THE UNIVERSITY OF MELBOURNE

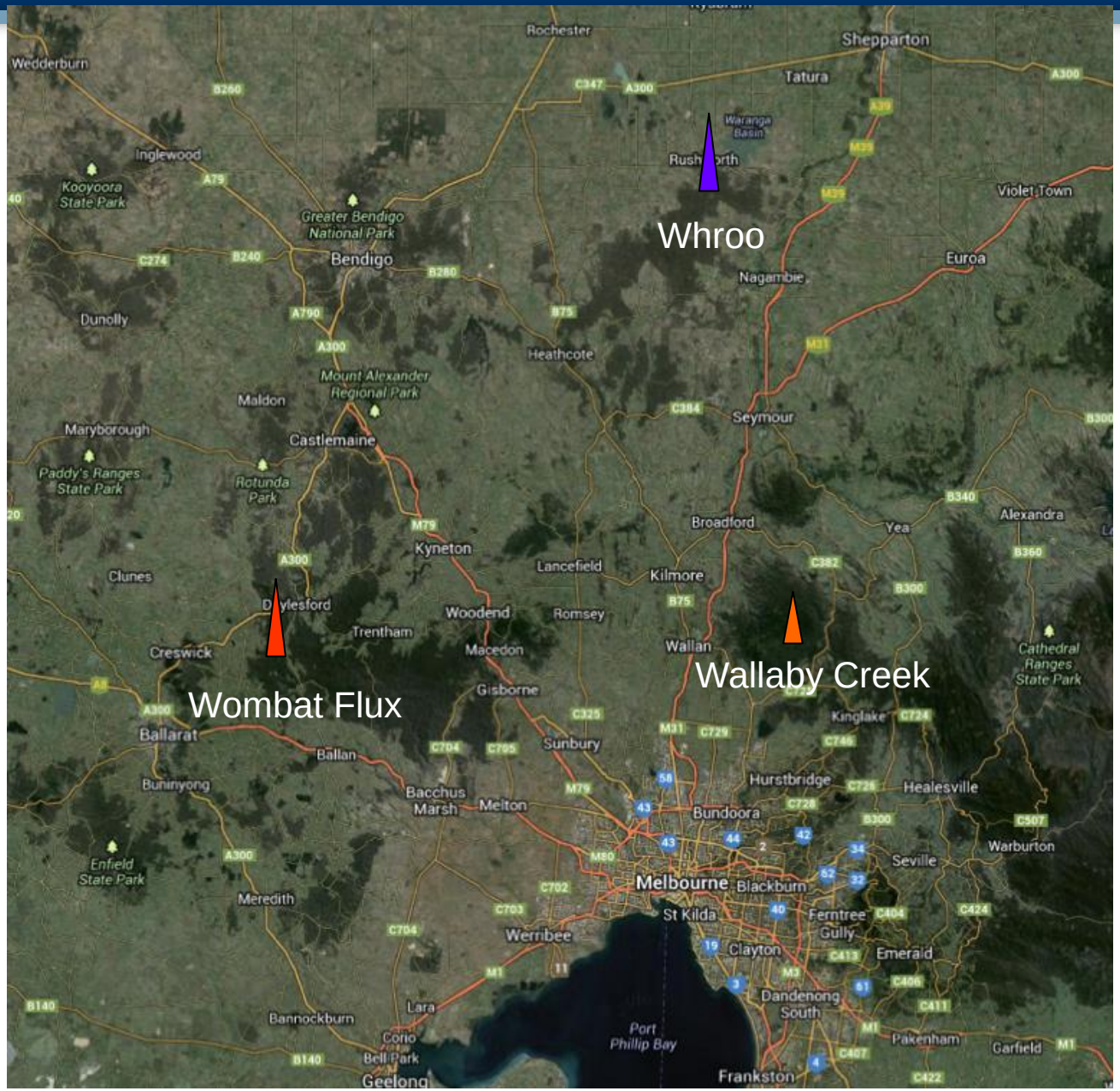
Wombat Flux

Department of Forest and Ecosystem Science

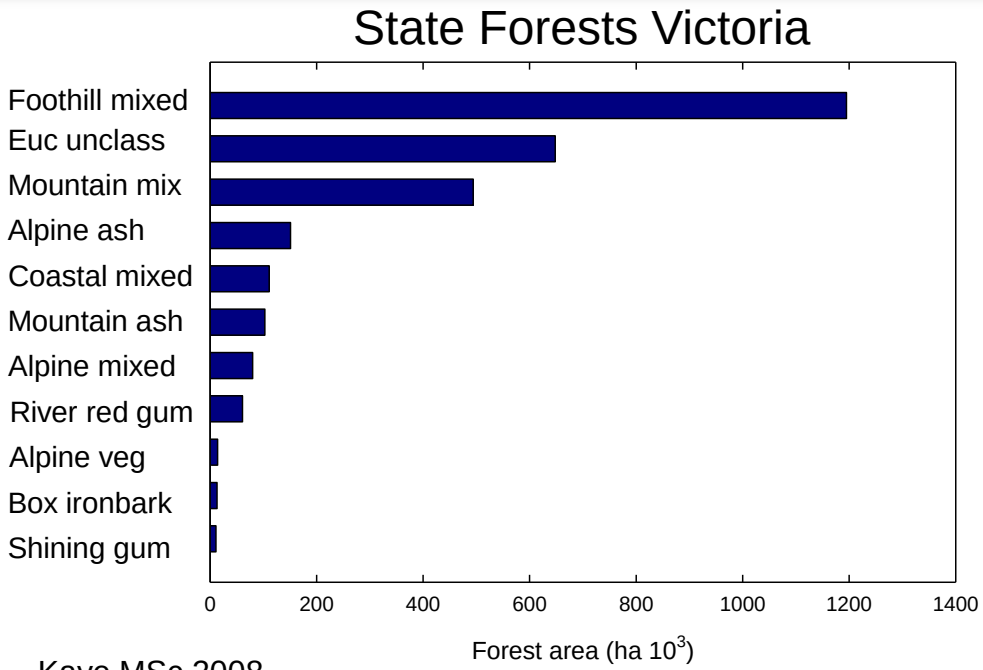
Nina Hinko Najera, Anne Griebel, Benedikt Fest, Julio Najera Umana, Steve Livesley, Stefan Arndt and a lot of Monashians

