The Australian flux and ecosystem research network

Presentation by Dr Helen Cleugh, Dr Eva van Gorsel and Dr Ray Leuning
Purpose of Facility

- Terrestrial ecosystems modulate climate
- Globally, terrestrial ecosystems sequester about 25% of CO2 emissions.
- Impact of climate change on terrestrial ecosystem functioning can be informed and quantified by energy, water and carbon budgets

RG Anderson et al.  
*Front Ecol Environ* 2010; doi:10.1890/090179
Purpose of Facility

- measure flows of carbon and water (NEE, ET)
- measure flows of energy (radiation Q, heat H)

Drivers:
- above-canopy meteorology (Q, T, VPD)
- soil temperature, moisture and heat fluxes

Analysis and Interpretation:
- within-canopy temperature, CO2, humidity and wind profiles
Key Questions being Addressed

Fluxes
- Canopy conductance and photosynthesis
- Autotrophic and heterotrophic respiration
- Surface temperatures and heat fluxes
- Surface water balance
- Soil heat and moisture

Ecosystem dynamics
- Allocation
- Litter production
- Phenology
- Nutrient cycles

Landscape dynamics
- Vegetation dynamics & disturbance
- Land use and land cover change

M. Williams et al.
www.biogeosciences.net/6/1341/2009/
Key Questions being Addressed

Tumbarumba

- PIs: van Gorsel and Leuning

![Diagram](image)

- Shortwave incoming radiation
- Soil temperature
- Vapour pressure deficit
- Soil water content
- Leaf area index
A decade of hourly measurements at Tumbarumba flux station
(*E. Delegatensis*)
Infrastructure to be Delivered

• A network of flux stations delivering nationally consistent observations of energy, carbon and water fluxes
  – Common and long-term set of core measurements
  – Quality-controlled data sets available via TERN portal

• Understanding ecosystem function and biogeochemical cycles for ecosystem and land surface models
  – Provide parameter values
  – Evaluate uncertainties in model performance for Australian ecosystems

• Data needed to quantify water and carbon balances under existing and future climates

• Understanding ecosystem response to climate change

• Advancing climate and Earth system science; especially ACCESS development

Green - core observations made to standard measurement protocols
Gray - ‘constellation’ measurements specific to each site
Infrastructure to be Delivered
Our plan for community engagement

M. Williams et al.
www.biogeosciences.net/6/1341/2009/
Our plan for community engagement

Northern Tropical Savanna Flux Transect

- PIs: Beringer and Hutley
- Carbon balance and hydrology
- Disturbance: Land clearing and fire
- Aerosols and trace gas emissions
Our plan for community engagement
Acknowledgements

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ACCSP
DCCEE
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THANK YOU

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<table>
<thead>
<tr>
<th>Site Name</th>
<th>Ecosystem</th>
<th>Location</th>
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<tbody>
<tr>
<td>1. Robson</td>
<td>Simple notophyll vine forest</td>
<td>Qld (Atherton Tablelands)</td>
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<tr>
<td>2. Cape Tribulation*</td>
<td>Complex mesophyll vine forest</td>
<td>Qld (Daintree)</td>
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<td>3. Samford</td>
<td>Peri-urban</td>
<td>Qld (Brisbane)</td>
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<td>4. Tumbarumba</td>
<td>Alpine ash forest (E. delegatensis)</td>
<td>SE NSW</td>
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<td>5. Wallaby Creek</td>
<td>Mountain ash forest (E. regnans)</td>
<td>SE Vic</td>
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<td>6. Wombat</td>
<td>Dry sclerophyll Eucalypt forest (E. obliqua; E. radiata and E. rubida)</td>
<td>Central Vic</td>
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<tr>
<td>7. Warra</td>
<td>E. obliqua forest</td>
<td>Tasmania</td>
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<tr>
<td>8. Nimmo High Plains</td>
<td>Poa C₃ grassland</td>
<td>NSW alpine region</td>
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<tr>
<td>9. Chowilla</td>
<td>Mallee</td>
<td>SA (Lower Murray)</td>
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<tr>
<td>10. Gnangara</td>
<td>Coastal heath</td>
<td>Southern WA</td>
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<tr>
<td>11. Great Western Woodlands**</td>
<td>Temperate woodland, heath and mallee</td>
<td>WA</td>
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<tr>
<td>12. Hamersley Station*</td>
<td>Semi-arid C₄ grassland</td>
<td>NW WA</td>
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<tr>
<td>13. Weeli Wolli Creek*</td>
<td>Semi-arid, riparian coolabah woodland</td>
<td>NW WA</td>
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<tr>
<td>NT Savanna Flux Transect</td>
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<td>NT – N/S transect</td>
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<tr>
<td>14. Howard Springs</td>
<td>Wet tropical savanna to rangelands</td>
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<td>15. Daly** and 16. Dry River**</td>
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<tr>
<td>17. Alice Springs</td>
<td>Mulga – arid rangelands</td>
<td>NT</td>
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