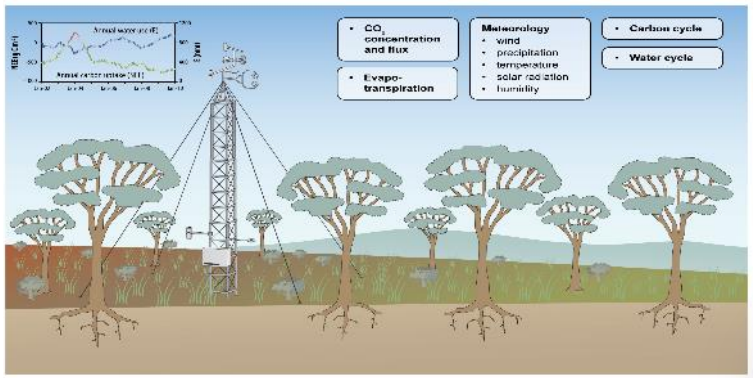
Ground truth measurements to validate the Calperum flux tower.

Georgia Koerber, Wayne Meyer, Qiaoqi Sun (PhD student), Peter Cale and Grant Whiteman (Aust. Landscape Trust), Cacilia Ewenz, ARA, FU, David Chittleborough (UA), Elena Kondrlova (Visitor, SUA in Nitra, Slovakia), Jason P. Koerber, Flinders Medical Centre, Susan Gehrig, Aquatic Sciences, South Australian Research and Development Institute, Todd A. Wallace (UA), SA MDB NRM Board, SA Govt. agencies (DEWNR).

TERN's infrastructure for ecosystem science, the Australian supersite network.



Calperum operational since August 2010, located within Calperum station.