THE UNIVERSITY OF MELBOURNE

Location of flux towers



Wombat Forest Flux



Kaye MSc 2008

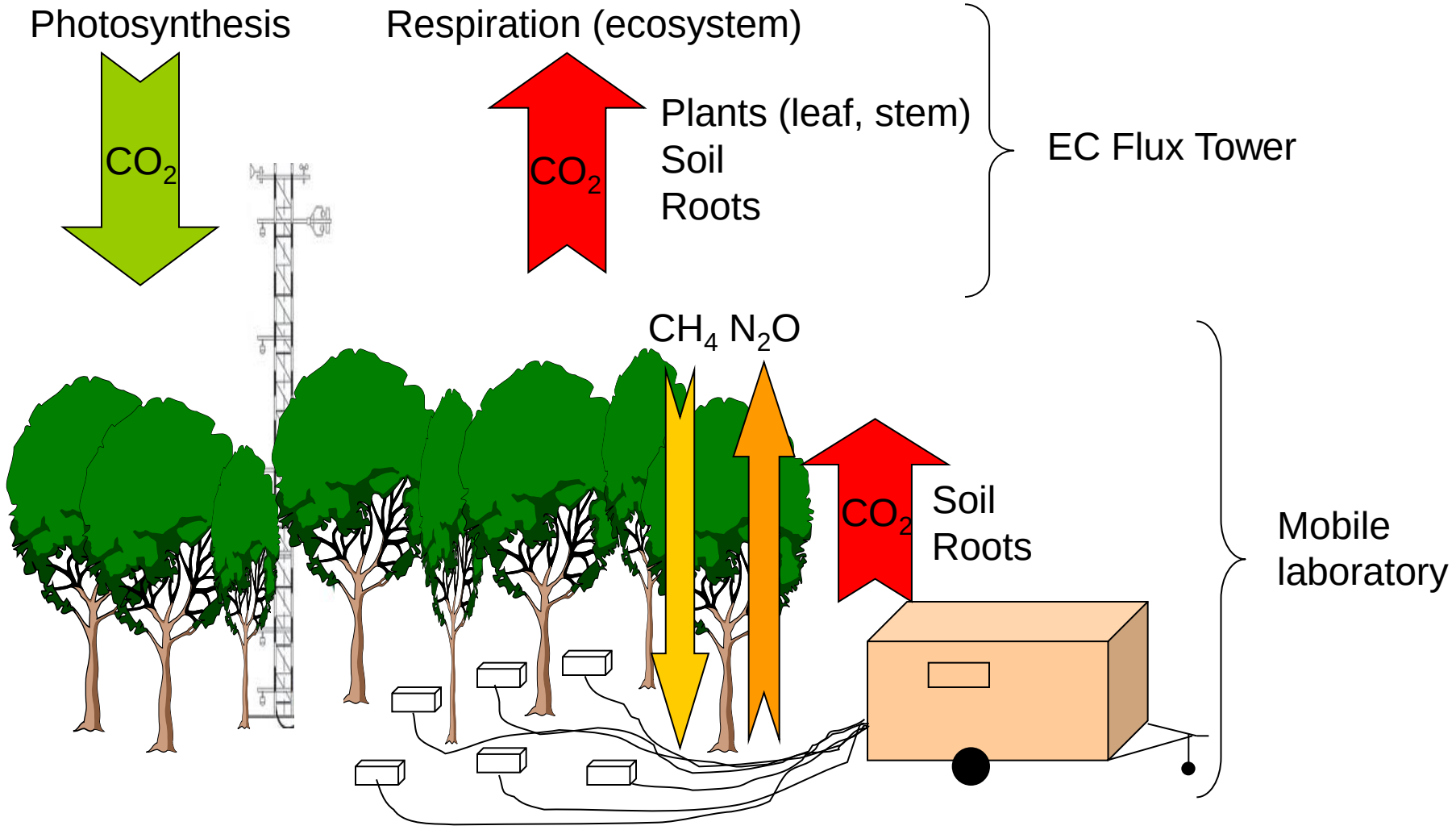
- cool temperate dry sclerophyll forest
- *E. obliqua* (messmate stringybark), *E. radiata* (narrow-leafed peppermint), *E. rubida* (candlebark gum)
- Climate: cool temperate to Mediterranean (warm & dry summers, cold & wet winters)
- yellow podzolic soil, silty clays overlying clays (from Ordovician marine sediments)

E. obliqua

E. radiata

E. rubida

Wombat Forest Flux



Flux tower 35m
Mean canopy 25m

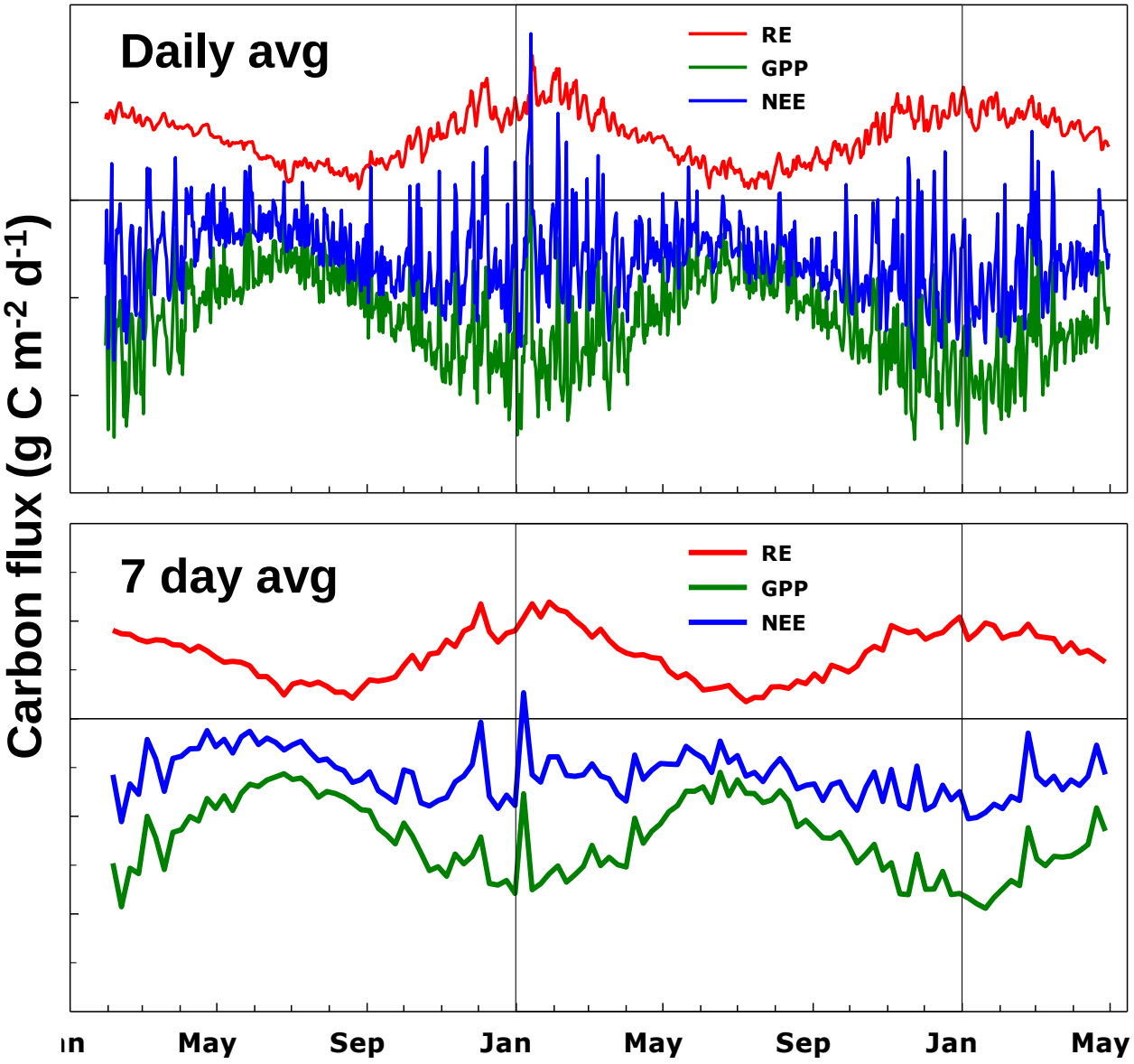
Drought treatments (-40% of rainfall)

