

Quarterly Newsletter

Issue 12, November 2015

SuperSite and OzFlux Update

Welcome to Issue #12 of the SuperSites/OzFlux newsletter. While the funding situation remains tight TERN is still in business and battling strongly alongside the other NCRIS platforms, especially important given the recent announcement of \$1.5b in funding to NCRIS over 10 years from 2017 going forward (<http://www.innovation.gov.au/page/maintaining-world-class-research-infrastructure>). It is important to maintain the research momentum across the networks going forward and communications plays a big part in this. After some discussion with the SuperSite staff (especially Shiela) we decided that it was still possible to produce the newsletters on a quarterly basis - as long as timelines could be stretched a bit if needed on occasion. Since the last newsletter the TERN board has met again and there is now support for a more oriented TERN that is focussed on answering science questions in an integrated fashion. Alan Anderson (ATN) and Mike Liddell have been working with Tim Clancy and most recently David Lindenmayer (LTERN) to look for questions that can be answered using multiple facilities in a practical manner. Once these questions are formulated and discussed amongst the Facility leaders they will be sent back to the networks for comment. The on-going strong integration in activities between the SuperSites and OzFlux fits in well with the future direction of TERN. To further strengthen these ties (and given the budget restraints over the next year) a suggestion was made to hold the SuperSite 'face-to-face meeting' in concert with the OzFlux meeting. This will be a positive move as it will help ensure that most (hopefully all 😊) of the PIs will be there for both OzFlux and SuperSite meetings. A central location was suggested and Peter and Wayne have graciously agreed to host the 2016 meeting(s) at Calperum/Adelaide.

The dates/venues are:

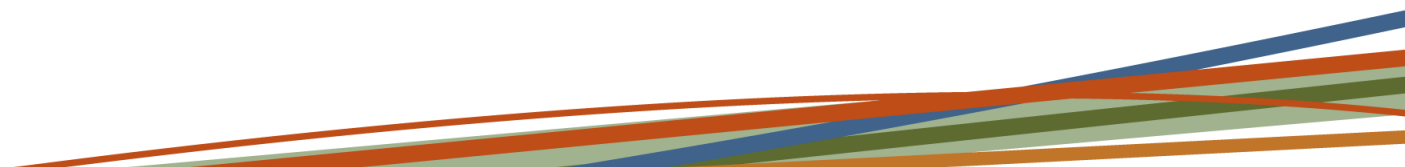
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| • <i>OzFlux Workshop</i> | 27th June - 1st July | Calperum |
| • <i>OzFlux Conference</i> | 4th - 7th July | Calperum |
| • <i>SuperSite face to face meeting</i> | 8th - 9th July | Adelaide |

If people could sketch these dates into your calendars early it would be good as it is sure to be another excellent visit to a SuperSite/OzFlux field site.

SuperSite Central Update

The 2015-16 year will be a challenging period for TERN and the SuperSites with a reduction in the budget available for monitoring activities. Consequently a reduced set of monitoring data is for the year. Contract Variation Agreements for the NCRIS III 2015-16 period have been signed for all SuperSites.

Soil microbial diversity at the SuperSites: The Biomes of Australian Soil Environments (BASE) project data is now available from the Bioplatforms data portal and a publication (Introducing BASE - The Biomes of Australian Soil Environments soil microbial diversity database) has been submitted to GigaScience. This article describes the project and database of amplicon sequences and associated contextual data for over 900 sites.



Citizen Science is a rapidly growing aspect of science outreach and education in Australia. SuperSites are involved in Citizen Science through Earthwatch /NAB field campaigns at Calperum Mallee SuperSite and the recent release of a ClimateWatch trail at the Tinaroo Environmental Education Centre associated with the Robson Creek node of the FNQ Rainforest SuperSite.

SuperSites have an opportunity to participate in a Citizen Science project that will produce complementary soil microbial biodiversity data using similar techniques. Plans are also underway to contribute pictures of fungi from the SuperSites to the Fungi Map project (<http://fungimap.org.au/>). This will allow the fungi to be identified and the data (species/location/date) to be collected by the Atlas of Living Australia and add to the phenology information for each SuperSite. Images of fungi at the SuperSites can be sent to Mirko for collation and upload to Fungi Map.

TERN Central has implemented a change in the default licence applied to TERN funded data to Creative Commons 4.0.

A review of the applications of the SuperSites phenocam data and camera specifications is currently underway to provide some guidance for implementing a network wide change in camera type when funding allows.

SuperSites BioAcoustic Data and BioImage Data Portals are in development and will soon be operational.

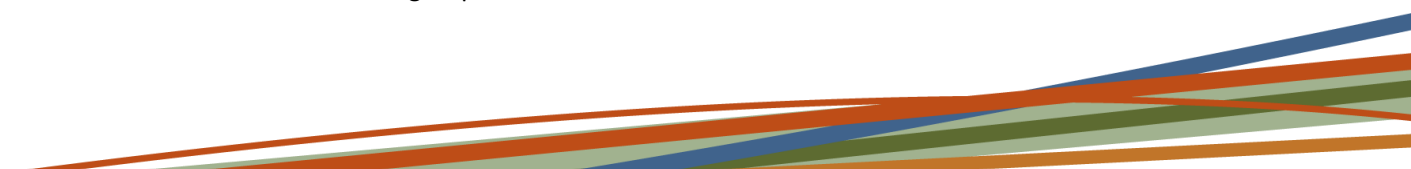
Cross-SuperSite projects include a hydrological study, led by Brendan Choate, looking at tree performance from a range of SuperSites including FNQ Rainforest, Calperum, Warra, Cumberland Plain and Litchfield.

