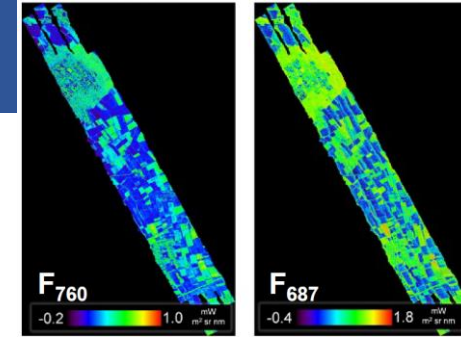


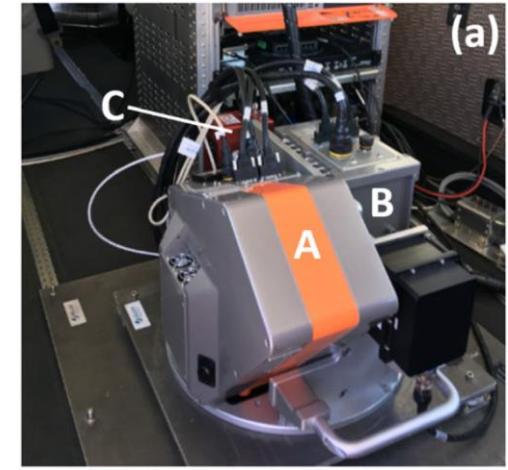
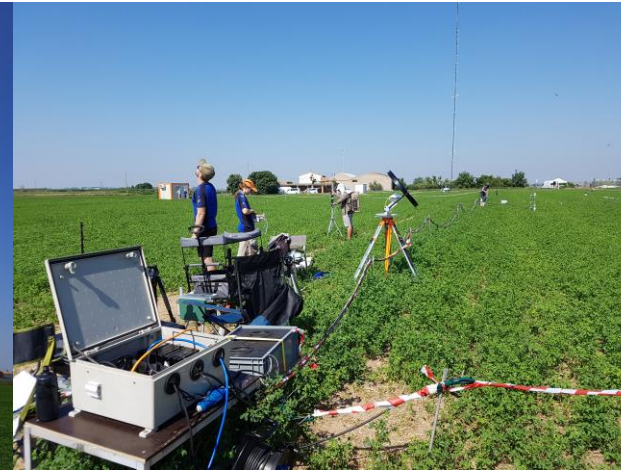
# WG1 meeting - 20221124



- **THEME:** Chlorophyll Fluorescence measurements

- **Program:**

- 16:05 - Mary-Rose Mangan: Update on Unified Eddy Covariance Fluxes and Flux Maps
- 16:10 – Bastian Siegmann and Uwe Rascher: SIF measurements across spatial scales
- 16:30 – Yves Goulas, Gabriel Hmimina, Valerie Dantec: Active and passive fluorescence measurements at La Cendrosa
- 16:45 – Discussion on inter-comparisons measurement techniques (ET,...)
- 17:00 - Closure