Satellite sites

THE UNIVERSITY OF MELBOURNE

Wombat Forest Flux

Carbon flux Wombat Forest



Respiration

Net ecosystem exchange

Photosynthesis (GPP)

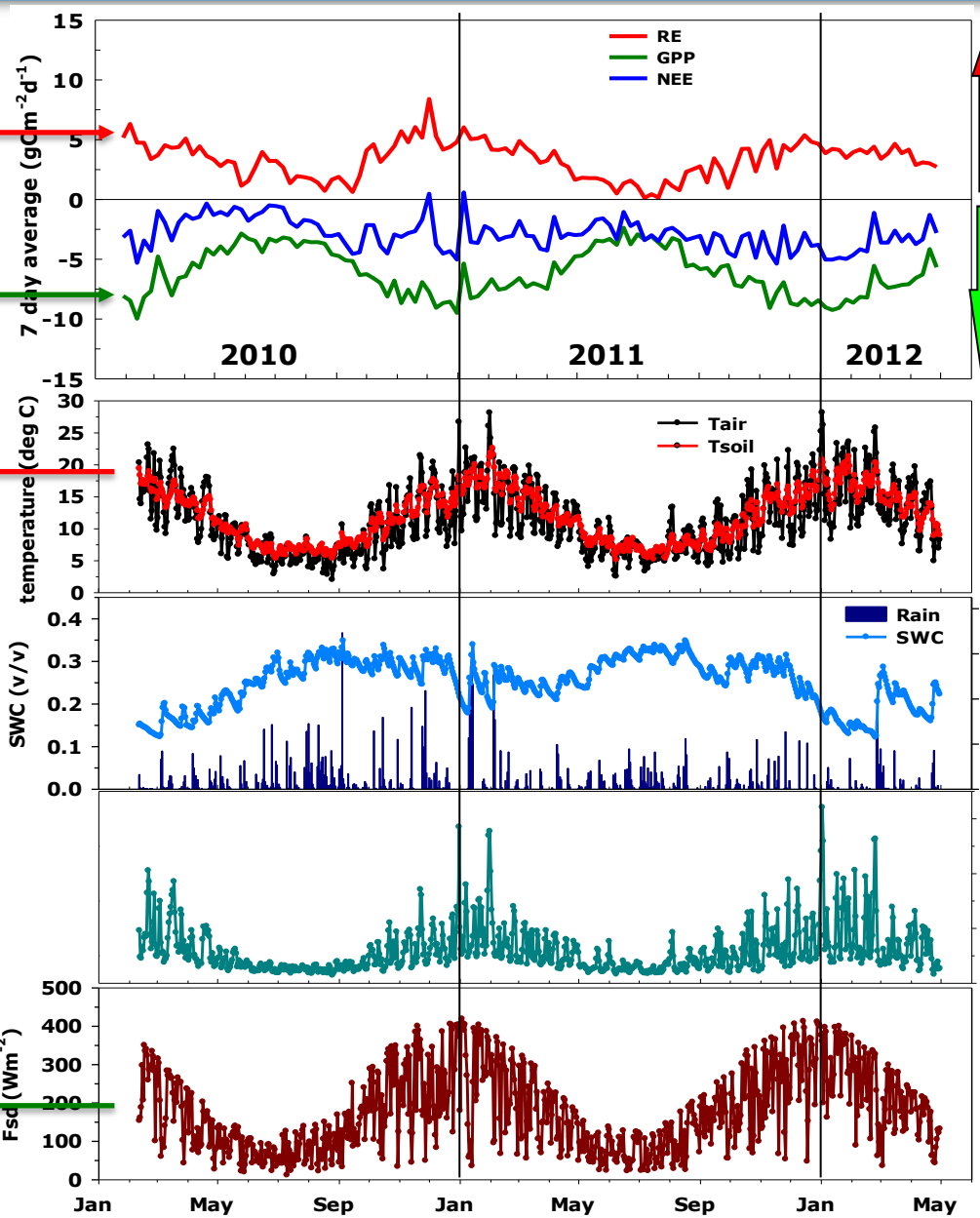
Wombat forest is a strong and continuous carbon sink at all times

→ Stronger C sink in summer than in winter

→ But not a strong seasonality

→ Data will allow a detailed monitoring of carbon uptake/release in future (planned burning at Wombat Flux late 2013 or

Environmental drivers of carbon flux



Respiration

Net ecosystem exchange

Photosynthesis (GPP)

Temperature (air, soil)

Soil moisture

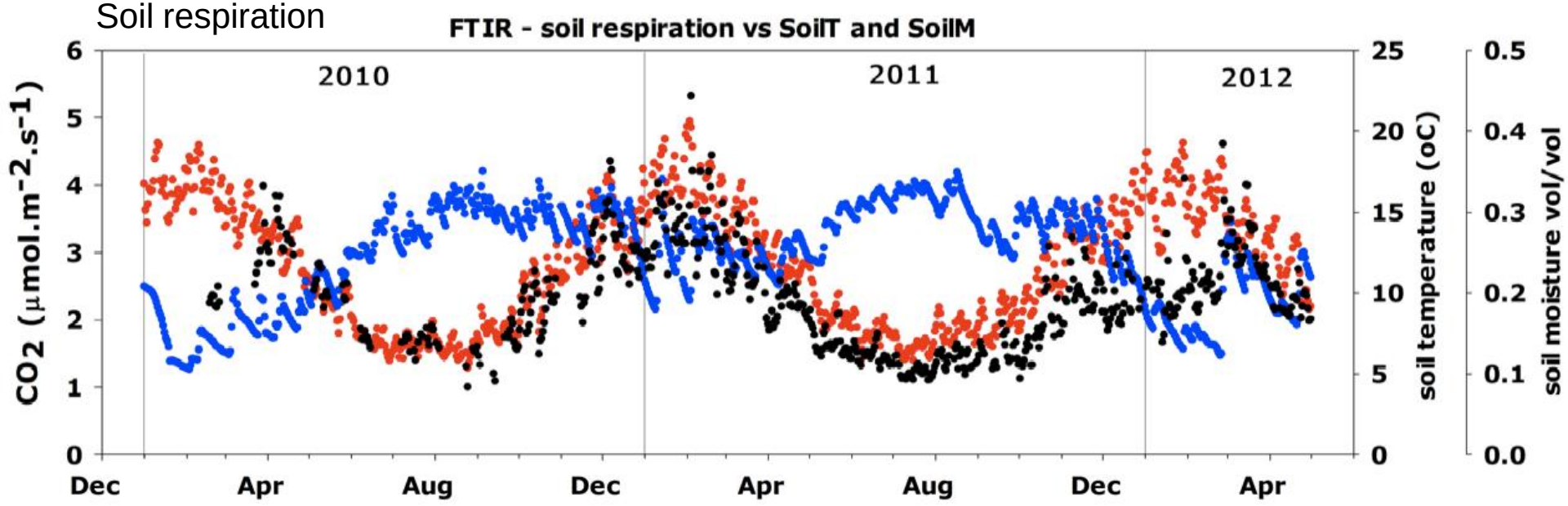
VPD (dryness of air)

