

PROGRAM B: HighFire



Fire, vegetation change and potential feedback to the global carbon cycle

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Outline

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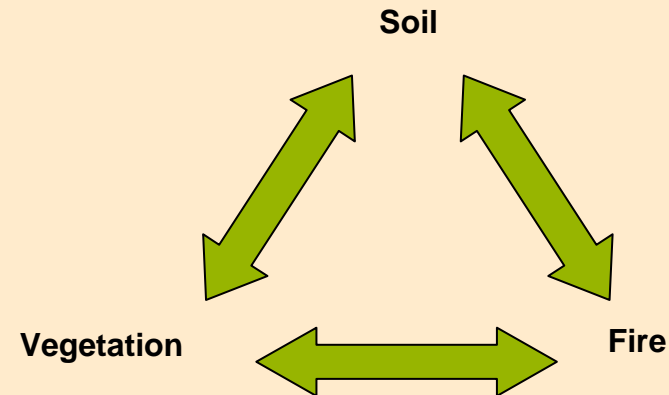
Fire

Direct

- Heat

Indirect

- Increased solar radiation leading to increased soil temperatures
- Chemical changes
- Physical changes
- Hydrophobicity
- Post-fire vegetation





Carbon Fluxes

Ecosystem Fluxes

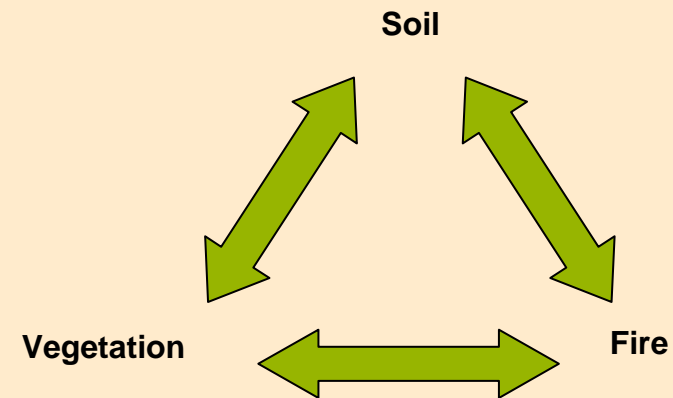
Why is soil so important?

What influences these fluxes?

Temperature

Vegetation Type

Soil depth



Why is this so important with respect to climate change?

