

# FLUXNET

## Community Council

### Newsletter

November, 2023  
FCC Issue No. 2

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# FLUXNET Community Council News/Updates

FCC Issue No. 2,  
November 2023



Dear FLUXNET Community,

As we approach the year's end, I'd like to extend my heartfelt thanks to the community and in particular the FLUXNET Community Council (FCC) for their service throughout the year. Your efforts have been instrumental in making the FLUXNET 2023 Meeting a resounding success, in supporting students to go on career-changing secondments around the world, in the two FLUXNET workshops, in reaching so many students through Fluxcourse, in the activities of our multiple working groups, and so much more.

We also welcome new FCC members, whose expertise will undoubtedly contribute to the depth and breadth of our network's research. Their fresh perspectives are vital as we continue to foster scientific collaboration and excellence. Thank you Shuli Niu, Vincent Odongo, Jorge Pérez Quezada, and Débora Regina Roberti for agreeing to serve.

Looking forward, the AGU conference in December will host our Town Hall and social event. This occasion will be an ideal platform for us to engage in meaningful dialogue, share our latest findings, and reinforce our community bonds.

As we come to the end of the second year of the FLUXNET Coordination Project, let's take this opportunity to acknowledge our collective progress, and set our sights on the promising avenues of research that lie ahead.

Best wishes, and hope to see many of you soon,

Trevor  
FCC Chair

P.s. Huge thanks to Caitlin Moore, for coordinating this issue of the FLUXNET Newsletter

## FLUXNET Community Council Members



(from top left: Trevor Keenan, Kyle Delwiche, Jamie Cleverly, Dennis Baldocchi, Shuli Niu, Gregor Feig, Kazuhito Ichii, Minseok Kang, Natalia Kowalska, Jorge Pérez-Quezada, Stefan Metzger, Caitlin Moore, David Moore, Magna Moura, Débora Regina Roberti, Jacob Nelson, Kim Novick, Dario Papale, Tonantzin Tarin, Vincent Odongo, Gabriela Shirkey)

## Flux measurements in New Zealand



Photo Credit: Aaron Wall

A typical New Zealand flux system on a Waikato dairy farm



Photo Credit: Georgie Glover-Clark

Flux measurements at Kopuatai peat bog

New Zealand's GHG emission profile is dominated by the agricultural sector (agriculture contributes ~50% of the net emissions) and there is considerable research effort and funding to identify practical mitigation strategies to meet our international obligations. Consequently, most of our eddy covariance flux measurements over the past decade have been focused on agricultural ecosystems to better quantify these emissions and test mitigation strategies.

CO<sub>2</sub> flux measurements coupled with other carbon imports and exports have been used to calculate the carbon balances of our agricultural ecosystems. In a recent synthesis of 68 site-years of data from mineral soils (Wall et al., under review), we showed that the ecosystems were, on average, C-neutral. However, management practices, including pasture renewal (renovation), periodic cropping, and use of swards different to the traditional ryegrass and white clover were all detrimental to ecosystem carbon stocks.

In contrast to mineral soils, CO<sub>2</sub> flux measurements from agriculture on drained peat soils indicate farming this land may be releasing the equivalent of 8% of New Zealand's net annual emissions annually despite covering only 1% of the land area. Parallel measurements have also been made from Kopuatai peat bog, an undisturbed wetland, which is a robust carbon sink further emphasising the importance of maintaining all remaining intact wetlands.

Alongside CO<sub>2</sub> flux measurements, we have also made eddy covariance measurements of CH<sub>4</sub> and N<sub>2</sub>O fluxes to calculate total GHG budgets from the agricultural systems. A key driver for making N<sub>2</sub>O flux measurements was to test management strategies that reduce N<sub>2</sub>O emissions, such as the inclusion of plantain in the pasture sward. However, we found that while N<sub>2</sub>O emissions may have decreased, the overall GHG budget increased (more emissions) due to soil C loss indicating the need to consider all gases when testing mitigation strategies.

