OzFlux newsletter - #1 autumn 2024

Welcome from the new OzFlux Director, Stefan Arndt

This year is an important year for our flux community in Australia and Aotearoa. Eddy covariance flux methodology is experiencing a significant uptake, not only by researchers, but also by government departments, farmers, landowners and industry. This means it will become more and more important that we, as a community, welcome our new fellow fluxies and help them to apply and use this amazing technology.

The TERN Ecosystem Processes research infrastructure platform is negotiating a new four year funding plan, and flux towers will continue to be an important part of the program. TERN EP is looking into ways in which more sites can be supported by TERN.

The Australian federal government has announced a new Zero Net Emission in Agriculture CRC. This 10-year research program will address how to reduce emissions in the agriculture sector, and flux towers will be an important component in the research and demonstration on farms of the CRC.

Our OzFlux steering committee will meet monthly in 2024 to discuss how we can assist the community to make the most out of the flux technology. It you have any issues or concerns, or things that you need assistance with, then please contact one of the steering committee members (listed below) so we can discuss how we can help you best.

We will aim to have an OzFlux conference and data workshop in 2024, details will be released via the OzFlux email list once confirmed.

A big thank you to my predecessors as OzFlux Director, ***Jamie Cleverly*** and ***Jason Beringer***. Both have been instrumental in keeping OzFlux alive and well and steered us through very challenging times!

Who is Stefan Arndt?

Here is the evidence, Stefan Arndt does flux stuff! In this case on top of the wonderful 40 m tower at Whroo (and no, this was not photoshopped…😊)

Yes, good question! I still do not see myself as a true flux researcher, although we have been operating flux towers since 2010 and will soon operate five flux towers in southeastern Australia. My background is ecophysiology and I studied plant adaptations to drought and other environmental stresses. This is still a focus of my research, and I am intrigued by the many ways that plants can adjust to harsh environmental conditions. After my PhD at the University of Vienna in 2000 I moved to Australia to UWA and spent two wonderful years in Perth studying drought adaptation of eucalypts. In 2002 I moved over to the east coast of Australia, initially to Creswick (‘the coldest winter I have ever experienced was the summer in Creswick’) and since 2006 I have been living in Melbourne. I have become a true Melburnian, live northside (of course, but inside the “tofubelt”), wear mainly black and drink soy flat whites (true story). In 2010 we established the Wombat Flux tower near Creswick that included an automated trace gas measurement system to study the soil-based greenhouse gases nitrous oxide and methane. This field has been a focal point of my research for about a decade, with a range of ARC Linkage and Discovery projects that investigated landscape level fluxes of CO_2, N_2O and CH_4 in various ecosystems with Klaus Butterbach-Bahl, Lindsay Hutley, Jason Beringer, Elise Pendall and lately Damien Maher (‘treethane’). Over the years we have added flux towers into our research program, and my group now operates the towers at Wombat, Whroo and Tumbarumba, with plans to expand by mid-2024 by adding two agricultural towers on the University of Melbourne research farm at Dookie Campus.

OzFlux steering committee

Introducing the current members of the OzFlux steering committee that meets every month:

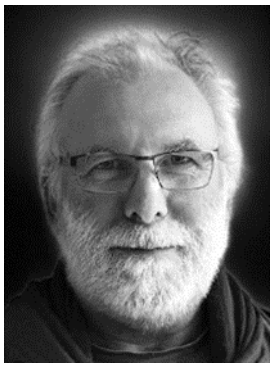
Director – Stefan Arndt

Chair – Elise Pendall

Deputy Director – Nina Hinko-Najera

Deputy Chair – Samantha Grover

Secretary – Mark Hovenden



Data Manager – Peter Isaac

Communications – Caitlin Moore

Industry – Lindsay Hutley

Aotearoa (New Zealand) representative – Johannes Laubach

Early career researcher representative – Charuni Jayasekara

Zero Net Emissions in Agriculture CRC

The Australian federal government announced last month the establishment of a new cooperative research centre for net-zero emissions in agriculture (ZNE-Ag CRC). The CRC is operated out of the University of Queensland and involves a consortium of 73 partners across industry, education and government. The CRC has secured $300 million in funding over 10 years, with the Federal Government's contribution of $87M making it the largest CRC in the program's history.

ZNE-Ag CRC is kicking off with four research programs:

- Low-emissions plant solutions for broadacre and horticultural systems which also reduce emissions from livestock via the delivery of anti-methanogenic plant properties and mixed-species pastures.
- Towards methane-free cattle and sheep.
- Whole-farm and mixed-enterprise systems analysis.
- Delivering value from net zero.

The collaboration includes 16 major industry groups, all six state governments and the Northern Territory, 10 universities, three indigenous organisations, and grower groups and businesses.

There will be room for flux-based research in the CRC, especially in the whole farm systems analysis, where novel agricultural productions methods that will assist a transition to net zero emissions will be tested. The CRC has many foundation members that are involved in flux research and in the coming months planning will get underway on which sites or projects will be established.

Network news – site updates

Wombat flux

The destroyed Wombat flux tower in June 2021 (left) and in its new and shiny re-incarnation in March 2024 (right).