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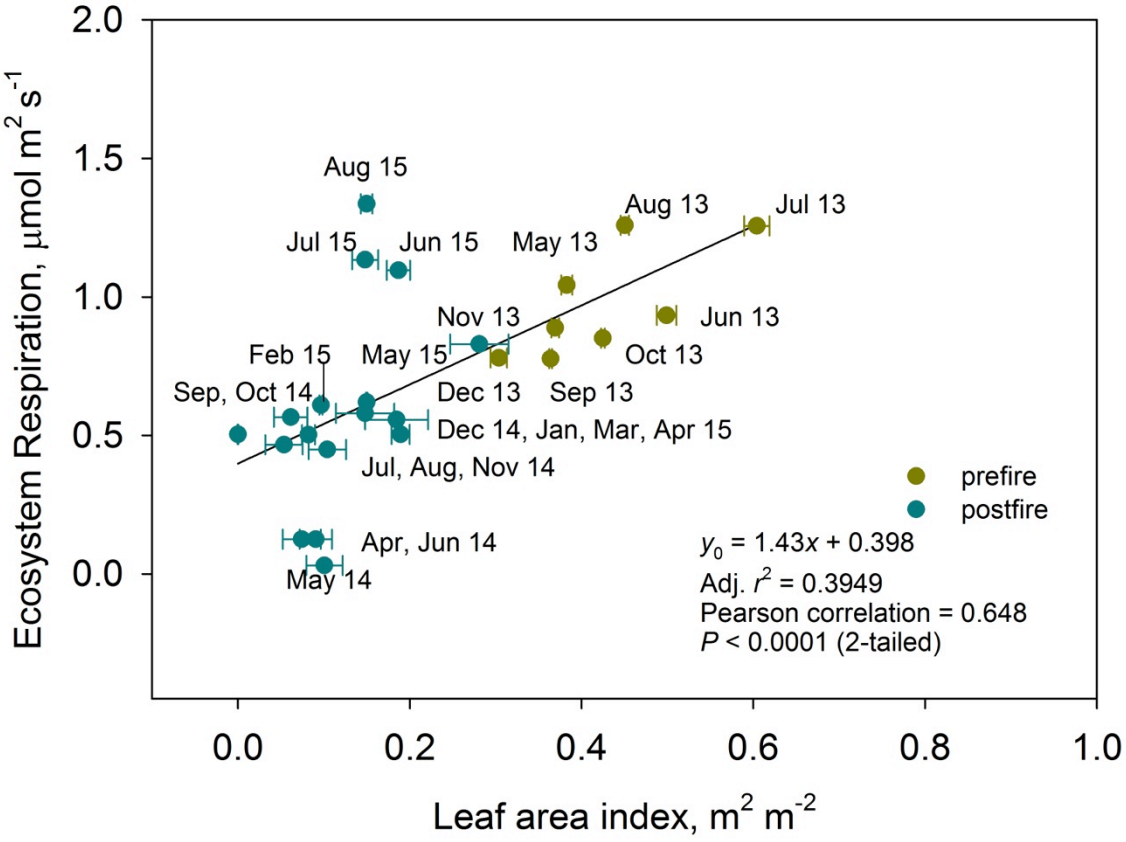
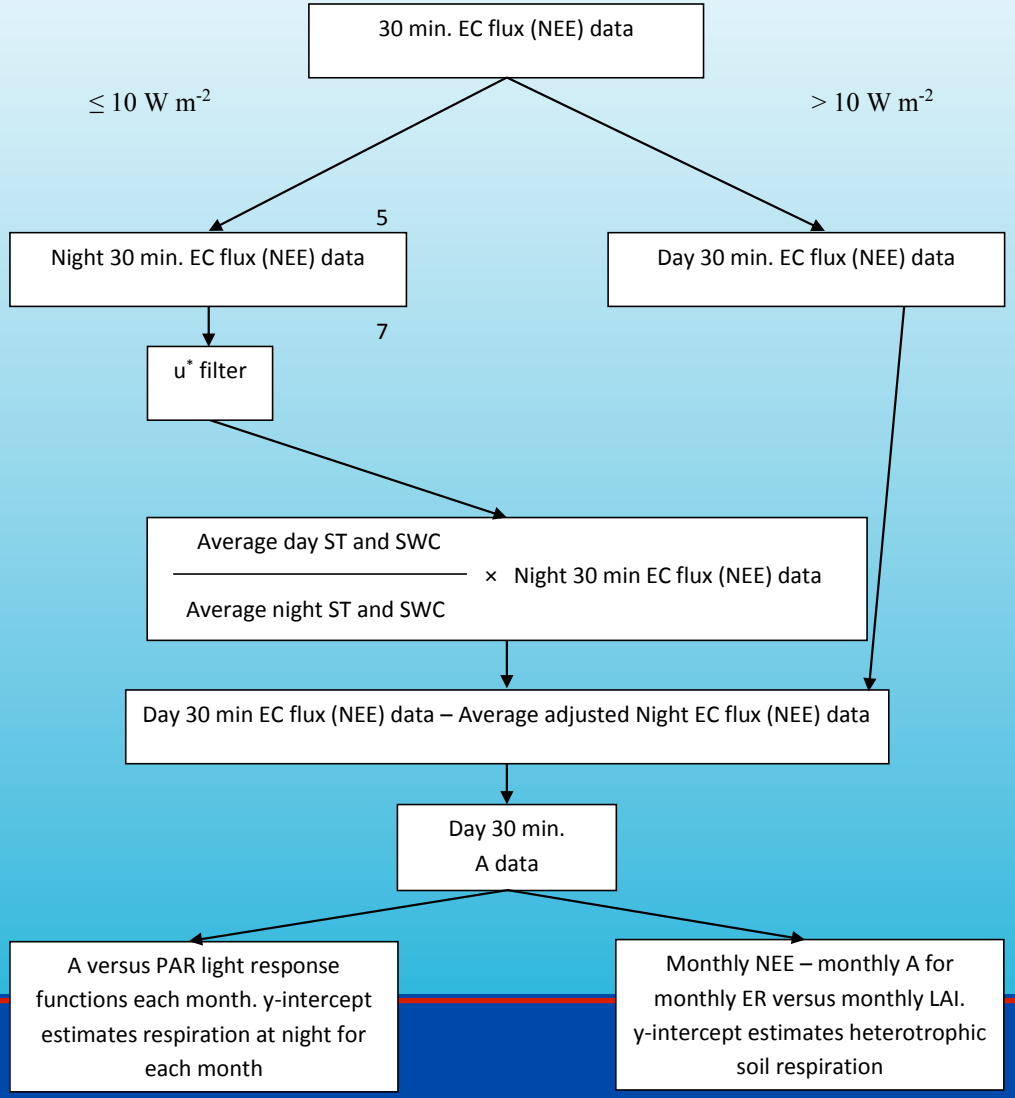
Hypothesis: ER versus LAI , y-intercept of heterotrophic soil respiration in a similar approach to root biomass by Yackov Kuzyakov (2006), Koerber et al. (2010).



Ground truth measurements for the ER (y-axis)

- NEP = NPP – RH
- I use total soil respiration and litter to give the BGC
- I use annual harvest for the AGC
- AGC + BGC = NPP
- Therefore I knew once I had NPP and RH then I would hope to be able to validate the Tower NEE if this y-intercept RH agrees with ground measurements.
- For ER on the y-axis I wanted to have a go at light response curves with assimilation instead of NEE to account for the “kok” effect.