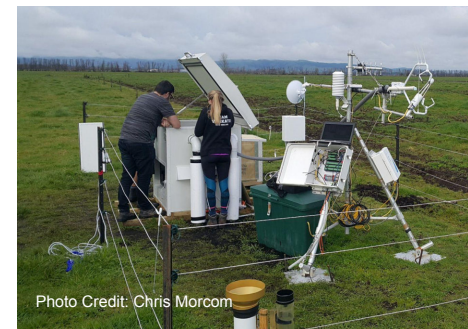


Photo Credit: Chris Morcom

Students tending to the quantum cascade laser for N<sub>2</sub>O and CH<sub>4</sub> flux measurements over a drained peat soil

***Interested in featuring your science in our next FLUXNET newsletter? Email us at [fluxnet.cc@gmail.com](mailto:fluxnet.cc@gmail.com).***





## AmeriFlux

### Network and Data Products

With over 600 sites in the Americas, AmeriFlux continues to make available new and updated data products: 469 sites had their AmeriFlux BASE and 144 sites had AmeriFlux FLUXNET [data products available for download](#). A new paper led by [Housen Chu](#), describing the AmeriFlux BASE product, was recently published (DOI: [10.1038/s41597-023-02531-2](#)), including details on the process of uploading and quality controlling data from sites across a wide range of conditions and ecosystems.

### AmeriFlux Annual Meeting

The [2023 annual meeting](#) was hosted by the team at [Harvard Forest](#), near three AmeriFlux sites ([US-Ha1](#), [US-Ha2](#), and NEON-led [US-xHA](#)). Leading the local host team, [Jackie Matthes](#) welcomed participants starting with a field site visit, including stops at the three Harvard Forest flux towers as well as ongoing experiments. The meeting was [rich](#) with talks and discussion sessions on flux science, remote sensing, methane, and more—on the work being conducted by AmeriFlux researchers and being done with AmeriFlux data.



Image credits: [Christin Buechner \(LBNL\)](#)

## OzFlux

### Data and Field Techniques Workshop

In September OzFlux combined forces with Campbell Scientific and TERN to deliver a week long workshop on all things eddy covariance at the University of Melbourne Burnley campus in Victoria.

Participants learned from the Campbell Scientific team all about remote connectivity to micromet systems; software and programming fundamentals; micromet instrumentation theory; installation, commissioning and maintenance; and troubleshooting and diagnostics.

From the OzFlux team, participants learned about hand-on processing of flux tower data using [PyFluxPro](#) - an open source Python-based processing tool. Lectures from the team included eddy covariance theory, footprint estimation, storage and profile measurements, and partitioning of NEE into GPP and ER.



Image credits: [Kara Sutcliffe, Campbell Scientific Australia](#)

### Critical Zone Observatories established at 3 sites

In partnership with TERN, the Ridgefield Farm (Avon River catchment), Fletcherview and Calperum OzFlux sites in Australia have received new infrastructure to improve observation of belowground processes. Read more about it via the [TERN website](#).





# Regional Network Updates



MexFlux has been consolidated as regional network and science consortium engaged in the understanding of water, energy, and carbon fluxes in Mexican ecosystems during the past decade.

Recently, a breakout session was proposed to engage the MexFlux community into the Ameriflux dialogue to account the challenges, opportunities and lessons learned within the last decade, and set the agenda for the next decade. The discussion was opened through the AmeriFlux community to also bridge with the Latin American context. Future goals for MexFlux are to highlight ongoing work, increase networking, share experiences, best practices, challenges, and future needs for the field.



Another breakout session was held during the National Congress of Soil in Mexico, entitled: MexFlux: Synergies for advancing the understanding of material and energy flux in the soil-plant- atmosphere continuum. There was a visit to the observatory Altzomoni which is part of the Red Universitaria de Observatorios Atmosféricos (UNAM).



During the Symposium of the Mexican Carbon Program, the **MexFlux-S database** (MexFlux-S 2023) was introduced to the academic community. MexFlux-S is the database of CO<sub>2</sub> efflux (including soil respiration and plant respiration) in Mexico. This is an effort to open data, which will have an important impact, not only in the integration of a related academic community to advance knowledge of the carbon cycle in Mexico.



Visit our website!

