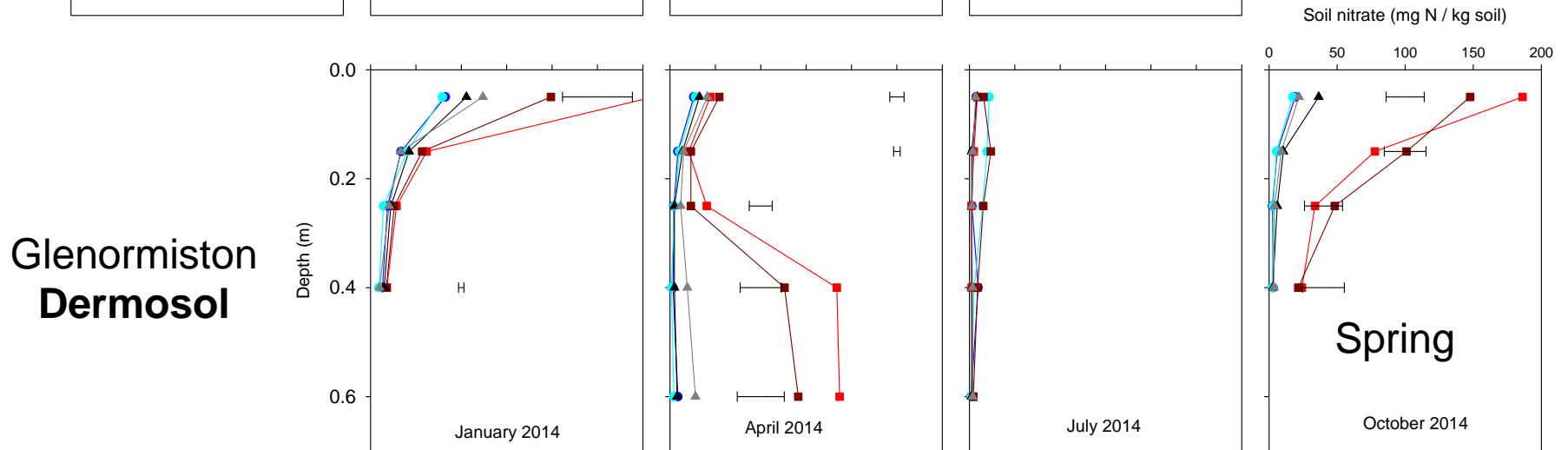
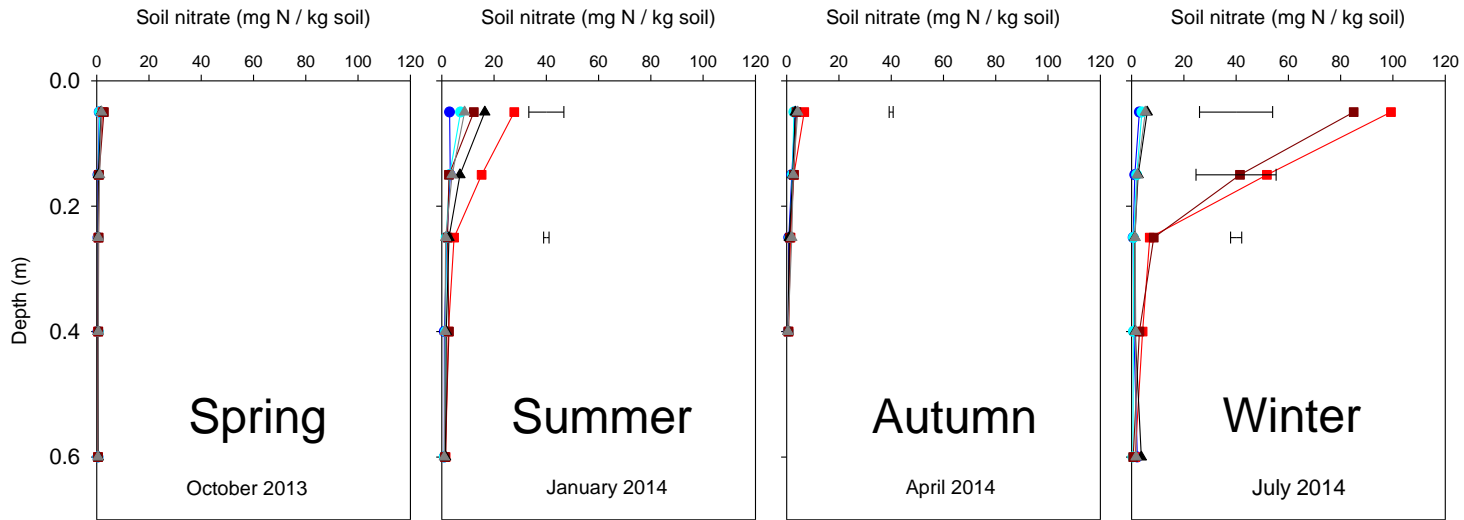
Summary N₂O emissions - Terang

	Nil	Nil +	Urine	Urine +	Dung	Dung +	I.s.d. (p=0.05)
16 October 2013 - Spring							
kg N / ha EF	0.46	0.43	1.28 0.10%	1.09	0.76 0.08%	0.52	0.392
22 January 2014- Summer							
kg N / ha EF	0.22	0.27	0.51 0.04%	0.38	0.36 0.04%	0.36	0.072
16 April 2014 – Autumn							
kg N / ha EF	0.16	0.17	0.32 0.02%	0.35	0.22 0.02%	0.17	0.080
16 July 2014 – Winter							
kg N / ha EF	0.26	0.30	2.15 0.19%	1.52	0.46 0.05%	0.42	0.491

Summary N₂O emissions - Glenormiston

	Nil	Nil +	Urine	Urine +	Dung	Dung +	I.s.d. (p=0.05)
20 January 2014 – Summer							
kg N / ha EF	0.24	0.23	0.44 0.03%	0.38	0.29 0.01%	0.31	0.102
14 April 2014 – Autumn							
kg N / ha EF	0.25	0.24	1.06 0.08%	0.81	0.67 0.12%	0.68	0.352
14 July 2014 – Winter							
kg N / ha EF	0.31	0.28	0.74 0.06%	0.63	0.37 0.02%	0.36	0.197
16 July 2014 – Spring							
kg N / ha EF	0.15	0.13	0.48 0.04%	0.41	0.26 0.03%	0.21	0.094

Soil Nitrate - N (3 months after application)



Summary

- N_2O emissions from urine 0.02-0.47 % of applied
- **NI reduced emissions from urine by 0 to 50%**
- Minimal effect of nitrification inhibitor on leaching
- **Emissions strongly related to soil water conditions**

- N_2O emissions from dung 0.01 to 0.12% of N applied
- **NI little impact on emissions from dung**

- N_2O emissions from sludge 0.10% of applied N
- **NI reduced emissions from sludge by 60%**

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Landholders

DemoDAIRY, Terang and SW TAFE Glenormiston Campus