

Quarterly Newsletter

Issue 3, June 2013

Supersite Central Update

Welcome to Issue # 3 of the ASN/OzFlux newsletter.

The Australian Supersite Network convened a session at the 10th Annual Meeting of Asia Oceania Geosciences Society in Brisbane, June 24-28. Session BG-17 **"The Australian Supersite Network - Biogeochemical Observatories"** had 7 presentations:

"TERN Supersites and Carbon Monitoring"

Mike Liddell, Matt Bradford, Tim Wardlaw & Suzanne Prober

"Remote Sensing of Biophysical Parameters: Linking Field, Airborne and Continental Scale Satellite Data"

Kasper Johansen & Stuart Phinn

"Coupling Ecophysiological Data to Modelling: Multiscale Ecophysiological Measurements, Data Analysis and Applications"

Rhys Whitley, Colin Prentice, Henrique Togashi, Zhou Shuangxi & Dong Ning

"Ecosystem Primary Productivity and Resilience across Australian Drought and Wet Cycles through Coupling Field Data, Tower Fluxes and Satellite Imagery"

Alfredo Huete

"Measurements of Carbon, Water and Energy Exchanges: Determining the Best Available Estimates of Carbon and Water Fluxes Across the Australian Continent"

Helen Cleugh & Eva van Gorsel

"Analyses of Stable Isotopes Across Australian Supersites"

Derek Eamus

"Recent developments in the availability and delivery of biogeochemical datasets through the TERN Australian Supersite Network Data Portal"

Mirko Karan, Marco Fahmi & Mike Liddell

Mirko Karan will be presenting a talk at the annual meeting of the **Ecological Society of America** in August, at a session convened by NEON Inc. **"Plugging Into NEON – A Foundation for Ecological Research at the Continental Scale and Beyond"**. The talk is titled ***"International partnership for ecological observations at the continental scale: TERN-Australian Supersite Network/NEON partnership"*** – Mirko Karan, Michael Liddell & Stuart Phinn.

Recently, the FNQ Rainforest and SEQ Peri-urban Supersites were successful in obtaining an allocation from the Queensland TERN Supplemental funding. This has allowed the pilot development of Near Remote Sensing phenology products. Funding has allowed the instalment of 10MP IP phenocameras at both Supersites by Tim Brown (ANU). The cameras will provide RGB and RGB+NIR data streams. Subtracting the RGB image from the RGB+NIR gives a low quality infrared image. Alignments will be made with the data collections standards adopted by the US National Parks and NEON sites and the greenbook being developed by AusCover. Also funded were projects to further develop the [Bush.fm](http://bush.fm) database and assist botanical monitoring and management of the Robson Creek node of the FNQ Rainforest Supersite.



TERN-Wide Synthesis Project

The Supersite network is involved with a TERN-wide synthesis cross-facility project, recently selected for progression. The aim of this program is to demonstrate the benefits collaborative networks such as TERN to address difficult questions.

The project "Integrating Field, Airborne and Satellite Biomass Measurements from Deserts to Rainforest – Australia's Contribution to Global Biomass Mapping and Monitoring" involves comparing biomass and Leaf Area Index estimates using Supersite, AusCover and AusPlots protocols with LIDAR data collected at a number of Supersites.

The aim of this work is to define and integrate the methods currently used for measuring and mapping biomass in Australia and to define their role in current and planned global biomass mapping programs from NASA, ESA and JAXA and global coordinating projects, e.g. forest carbon and CEOS biomass. The work will enable all of the field and biomass measurements collected across TERN facilities (AusPlots, Supersites, AusCover) to be linked for development of advanced biomass estimation methods, and to enable these data to be used in current and future global biomass mapping programs that are being planned now.

CosmOz Workshop

Soil moisture measurement is an important part of ecosystem monitoring and closing water budgets. A new cosmic ray soil moisture probe, Hydroinnova CRS-1000, is proving to be very robust and sensitive in measuring average soil water content over 40 ha, down to 10-70 cm depending on conditions.