## Brazil Flux Two new eddy covariance sites installed

The number of Brazilian flux towers are rising. In a partnership with the National Center for Monitoring and Early Warning of Natural Disasters (CEMADEN), one eddy covariance (EC) system was installed at the National Forest (FLONA) of Assú; and other was setted at the Brazilian Agricultural Research Corporation (Embrapa), Embrapa Semi Arid Unit. At the Flona Assu site the energy, water and CO<sub>2</sub> fluxes are been measured over the seasonally tropical dry forest of Caatinga, under the coordination of the Geoma Research Group at Federal University of Rio Grande of Norte (UFRN). At Embrapa the monitoring happens in an agricultural abandoned area soon to be converted to buffel grass.



Geoma group at Flona Assu Embrapa Semi-arid area

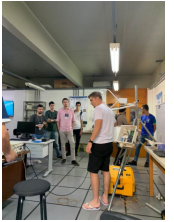
## Good fences matter!

Measuring fluxes in grazed areas is indeed a challenge! In addition to grazing and the gases released by the animals, it's necessary to ensure the secure protection of the equipment. During moments of agitation, one of the EC site of SulFlux had all its cabling destroyed by the cattle.



## Data processing training

Two training sessions on flux measurements took place, spanning from the South to the Northeast of Brazil. These sessions were held during the XXII Brazilian Congress of Agrometeorology and the 9th South Brazilian Meeting on Meteorology, offering students the chance to gain hands-on experience in EC systems.



# Regional Network Updates

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**ICOS** | INTEGRATED CARBON OBSERVATION SYSTEM

The first **FLUXNET** conference in over five years was held in Brno, Czech Republic in July 11-13. There were 91 participants in person from 24 countries. The meeting was hosted at Czech Globe – Global Change Research Institute CAS and Mendel University in Brno, **sponsored by ICOS**:

<https://www.icos-cp.eu/event/1328>, <https://fluxnet.org/>

More details in a Fluxnet report, which will be published soon.

- **ICOS** was present at the European Parliament on 21 Sept 2023: "Science should be at the heart of the European carbon credit system":

<https://www.icos-cp.eu/event/1349>

- **On 3-5 Oct 2023 ICOS** took part in WMO-led workshop preparing the implementation of the future Global Greenhouse Gas Watch:

<https://public.wmo.int/en/our-mandate/focus-areas/environment/greenhouse-gases/global-greenhouse-gas-monitoring-infrastructure>

**ICOS ETC** presented a poster on the integration of FLUXNET:

[https://filecloud.wmo.int/share/s/qP4BbQl5RV-dR36-X74K\\_A](https://filecloud.wmo.int/share/s/qP4BbQl5RV-dR36-X74K_A)

- In the upcoming issue of "Science of the Total Environment," a new collaborative publication led by the **ICOS** ecosystem community has been published: <https://www.icos-cp.eu/event/1337>

- Save the date for the **6th ICOS Science Conference** held in France from Tue 10th to Thur of Sept 2024 in Versailles Palais des Congrès and online... <https://www.icos-cp.eu/event/1336>

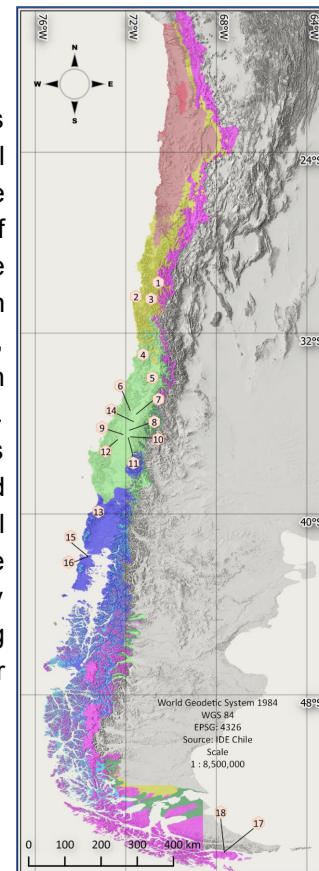
Chile Flux

Latin America is one of the areas described as lacking flux sites to represent its ecosystem-level fluxes. Chile is a natural laboratory that allows the study of natural phenomena in a wide range of latitudinal and altitudinal variations, while at the same time is home to hotspots of biodiversity in the central part of the country (particularly, vascular plants) and at the southern end in Patagonia (particularly, non-vascular plants). **ChileFlux** is a recently formed network of 6 sites in natural ecosystems (forests, peatlands and shrublands) and 12 sites in agricultural ecosystems (fruit orchards and vineyards). The establishment of these sites started in 2011, today range from 30° to 55° latitude and are generating data to feed regional and global models for predicting the effects of climate change.

