

Quarterly Newsletter

Issue 10, March 2015

SuperSite and OzFlux Update

Welcome to Issue #10 of the SuperSites/OzFlux newsletter. A new year has begun with the federal political arena claiming more attention than it deserves. NCRIS and TERN had been anxiously waiting on the 2015-16 NCRIS funding allocation to be released and this finally happened on the 16th March. TERN Central was asked prior to this announcement to work on the premise that we will get the same amount of operating as for 2015-16 but to expect that 85% of this amount is more likely. We will discuss what that means at a joint SuperSite/Ozflux meeting later in the month once we know where we are with the NCRIS funding for 2015-16 as clearly any cut-back below the current funding has major ramifications for what the networks can deliver.

International collaborations

Satellites

The use of SuperSites for ground validation of satellite data will be increased with an MOU being considered between TERN and NASA-JPL to supply ground data for the Soil Moisture Active Passive observatory (SMAP) and future missions. Several site PIs have been approached by NASA-JPL as they would like to use the flux data for validation purposes and James Cleverly is working with TERN towards an agreement between NASA and TERN OzFlux. Peter Isaac and Matt Nethery have started to bring the data into shape and implement the pipeline for transfer. There is also an application submitted to collaborate with the Venus (Vegetation and Environment monitoring on a New Micro-Satellite) mission (French/Israeli satellite launched 2016) on Phenology, Ecosystem Stress and LUE study that includes seven of the SuperSites.

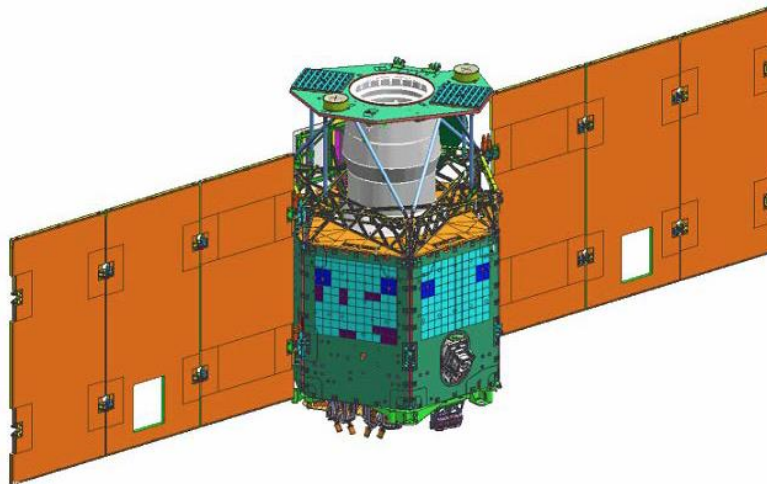
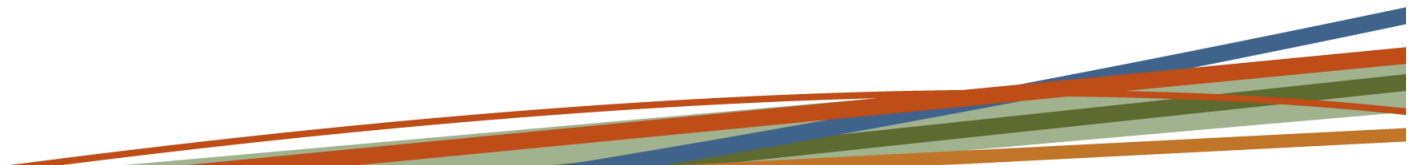