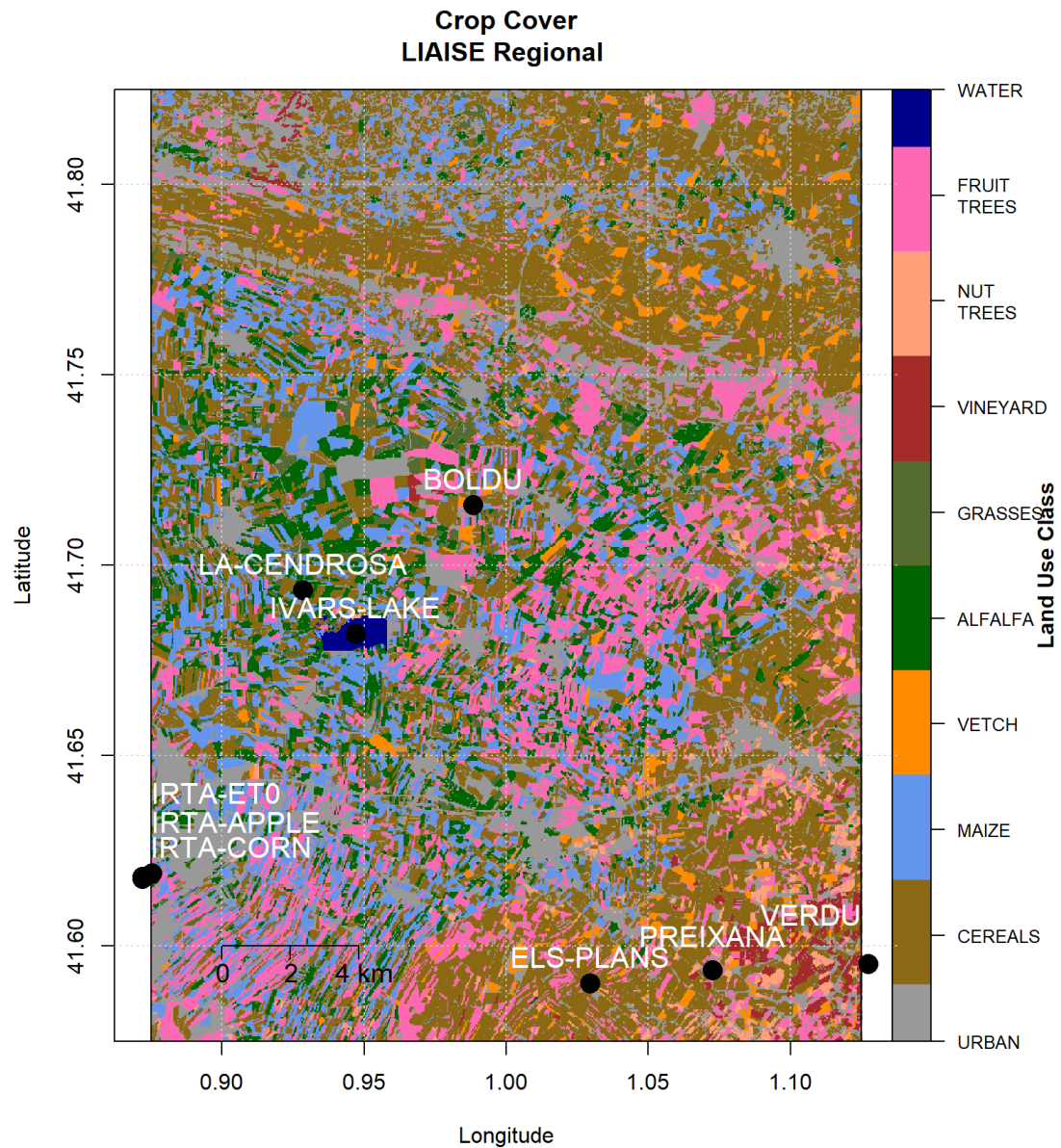


# Update on LIAISE Unified EC and Flux Maps

Mary Rose Mangan

24 November 2022

# 1) Verified Land-Use map



# 2) Network of EC/EB systems

## Irrigated:

- La Cendrosa (Flooded)
  1. Alfalfa (CNRM)
  2. Alfalfa (WUR)
- Lake Ivars
  3. Shallow water (CNRM) ← Not included in L1
- Mollerussa
  4. Natural grass – ETO (SMC)
  5. Apple orchard (UIB) ← Krypton Problems
  6. Corn (UIB, OWL) ← Krypton Problems
- Boldu
  7. Corn (UH) ← Krypton Problems

## Rain-Fed:

- Els Plans
  8. Natural (UKMO) ← Krypton Problems
- Preixana
  9. Almond orchard (CNRM)
- Verdu (Drip)
  10. Vineyard (CESBIO)

# Level 1 Uploaded onto the AERIES Database

## Unified EC Processing

### LIAISE\_UNIFIED-EC\_WUR\_30min\_L1

LIAISE

[INFORMATION](#) [DOWNLOAD](#) [INTEROPERABILITY](#)

Abstract

**Abstract**

Temporal extents

This has the processed eddy-covariance fluxes using the LIAISE unified eddy-covariance processing protocol discussed in a January 2022 Working Group 1 meeting.

Instruments

Parameters

Fluxes were calculated with EddyPro (version 7). Fluxes were calculated using both 10 and 30-minute averaging times. The missing data threshold was 10% per period.

Contacts

Milestones

The flux settings selected:

Resource type

- > Rotation method: planar fit (Wilczak et al, 2001) rotation method
- > Detrend method: linear detrending
- > Time lag detection method: covariance maximation
- > WPL density correction (Webb et al, 1980)
- > Spike detection: Vickers & Mahrt, 1997
- > Spectral correction and QA/QC

## Flux Maps

### LIAISE\_FLUX-MAPS\_WUR\_SurfaceFluxes\_L1

LIAISE

[INFORMATION](#) [DOWNLOAD](#) [INTEROPERABILITY](#)

Abstract

**Abstract**

Spatial extents

This is the dataset with the 30 minute flux maps created from the LIAISE Unified EC Processing and the 100 m resolution crop cover map from 2020. The files contain the reclassified crop cover map and the raster map of the components of the surface energy balance (e.g. net radiation, ground heat flux, latent heat flux and sensible heat flux) for each day applied to each pixel. Data has been gap filled where possible and missing data is listed as -9999.

Temporal extents

Platforms

Instruments

Parameters

In the Level 1 version, fluxes from urban and water surfaces were modeled using an energy budget closure model. Furthermore, all alfalfa fields are on the same growing cycle as La Cendrosa across the domain.