The 9th of June in 2021 was a sad day for many Victorians as a massive storm event swept through the state. It caused extensive windthrow through the Wombat State Forest, damaged homes and infrastructure, including severely damaging the old Wombat flux tower - as eucalypt trees were uprooted they fell on the supporting guy wires of the old tower, so it had to be taken down. It took a while to work through all the issues, but since the end of February this year a new and shiny 40 m free standing tower has been built. The new tower has an internal ladder and a working platform at the top, the design is by Roam. The Wombat team will start instrumenting the tower in the coming weeks and restore it to its former glory.

Tumbarumba

The old Tumbarumba tower after the 2019/20 summer (right). The new tower is nearing completion, it is a free-standing tower with an internal staircase (left).

The flux site in Tumbarumba was burned in the summer of 2019/20, which led to the destruction of containers on site and some sensors. The old flux tower was still standing and was operational, but it was a guyed tower with many dead alpine ash eucalypts in close vicinity. Last month the old tower structure was removed, and a new 70 m free standing walk-up tower installed. The installation is nearing completion, and we are hopeful that we can start re-installing the sensors soon. We need power supply and new containers installed before the sensors can be mounted, which will hopefully happen next month.

Gingin

The Gingin flux tower is still standing and going strong (left) – but changed ownership recently following the retirement of site PI Richard Silberstein (right).

The end of 2023 marked significant change for the Gingin flux tower site, with long-term site PI Richard Silberstein retiring from his role at Edith Cowan University. Fortunately, the team at the University of Western Australia have taken over the management of Gingin to keep alive the flux monitoring legacy in the iconic coastal banksia woodlands of WA. The new site PI, Caitlin Moore, will run the Gingin site at UWA in collaboration with Jason Beringer and continued input from Richard – who despite being retired, still wants to make the occasional trip to Gingin to keep in touch with research activities there.

Meeting report – OzFlux at AGU 2023

At the end of the 2023, Aaron Wall and Louis Schipper (University of Waikato, NZ), along with colleague Rachael Murphy (Teagasc, Ireland), convened a session titled "Carbon Balances of Agricultural Ecosystems and Their Management: Measurements at Hectare to Farm Scale" at the AGU conference in San Fransisco. The successful session had speakers from New Zealand, Australia, Ireland, Switzerland, Canada and USA providing informative updates of research undertaken in diverse agricultural ecosystems. A common theme from the session was the need for agricultural flux research to go beyond gaseous flux measurements with the imperative to account for the non-gaseous flows of carbon in these ecosystems including accurate tracking of exports and imports of other sources of carbon. From this meeting developed a currently informal group (AgFlux) with the focus of using eddy covariance and other techniques to determine carbon balances and nitrous oxide fluxes at paddock to farm scales.

Before the conference Aaron, Louis and Rachael also visited with Michael Schuppenhauer, Lawrence Berkeley National Laboratory, who is measuring all greenhouse gases from fields irrigated with effluent from a housed dairy operation. The very intensive system (equivalent to a stocking rate of ~10 cows ha^{-1}) was very different from those in New Zealand including year round housing of animals and cropping of the land for feed production. Despite the very different system, many of the data processing challenges experienced working in grazed agricultural ecosystems were also evident in the harvested and flood irrigated Californian system leading to an on-going relationship with potential for future collaboration.

Aaron and Rachael check out a heavily instrumented eddy covariance tower on a Californian dairy farm (left, credit: Louis Schipper). Aaron Wall, Louis Schipper, Lutz Merbold, Shannon Brown, Rachael Murphy and Caitlin Moore (the AgFlux group) out for dinner at the AGU conference (right, credit: Aaron Wall)

Early career researcher news

The Soil Atmosphere and Anthroposphere Lab (SAAL) at RMIT lead by Dr. Samantha Grover is currently hosting Torben Callesen, a guest PhD student from the Free University of Bozen-Bolzano in Italy. Torben's research focuses on interpreting CO_2 flux signals measured by eddy covariance over vineyards. His thesis encompasses various aspects, including process-based modelling of GPP and the investigation of nocturnal drainage flows occurring over sloped terrain, a common feature in viticultural sites. Additionally, Torben will conduct semi-qualitative investigations on the night-time lateral flow dynamics at the natural peatland ecosystem site in Fall's Creek, Victoria. For this study, Torben needs volunteers who are willing to stay overnight at Fall's Creek alpine peatland and participate in the experiment. Honors or master's students interested in volunteering for this field study, or anyone interested in collaborating with Torben's research are encouraged to contact Torben at tcallesen@unibz.it or Sam at samantha.grover@rmit.edu.au.

Upcoming meetings

11th International Carbon Dioxide Conference (ICDC11)
Manaus, Brazil, 29 July – 2 August 2024
For more information see the ICDC11 website

ICOS Science Conference 2024
Versailles, France 10-12 September
2024 Abstracts open, close 8 April 2024
For more information see the ICOS Science Conference 2024 website

Ecological Society of Australia annual meeting (ESA 2024)
Melbourne, Australia 9-13 December 2024
Abstracts open on 11 April 2024
For more information see the ESA 2024 website

American Geophysical Union annual meeting (AGU24)
Washington DC, USA, 9-13 December 2024
For more information see the AGU24 website