At the start of November a post-doctoral fellow, Melissa Fedrigo, started work at CSIRO L&W Canberra and JCU Cairns. Melissa will be working on remote sensing looking at lidar to biomass products and validation/error estimates will be a key part of her research. The project will make use of AusCover lidar data sets from at least 2 SuperSites (Robson Creek, Warra) and also Injune (Qld Brigalow country), along with site plot data. The research team currently comprises Stephen Roxburgh, Keryn Paul, Alex Held, Randall Donohue, Matt Bradford (CSIRO), Mike Liddell, Karen Joyce (JCU). Additional external scientists who are participating include John Armston, Peter Scarth (DSITI, AusCover) and Stuart Phinn (UQ AusCover).

At Robson Creek a Japanese research group lead by Professor Akira Kato from Chiba University has been working on site for the last 3 years using remote sensing to study canopy structure. This year in addition to using two Terrestrial Lidar Systems his group brought over a UAV and prepared a detailed 3D map of the canopy across the 25 ha census plot using photogrammetry.



The post-doc project and the work of Prof. Akira's group are complementary and both groups were quick to establish a new collaboration – as seen here in the group shot on site at Robson Creek.



In November, Mike, Mirko and Nikki teleconferenced with Herbert Haubold from iLTER, to discuss potential alignments. We found lots of similarities in aims and activities between iLTER and TERN and especially the SuperSites. The outcome of the meeting is that the SuperSites and LTERN will register with iLTER as affiliated networks in January, when they implement a new web interface. This will mean our TERN sites will appear on the iLTER map of affiliated network plots, increasing our international exposure. We will also be sharing metadata with their database (DEIMS) to enhance our data visibility and potentials for collaborations.

The new SuperSites BioAcoustic Data Portal is now live! Go to bioacoustics.supersites.net.au to check it out.

OzFlux Central Update

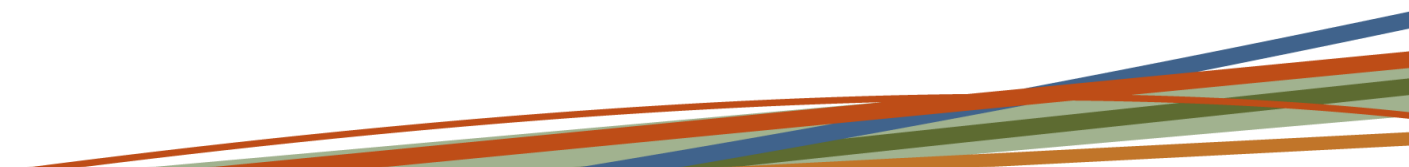
It's been a big few months for OzFlux and in the lead up to the Special Issue early next year, the next 2 months will also be busy.

Data Workshop and Conference

The annual OzFlux Data Workshop and Conference were held in Hobart this year, hosted by Tim Wardlaw and Alison Phillips of Forestry Tasmania. Many thanks to Tim and Alison for their work in organising the 10 day event and to CSIRO for providing space at the Marine Labs.

The data workshop was well attended again this year with about 15 people there for the week. This year we were fortunate to have Rick Garcia and Gerardo Fratini from Li-cor and Ivan Brogeov from Campbell Scientific to help with lectures and practical advice during the data processing sessions. Several people took advantage of Gerardo's presence to either learn about EddyPro or to refine their skills and several more benefited from Rick's depth of experience in surface-atmosphere exchange and Ivan's experience with instrumentation. We are extremely fortunate to have people from Li-cor and Campbell come to the workshops every year, they have played a large part in raising the skill level of the OzFlux community over the years.

A personal highlight for me was the number of people who are now processing their data to L6 (gap filled and partitioned) and then starting their own analysis of the data. This is a big advance over the 5 years the workshop has been running.



Numbers were down a little for the conference but the content of the presentations, the strong contingent of Kiwi's and Ed Swiatek from Campbell more than made up for this. As with Li-cor and Campbell at the data workshop, we are really lucky to have people travel from New Zealand to the conference every year. There was a marked transition this year from updates on site status to science results. After Eva opened the conference, we were fortunate to have the TERN Director, Tim Clancy give us a presentation on strategic directions and funding expectations for TERN over the next few years. Tim was followed by Siddeswara Guru, the TERN Data Integration and Synthesis Coordinator who spoke on the recent adoption by TERN of the Creative Commons V4 license suit and the TERN CoESRA initiative (<https://www.coesra.org.au/#/>).

Most people made it for the field trip on Wednesday to what is now the tallest tower in Australia at the Warra site. The old growth forest at this site is impressive as were the logistical challenges in getting the site established and keeping it running. Highlights from this trip were Tim's thorough knowledge of this forest ecosystem, Alison's quiet and determined work and the Tahune Air Walk.

OzFlux Submission to FluxNet

OzFlux reached another milestone during the data workshop in Hobart when Mike Liddell uploaded his data to the FluxNet collection on the OzFlux Data Portal and pushed the total number of site years being submitted to over 150. This is a fantastic effort by all across OzFlux and represents close to an order of magnitude increase over the quantity of OzFlux data contained in the last (La Thuile) FluxNet synthesis.

Although FluxNet's deadline for submissions has now passed, it is still possible to update the files in the FluxNet collection on the data portal as any remaining quality issues are resolved. There is a chance these updates will make it into the final synthesis and they will certainly be ready for the next.