CSIRO established the The Australian Cosmic Ray Sensor Soil Moisture Monitoring Network (CosmOz) in 2010 as a near-real time continental scale soil moisture monitoring system using these new probes at 11 sites around the country. A CosmOz workshop was held in Brisbane on 22-23 May with members of Supersites and OzFlux in attendance.

Mirko Karan presented an overview of the ASN while Richard Silberstein and Lindsay Hutley contributed to a range of presentations that highlighted calibration improvements and the stability and reliable nature of the sensor in the detection of soil moisture content as well as likely new uses for the technology.

Presentations at the CosmOz workshop compared soil moisture detection using the cosmic-ray, capacitance and Time Domain Reflectometry soil moisture probes. Recent improvements in calibrating the sensors have increased sensitivity and demonstrated the potential of extending the utility to detecting changes in above ground biomass of vegetation as well as ground litter (due to the presence of H in organic molecules).

There is a great potential to further test and develop this application at Supersites where biomass is measured on a regular basis, with sensors already present at Robson Creek (FNQ Rainforest Supersite) and Tumberumba Wet Eucalypt Supersite. At Robson Creek there is a plan to install two modified detectors on the new 40 m tower above the canopy to test a method for deriving changes in the canopy biomass over time.

Previous work in the tropical savannas has demonstrated the need to discriminate between both grass and tree transpiration sources. Coupled measurements of grass and tree LAI with gas exchange is essential given the grass understory dominates wet season CO₂ and transpirational flux, with woody cover dominating during the long dry season. The Litchfield OzFlux/AusCover linked Supersite will continue to refine this work via measurement, modelling and significantly integrating remote sensing at the one site. This will lead to improvements in land-surface modelling through to improvements in bushfire severity predictions for vegetation type that dominates the top 1/3 of Australia, critical capability given land use change, grassy weed invasion and climate change.

Recent findings were presented showing how the sensor could detect point of water saturation and the beginning of runoff, potentially a means of monitoring flows into catchments and flood predictions. A comparison of satellite derived soil moisture and cosmic-ray probe data was very impressive and assimilation of data into models shows great potential. As does a



potential use on farms to detect soil moisture and control water use by only irrigating when soil moisture content drops to a predetermined level.

The ASN will aim to have a CosmOz sensor at every Supersite where the intensive ecosystem monitoring will allow further development of the cosmic-ray soil moisture sensor potential.

OzFlux Central Update

TERN Synthesis Day

TERN held a Synthesis Day at the University of Queensland on the 3rd May to discuss potential cross-facility projects that could be used to demonstrate the science made possible by TERN's existence.

All TERN facilities were represented with Peter Isaac attending for OzFlux. The morning focussed on updates from each facility and a discussion among all present to identify areas of potential work. In the afternoon, the group split into 6 or 7 smaller groups to flesh out individual proposals based on the areas identified in the morning session. OzFlux partnered with David Lindenmayer and Emma Burns of the Long Term Ecological Research Network and Stuart Phinn of TERN on a proposal called "Change versus Change". The proposal also included Glenda Wardle and Alex Held. The question underlying the proposal topic was "Is there a relationship between change in vegetation cover, changes in primary production and changes in faunal populations?". This proposal was 1 of 3 that made it through the first assessment round for subsequent funding

Data Processing Workshop and OzFlux Conference

This year, OzFlux is combining 2 annual events into a single hedonistic fortnight in Cairns.

The OzFlux Data Processing Workshop starts on Monday 1st July and has 18 participants so far. This year, James Kathilinkal and Israel Begashaw from Li-cor Biogeoscience will be joining us for the workshop to conduct the morning lecture sessions and to train advanced OzFluxers in the use of EddyPro in the afternoon.

The OzFlux Conference starts on Monday 8th July and runs over 3 days with a trip to the Robson Creek node of the FNQ Rainforest Supersite planned for Wednesday. Many of the OzFlux site PIs will then stay on for a discussion day on Thursday that will seek to identify low hanging fruit for a high impact publication based on OzFlux data.

OzFlux Data License and Phase 2 of the ODP Development

Phase 2 of the OzFlux Data Portal (ODP) development is now complete and the new site has been operational for a few weeks.