More info: <https://www.chileflux.cl>

Octavio Lagos ([octaviolagos@udec.cl](mailto:octaviolagos@udec.cl))

Jorge Perez-Quezada ([jorgepq@uchile.cl](mailto:jorgepq@uchile.cl))







## FLUXNET ECN Workshop

*Early Career:* Frederick Otu-Larbi, Hojin Lee, Theresia Yazbeck, Youmi Oh, André Luís Diniz dos Santos, Xiangmin Sun, Caleb Mensah, and Gabriela Shirkey

*Mentor:* Mirco Migliavacca

July 31-August 2 | 338 participants | Virtual event

### Workshop Goals:

1. Develop cross-regional mentorship with ECN and regional network leaders
2. Improve cross-regional interactions
3. Serve underrepresented early-career communities

### Outcomes

1. Engaged 338 participants over 3-days & time zones
2. Live & recorded materials for educational outreach
3. Mentor-mentee connection for long-lasting impact
4. Curated survey of global community needs.

Link: [2023 FLUXNET ECN Global Workshop YouTube playlist](#)

Link: [Workshop over on FLUXNET blog](#)



## Linking Optical and Energy Fluxes Workshop

Zoe Pierrat (JPL) and Troy Magney (UC Davis)

July 12-15 | 40 attendees |  $\frac{3}{4}$  early career

Mountain Research Station, Niwot Ridge CO

### Workshop Goals:

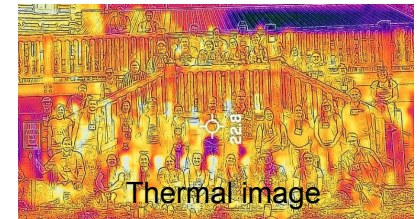
1. Build awareness of synergies, challenges and opportunities
2. Foster cross-disciplinary connections
3. Increase accessibility, usability and standardization of RS data w/ fluxes
4. Focus on hyperspectral, thermal, SIF, lidar and microwave w/ group breakouts and hands-on activities

### Outcomes

1. EoS workshop summary paper (submitted)
2. Short commentary on federal strategy (submitted)
3. Long paper on challenges, opportunities, and advice for building a coordinated RS/flux network (in progress).

Link: [Workshop agenda and goals](#)

Link: [Workshop write up blog post](#)

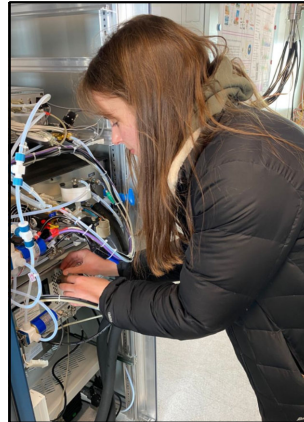


The FLUXNET Secondment program launched in 2022, and has now sent 12 U.S. based early-career scientists abroad to study at host institutions. A brief write up from three secondees is below, and full write ups from all secondees can be found here:

<https://fluxnet.org/fluxnet-secondment-recipients/>



Mukund Rao visited Dr. Tonantzin Tarin Terrazas (Autonomous University of Mexico, UNAM) and Dr. Enrico Yepez (Technological Institute of Sonora, ITSON) in Mexico, to determine phenology and environmental controls of forest carbon from assimilation to tree growth.



Helen Kenion traveled to Zürich, Switzerland, for a six-week secondment at Empa, a Swiss federal lab, working with Dr. Dominik Brunner. In her time abroad, Helen tested methods to estimate urban GHG emissions with mid-cost sensors that, in previous work, she'd already tested using high-precision sensors



Nic Katz visited Dr. Regina Roberti, head of the GEE (Gases do Efeito Estufa) lab at Universidade Federal do Santa Maria (UFSM) in Brazil. The secondment project looked at how weather mediates carbon uptake in the Pampa grasslands of southern Brazil.