Image sourced from http://smc.cnes.fr/VENUS/GP_satellite.htm

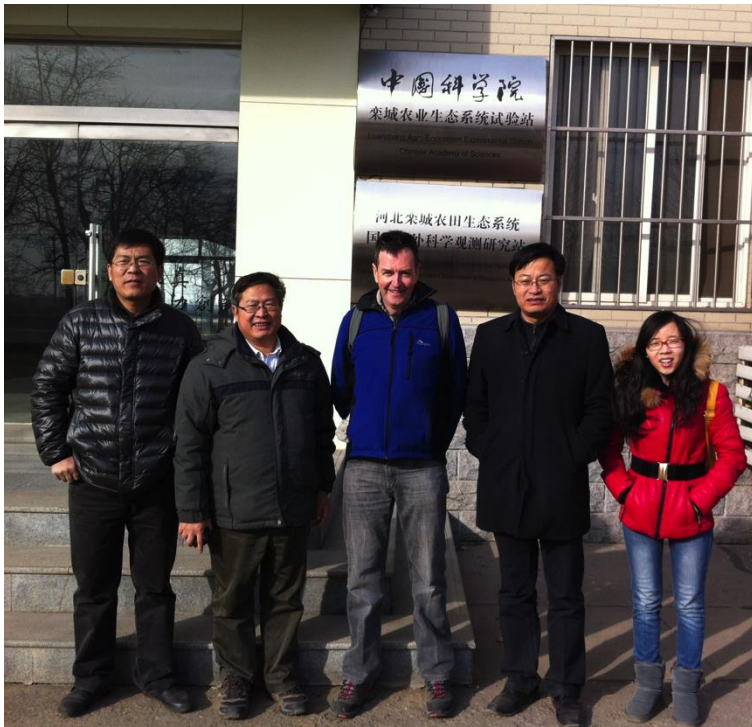


SuperSite Central Update

International networking

Interactions with comparable international ecosystem networks has been a recent focus at SuperSites Central. Mike used his study leave in January to visit NEON Inc, Critical Zone Observatories (CZO-US) in the USA; AnaEE (France) and CZO-EU (Crete) in Europe and the Chinese Ecosystem Research Network (CERN) and the Earth Observatory of Singapore. In all cases we are exploring the potential for linkages with these networks and also the potential for specific linkages between individual SuperSites and sites in similar biomes overseas.

An article has been published in the iLTER newsletter indicating the usefulness of these visits in establishing international collaborations <http://www.ilternet.edu/news/terns-iter-australia-supersite-director-visits-cern-iter-china>



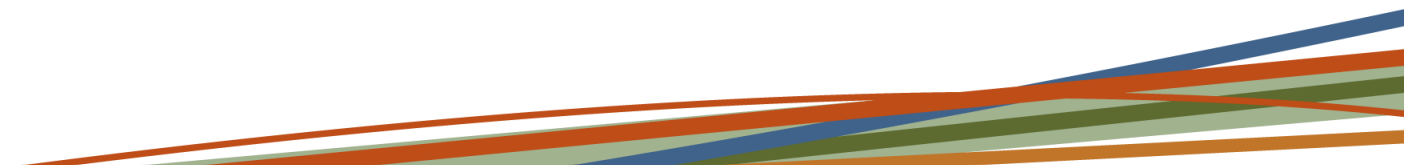
Databases

The Bioacoustic Data Portal Shootout was a useful exercise that helped to focus our attention on the aspects of this data portal that we need to deliver. Deliberations continue but we expect a decision by late-March followed by the rollout of the SuperSites Bioacoustic Data portal.

The SuperSites Image database on the NCI server has been set up with the final touches to upload instructions and data management procedures being completed. It is expected that uploads of image files (LAI, Photopoint (Five point and Panorama) and Phenocams) will be underway by mid-March.

Standardised data spreadsheets have been circulated to the SuperSites. These will be used with the monitoring data being delivered and optimised over time to get us closer to machine readable data and greater use and re-use of SuperSites data. The SuperSites Vegetation Monitoring protocol has been published on the SuperSites website.

The SuperSites website internals have been tidied up by implementing the Joomla content management system, allowing future website maintenance and changes to be made more easily. The Metacat has been upgraded to version 2.4.1 which will allow SuperSites metadata to be harvested by DataONE.