This phase of the portal development focussed on meeting requests from TERN on implementing a consistent license and metadata model across OzFlux and on making changes OzFlux had identified to improve the usability of the site.

One of the features of the OzFlux data license model is the ability to restrict access to data for up to 18 months to protect post-graduate student intellectual property with all other data being publicly available. This is a significant change to data access from the previous incarnation of the ODP where users had to request permission from the data owner before they could access any data.

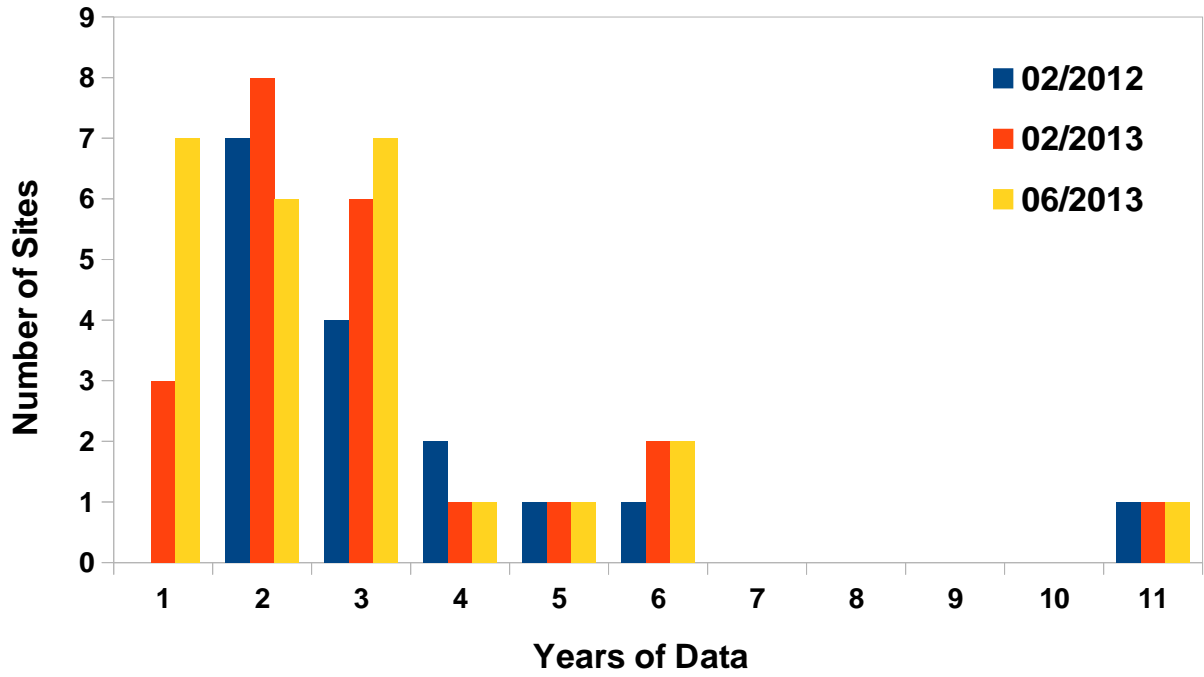
To smooth the transition to the more open policy implemented on the new ODP, all data has been migrated to the new ODP with restricted access for the full 18 month period. Peter Isaac will be contacting OzFlux site PIs over the next month to discuss removing the restricted access provision from as much of the portal data as possible.