Soil store = 1500 Gt C

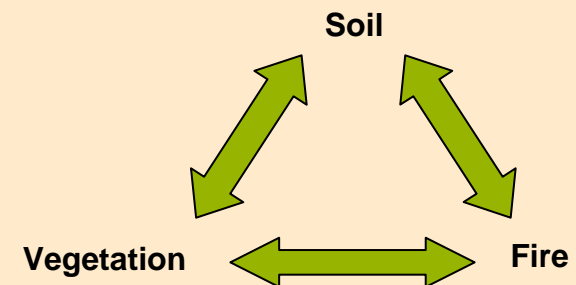
Soil respiration = 76 Gt C/yr

Anthropogenic emissions = 6.3Gt C/yr



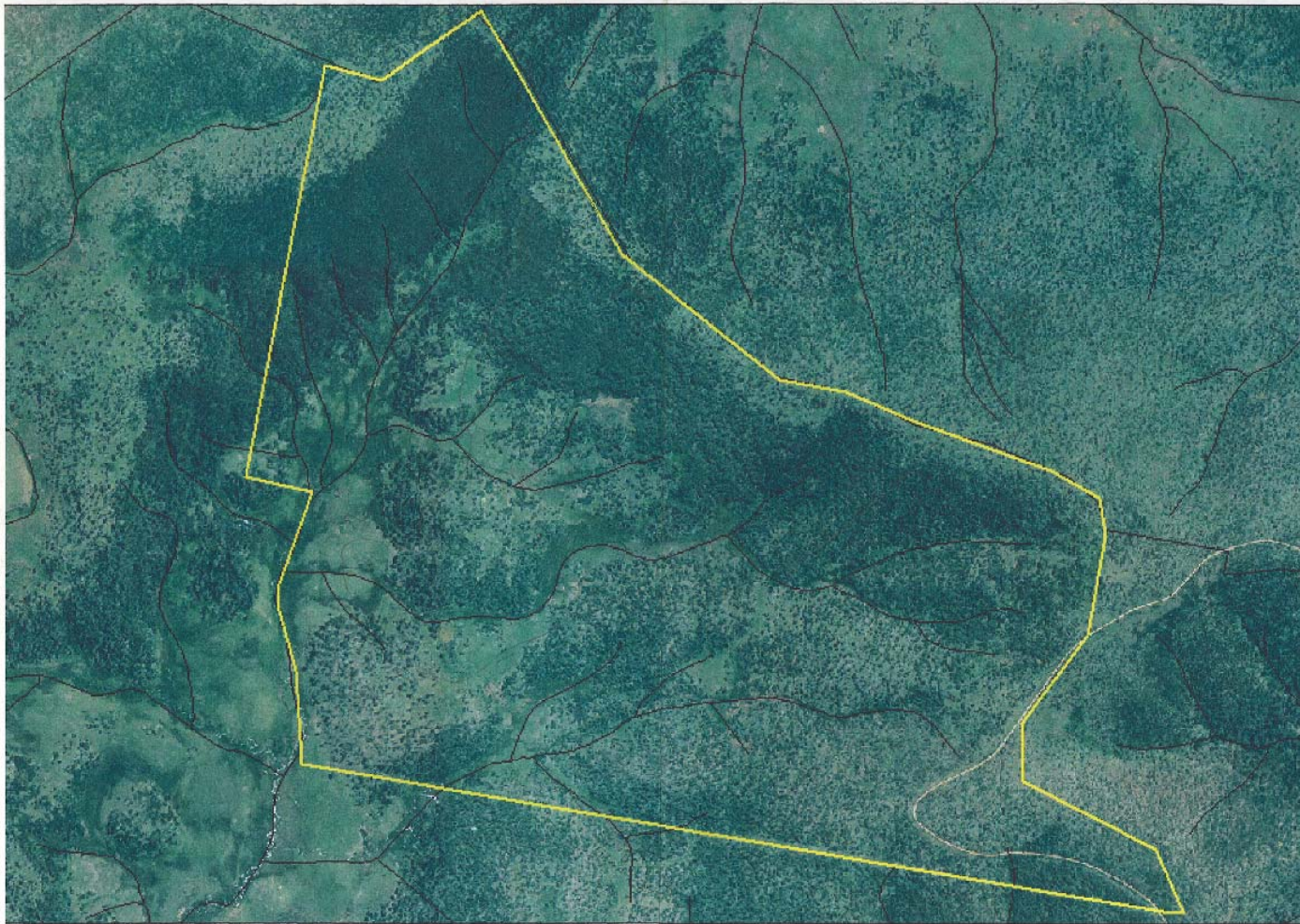
Research Goals

1. Examine the response of soil respiration to fire.
 - Develop temperature dependence functions for alpine soils
 - Test effects of different vegetation types
 - Test effects of soil depth
2. Examine recalcitrant and labile pools of soil C - with and without fire
3. Examine substrate influence on soil respiration, especially effects of recently fixed C (e.g. root exudates) vs older C (e.g. litter)





Snowy Plains, NSW





Sites

- Snow gum with shrub understorey
- Snow gum with grass understorey
- Grassland

Sampled at 3 soil depths







Results to Date

Soil analysis for vegetation type at different depths.