OzFluxQC Update

There have been several major changes to OzFluxQC in recent months:

1. adoption of the symbols and definitions given in Chapin et al (2006).
2. output of summary statistics (daily, monthly, annual and cumulative) at the end of L6 processing as an Excel spreadsheet and as plots.
3. addition of ecosystem respiration using the Lloyd-Taylor temperature function (many thanks to Ian McHugh for the code).
4. ability to output L3 data in the format required by REdDyProc, the R scripts used in the online tool provided by the Max Plank Institute for Biogeochemistry.
5. ability to ingest REdDyProc output (or any other similar data in netCDF form) to facilitate comparison with OzFluxQC output at L6.

Anyone using OzFluxQC should update to the newest version available from the OzFluxQC GitHub repository (<https://github.com/OzFlux/OzFluxQC>). Contact Peter Isaac if you need help with this process.

OzFlux OPeNDAP Server

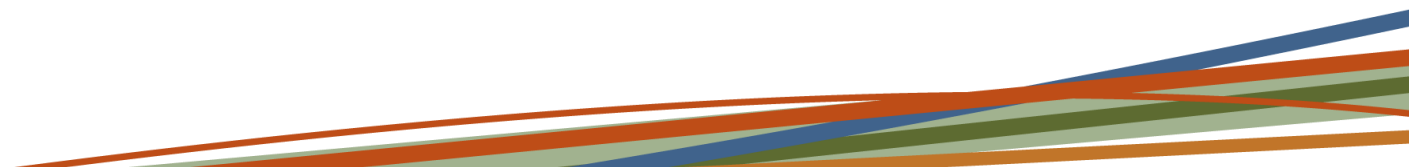
Progress on getting L3 to L6 data on the OzFlux OPeNDAP server (<http://dap.ozflux.org.au/thredds/catalog.html>) has been slow in the last month due to the distractions of the FluxNet submission and the OzFlux Data Workshop and Conference. However, processing of 21 OzFlux sites to L6 has been completed and the data is ready to be uploaded to the OPeNDAP server. In addition to the data processed by the OzFlux Central Node, some site PIs have prepared their own L6 data. At this stage we plan to offer both sets via the OPeNDAP server so that end users can choose between the site PIs "best" version and a "standard" version.

OzEWEX and AGU

James Cleverly attended the OzEWEX 2nd National Workshop in Brisbane held in early December and gave a presentation introducing OzFlux and showing results from across the network.

Eva van Gorsel attended the AsiaFlux meeting. It was a great meeting, a lot of networking was done and a lot of faces put to names long known. The meeting was packed with great science and it was interesting to exchange notes.

Eva van Gorsel, Elise Pendall and Jason Beringer are all attending the AGU Fall meeting in San Francisco and giving a range of presentations and posters using data from the OzFlux network. Enjoy the free beer at 3:00 pm, maybe we need to introduce this at the OzFlux conference to get numbers up.



CZO Central Update

This is the first Critical Zone Observatory (CZO) Central Update, a new addition to the SuperSites/OzFlux Quarterly Newsletter which reflects the growing collaboration between the CZO and TERN networks. Many thanks to Mike Liddell and Stuart Phinn for promoting this initiative, and we look forward to developing projects in partnership with the TERN community. As a brief introduction to the CZO network and aims, the 'Critical Zone' is defined as Earth's highly permeable near-surface layer, from the atmospheric boundary layer above the canopy to the bottom of the shallow groundwater systems and the onset of fresh unaltered bedrock. Interactions across these components shape ecosystems and underpin life on Earth, yet key questions around the formation, functions, and future evolution of the Critical Zone remain unanswered. Understanding the complex web of physical, chemical, and biological processes of the Critical Zone requires a systems approach across a broad array of sciences: hydrology, geology, soil science, biology, ecology, geochemistry, geomorphology, to name a few. Critical Zone Observatories were initiated in the USA, with a national network that now comprises ten Critical Zone Observatories (<http://criticalzone.org/national/>), and many others now spread across Central America, Europe, and Africa (<http://www.czen.org/>). The first Australian CZO was established in Pingelly, Western Australia in late 2013 (Matthias Leopold, Deirdre Gleeson; UWA), in a semi-arid, deeply weathered landscape, with a second established in the Main Range National Park, Queensland (Talitha Santini, Joshua Larsen; UQ) shortly thereafter. Over the last two years, these sites have developed a number of projects and research themes, with the most recent activities highlighted in the update below.

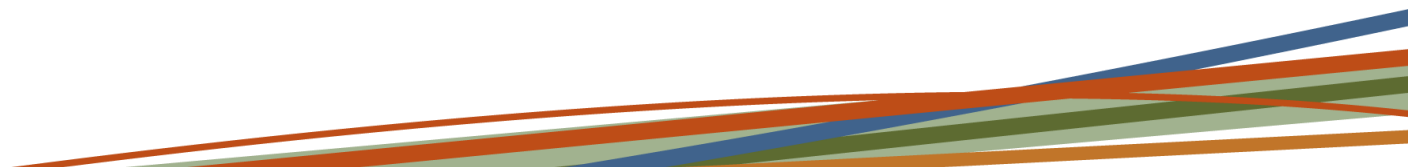
Ashlee Dere (University of Nebraska, Omaha) visited the Main Range CZO in August (Talitha Santini, Josh Larsen) to expand her international shale weathering study to Australia. To investigate the influence of climate on soil properties, a climosequence of forested sites underlain by shale was established in North America, Puerto Rico and Wales as part of the Susquehanna Shale Hills CZO in central Pennsylvania. The transect of sites exists along a climate gradient that includes relatively cold and wet sites in Wales, New York and Pennsylvania, with mean annual temperature (MAT) and precipitation (MAP) increasing to the south in Virginia, Tennessee, Alabama, and Puerto Rico. The Main Range site forms an intermediate member between Alabama and Puerto Rico in terms of latitude (28.2 °S), with similar MAP to Alabama (1350 mm/yr) and cooler MAT than both Alabama and Puerto Rico (14.5 °C). Dr Dere collected soil and rock samples for analysis of long term in situ weathering rates and established a shale weathering experiment to investigate contemporary shale weathering rates and processes. Talitha and Josh will also be hosting Reggie Walters from Boise State University (Reynolds Creek CZO) this November to collaborate on water balance modelling.