Night and day partitioning.



Leaf Area Index (x-axis)

- Leaf area index varies monthly
- Leaf area index is an indicator

of optimum plant condition
and water consumption

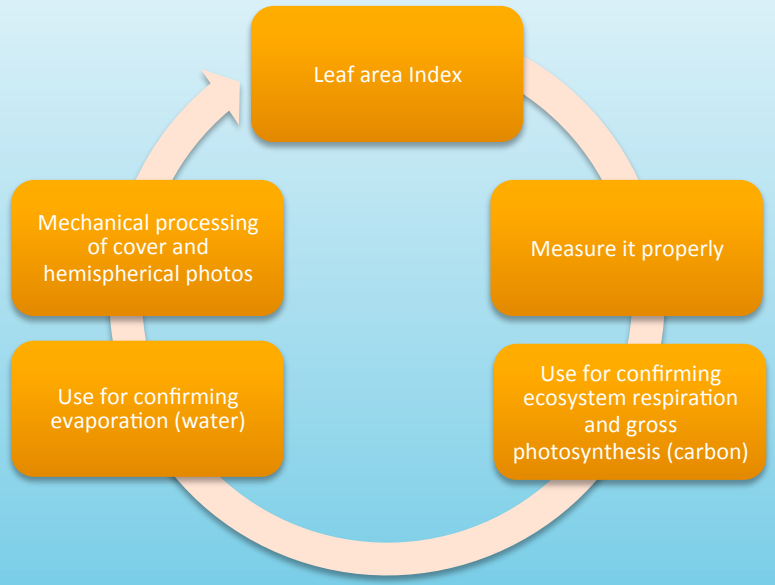
- Leaf area index has to be measured

directly or estimated from photos
of plant area index

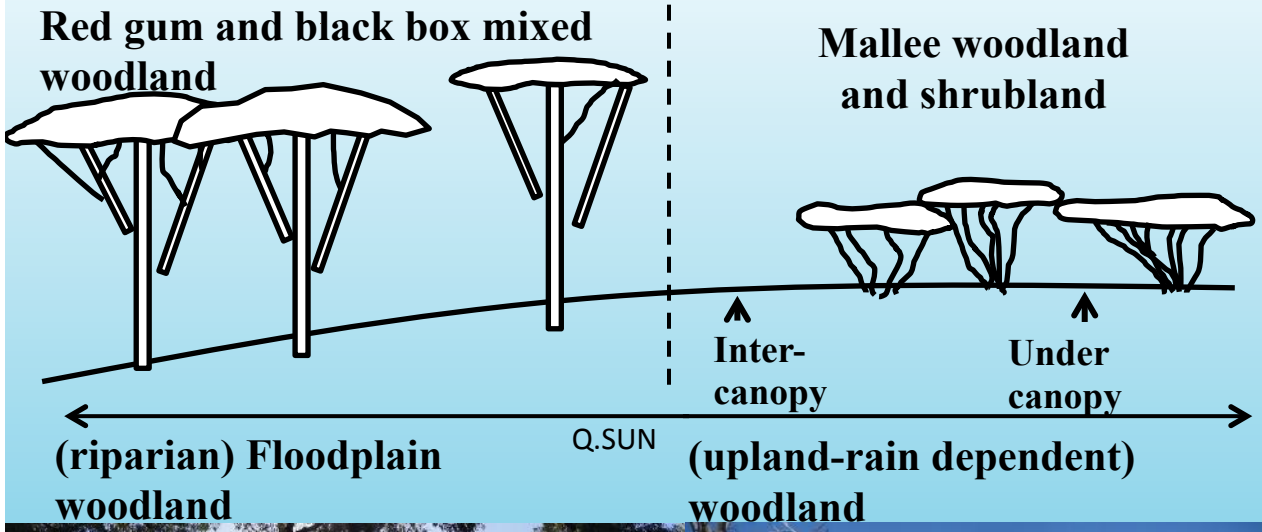
- Photos of plant area index can be

cover or hemispherical

- Photos can be processed accurately in Adobe Photoshop or precisely or repeatedly using processing programs