Solar radiation

Carbon flux Wombat Forest

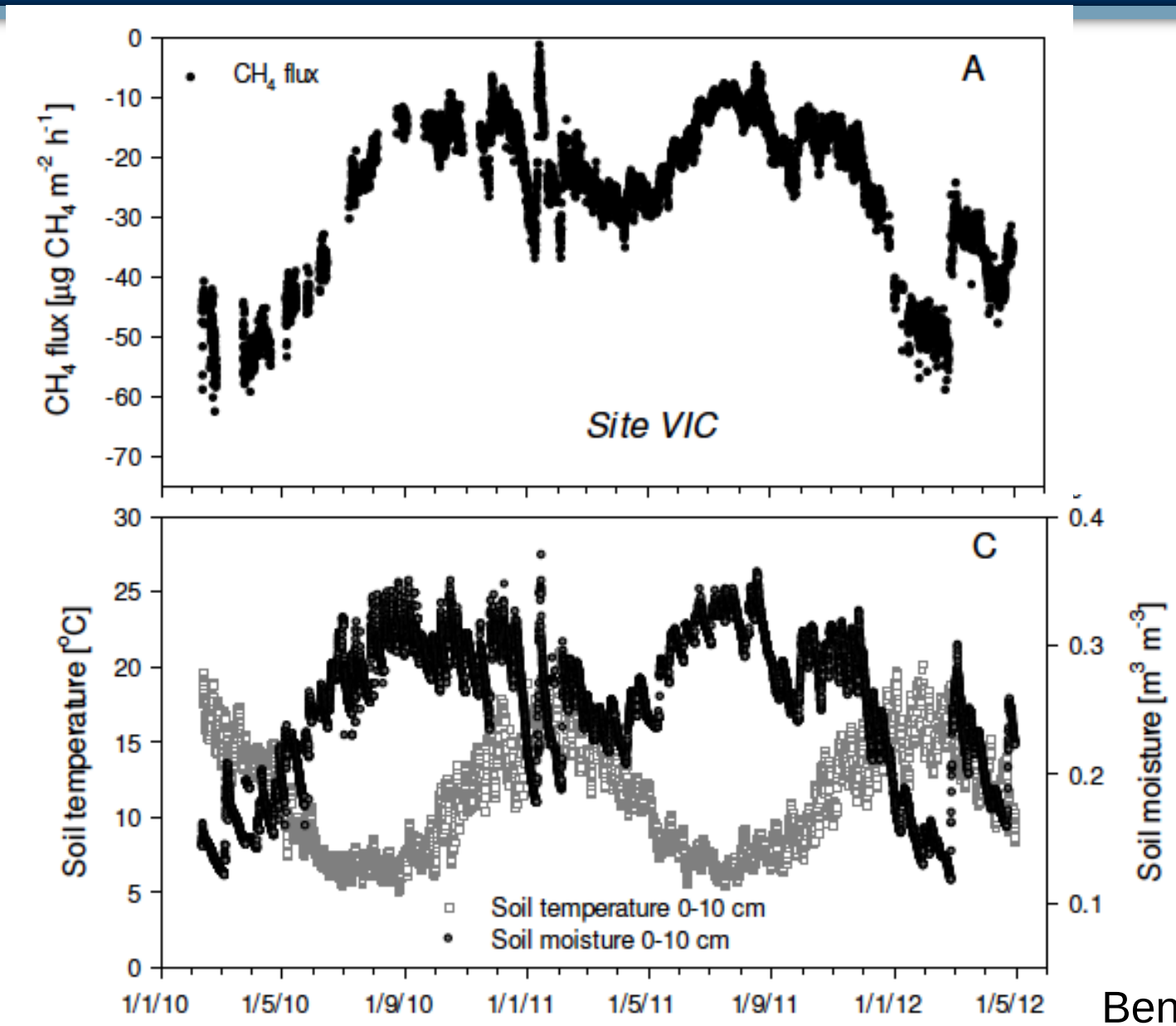
Control of soil respiration at Wombat Forest

Soil temperature
Soil moisture
Soil respiration



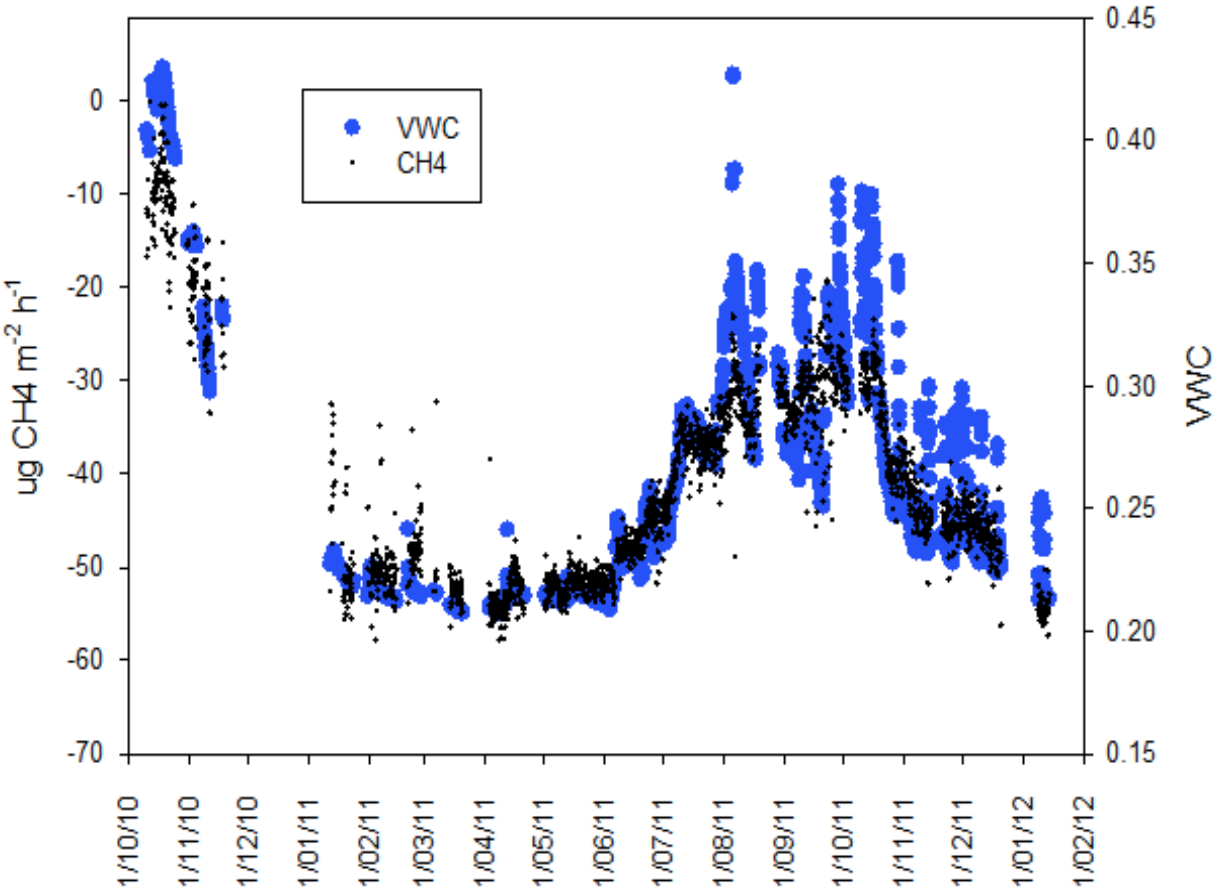
Soil temperature has strong control over soil respiration
But only if the soil is wet enough
Was very wet in the last two years