OzFlux Central Update

Data

OPeNDAP/THREDDS Server

As outlined in the 30th January email, OzFlux has implemented an OPeNDAP/THREDDS server as part of the OzFlux Data Portal (<http://dap.ozflux.org.au/thredds/catalog.html>). netCDF files on an OPeNDAP/THREDDS server can be accessed by DAP-aware applications (eg Panoply from NASA GISS) over the internet as though they are on your local machine. This allows potential users of OzFlux data to access the latest version of the OzFlux data sets without having to download individual files from the ODP. Data on the OPeNDAP/THREDDS server will be netCDF files at levels L3 to L6 (gap filled and partitioned).

Getting your data on to the OPeNDAP/THREDDS server requires no extra effort. Simply upload your L3, L4, L5 and L6 data sets to your collections on the ODP and provided it is not restricted access, the data will automatically appear on the OPeNDAP/THREDDS server.

Data for Gap Filling

Some minor problems were found in the ACCESS and AWS data supplied last year for gap filling meteorological data at the OzFlux towers. The problems were in the precipitation data for both the ACCESS and AWS files (occasional negative values due to problems in the routine for fixing time gaps in the data) and in the wind direction data for the AWS files (wind gust was written out instead of wind direction). These problems have been fixed and the ACCESS and AWS files have been updated to include data for 2014.

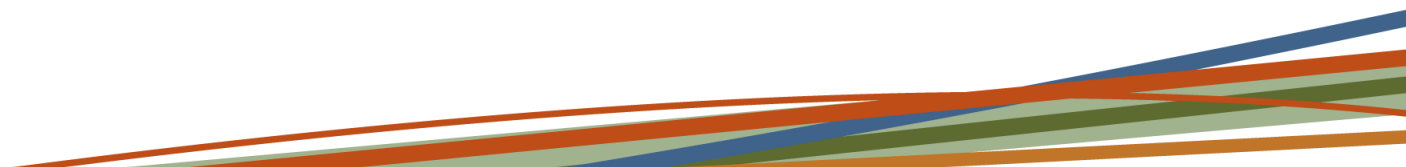
The updated ACCESS and AWS data are now available from the OzFlux shared directory on CloudStor+ (<https://cloudstor.aarnet.edu.au/plus/>) under OzFlux/Sites/<site_name>/Data/. Contact Peter Isaac if you do not have access to the CloudStor+ folder.

Special Issue

Thank you to all for submitting a title/abstract for the special issue to be proposed to *Biogeosciences*. We currently have an impressive 24 titles across a wide range of topics. There are still a couple of administrative details to organise:

1. Opening and closing dates

Were up for a vote. Right now it looks as if August is the most likely month for submission, but the journal provides an extra month for submissions to special issues in extraordinary circumstances. We will try to negotiate with the editor of the journal to link a couple of early/late papers to the special issue.



News from around the SuperSite and OzFlux networks

Alice Mulga

Very large rainstorms began in late November across the catchment, resulting in the Nov 2014–Jan 2015 receipt of 275 mm at Alice Springs Mulga site and 360 mm at Ti Tree East (long-term annual average: 314 mm). The largest of the storms (> 100 mm in a few days) occurred shortly after our return from the site. This led to a large increase in productivity across the basin by mid- to late-January. Reports have emerged that the wildlife response was associated with the occurrences of Murray Valley encephalitis and Ross River fever in Alice Springs.

Field trips to the SuperSite took place 20 Nov - 5 Dec to maintain instruments, collect samples and take vegetation monitoring measurements and preliminary ecophysiology measurements. During the 16 - 20 Jan field trip Nicholas White made repairs to the damaged bore.



Woodforde River stage hydrocam image. This is typically a bare river channel.

Normalized Difference Vegetation Index (NDVI) sensor installed on flux tower, collecting 30 min data.

Calperum Mallee

Major rain (62mm in 24 h) in mid-January caused a response in summer grasses and the burnt site mallee regrowth is now at 1 m high. Soil respiration increased 2 to 3x for a couple of weeks after rainfall.