The Secondment program is designed to increase international connections between scientists using eddy covariance data and to therefore strengthen the FLUXNET network. The program provides an excellent opportunity for recipients, allowing them to work and live in a different part of the world for up to 6 weeks while enhancing their research through collaboration.

Secondments are available for early career, US-based researchers wishing to study with an international host. For information on how to register a project as a host, or for secondment candidates interested in applying, please see

<https://fluxnet.org/community/secondment-program/> for more details.

# Early Career Researcher Network

FCC Issue No. 2,  
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## ECN Newsletter fall 2023

Early career network (ECN) organizers lead in the development of FLUXNET activities that are accessible and engaging for a global audience. Our communities' research interests and skills are consistently developing and interdisciplinary focus and interest in hands-on learning. Recent events to serve our global community in person and online were found at the FLUXNET Annual Meeting this summer, online during our global ECN Workshop, and in-person at the AmeriFlux Annual Meeting this fall.

Our Fluxnet ECN Coop representatives Gabriela Shirkey (Chapman University, USA) & Jake Nelson (Max Plank Institute) joined as co-chairs in the FLUXNET Annual Meeting, July 2023 to bring back the annual meeting after a 5-year hiatus. If you joined virtually or submitted an abstract, you might have caught Jake's web design and moderation on display! Looking around the poster booths, you would have seen Gabriela promoting the first global-focused ECN webinar. These EC representatives help connect the broader ECN organizer board with our FCC leadership.

This July, the ECN organizers launched a one-of-a-kind workshop serving multiple time zones per day, supported by the FCC. This novel educational format required dedication from our organizers in various time zones including Xiangmin (Sam) Sun, Jiangong Liu, Theresia (Tera) Yazbeck, Fred Otu-Larbi, Caleb Mensah, and Hojin Lee. Three time zones in one day allowed audience members from around the world to watch regionally-representative speakers in a live webinar, catch additional presentations from other time zones online at their convenience, and join a 24-hr Slack channel for mentorship.



Throughout the year, the ECN coordinates educational research and career opportunities for our regional networks. Our most recent guest speakers for the FLUXNET-ECN webinar series included Sam Murphy and Jason Horne, both PhD students from the Dept. of Meteorology & Atmospheric Science at The Pennsylvania State University (Penn State). Helen Kenion, PhD Candidate, led our community to discuss "Biogenic Fluxes in Urban Environments" including site-level processing of urban CO<sub>2</sub>. All ECN-led webinars are hosted and recorded on the AmeriFlux YouTube Channel.

An annual tradition held by the ECN organizers at the AmeriFlux meetings are career panels. This year, Xiangmin (Sam) Sun, Karem Meza, and Fred Otu-Larbi co-chaired the AmeriFlux 2023 Annual Meeting and Sam moderated the five-person career panel hosting Victor Cassella (Kipp & Zonen North America), Ed Swiatek (Campbell Scientific), Erika Gallo (USDA ARS), Jakie Matthes (Harvard Forest), Marco Montemayor (Woodwell Climate Research Center) [PHOTO: from left to right facing the audience]. The "Career Panel Discussion" was held in Harvard Forest on Oct 3<sup>rd</sup> during the 2023 Ameriflux meeting. This discussion provided career insights

and guidance for graduate students, early-career professionals, and anyone interested in pursuing a career in the field relevant to eddy covariance measurement. The career panel discussion invited a diverse consortium of researchers, scientists, and extension specialists to assist early career members in broadening their career horizons, ranging from academia to government and industry (community-oriented and applications-focused). Most panelists obtained their PhDs with topics relevant to atmospheric science/remote sensing/ecosystem ecology. These distinguished panelists, shared their experiences, challenges, and advice related to careers in eddy covariance technology and greenhouse gas measurement in ecological and environment studies. The discussion raised questions from the audience on educational pathways, jobs, the skill sets and competencies required, factors for choosing careers, transition and switch among different career paths, and the time management for post-COVID lives. This panel discussion provided a great opportunity and valuable insights for participants to build successful and rewarding careers through eddy covariance research and application in the flux community.