In February 2015 the UWA-CZO hosted the inaugural Worldwide Universities Network (WUN) summer school focussing on "critical zone science and climate change". Matthias Leopold, Deirdre Gleeson (both UWA) Steven Banwart (Univ. Sheffield) together with many colleagues from UWA led 19 PhD students on a 2 week field trip to the UWA-CZO including subsequent writing retreat. Topics targeted included the specific composition of the southern hemisphere critical zone architecture with its ancient weathering profile and soils and the implications for water availability in an agricultural context. The whole project was funded by WUN and the US-National CZ-office (US-NSF funded). A snapshot of the event can be viewed on the web (<https://www.youtube.com/watch?v=SBHOIH679wg>).

Last year Matthias and Deirdre initiated Australia's first international workshop on critical zone science at UWA followed by a second workshop lead by Dirk Mallants and Paul Bertsch (CSIRO) in Adelaide. As a result of these two events a special issue of Science of the Total Environment is currently being prepared with contributions from the Main Range CZO in Queensland (Contrasting hydrochemistry – discharge relationships in headwater catchments with similar geology and rainfall: implications for landscape weathering and solute export) and the UWA-CZO in Western Australia (Influence of the critical zone architecture on the soil microbiology on a lateritic hill at the UWA farm Ridgefield, Western Australia).

Matthias Leopold participated at the deep critical zone workshop held at Winter Park, Colorado USA in June 2015. Representatives from all major US-CZOs discussed on a unifying concept of hill slope development and UWA-CZO contributed as an end-member for long term weathering processes in a granitic landscape. Results are currently being prepared for a joint publication.

In November 2015 professors Jinshui Wu, Kelin Wang and Wenxue Wei from the Chinese Academy of Agricultural Science (CAAS) visited the UWA-CZO to learn about the site and to discuss further collaboration.



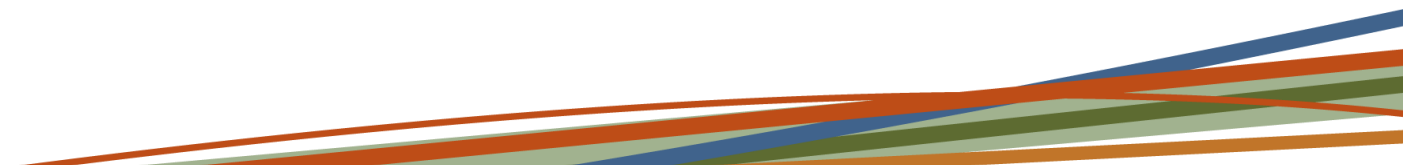


From left to right, Deirdre Gleeson (UWA), Steve Banwart (Sheffield, UK), Judy Fischer (WA), Tim White (Penn State, USA), Matthias Leopold (UWA) and Oliver Chadwick (UC Santa Barbara, USA) discussing at a lateritic profile during the international workshop at the UWA-CZO.

This year's American Geophysical Union conference (14-18 December) will have numerous Critical Zone-related sessions of interest to TERN members – including the town hall session on Tuesday 15 December ('A Townhall for the Network of Critical Zone Observatories). Talitha Santini will be speaking at an international Critical Zone Science workshop to be held on Sunday 13 December and presenting a poster on the Main Range CZO in the International Critical Zone Science: Status, Networking, and Challenges poster session on Wednesday 16 December. The UWA-CZO will be also presented during the workshop on 13th of Sept by Jason Beringer.

Data from the Main Range and Pingelly CZOs will soon be available online thanks to Mike Liddell and Alvin Sebastian – please contact the teams at each CZO if you are interested in using this data to build cross-site models/data analyses in future. Additional aerial imagery, soils, vegetation, and water data will be uploaded in early 2016 following summer field campaigns at the Main Range CZO. First data from the UWA Pingelly CZO including general maps (geology, vegetation, slope etc.) will be uploaded in 2016 and linked with the already available WEB-GIS for the site. Numerous soil profiles with physical and chemical data have been made publically available already (<http://www.arcgis.com/home/item.html?id=2b991718802047ab96492ddb5d6c1d7>). Furthermore the site includes and automated weather station to download relevant data and set threshold values for alerts (e.g. rain storms). In early 2015 a complete flux tower was installed in one of the main cropping paddocks at the UWA-CZO. It is currently the only flux tower in an agricultural context in WA. The instrument will help to better understand energy fluxes in the critical zone and the atmosphere. Additional microbiome data from the UWA-CZO will be available publicly via international databases (www.metagenomics.anl.gov) and will be migrated to the CZ database during 2016.

The Main Range CZO has been compiling vegetation, climate, and hydrology datasets in order to determine why the water balance of two adjacent catchments with near identical geology, climate, and topography, have large differences in seasonal water balances, storage capacity, and low flow persistence. This question has been the focus of undergraduate research projects at UQ, and may be due to small differences in aspect and incoming solar energy, which has a large influence on the water fluxes back to the atmosphere. Improving our knowledge on how these headwater environments store and release water downstream is critical to understand for water resource ecosystem resilience, and along with water quality, soil, and vegetation processes, is a key focus of future CZO research at this site.