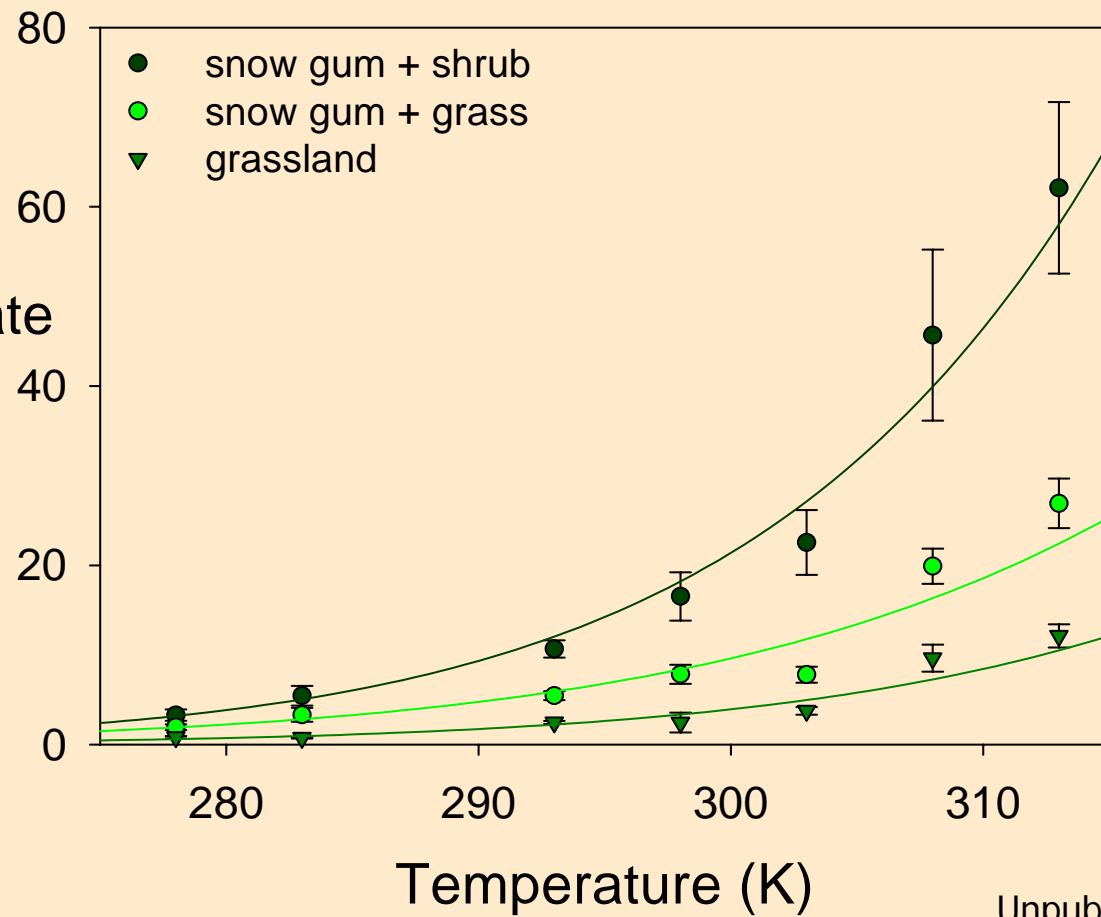
	Loss on Ignition %	SE	Organic C %	SE	C:N	Available P (Olsen) mg/kg	SE
Snow gum + shrub understorey							
0-10	24.2	2.4	6.8	0.4	7.7	22.4	2.4
10-30	19.8	3.4	6.0	0.1	10.0	19.1	4.0
30-50	10.2	2.7	5.2	0.9	15.4	7.7	3.1
Snow gum + grass understorey							
0-10	17.9	1.5	6.3	0.1	10.7	11.1	1.5
10-30	12.4	0.7	5.6	0.3	13.9	5.7	0.4
30-50	8.3	0.4	3.7	0.3	14.0	3.5	0.2
50-70	6.4	1.3	2.3	0.4	12.3	4.5	1.0
Grassland							
0-10	10.2	0.8	6.7	0.4	13.9	5.0	0.4
10-30	8.6	0.8	5.0	0.3	13.4	2.9	0.2
30-50	5.0	0.6	2.8	0.2	13.0	1.9	0.3

Unpublished Data



Vegetation type

Respiration Rate
 ($\mu\text{mol C g}^{-1}$
 dwt soil h^{-1})