Audit of the ODP Contents

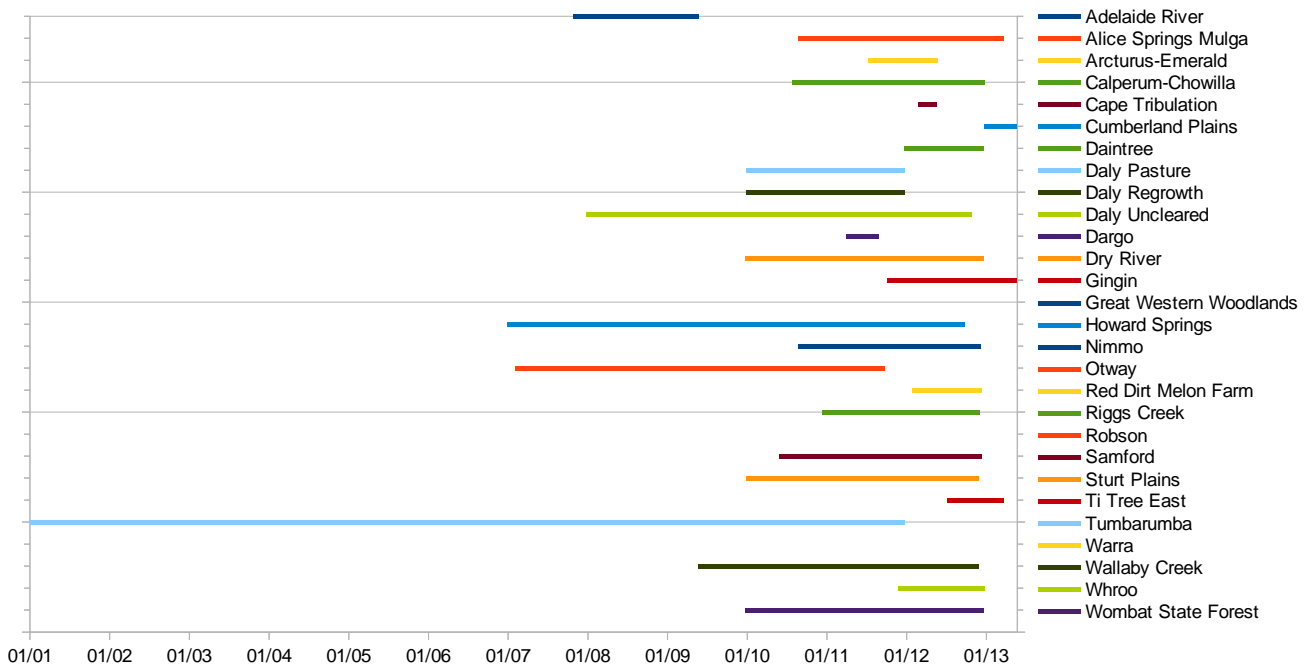
We recently conducted an audit of the OzFlux Data Portal (ODP) contents to identify how much data was present and which sites would benefit most from assistance with data processing. Some of the summary plots from the audit process are given below.

The first plot shows the distribution of the number of sites with 1, 2, 3 etc years of data on the portal as at June 2013 (plus results from 2 earlier audits of the portal). Most sites have between 1 and 3 years of data on the portal with the NATT sites Howard Springs and Daly Uncleared both contributing 6 years. Tumberumba sits out in the tail of the distribution with an 11 year record on the portal. There is still historical data that can be contributed to the portal, in particular Jason Beringer and colleagues are currently undertaking the huge task of getting the Howard Springs data from 2001 to current into the same format and on the portal. This will give OzFlux two decade-long data sets.