Methane flux



Benedikt Fest

Methane flux



Volumetric soil water content explained 91% of the CH_4 flux

Benedikt Fest

THE UNIVERSITY OF MELBOURNE

Climate change

Detection of carbon fluxes

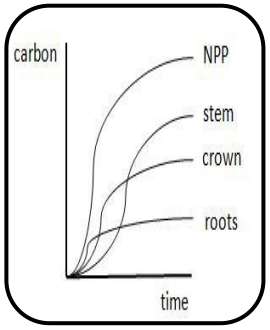
Seasonality of growth

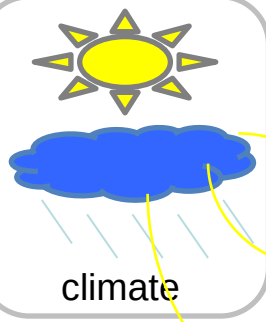
Structural dynamics

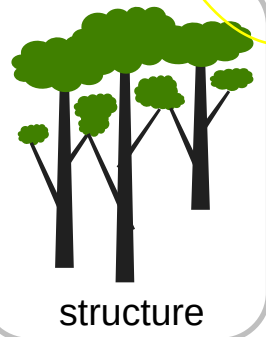
Question 5
Carbon and water fluxes

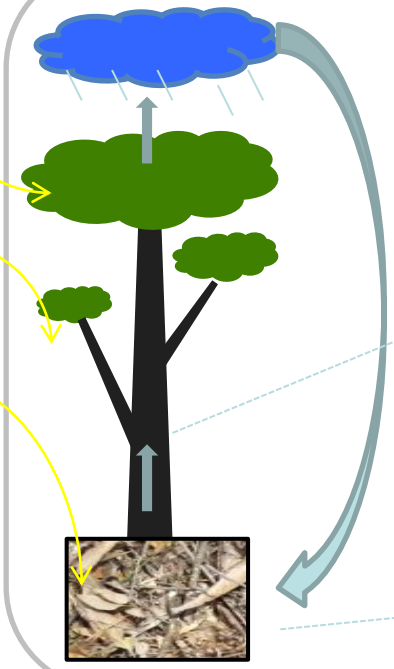
Crown dynamics

Stem increments









Question 1 + 1b

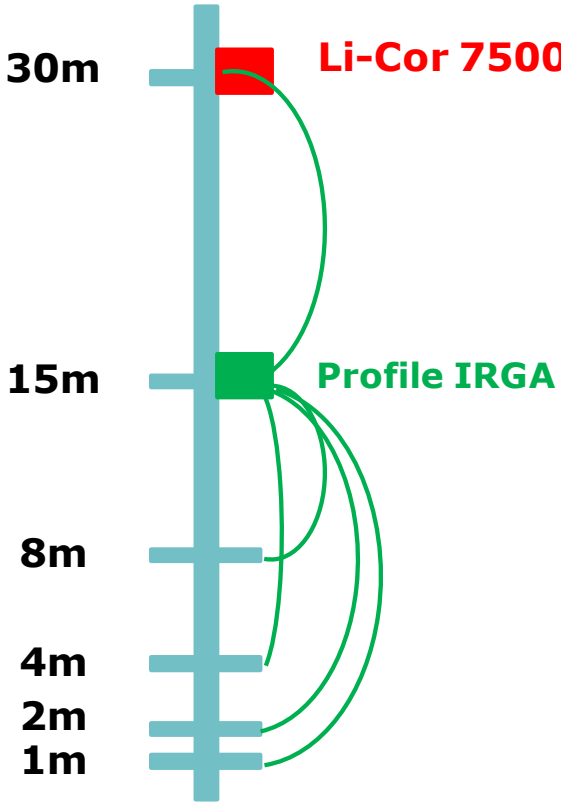
Question 2

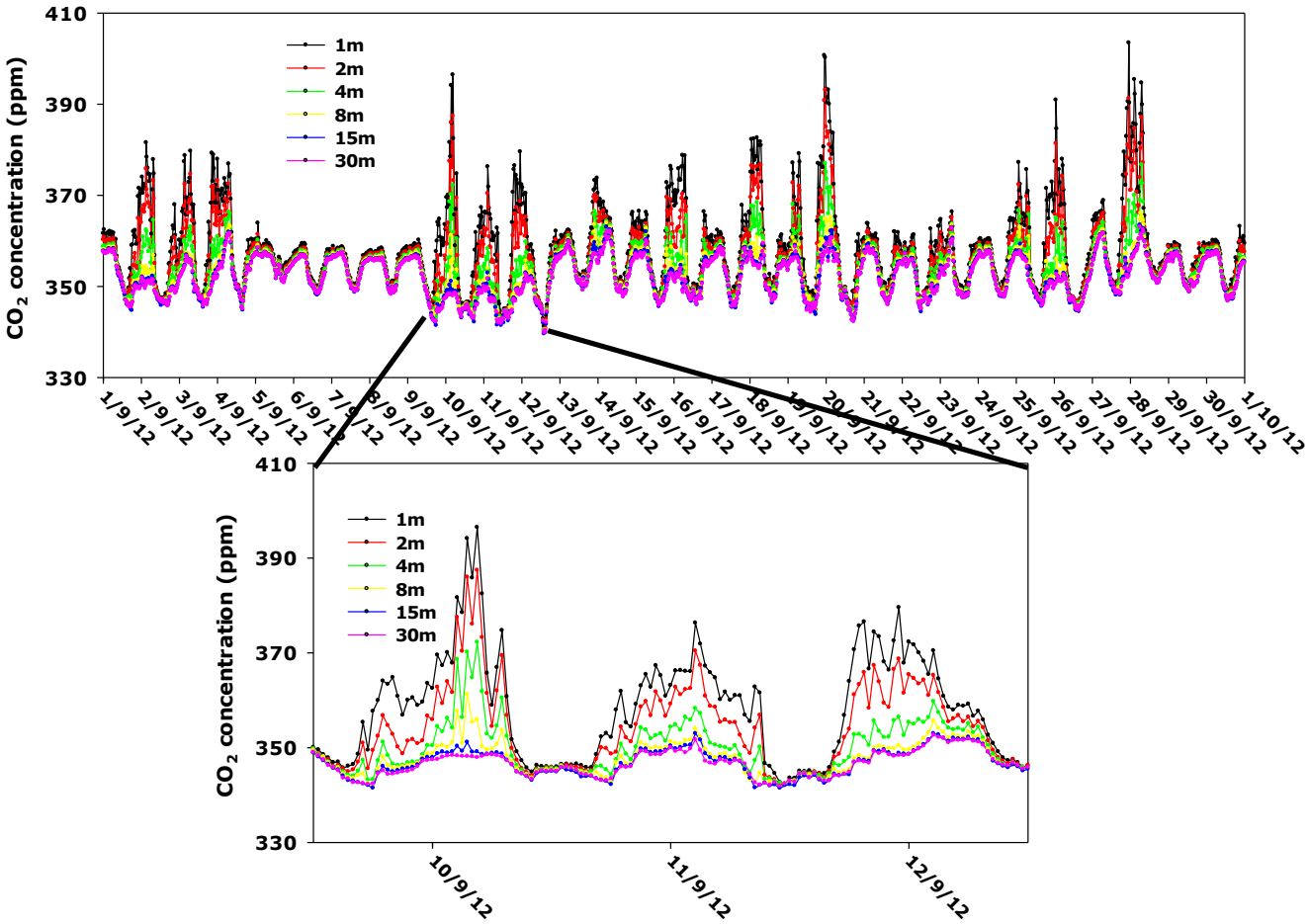
Question 3

Question 4

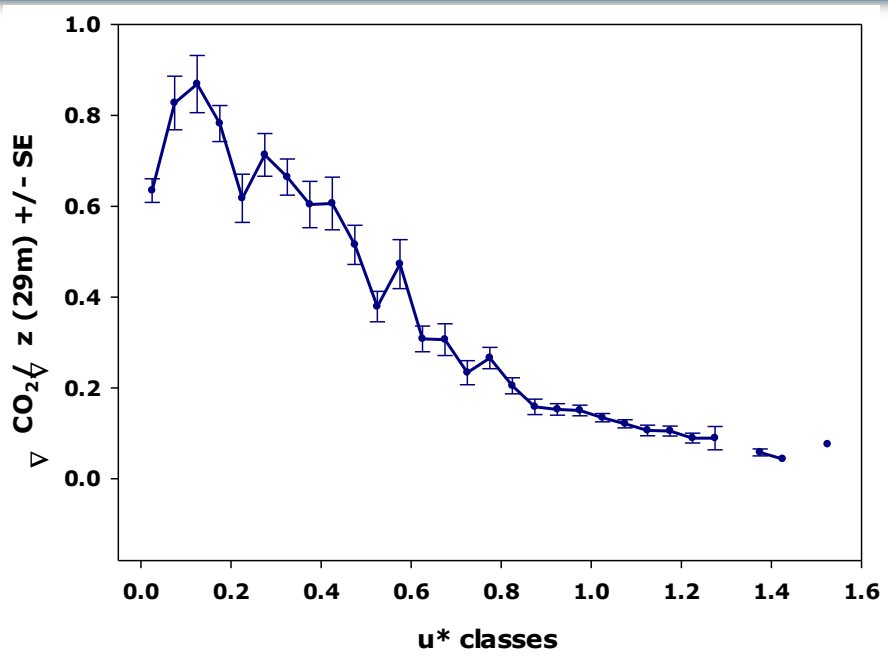
Profile system Wombat Flux

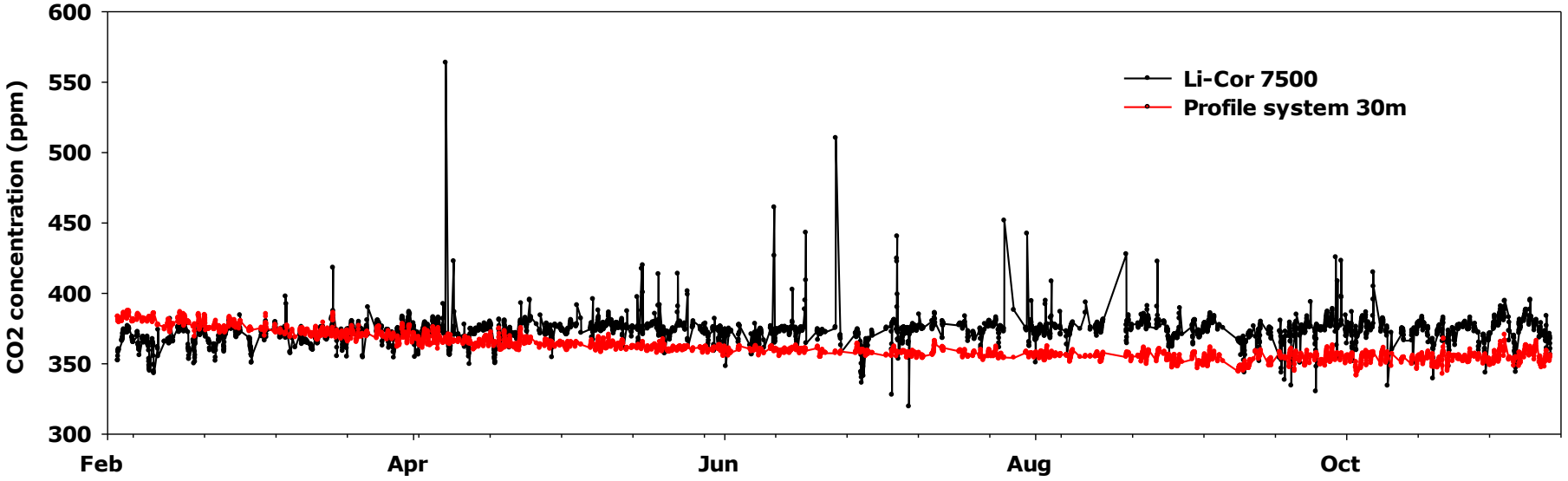
- **Issue of drainage**
- **System installed since February 2012 (built by Ian McHugh)**