All our ECN global and regional activities are open for our FLUXNET community to enjoy. We encourage the inclusion of our early-career membership to participate and lead in our activities and for our mid- and senior-career community to share impactful mentorship. To send an email to the FLUXNET ECN mailing list (e.g., post a job, workshop opportunity), please use [fluxnet-ecn@fluxdata.org](mailto:fluxnet-ecn@fluxdata.org); or reach out to our ECN organizers at [fluxnet-ecn-owner@fluxdata.org](mailto:fluxnet-ecn-owner@fluxdata.org).



In summer 2023 we held Fluxcourse at the Niwot Ridge Ameriflux site, hosted again by the CU Mountain Research Station. We had attendees and instructors from the Americas, Europe, Asia, Africa and Australia. Fluxnet was able to contribute support to 7 attendees. Attendees learn about how to set up and manage flux towers as well as different approaches to synthesis, modelling and collaboration. Attendees benefit from opportunities to interact with each other, and the instructors, in a setting that fosters development of close interpersonal networks that are sustained through social media and conference activities afterwards - look for your fluxcourse sticker at AGU and EGU this coming year!

The course relies on an international team of volunteer instructors who are leading experts in the field (<http://www.fluxcourse.org/about.html>). If you are excited to volunteer as an instructor, please reach out and consider serving on our curriculum committee. If you are interesting in attending at a future course look for announcements on [www.fluxcourse.org](http://www.fluxcourse.org). If you are an alumnus of the course - Please enter your email [here](#) to stay in touch and receive news from the Fluxcourse alumni mailing list, and contact [Ngoc Nguyen](#) for more info.

Kim Novick & Dave Moore



# FLUXNET Meeting – July 11-13th 2023

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On July 11-13, 2023, FLUXNET scientists gathered in Brno, Czech Republic for the first FLUXNET meeting since 2017. The meeting was sponsored by Integrated Carbon Observation System, (ICOS, <https://www.icos-cp.eu/>) and company representatives, hosted at Mendel University, and planned by colleagues from the Global Change Research Institute CAS and the FLUXNET Community Council. We had 91 in-person participants from 24 countries, with another 126 registering to join virtually. The 3-day meeting consisted of plenary speakers, lightning talks, poster sessions, breakout discussions, and informal time for peer-to-peer networking.





# FLUXNET Meeting – July 11-13th 2023

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Marian Pavelka from CzechGlobe leading a site tour at Lanžhot field station



Group dinner featuring Moravian wine tastings



The lovely city of Brno, Czech Republic.



Lanžhot is an ICOS Class 1 station



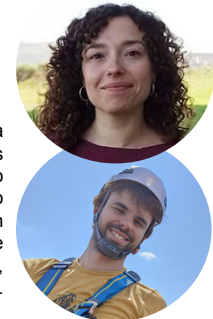
On Friday we toured the Lednice Castle



# FLUXNET Member spotlight

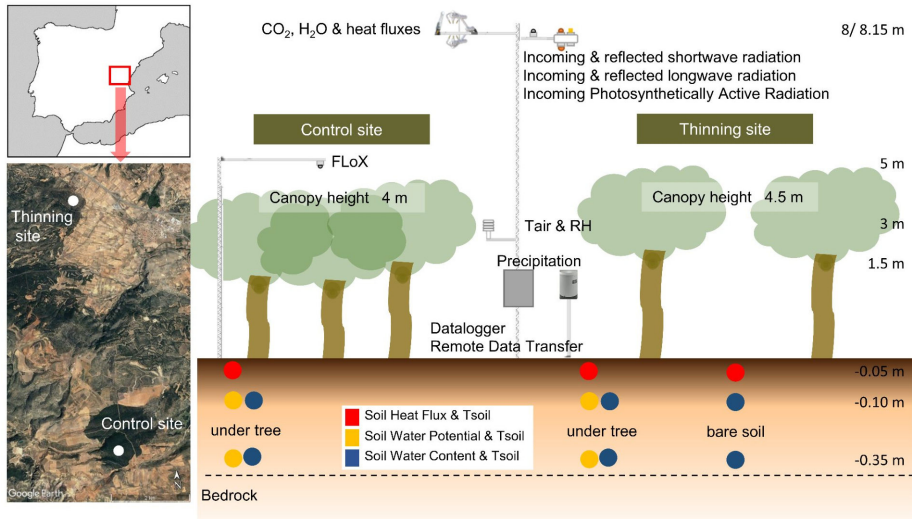


## Ecophysiology Group at the Agri-Food Research and Technology Centre of Aragon (Spain)



Dr. Ana López-Ballesteros and Álvaro Doblas-Rodrigo (PI and Research Assistant of the project, respectively).