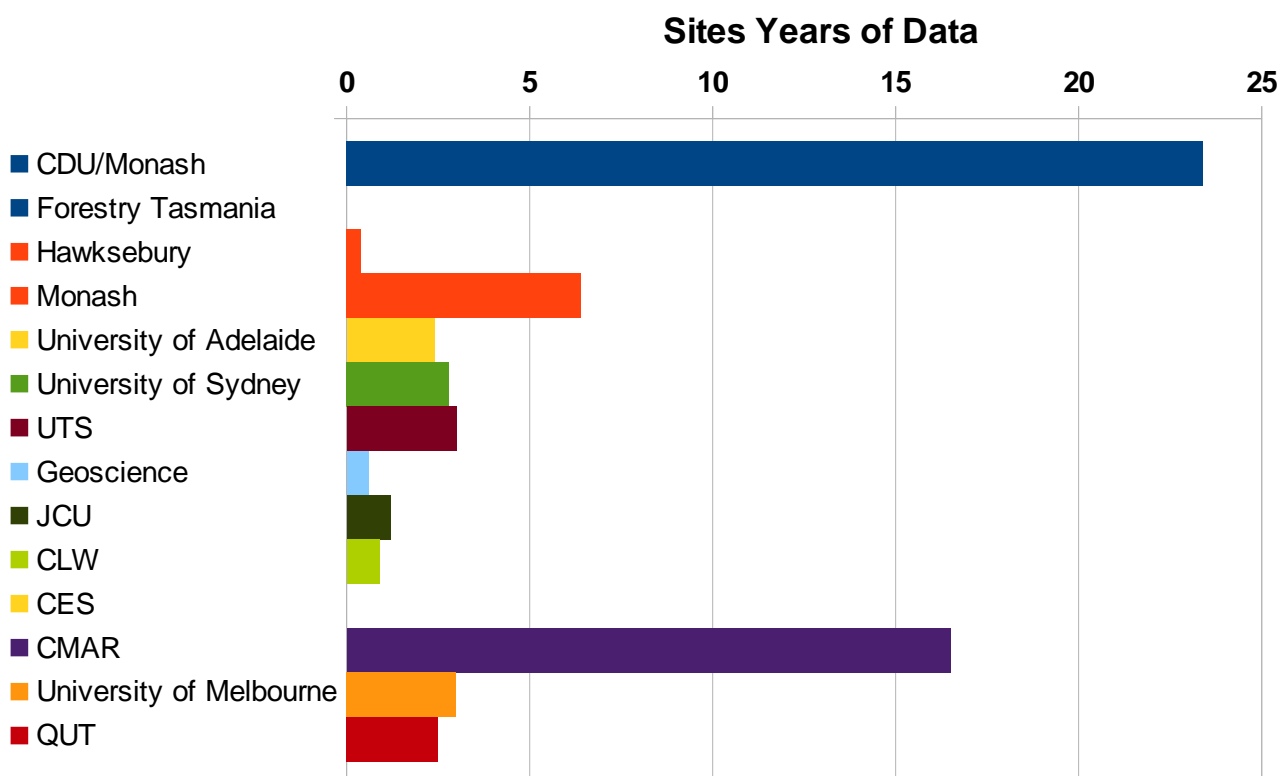
The second plot shows the start and end date of the data record for each site on the ODP.



Again, the long records from Tumbarumba, Howard Springs and Daly Uncleared are clearly visible. Multiple year data records require a large commitment but are an important source of data that allows the impact of climate variability on vegetation dynamics to be assessed.



The last plot shows the distribution of site-years of data on the ODP by institutions. The contribution from the NATT towers operated by Charles Darwin and Monash Universities and from Tumbarumba operated by CSIRO Marine and Atmospheric Research are again clearly visible.



Towers and People

Some late and some belated news about the OzFlux network.

First, recent additions to the OzFlux network have included Warra (Tasmania), Gingin and Great Western Woodlands (Western Australia) and Robson Creek (FNQ). Warra, also a Supersite and a member of the LTERN network, boasts the tallest tower in the OzFlux network at 80 m and one of the most challenging sites for interpretation of ecosystem flux measurements. PI Tim Wardlaw will be joining the data processing workshop in Cairns. Gingin and Great Western Woodlands are welcome additions and start to balance out the dominance of sites in the Eastern half of Australia. Trish Lambert and Richard Silberstein will join the data processing workshop as well. The 'grandest' tower in the network is the new 40m walk-up tower at Robson Creek, with a 9m x 9m x 0.7m concrete base providing a steady footing the tower slims from 5.8m at the base to a very comfortable 2.2m work platform at 40.6m. Data collection commenced at Robson on 27th of June giving Mirko and Mike 3 towers to look after.

After a start that would have tried experienced tower operators, the Cumberland Plains site has been running reliably since the end of 2012. Welcome to Victor Resco de Dios, who will also join the data processing workshop, and Chelsea Maier. Chelsea has recently uploaded the first contribution from Cumberland Plains, covering January to June 2013, to the OzFlux Data Portal.

Recent departures from the network were Rose Andrykanus (NATT and Victorian towers) and Tim Lubcke (Calperum-Chowilla). As their replacements, we welcome Caitlin Moore and Ashley Broadbent (Monash University) and Georgia Koerber (University of Adelaide).



News from around the ASN and OzFlux Sites

Cumberland Plains EucFACE

Matthias Boer has taken over as Project Leader of the Supersite with Victor Resco de Dios as Deputy Leader.