Insect trapping and sampling underway at 6 sites. Summer bird surveys have been completed.

An environmental water release onto the floodplain occurred during January – samples of surface and shallow water tables collected, along with soil and tree samples for stable isotope analysis.

A paper entitled “Evaporation of perennial semi-arid woodland in south eastern Australia is adapted for

irregular but common dry periods” has been submitted to Hydrological Processes

Conference abstract – “Use of light-use efficiency functions to describe CO₂ uptake at a semi-arid site, role of leaf-area index and leaf density.” – accepted for Rhizosphere4, Maastricht, the Netherlands, June 2015

Cumberland Plain

Everything running smoothly, tower based NDVI sensor has 1 year of data, SM2 acoustic sensor has been moved to the flux tower hectare and an array of SM3Bat acoustic sensors have been installed. Understorey tagging in the core 1 ha and Gentry plots have been completed by a team of botanists from Sydney Gardens. Second overstorey biomass will be measured in March, as well as LAI and CWD mapping. Bird survey is scheduled for early March, and James Cook will do ant trapping in March with Global Malaise trapping.

Elise is due to start a soil sampling program with Bioplatforms BASE project at 50 sites (100 samples). A ClimateWatch trail being planned and plans are underway to join the global Drought-Net experiment.

FNQ Rainforest

Cape Tribulation: Daintree Rainforest Observatory

Mari Pasanen, a research trainee from the University of Eastern Finland is currently working on site and assisting with biomass measurements.

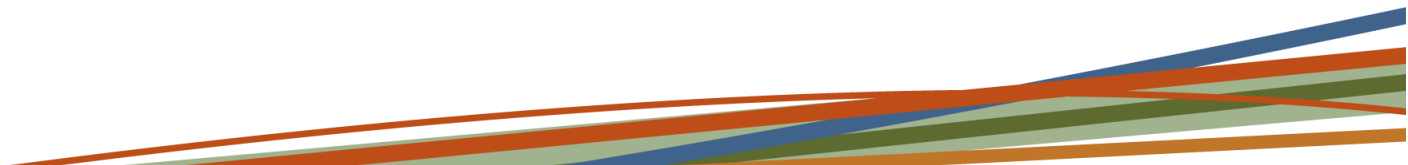
Potential collaboration with group in Brazil to work on plant growth modelling.

Recent visitors to the site included: the German Ambassador to Australia, and representatives from the Maldives education department looking at collaborations for university education.

All equipment functioning, apart from the rain gauge on the ground weather station which is persistently being attacked by ants and the above canopy phenocams (water damage).

Dimitris Martins (PhD student, Imperial College London) will visit the site for three weeks in June using the canopy crane to sample for vertical gradients in the wood properties.

Two Masters students from Imperial College London will visit the site from May to July, working on entomology (with Tobin Northfield) and plant physiology (with Lucas Cernusak).



Robson Creek

Article using Robson Creek data (and other SuperSites) by Atkins *et al.* (2015) has been published in New Phytologist.

Re-measurement of the >10 cm stems at the core 1 ha will be carried out soon.

Latest Robson Creek vegetation data (coarse woody debris, seasonal photopoints, seasonal LAI, monthly fruit phenology) has been submitted to data portal

Only equipment failures in wet season have been rain-gauge on tower and logger in creek during flood event.

Great Western Woodlands

Activities undertaken at Credo in December 2014 field trip included:

- Replaced CF card in EC loggers with new cards and cleaned all instruments.
- The IRGA from the understorey flux tower was shifted to the main tower to restore the full functionality of the main tower. It was not possible to install an older IRGA temporarily on the understorey tower owing to incompatibilities with existing equipment.
- Installed a second rain gauge and five new CS650 soil moisture sensors at the tower site.
- Downloaded the song meters, phenocams and weather station. Weather shields were installed on the phenocams. The main phenocam was replaced with a new camera.
- Emptied the litter traps and downloaded dendrometers at all four plots. Removed loose bark from all trees with dendrometers and, where necessary, re-installed dendrometers with longer steel tape.
- Recorded groundwater depth at the two piezometers.
- Photopoints were collected at the corners and panorama photos at the centre of the salmongum and gimlet plots.
- Measured tree diameters at the salmongum and gimlet sites and tagged all trees in both plots.
- Data loggers recording sap flow velocities from trees at the gimlet and salmongum plots were downloaded.
- Collected second set of *in situ* soil evaporation and soil respiration measurements at the salmongum and gimlet plots, aiming to help partition fluxes among canopy trees, understorey and soils using the two EC systems and these measurements.
- Collected leaf samples for 'barcoding'.

Partnership begun with NASA Jet Propulsion Laboratory (JPL) in Pasadena, California on their Soil Moisture

Active Passive (SMAP) Level 4 Carbon Product calibration and validation activities (Natasha Stavros). They'll be using the GWW and other OzFlux data to include in their calibrations.

Craig is attending a CSIRO Critical Zone Observatory meeting in Brisbane, to help make sure this aligns with TERN initiatives.

We aim to seek a site for Drought-net on March 2015 trip, in partnership with Murdoch University and University of WA. We have in principle agreement from DPaW to set up the experiment, and are looking at costs, which look like coming to around \$2500 per 6 x 6 m rain-out shelter (and we'll need 3-6 shelters).

The Department of Lands and the Department of Parks and Wildlife conducted a workshop at the Credo Field Studies Centre with pastoralists from the region on 06 November 2014. The workshop was about rangelands vegetation cover monitoring and remote sensing with validation of a number of pilot sites on Credo and the adjoining pastoral lease to the south. It will be used again in a couple of weeks for an outback survival course.

Full data stream from the main tower has been restored by shifting understorey IRGA to main tower. Understorey tower is currently without an IRGA.

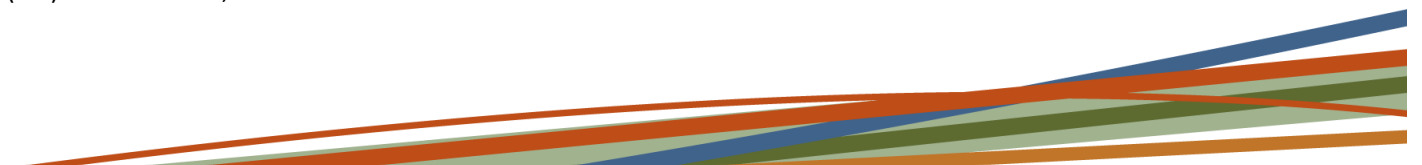
SEQ Peri-urban

Samford: SERF

- isotope samples have been collected and sent to UTS
- new seedling transects have been established
- CWD has been measured
- photopoints have been photographed
- panorama photos have been taken
- canopy leaf area index photos have been taken, converted to jpegs and analysed
- ant surveys (October-November) have been completed
- a general structural description has been created
- above ground biomass has been calculated based on 2012 DBH and height measurements and wood density values
- bird surveys have been completed 2013-2014 monthly
- seedling transect, CWD, general structural description, above ground biomass and bird survey data have all been uploaded to data portal.

The following is to be completed in Feb-Mar.

- the vascular plant list is ongoing (about 20% of the site surveyed)



- voucher specimens are being collected during vascular plant survey
- genetic samples are currently being collected during vascular plant survey
- canopy leaf area index will be remeasured in Autumn
- ant surveys will be repeated in March
- acoustic data is still to be finalised and uploaded in march

Karawatha Forest

Discussions with Tim Brown and Brisbane City Council for installing a phenocam are continuing; Discussions with Brisbane City Council for installing a 28 Vantage Pro 2 Plus ISS weather station are also close to complete. The plan is to install the phenocam and the weather station at the same location; Installation of the core 1 ha forest AusPlot at Karawatha Forest completed;

Completion of woody vegetation sampling at SuperSite plot and additional PPBio LTER plots where ground and aerial LIDAR was conducted. Now a comparison can be made among different sampling techniques; Vegetation sampling at the core 1 ha plot is almost completed; Acoustic sampling on the core 1 ha plot using an SM3 is continuing; Biannual bird survey completed on the core 1 ha plot in Feb 2015.