u* treshold of CO_2 profile– Li-Cor 7500 vs Profile system 30m





Calculation of storage term

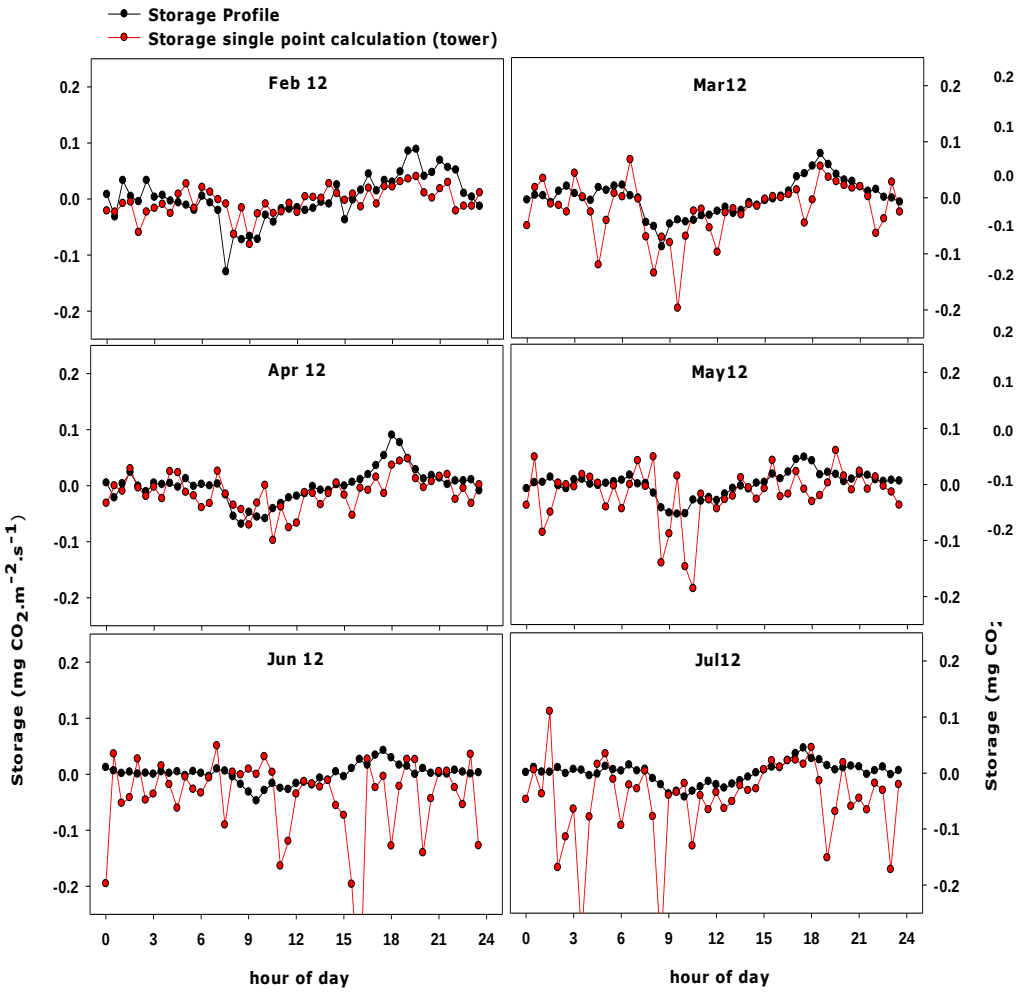
measurements: 2 min intervals
→ 6 min averages to the end of 30 min

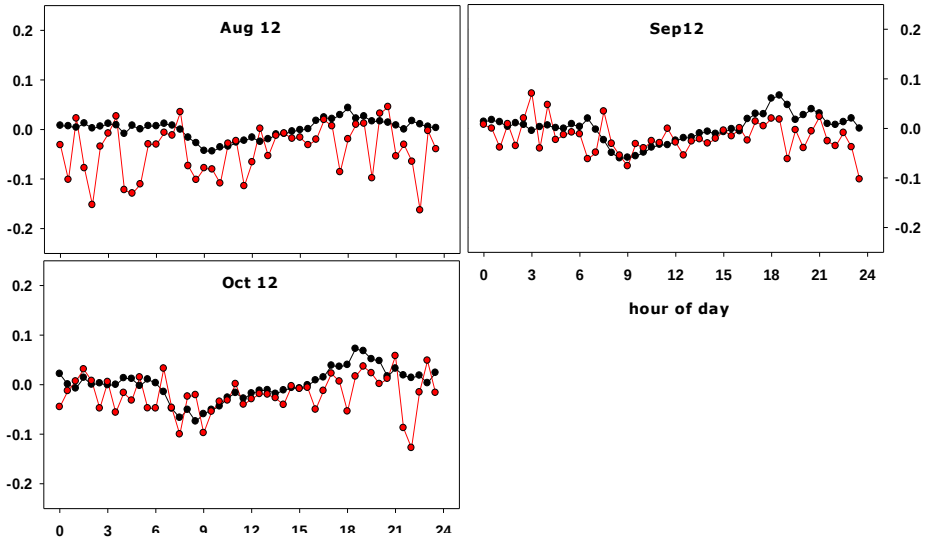
$$\text{total } CO_2\ (mg.m^{-2}) = [CO_2(z_1)*z_1 + (CO_2(z_1)+ CO_2(z_2))*((z_2-z_1)/2) + (CO_2(z_2)+ CO_2(z_3))*((z_3-z_2)/2) \dots]$$

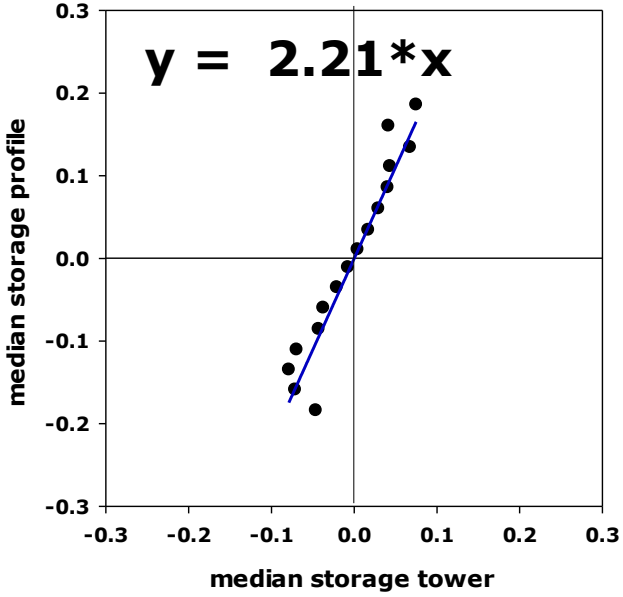
$$\Delta\ CO_2 = \text{total } CO_2\,(t_2) - \text{total } CO_2\,(t_1)$$