News from around the SuperSite and OzFlux networks

Alice Mulga

Activities during the last quarter included:

- LAI measurements;
- Ant collections;
- DBH;
- Soda lime respirometers;
- Litterfall collection;
- Leaf collection for N and genetics analysis;
- Photopoints using the rangeland and forest method;
- Collection of data from acoustic recorders;
- Root collection for anatomy studies;
- Record dendrometer measurements;
- Soil physico-chemical analysis
- Ecophysiology measurements (leaf gas exchange, leaf water potential, xylem hydraulics, water use efficiency of sugars and bulk leaf tissue (stable isotope analyses of $\delta^{13}\text{C}$);
- Water source of vegetation (stable isotope analyses of deuterium and $\delta^{18}\text{O}$).

Recent visitors to the site included: Rachael Nolan, Tonantzin Tarin Terrazas, Rolf Faux, Cacilia Ewenz, Mark Carter (bird surveys).

Calperum Mallee

Ongoing monitoring activities have included LAI, leaf litter, standing dry matter, Malaise trapping, and OzFlux. Studies ongoing using drone surveys, water use of the mallee area, soil respiration vs canopy respiration.

Dr Elena Kondrlova is continuing her research looking at soil water data and water balance.

Three posters and a paper presentation are being prepared for the Ecological Society of Australia conference in Adelaide (30 Nov – 2 Dec).

Cumberland Plain

Spring vegetation (Gentry) surveys, in collaboration with Royal Botanic Gardens - Sydney, finalised and continued voucher collection in October.

The Spring 2014 & Autumn 2015 vegetation composition data has now been checked and formatted ready to upload. Spring bird survey completed and uploaded.

Standing Above Ground Biomass and Coarse Woody Debris calculated for core 1 ha. The densities of the decomposition classes were very similar for all classes except the most decomposed one.

A hazard reduction burn is planned this spring for an adjacent plot. The CLBP SuperSite hasn't seen a fire since 1977 when it was lit up as a back burn to stop a wildfire.

Hazard reduction burning will quite likely be proposed in the next few years.

Wouter Maes carried out UAV-based remote sensing of water stress and evapotranspiration: we have collected observations of mistletoe infestation in the eucalypts of the core hectare and surrounding area (~600 trees) to support Wouter's study. Elise took her students of the Master of Research ecology course to the site this winter.

FNQ Rainforest

Robson Creek

Additional monitoring at Robson Creek includes: Reveg planting; remeasured core plot; phenology; bird monitoring. Acoustic monitoring, phenocams, weatherstations and flux stations are all running normally.

MicroBlitz soil samples have been collected.

Wiring has been installed from the donga to the tower to allow 240V supply in the forest and 12V supply from tower to acoustic sensor. Revegetation of the entrance area to the tower.

Recent visits to Robson Creek included: Enno Keskinen (TUT Finland); Wouter Maes (UTS), drone surveys with hyperspectral cameras; Yadvinder Malhi (Oxford University), ecophysiology;

ClimateWatch trail associated with Robson Creek has been established at the Tinaroo Environmental Education Centre

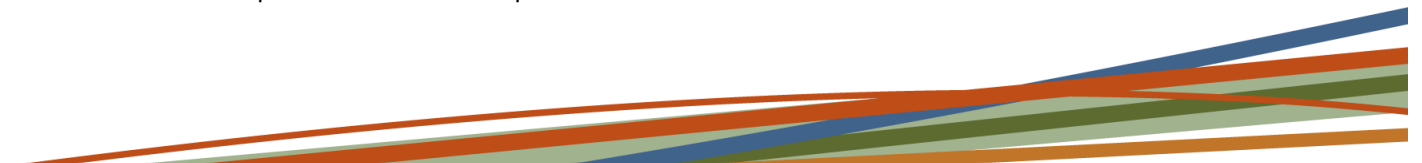
(<http://www.climatewatch.org.au/trails/tinaroo-environmental-education-centre>).



Wouter Maes and his team with the UAV at Daintree

Daintree

Acoustic monitoring, phenocams, weatherstations and flux stations are all running normally.



MicroBlitz soil samples have been collected for Cape Tribulation and Cow Bay.

Recent visitors to Cape Tribulation included: Wouter Maes (UTS), drone surveys with hyperspectral cameras; Yadvinder Malhi (Oxford University), ecophysiology; Cynthia Theodore (Univ of Lund), looking at evolution in birds; Christine Miller (Univ of Florida) - entomology; and groups from Mossman High School; Carey Grammar School; AUIP (American Universities International); SWJ (Small World Journeys - school groups); SFFS (School for Field Studies - uni groups); OTW (On the Wallaby - Uni Groups).

Daintree Discovery Centre Bags Double Gold at the State's Top Tourism Awards



The world-class Daintree Discovery Centre has won Gold in the categories of 'Tourist Attraction' and 'the Steve Irwin Award for Ecotourism' at the recent Queensland Tourism Awards, held at the Brisbane Convention Centre on Friday night.

Great Western Woodlands

In collaboration with Murdoch University, 20 plots have been set up in chenopod shrubland at Credo as part of the international Drought-Net collaboration. This includes initial floristic, soil and biomass measurements and erection of 10 rain-out shelters.

Two new sub-projects established at the Mt Caroline Nutrient Network site in collaboration with Colorado State University and with the Swiss Federal Institute for Forest, Snow and Landscape Research.

SuperSite activities and issues over the July-September period include:

Department of Parks and Wildlife works at Credo flux site

- Cattle trapping is continuing as cattle numbers remained high after last cull.