FNQ Rainforest



Finally we have the Robson Creek tower signed across to us to work on. It was somewhat of a miracle that they got the 40t crane in and out with the out-of-season, wet season rainfall. Fortunately they did and so we now have a platform for the flux gear.

From a flux perspective while not perfectly flat

(e.g. Calperum) it is satisfactory and should enable us to develop a quantitative flux system in the rainforests of the Far North (that was simply not possible in the complex topography of the Daintree).

We will have data in the OzFlux data portal from the site by the end of June.

Building work has been delayed at the Daintree Rainforest Observatory.

Daintree Discovery Centre wins Premier's sustainability award

The Daintree Discovery Centre has been recognized in winning the Small Business category at the Premier's Sustainability Awards held in Brisbane on Friday the 14th June 2013.



The award was presented to the Discovery Centre's Alan Curtis by Minister for Tourism, Major Events, Small Business and the Commonwealth Games, Minister Jann Stuckey.

'The Centre has demonstrated it is a high achiever and a leader in adopting sustainability practices that reduce its environmental impact and strengthen its commercial viability' said Ms Stuckey. 'It sets high standards and

receives \$2,500 to support sustainable initiatives and everyone involved in the Centre is to be commended for their efforts'.

In accepting the award, an elated Alan Curtis thanked the team at the Discovery Centre and owners / directors Ron and Pam Birkett.

'We're thrilled to be recognized in this way. Everything we do at the Discovery Centre reinforces the need to preserve the Daintree Rainforest. We have elevated walkways designed to protect the fragile root systems, Interpretive displays that foster environmental sustainability and we model best practice in water conservation, waste management, recycling and eco-friendly design'.

He also added 'We are a carbon neutral business since establishing our Carbon Offset / Bio-sequestration project in 2007, and we sponsor Carbon Flux research by James Cook University. The Centre is also one of 10 environmental research Supersites that form the Australian Supersite Network collecting scientific data across various ecosystems'.

The multi award winning Discovery Centre is a world-class interpretive facility nestled in the heart of the Daintree rainforest, just 10 kilometres north of the Daintree River and boasts a spectacular Aerial Walkway leading to a 23m high Canopy Tower.

The tower provides viewing of the very top of the rainforest canopy, while the walkway allows unprecedented access to the mid-level rainforest. For international visitors, Self-guided Audio Tours are available in 8 languages.

An accredited Wet Tropics visitor Information Centre, the Daintree Discovery Centre is open daily from 8.30 am to 5 pm and also carries Advanced Eco-Tourism and TQUAL Accreditation and is a Climate Action Business.

Great Western Woodlands

BirdLife Australia have completed a second survey and now have datasets from four plots. Bore drilling (to the water table or up to 20 m) five bores with piezometers and isotopes, is due to commence.

Gimlet plots are established and data has been uploaded to the ASN portal. Currently one paper published, one in press and one submitted and an Honours Project is currently going on.

Work has commenced on the SWATT transect and The CREDO History report has been delivered. The FLAMES modelling project and the Ngadju project are almost complete.

Date for official opening still to be confirmed.



Litchfield Savanna

A field campaign in early June has involved 23 researchers from AusCover, AusPlots and Supersites ground assessments of vegetation biomass and leaf area index using a range of methods to assist in calibration/validation of remote sensing products. AusCover carried out an airborne LiDAR survey as well as ground based 3D laser scans. Further details available on the [Charles Darwin University, Research Institute of the Environment and Livelihoods blog](#).

Traditional Owner agreement for the flux tower siting is now in place. Discussions have taken place with NERP hub regarding possible links with Supersite to align short-term monitoring activities.

SEQ Peri-urban

Samford

The Samford site is up and running again after flood damage, but unfortunately the solar panels have now been stolen. A high definition camera has been installed at the Water Quality Station.

Researchers from Cornell University are continuing to carry out studies on red-backed fairy wrens.

Michelle Gane recently gave a presentation on SEQ with an overview of TERN and ASN to NEON HQ in Boulder.

Karawatha

Brazilian colleague who has been working on PPBio plots throughout the Amazon is currently on a one year sabbatical working at Karawatha and other plots.