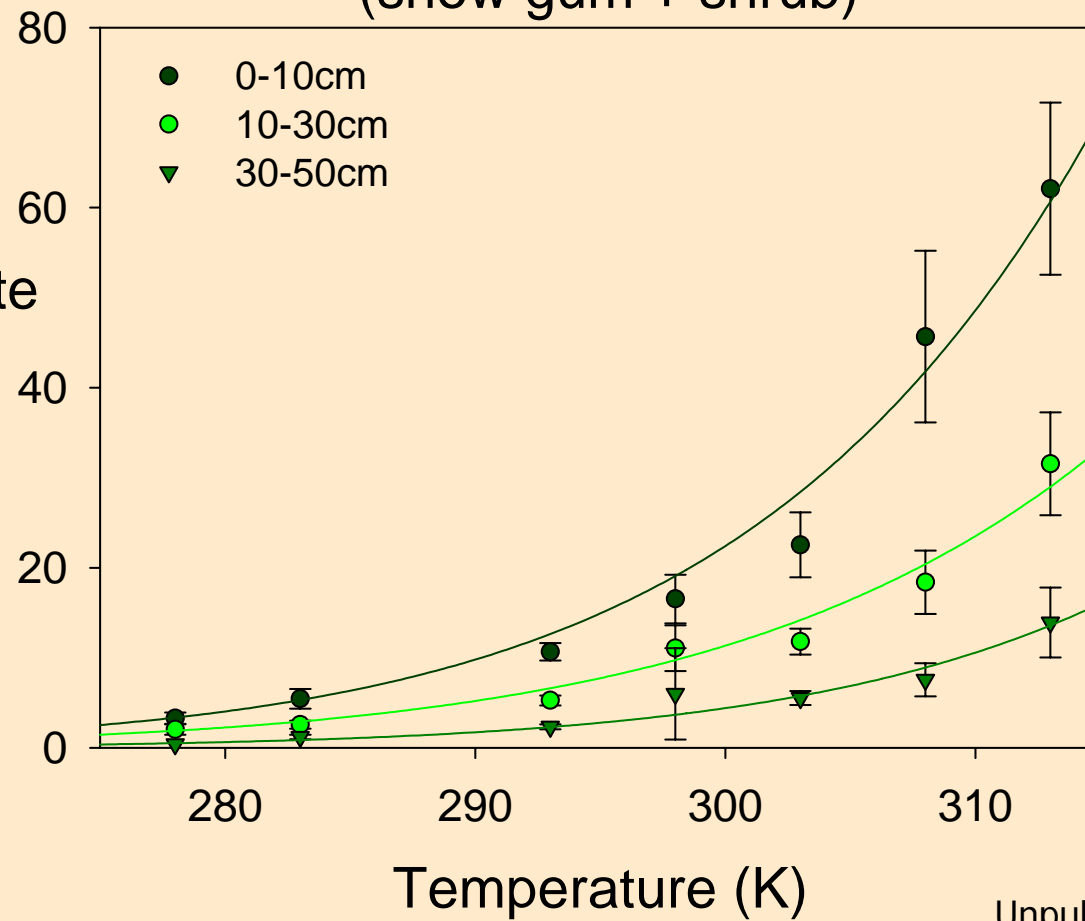


Unpublished Data



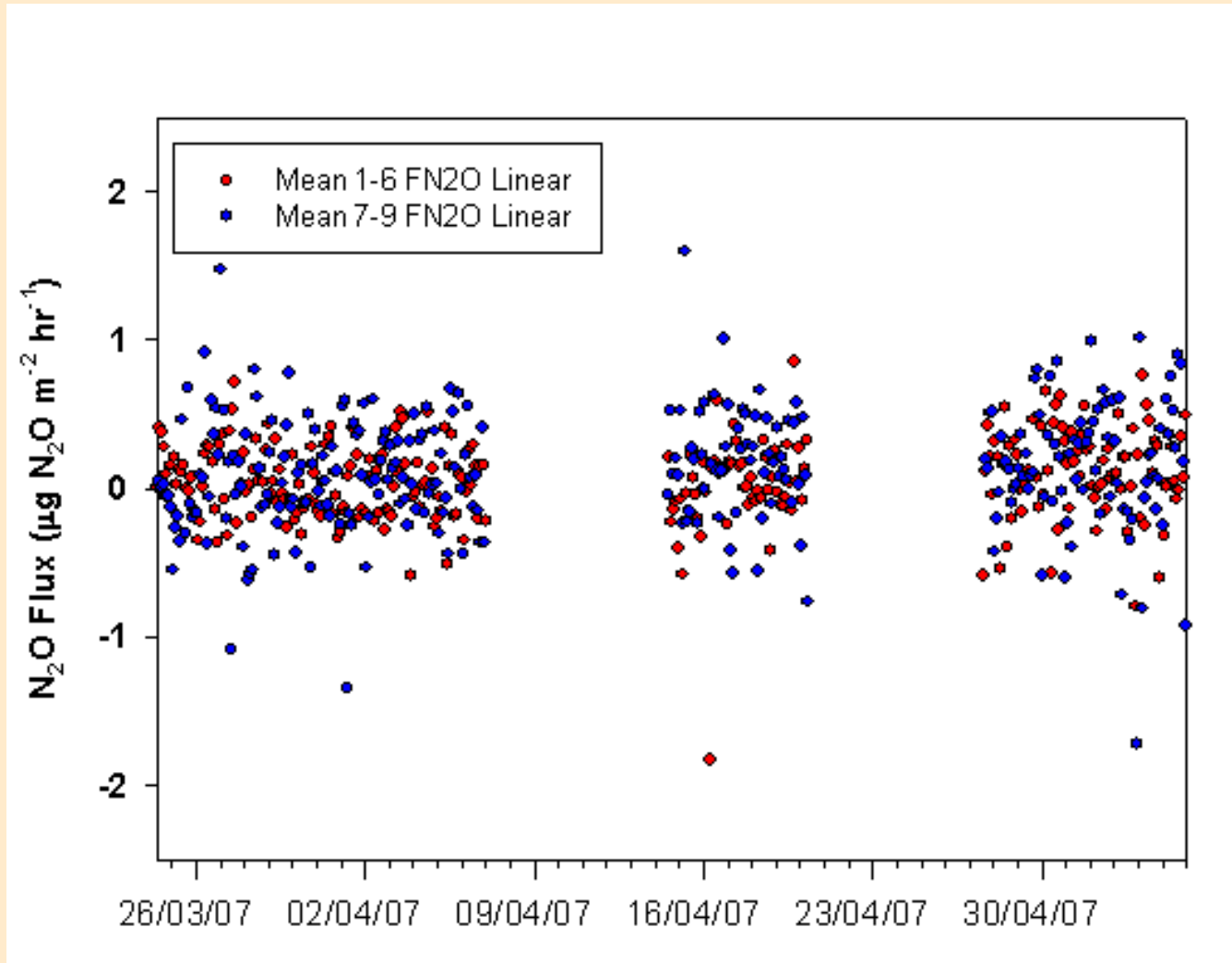
Soil depth (snow gum + shrub)

Respiration Rate
($\mu\text{mol C g}^{-1}$
dwt soil h^{-1})



Unpublished Data







Future work

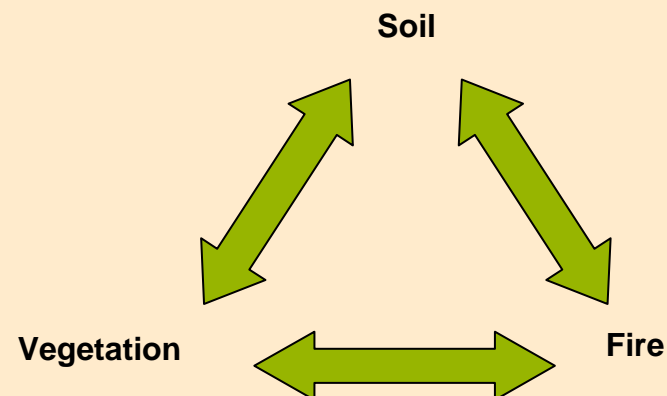
Addition Experiments:

- Influence of Litter type on C fluxes
- C substrates as drivers of C fluxes
- Influence of Charcoal on C fluxes



Conclusion

- Fire plays a major role in ecosystem function
- Important to understand the driver of soil C fluxes





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