Recently-erected rain-out shelters for the Drought-Net experiment at Credo

Flux tower, weather station, plant physiology

- An equipment issue led to a breakdown in communications with the tower during August. This was easily fixed but required an additional trip in September to troubleshoot. No data were lost.
- Leaf area index, phenocam, litter traps, sap flow, and dendrometer data collected in September

Credo biological monitoring

- Routine monitoring has been scaled back due to reduced funding. Monitoring completed in September includes: acoustic monitoring data collected, AusPlots vegetation monitoring protocol undertaken for Salmon gum plot.

Gimlet fire-age plots

- Carl Gosper led two field trips towards characterising the fire age distribution in gimlet woodlands across the western half of the GWW.

Nutrient Network

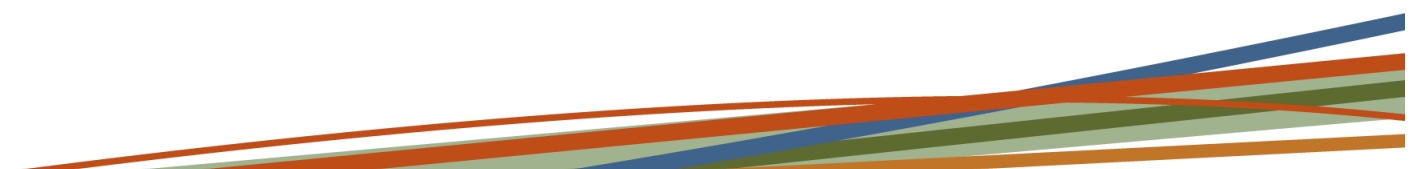
- Routine floristic monitoring undertaken in September
- Incubation and collection of soil cores and bait lamina strips was undertaken for a new nutrient cycling project led by Anita Risch, Swiss Federal Institute for Forest, Snow and Landscape Research
- Sampling of leaf damage in five species was undertaken for a new NutNet project led by Dana Blumenthal, Colorado State University.

Litchfield Savanna

The new Litchfield flux tower has been instrumented and is now fully operational. An over-canopy Vivotech phenocam has been installed, and the Acoustic recorder is operational.

eSMAP Campaign

eMAST is not on ice, but they were melting at Litchfield last month. Brad Evans, Ian Marang (PhD student), Jason Beringer, Matthew Northwood, Did Alvarez Cortes and



Lina Luck carried out a field campaign (eSMAP) at Litchfield 12-17 Oct to collect to investigate dry season minima soil moisture patterns and trends across the Litchfield TERN SuperSite. Called eSMAP (eMAST Soil Moisture Active Passive) campaign, the objective was threefold:

- i) establish a set of five continuous measurement stations to collect time series data on soil moisture at three depths (2.5-17.5 cm, 42.5-57.5 cm, 60-94.5 cm) along with ecophysiological sensor data (Photosynthetically Active Radiation, Radiometry and canopy photography),
- ii) conduct a spatial sampling campaign across the full 25 km² area of the Litchfield SuperSite and a 9 km² subset
- iii) to collect gravimetric soil and tree core samples to calibrate the soil moisture sensors and provide a vegetation water content estimate.

Conditions were hot and challenging, with highs of 37 °C and 60% relative humidity, but after a week traversing the TERN SuperSite by foot and vehicle, 107 points (each with replicates) were collected and the 5 continuous measurement stations installed. The gravimetric calibration samples were taken, but the vegetation water content measurement is still a challenge. The process of collating and analysing the data has now begun and there will be updates to come.

This work is part of Ian's PhD studies and ground truthing (SMAPex) of the Soil Moisture Active Passive (SMAP) satellite data.



Spatial sampling using POGO tool with Hydramon smartphone app (Mr Didi Alvarez Cortes pictured)

SEQ Peri-urban

Samford

Collection of functional trait data for all species is ongoing. Species list has been updated and vouchers collected. Autumn and Winter LAI data, acoustic data, and bird survey data have been uploaded to the portal. CWD will be completed soon.

Recent users of Samford SuperSite include: Andrew Schwenke, Acoustic research for Honours Project; QUT undergraduate classes (Site Survey, Ecosystems and the Environment, Insect Life); University of Washington (UAV multispectral study); Atthow Family Descendents; Annual SERF Information Evening.

Karawatha

Bird survey completed, vegetation monitoring continuing. Discussion ongoing with Brisbane City Council on phenocam installation.

In discussions with Pullenvale Environmental Education Centre and Brisbane City Council with regards to developing a ClimateWatch project.

MicroBlitz soil metabarcoding is being extended to all of the PPBio plots.

New visitor centre planned - Karawatha Visitors Centre - developing interpretation information to highlight the long-term ecological monitoring and research.

Users of the site include: school students with the Pullenvale Environmental Centre and James Cifuentes, working on spatial variation in ant species abundance and composition within the Karawatha Forest.

Tumbarumba Wet Eucalypt

Flux tower, met measurements, soil measurements (heat flux, T, soil water), proximal remote sensing, Cosmoz, in canopy PAR sensor network, vegnet, sound monitoring, LAI/ photopoints, and avian fauna are all ongoing.

New CSIRO OCE project on Impact of temperature and precipitation extremes on Australian terrestrial vegetation.