One paper already published on the vegetation dataset and a biomass paper is ready for submission. Book entitled ***Biodiversity and Integrated Environmental Monitoring*** is currently in press.

Tumbarumba Wet Eucalypt

Installation of Sensor Network in collaboration with AusCover (A Held, D Culvenor) and University of Alberta (Arturo Sanchez-Azofeifa).

We have replaced the CNR3 radiometer with a CNR4 and also get data in from PAR sensors.

There is a new paper published:

van Gorsel, E., Berni, J. A. J., Briggs, P., Cabello-Leblic, A., Chasmer, L., Cleugh, H. A., Hacker, J., et al. (2013). Primary and secondary effects of climate variability on net ecosystem carbon exchange in an evergreen Eucalyptus forest. *Agricultural and Forest Meteorology*. doi:10.1016/j.agrformet.2013.04.027

Warra Tall Eucalypt

Plant physiology campaign is currently being carried out. Re-measurement of the silvicultural systems trial will take place over the next 12 months, and a bird survey will be undertaken in the Spring.

Long-term future of hydrology plot is currently under review, so no monitoring has been undertaken yet.

The Annual Warra Meeting took place on 20 June with Mike Liddell and Suzanne Long (TERN Central) in attendance. This was followed by a trip for most of the attendees to the Warra Supersite the next day. Sam Wood from Ausplots Forests showed the group around one of the Ausplots 1Ha plots and Keith Bloomfield demonstrated the fine art of ecophysiology in the luxurious environment of the Tahune AirWalk – the entrance to Warra.

The Official Opening of the Warra Supersite is expected to occur in July.

Potential NCRIS-II Funding

At the recent TERN EAC meeting it was announced that we should prepare information for TERN on the costing of our Facility infrastructure over a 2 year period July 2013 - June 2015 for potential NCRIS-II funding. This is additional funding to that which TERN has received under the NCRIS-I and EIF schemes; and the very modest “bridging” CRIS funds that were allocated.

Both the Ozflux and Supersite network Directors have circulated proposals for their respective funding requests that will be tabled with the TERN office on Monday 1st July. The networks will be asking for substantially more funding per year than was asked in the prior funding rounds to ensure that the networks are funded at an operational level. It remains to be seen a) how much money TERN will be allocated and b) if TERN will make a more substantive investment in these networks than has been seen in the past.



New Faces

Dr Matthias Boer, Project Leader, Cumberland Plains EucFACE Supersite

Matthias is the new Project Leader for the Cumberland Plains EucFACE Supersite. Matthias is a senior lecturer with the Hawkesbury Institute for the Environment at the University of Western Sydney. Matthias joined the



Hawkesbury Institute in 2011, after previous research positions with Cemagref in France (2010), The University of Western Australia (2004-2010), the CSIC - Arid Zone Research Station in Spain (1993-1999; 2001-2003), and CSIRO's Centre for Arid Zone Research in Central Australia (1999-2001). Matthias received his PhD in Physical Geography (1999) and his MSc in Physical Geography and Landscape Ecology (1986) from Utrecht University, The Netherlands.

Matthias' research interest focuses on the landscape ecology and management of fire-prone environments. He is particularly interested in the biophysical basis for spatial variation in current and future fire regimes, and in the mechanisms and feedbacks by which fire may mediate, reinforce or constrain impacts of changing climate, [CO₂] or land use on ecosystem functions and services.

Dr Victor Resco De Dios, Deputy Leader, Cumberland Plains EucFACE Supersite



Víctor is a physiological ecologist broadly interested in understanding plant community dynamics and ecosystem function. He obtained his MSc in 2003 (University of Lleida, Spain) and his PhD in 2008 (University of Wyoming, USA). He worked at the University of Castilla la Mancha and the Fire Research Center (Toledo, Spain) before joining the Hawkesbury Institute for the Environment at the University of Western Sydney in 2011.

A main objective of his research is to understand the limitations to carbon assimilation and how the carbon and water balances help decipher population, community, evolutionary and ecosystem processes in a global change context.