Ant survey completed on 6 plots in spring 2014. New Ant survey project commenced in Feb 2015. Involves comprehensive ant sampling on 32 x 1 ha plots in 2015. An honours student (James Cifuentes) was trained in ant ID by Alan Anderson in Dec 2014. Sampling on all 32 plots will allow a comparison among plots, determine factors driving ant diversity, and provide an estimate of the number of plots required for sampling that will represent Karawatha;

Publication of the manuscript, 'Determinants of tree assemblage composition at the mesoscale within a subtropical eucalypt forest' in PLOS ONE. The study was conducted at the Karawatha

International Biomass workshop - planning for a Karawatha SuperSite visit on Friday 27/2/15 (collaboration with Stuart Phinn). Potential partner identified in developing education outreach and a ClimateWatch trail at Karawatha.

Tumbarumba Wet Eucalypt

Phenocam and acoustic monitoring are continuing. The Core 1 ha plot has been established. Data from LAI, phenocam, plant canopy analyser has been compared to PAR sensors. Bird survey completed with another due in 2 weeks. Ants have been sampled, vegetation (mid-stratum) has been mapped and measured, plant

composition done, vouchers and samples for DNA/isotopes collected.

Litchfield Savanna

Main focus has been on building the tower before monsoon. Engineers signed off on it in mid-December. Underground power lines, power management system and lightning protection installed. Power available at 1/3 capacity. Acoustic monitor to be installed next. Logging climate and soil moisture. Working at heights training needs to be renewed before EC installed on tower. Bird survey due in April. CDU teaching program on site in June. UAV flights for remote sensing planned.

Victorian Dry Eucalypt

Whroo

Up to date with everything except the bird surveys. LiDAR campaign was carried out in February. Now have approval for a permit extension and expansion of allowed activities at the Whroo site.

New site being set up by UWA, "WA future farm" at Pingelly in the wheat belt. It is a pasture site with flux tower up and running (including methane fluxes). Will include a native comparison site. This site will be an AU CZO site. 30 students from across the world coming to a CZO meet.

Wombat

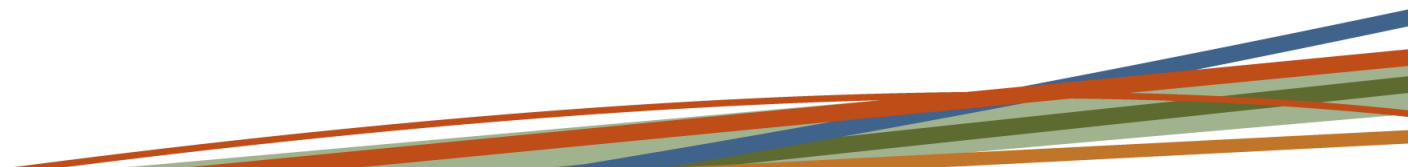
Core 1 ha plot monitoring done (veg monitoring, seedling transects, ants) - yet to do the photopoints, LAI, CWD planned for March. Phenocams to be installed on the tower, song-meter acoustic recorder off for maintenance, avifauna survey – still to find someone.

Warra Tall Eucalypt

2014 flux tower data processed to Level 3 and submitted to OzFlux portal. Acoustic Recording continued – no data gaps in period. Core 1 ha plot - ongoing weekly collection of insects in malaise trap for Global Malaise Study (University of Guelph); on-going monthly collection of insects in four flight-intercept traps. Spring ant survey completed.