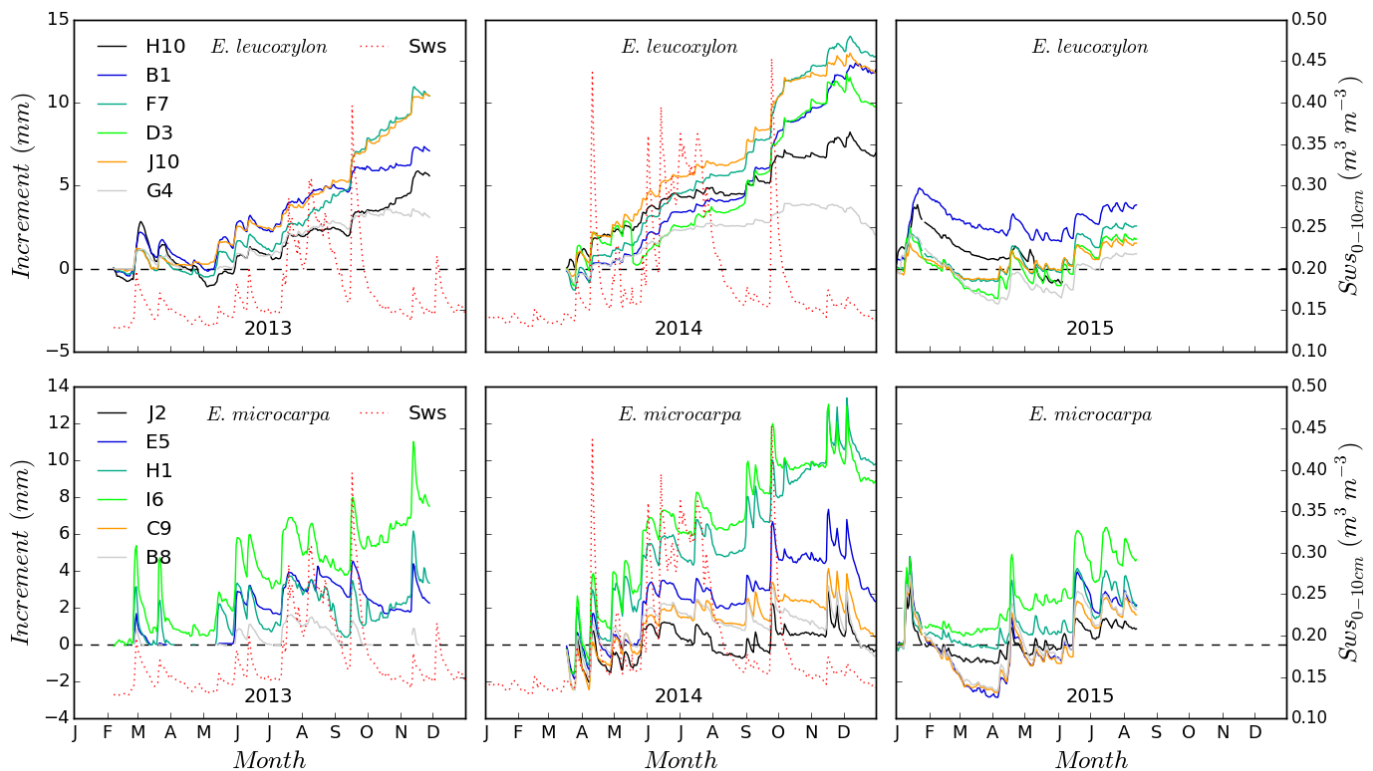
Victorian Dry Eucalypt

Whroo

Minor losses of data during winter. Ancillary measurements of LAI (hemispheric camera), litterfall and dendrometry are ongoing.

Planned activities / additions include:

- 5 wingscapes cameras
- windsonic 2D sonic anemometers to replace cup and vane type
- reconfiguration / overhaul of equipment mounting hardware to facilitate easier instrument access



Plot of recently analysed dendrometer data from Whroo site

The different colours represent dendrometers attached to different trees in the core 1 ha plot, and there are two species (upper and lower panels). The scale on the right is soil moisture (Sws is soil water storage).

Wombat

All infrastructure is generally fine and monitoring is progressing as planned.

There is a planned burn at Wombat Flux. The DELWP is preparing for a low intensity fuel reduction burn in the area of the Flux Tower and the Supersite. The burn encompasses the flux tower footprint and planned for early November. The logistical challenge is to get all the gear out and back in soon after the burn the impacts of the burn on key ecosystem processes can be tracked. Burns are natural and quite frequent in these forests, so this will be a good research opportunity if the burn goes ahead.

Warra Tall Eucalypt

Enclosed-path IRGA reinstalled on tower and now fully operational. Wind-sonic not currently operational but wind measurements are being made from CSAT. Two soil moisture probes (40 and 80 cm in replicate 3) ceased functioning on 16th Sept: Still have three replicates of functioning instruments operating at all depths.

Acoustic recording continued. The recorder was relocated to avoid background mechanical noises from the soil moisture multiplexers.

Core 1 ha plot: On-going monthly collection of insects in four flight-intercept traps. Hemispherical and photopoint images taken 24th September.

Hydrology – Vandalism at Warra Weir on weekend of 3rd October and at Swanson Weir in late October. Both weirs are currently not operational. Ongoing data collection from King Creek. Damaged booms gates restricting access into Warra have been replaced.

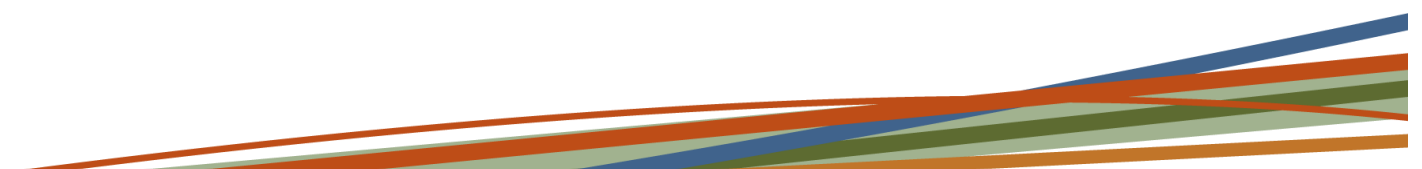
New People

Bechu Yadav commenced PhD studies at UTas as one of four PhD projects with ARC Linkage Project. Bechu’s studies will investigate the potential of LiDAR and other airborne imagery to describe the composition and structure of forest vegetation. He will be using high-resolution imagery captured from the AusCover campaigning at Warra as well as operational LiDAR and extensive ground plot data in production forest areas.