Bushfires in the Mallee and drought death events on the Floodplain



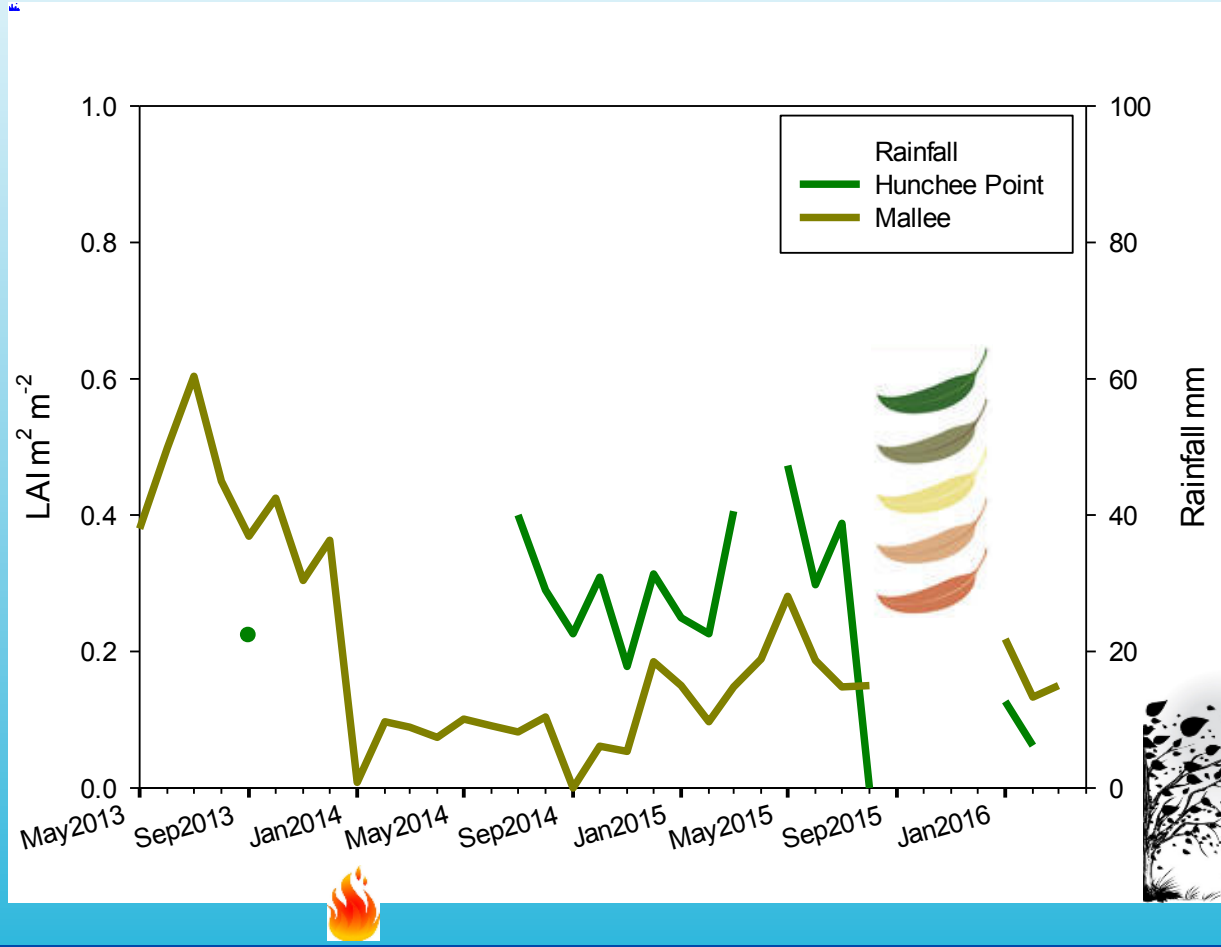
Methods

- Photos for Plant Area Index
- In the Mallee, May 2013-March 2016, bushfire 17th January 2014
- On the Floodplain July 2013, July 2014-March 2016, noticed beginning of 2016, River Red Gums were dying
- 1 hectare plot at the Mallee and the Floodplain, Hunchee point.
- Upwards and downwards photos every 10 metres (121 photos X2)
- Hemispherical photos were every 20 metres (66 photos) upwards only
- Processing by hand in Adobe, Craig's matlab and Jason's Space LAI and Waynes back calculation from evaporation.