Warra featured in November 2014 TERN Newsletter (science translated to management); January 2015 Newsletter (Pisek paper); and in a TERN press-release on 5th February 2015 (<http://tern.org.au/Lasers-drones-and-tree-climbers-in-the-Warra-bgp3592.html>) on the AusCover field campaign

Two UTas students awarded Dean's scholarships for summer work program. Scott Whitmore (graduated 2014 maths major) evaluated published indices for songscapes generated from acoustic data; found them wanting and proceeded to evaluate methods for



processing data based on methods of Briggs *et al.* (2012). Scott has decided to continue acoustic data processing as an honours project. Simon Marshall (2nd year biological sciences student) undertook a small study comparing pit-fall trap catches using propylene glycol as the preservative against those using ethylene glycol. Pit-fall surveys at Warra have traditionally used ethylene glycol but propylene glycol better for DNA barcoding. Need to confirm that change in preservative will not introduce a sampling bias.

Approached by Clemens Scheer (Queensland University of Technology) to include Warra in a latitudinal study on fluxes of soil greenhouse gases and the effect of drought (ARC Discovery).

Approached by Sebastian Seibold (Technische Universität München) to include Warra in an international study (commencing Spring 2015) to investigate climatic controls of litter decomposition by invertebrates.

Amanda Bates (University of Southampton) to progress with global-scale, cross-ecosystem time-series analysis of plant and animal responses to climate variability. Warra to contribute two time-series data.

Completed 10-year post-harvest survey of birds in all of the major treatments in the Silvicultural Systems Trial (SST). Continue monthly sampling of beetles from SST control plots. Continue sorting beetles from SST pit-fall traps (continuous monthly sampling from control plots now 2/3 completed)

AusCover campaign successfully completed in February 2015. Four star plots installed and measured. Superb weather on day hyperspectral imagery was captured.

Recent Publications

Atkin, *et al.* (2015) Global variability in leaf respiration in relation to climate, plant functional types and leaf traits. *New Phytologist*. doi: [10.1111/nph.13253](https://doi.org/10.1111/nph.13253)

Chiannucci F, Macfarlane C, Pisek J, Cutini A, Casa R (2014) Estimation of foliage clumping from the LAI-2000 Plant Canopy Analyzer: effect of view caps. *Trees Structure and Function*. DOI:10.1007/s00468-014-1115-x

Fest B.J., Livesley S.J., von Fischer J.C., Arndt S.K. (2015) Repeated fuel reduction burns have little long term impact on soil greenhouse gas exchange in dry sclerophyll eucalypt forests. *Agricultural and Forest Meteorology*. **201**: 17-25 IF 4.214

Gosper C, Petit MJ, Andersen AN, Yates CJ, Prober SM (2015) Multi-century dynamics of ant communities following fire in Mediterranean-climate woodlands of south-western Australia: are changes congruent

with vegetation succession? *Forest Ecology and Management* 342, 30-38.

Hero JM, Butler SA, Lollback GW, Castley JG. (2014). Determinants of Tree Assemblage Composition at the Mesoscale within a Subtropical Eucalypt Forest. *PLOS ONE*. 9(12): e114994. DOI:10.1371/journal.pone.0114994

Hinko-Najera N., Fest B., Livesley S.J., Arndt S.K. (2015) Reduced throughfall decreases autotrophic respiration, but not heterotrophic respiration in a dry temperate broadleaved evergreen forest. *Agricultural and Forest Meteorology* 200: 66-77 IF 4.214

Palmer *et al.* (2015). Partitioning of turbulent flux reveals woody vegetation has larger cooling potential than grassland during heat waves in south-eastern Australia. *Quarterly Journal of the Royal Meteorological Society* (In Press).