Sam Wood commenced part-time work (1-day/week) with UTas to undertake GIS analysis of wet eucalypt forest landscapes in Tasmania and Victoria. This work also contributes to ARC Linkage Project.

New Projects/Collaborations started

- Planning for the installation of micro-dendrometers on four tree species in and around the Warra Core 1-ha plot by Dr Kathy Allen (UniMelb).



- Planning continues for Warra as one of ca. 50 sites in the global study “Contribution of invertebrates to wood decomposition relative to global climate” being conducted by Dr Sebastian Siebold. Plan to install treatments at Warra in late Spring.
- Early planning by PhD candidate Jennifer Peters (Western Sydney University) for a summer sampling campaign to conduct water physiology measurements as part of a national study on the vulnerability of Australian Forests to Drought.
- Early planning by PhD candidate James Furland (UTas) for data to assist in the selection of sites to conduct measurements of fuel accumulation in wet eucalypt forests as a function of time since disturbance.

Recent visitors included: Darcy Vickers (Forest Education Foundation) hosted a visit to Warra of about 20 Environmental Studies students from Hobart College. TW hosted the group in a visit to the Warra flux site; UTas Surveying and Spatial group (Drs Arko Lucieer, Jagannath Aryal; PhD candidates: Bechu Yadav, Isram Iqbal) and Biological Sciences (Assoc. Prof. Greg Jordan, Dr Sue Baker) and Tim Wardlaw visited Warra Core 1-ha plot to progress planning for Bechu’s PhD study.

Recent Publications

- Barraza, V., Restrepo-Coupe, N., Huete, A., Grings, F. and van Gorsel, E. 2015. Passive microwave and optical Index approaches for estimating surface conductance and evapotranspiration in forest ecosystems. *Agricultural and Forest Meteorology* 213: 126-137. doi:10.1016/j.agrformet.2015.06.020
- Chen, C., Cleverly, J., Zhang, L., Yu, Q. and Eamus, D. 2015. Modelling seasonal and inter-annual variations in carbon and water fluxes in an arid-zone *Acacia* savanna woodland, 1981–2012. *Ecosystems*. Accepted 15 November 2015
- Cleverly, J., Thibault, J.R., Teet, S.B., Tashjian, P., Hipps, L.E., Dahm, C.N. and Eamus, D. 2015. Flooding regime impacts on radiation, evapotranspiration and latent heat fluxes over groundwater-dependent riparian cottonwood and saltcedar forests. *Advances in Meteorology* 2015: 935060, 14pp. doi: 10.1155/2015/935060.
- Haverd, V., Smith, B., Raupach, M., Briggs, P., Nieradzick, L., Beringer, J., Hutley, L., Trudinger, C.M. & Cleverly, J. 2015. Coupling carbon allocation with leaf and root phenology predicts tree-grass partitioning along a savanna rainfall gradient. *Biogeosciences Discuss.* 12: 16313-16357. doi: 10.5194/bgd-12-16313-2015.
- Kantvilas, G., Jarman, S.J. & Minchin, P.R. (2015) Early impacts of disturbance on lichens, mosses and

liverworts in Tasmania’s wet eucalypt production forests. *Australian Forestry* 78(2): 92-107.

- Restrepo Coupe, N., Huete, A., Davies, K., Cleverly, J., Beringer, J., Eamus, D., van Gorsel, E., Hutley, L. & Meyer, W.S. 2015. MODIS vegetation products as proxies of photosynthetic potential: a look across meteorological and biological driven ecosystem productivity. *Biogeosciences Discussions*.
- Santini, N.S., Cleverly, J., Faux, R., Lestrangle, C., Rumman, R. & Eamus, D. 2015. Xylem traits and water-use-efficiency of co-occurring woody species from the Ti Tree Basin arid zone. *Trees* 1-9. doi: 10.1007/s00468-015-1301-5
- Shanafield, M., Cook, P.G., Gutiérrez-Jurado, H.A., Faux, R., Cleverly, J. & Eamus, D. 2015. Field comparison of methods for estimating groundwater discharge by evaporation and evapotranspiration in an arid-zone playa. *Journal of Hydrology* 527: 1073-1083. doi: <http://dx.doi.org/10.1016/j.jhydrol.2015.06.003>.
- van Dijk, A.I.J.M., Gash, J.H., van Gorsel, E., *et al.* 2015. Rainfall interception and the coupled surface water and energy balance. *Agricultural and Forest Meteorology* 09/2015; 214–215: 402–415. doi:10.1016/j.agrformet.2015.09.006

Upcoming Events

14-18 December 2015

AGU Fall Meeting, San Francisco, USA. See [website](#) for details.

9-12 February 2016

Species on the Move Conference 2016. Hobart, Tasmania. See [website](#) for further details.

17-18 February 2016

Unmanned Aircraft Systems for Remote Sensing Applications, Brisbane, Queensland. See [website](#) for further details.

22-26 February 2016

2016 GFOI Plenary and Open Forum, Frascati, Italy. See [website](#) for details.

6-8 June 2016

Ecoacoustics Congress 2016. Michigan, USA. See [website](#) for details.

The next issue of the Newsletter will be published in January 2016. 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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