→ automated processing/calculation will be implemented into Python-QC

Storage profile vs. storage tower

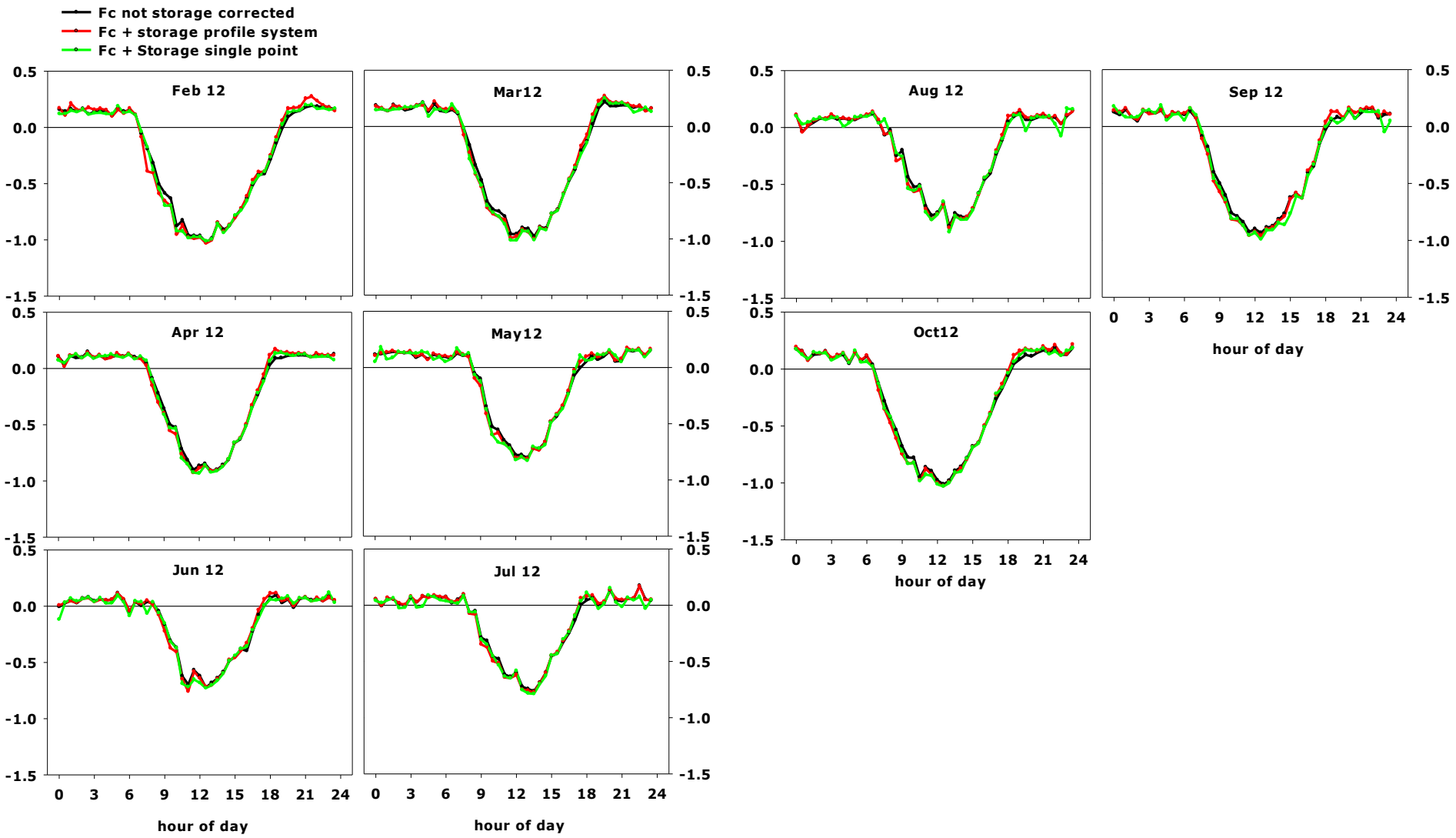




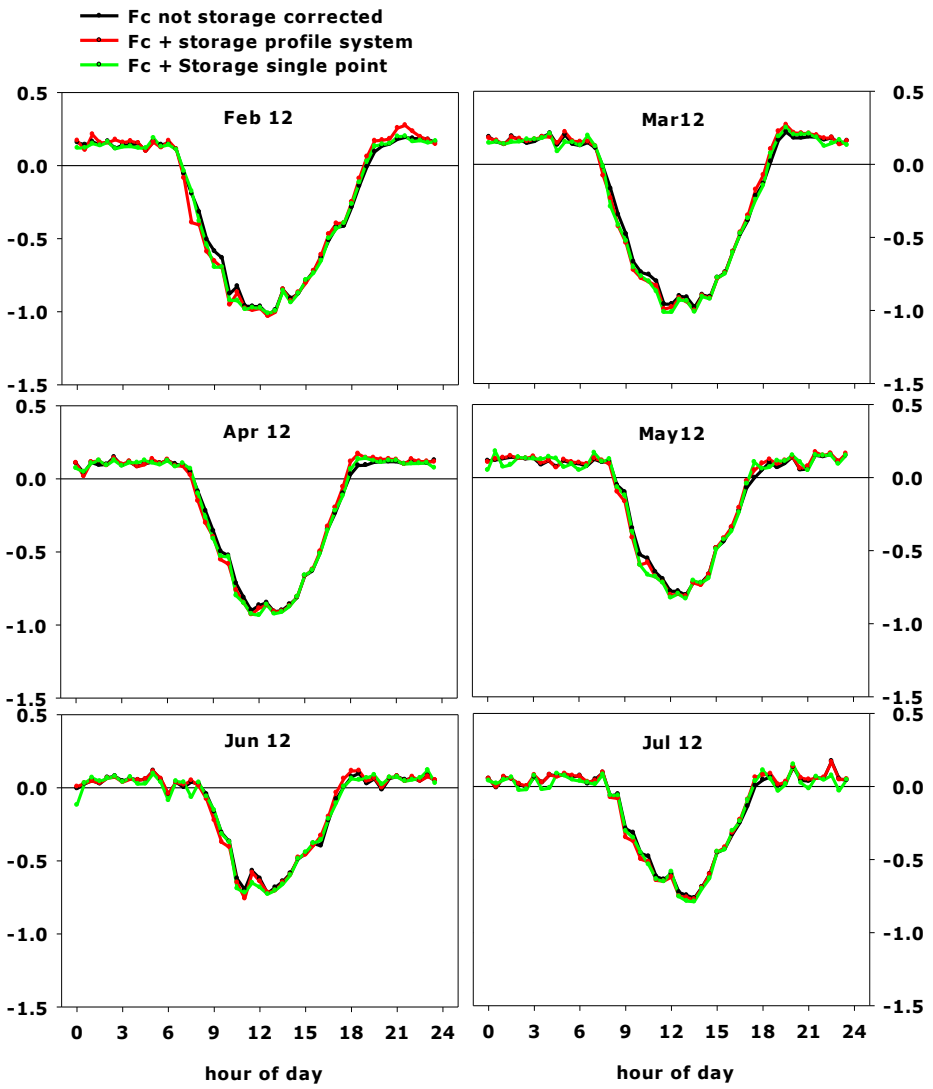


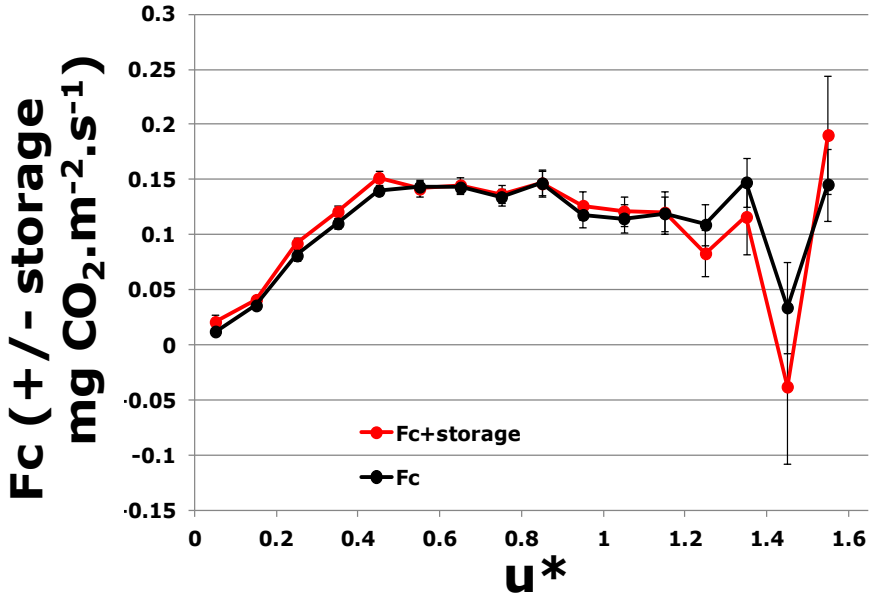
THE UNIVERSITY OF MELBOURNE

Fc + storage (mg $CO_2.m^{-2}.s^{-1}$ = y)



Fc + storage – u* treshold





WombatStateForest: 2012-01-01 00:30:00 to 2013-01-01 00:00:00