Images for plant and leaf area index

Cover and hemispherical

Results: Leaf area Index in the Mallee and at Hunchee Point on the Floodplain



240.2 mm 2013
255.1 mm 2014
201.8 mm 2015
37.4 mm 2016
so far

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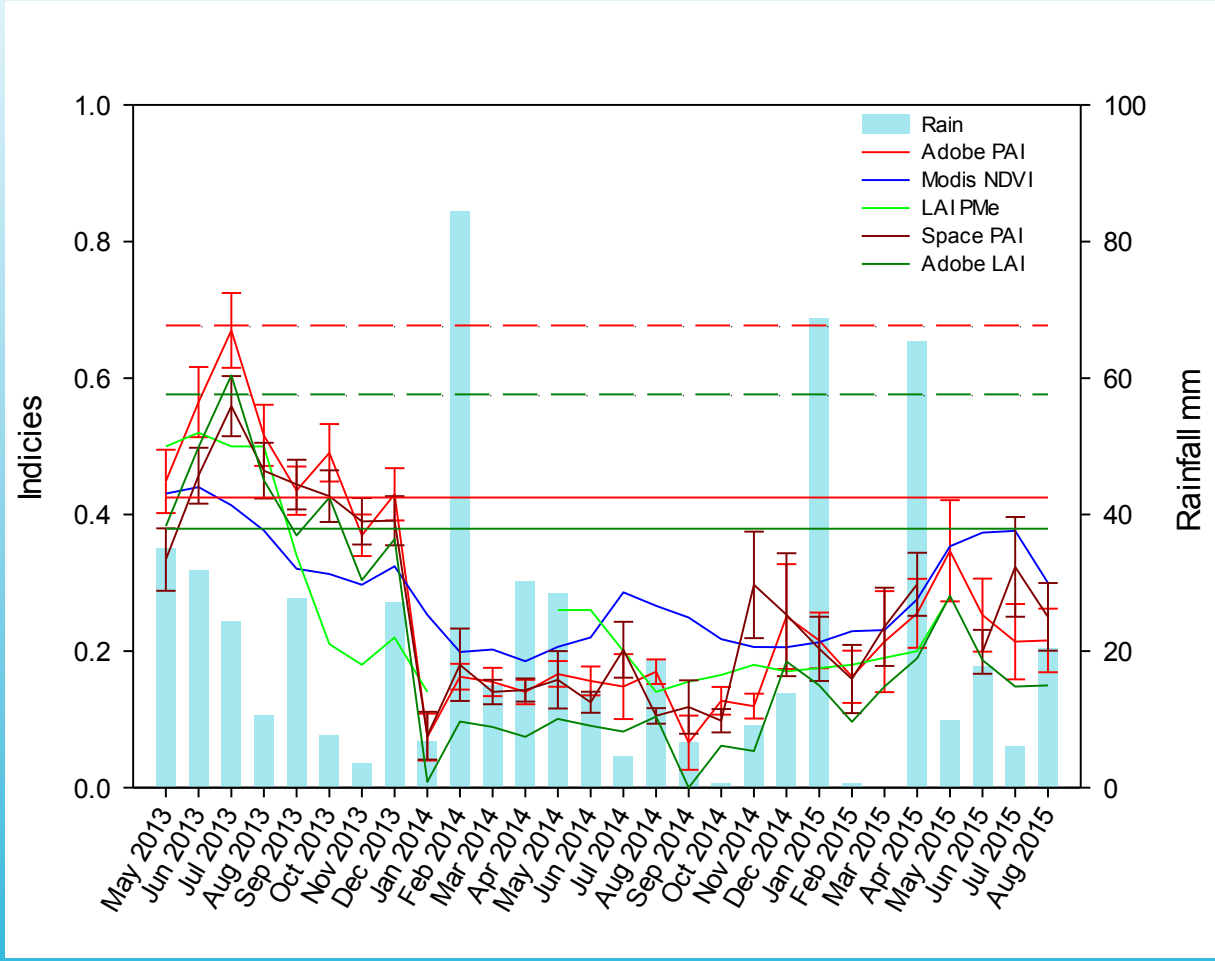
Results: Plant and leaf area index in the Mallee, photos and biomass



Scope and Outcomes

In the future : to improve ER on the Y-axis incorporating the suppression of the daytime respiration.

Hopefully once I can understand what a carbon offset is and if I can continue carrying out light response curves with an assimilation rate. The non-linear gives the night respiration and the linear gives respiration in the light.

Accounting for the suppression of respiration in the light allows us to measure at each of our ecosystem scales and to be able to get a handle on leaf structural properties underlying suppression of the respiration in the daylight.

Thank you and Questions

Acknowledgements: Peter Cale, Grant Whiteman and staff from Calperum ALT, NAB staff and Earthwatch Ramesh Raja Segaran, Lian Pin Koh, URAF, Qiaoqi SUN, Elena Kondrlova, OzFlux, Cacilia Ewenz, ARA, FU, TERN, Wayne Meyer, David Chittleborough, Todd Wallace and Susan Gehrig, Jason P. Koerber