Pisek, J., Govind, A., Arndt, S.K., Hocking, D., Wardlaw, T.J., Fang, H., Matteucci, G., Longdoz, B. (2015) Intercomparison of clumping index estimates from POLDER, MODIS, and MISR satellite data over reference sites. *ISPRS Journal of Photogrammetry and Remote Sensing*, 101: 47–56 doi: [10.1016/j.isprsjprs.2014.11.004](https://doi.org/10.1016/j.isprsjprs.2014.11.004)

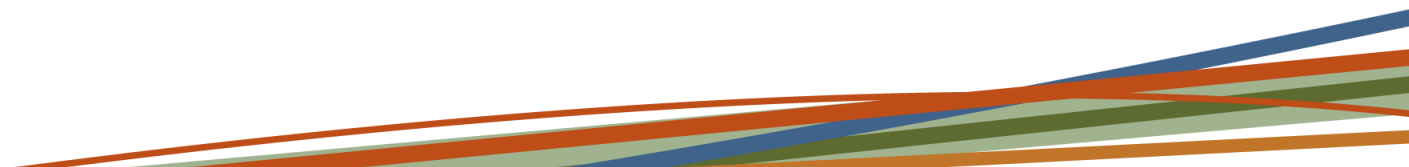
Prober SM, Bissett A, Walker C, Wiehl G, McIntyre S, Tibbett M (2015) Spatial structuring of arbuscular mycorrhizal communities in benchmark and modified temperate eucalypt woodlands. *Mycorrhiza* 25, 41-54.

Prober *et al.* (2015) Plant diversity predicts beta but not alpha diversity of soil microbes across grasslands worldwide. *Ecology Letters*. 18:85-95

Stevens CJ, Lind EM, Hautier Y, Harpole S, Borer ET, Hobbie S, Seabloom EW, Ladwig L, Bakker JD, Chu C, Collins S, Davies KF, Firn J, Hillebrand H, La Pierre KJ, MacDougall A, Melbourne B, McCulley RL, Morgan J, Orrock JL, Prober SM, Risch AC, Schuetz M, Wragg PD (in press) Anthropogenic nitrogen deposition predicts local grassland primary production worldwide. *Ecology*.

Villeneuve, S., Cook, P.G., Shanafield, M., Wood, C. White, N. (2015). Groundwater recharge via infiltration through ephemeral riverbed, central Australia. *Journal of Arid Environments*. 17, 47-58. doi:10.1016/j.jaridenv.2015.02.009

Wood, C. Cook, P.G. Harrington, G.A., Meredith, K., Kipfer, R. (2014). Factors affecting carbon-14 activity of unsaturated zone CO₂ and implications for groundwater dating. *Journal of Hydrology*. 519, 465-475. doi:10.1016/j.jhydrol.2014.07.034



Upcoming Events

12-16 April 2015

18th Biennial Conference, "Innovation in the Rangelands". Alice Springs. See [website](#) for details.

12-17 April 2015

European Geosciences Union General Assembly 2015. Vienna, Austria. See [website](#) for details.

13-15 April 2015

ANZIF 2015. Beyond Tenure: Managing forests across the landscape. Creswick, Victoria. See [website](#) for details.

5-8 May 2015

RIEGL LiDAR International User Conference 2015. Hong Kong and Guangzhou, China. See [website](#) for details.

2-12 June 2015

ICOS-NEON Greenhouse Gas Data Training Workshop. OHP, Haute-Provence, France. Details at: <http://carbonws2015.sciencesconf.org>

22-26 June 2015

Statistical Ecology and Environmental Monitoring 2015 Conference, Queenstown, New Zealand. Details at: [Conference website](#).

12-16 July 2015

52nd Annual Meeting of the Association for Tropical Biology and Conservation. Honolulu, Hawaii. See [website](#) for details.

19-24 July 2015

58th Annual Symposium of the International Association for Vegetation Science: Understanding broad-scale vegetation patterns. Brno, Czech Republic. See [website](#) for details.

20-31 July 2015

FLUXCOURSE 2015. University of Colorado Mountain Research Station, Niwot Ridge, USA. Conference, Queenstown, New Zealand. Details at: www.fluxcourse.org.

The next issue of the Newsletter will be published in June 2015. If you have any news articles, photos, upcoming events, etc that you would like included please email shiela.lloyd@jcu.edu.au

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