Dr Georgia Koerber (Calperum-Chowilla)

Georgia is working with Wayne Meyer and David Chittleborough on the Calperum flux tower near the Chowilla floodplain and



Renmark, South Australia. Georgia is interested in carbon and water ecosystem balance. Her research career has involved handling large datasets and using statistics to find associations, particularly CO₂ flux from plants and soil.

Georgia's PhD (2000-2004) with Professor Steve Tyerman, University of Adelaide, and Dr Peter Anderson and Dr Molly Whalen from Flinders University, measured salt and drought tolerance ecophysiology of a natural hybrid of *Eucalyptus largiflorens*, called Green box. This tree survives the harsh conditions on the Chowilla floodplain of the River Murray using sclerophyllous strategies of reduced specific leaf area and leaf nitrogen. They also measured stable isotopes of carbon and nitrogen, rates of photosynthesis, transpiration and stomatal conductance for indicating water use efficiency and their ability to cope with water/salt stress.

Her Postdoctoral research (2005-2007) at Bangor University in Wales with Professor Davey Jones, Professor Gareth Edwards-Jones and Dr Paul Hill, formed carbon budgets for vegetable production in the UK, Spain and Uganda. Components were soil respiration, plant biomass and soil organic matter and soil parameters for the DNDC (denitrification and decomposition) model.

Caitlin Moore (NATT and Victorian towers)

Caitlin commenced her PhD in June 2012. She is completing her PhD on a Savanna project jointly run by Monash University and Charles Darwin University, which is looking at understanding the tree-grass dynamics of Australian savanna. She is based at Monash but makes regular trips to Darwin to conduct research at her field site, Howard Springs, which is a registered OzFlux site. Her research interests are in physical geography, micrometeorology and ecology. She completed a BSci (Hons) in 2011 at Monash University investigating the water balance of a temperate eucalypt forest in Victoria.



Ashley Broadbent (NATT and Victorian towers)

Ashley's PhD will focus on modelling extreme heat events in Adelaide and Melbourne to investigate the effect of irrigation and stormwater reintegration on local to mesoscale urban climate. A meteorological weather prediction model (WRF) coupled with a urban land surface model (NOAH) will be used for these simulations. As part of this work, he will develop a parameterisation for irrigation and stormwater reintegration as these processes are not well accounted for in urban land surface models. Model parameters will be derived primarily from remote sensing imagery and modelled results will be validated with *in situ* climate station and flux-tower data sources. Sub-grid scale urban climate variability will be considered using high resolution observational data collected in Mawson Lakes, Adelaide.



Upcoming Events

1-5 July 2013

OzFlux Data Processing Workshop, James Cook University, Cairns. Details at [OzFlux Meetings](#)

8-12 July 2013

OzFlux Meeting, Reef House Resort, Palm Cove, Cairns. Details at [OzFlux Meetings](#)

21-26 July 2013

International Geoscience and Remote Sensing Symposium, Melbourne. Details at [IGARSS 2013](#)

4-9 Aug 2013

ESA: 98th Annual Meeting of Ecological Society of America, Minneapolis. Details at [ESA Minneapolis](#)

18-23 August 2013

INTECOL 2013 - the 13th International Congress of Ecology, London. Details at [INTECOL 2013](#)

21-24 August 2013

Joint Conference of 11th AsiaFlux International Workshop, 3rd HESS, GCEER and 14th Annual Meeting of Korean Society of Agricultural Forest Meteorology on "*Communicating Science to Society: Coping with climate extremes for resilient ecological-societal systems*", Seoul, Korea. Details at [AsiaFluxWS2013](#)

8-11 October 2013

Greenhouse 2013, Adelaide. Conference on climate change science, communication and policy. Details at [Greenhouse 2013](#)

24-29 November 2013

EcoTas13, 5th Joint Conference of New Zealand Ecological Society and Ecological Society of Australia. Details at [EcoTas13](#)

19-21 March 2014

Global Land Project 2nd Open Science Meeting, Berlin, Germany. Details at [Conference Website](#).

The next issue of the Newsletter will be published in September 2013. If you have any news articles, photos, upcoming events, etc that you would like included please email shiela.loyd@jcu.edu.au