Recently, two new eddy covariance (EC) towers have been established by this group in the context of the [MANAGE4FUTURE project](#) led by Dr. Ana López-Ballesteros. The main goal of this project is to evaluate the effect of thinning practices on the carbon sequestration capacity, water use efficiency, and climate change adaptation of holm oak (*Quercus ilex*) forests in continental Spain. During the last decades, these forests have become more vulnerable against climate extremes due the abandonment of traditional forest management (e.g.coppicing). At the two EC stations of the project, we are monitoring ecosystem CO<sub>2</sub> and H<sub>2</sub>O fluxes together with soil respiration, leaf photosynthesis and transpiration, hydraulic conductivity, canopy reflectance, tree growth, and soil and leaf water potential.



Photos of the control (ES-Mzn) and thinning (ES-Srn) sites.

Additionally, other complementary research lines in our group include (1) the use of stable isotopes to decipher the metabolic origin of CO<sub>2</sub> gas exchange, and (2) the study of how ecophysiological and morpho-anatomical traits (leaf and xylem) respond to climate, especially in the *Quercus* genus.



From the upper left to the lower right photo: Delta Ray IRIS to measure <sup>18</sup>O and <sup>13</sup>C isotopes of gaseous CO<sub>2</sub>; stem CO<sub>2</sub> chamber; xylem anatomical variables.

Paired-design of the ES-Mzn and ES-Srn eddy covariance stations.

Interested in being featured in our next FLUXNET newsletter? Email us at [fluxnet.cc@gmail.com](mailto:fluxnet.cc@gmail.com).



## Where to find us at AGU

- FLUXNET Town Hall - Advancing Global Ecosystem-Atmosphere Exchange Measurements  
Details: Monday 11th December from 13:00 - 14:00 (PST) in room 2020 West (Level 2 Moscone Center)  
<https://agu.confex.com/agu/fm23/meetingapp.cgi/Session/191809>
- AMERIFLUX Town Hall - Enhancing the Impact of Flux Science for the World  
Details: Wednesday 13th December from 18:30 - 19:30 (PST) in room 2003 West (Level 2 Moscone Center)  
<https://agu.confex.com/agu/fm23/meetingapp.cgi/Session/190968>
- Sessions: there are an extensive and exciting line-up of oral and poster sessions coming up at AGU that include 'FLUXNET' science ([7/39 sessions/abstracts](#)). Other suggested search terms to find exciting flux science at AGU include 'eddy + covariance' ([12/276](#)), 'evapotranspiration' ([21/551](#)), 'carbon + flux' ([13/419](#)), 'greenhouse + gas + flux' ([6/113](#)) and 'surface + energy + flux' ([5/183](#))
- Social activities **FLUXWORLD mixer (in person only) - evening of Monday 11th December**  
Details: announced via socials closer to the date

## Want to learn more or get involved?

Sign up for the mailing list (<https://fluxnet.org/community/join/>), and/or email [fluxnet.cc@gmail.com](mailto:fluxnet.cc@gmail.com)

Join one of our active committees by emailing the committee lead (see [here](#))

## Key upcoming events

[AsiaFlux Conference 2023](#) (27th November to 1st December)

[AGU 2023](#) (and see slide 15)

[TERN Australia](#) bi-monthly webinar series on Ecosystem Observations

[AmeriFlux Management Project](#) (AMP) webinar series

[ICOS events calendar](#) for Nordic 2023 symposium, COP28 and more

## Funding Acknowledgements



We would like to acknowledge and thank the National Science Foundation's Accelerating Research through International Network-to-Network Collaborations (NSF AccelNet) program for their funding support.

## About the Editor



Dr Caitlin Moore's research uses measurement and modelling techniques to observe and predict ecosystem processes over time. She's based at The University of Western Australia, and affiliated with the OzFlux community and TERN in Australia.

For more information & to contact Caitlin, view her [UWA Research Repository](#).