Contacts

Process level

Milestones

**Spatial extents**

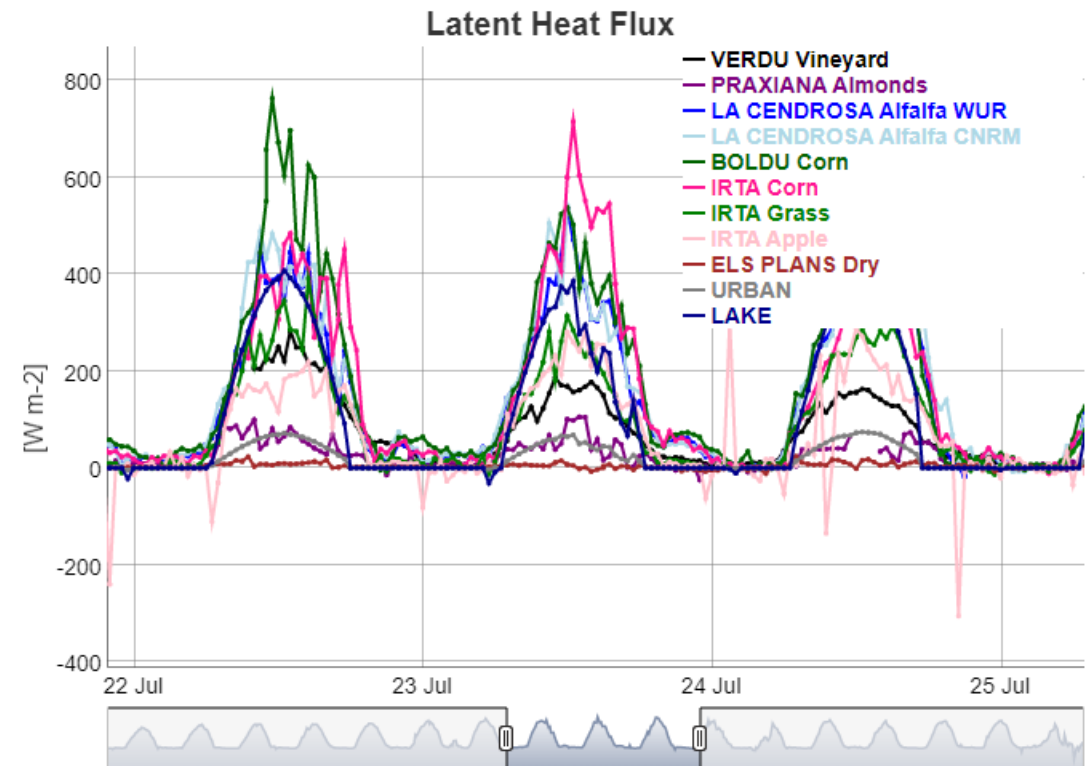
Information links

Resource type



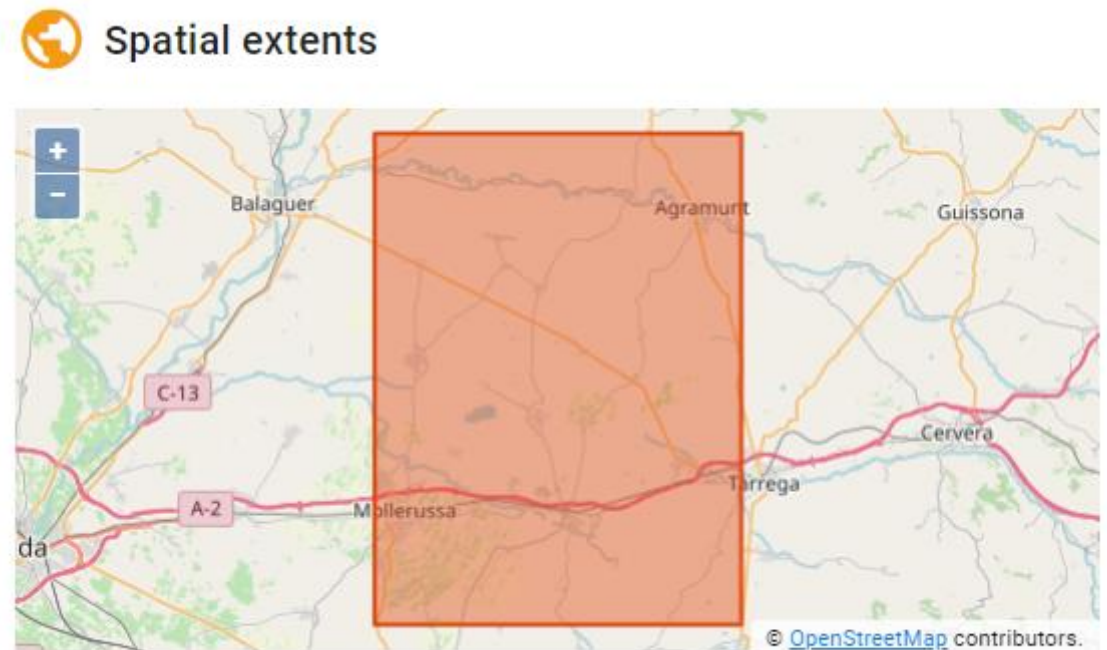
# LIAISE Unified Eddy-Covariance

- Data in csv format
- 10-minute and 30-minute fluxes for all stations
- Eddy-Pro metadata files
- A composite product with fluxes and select met variables for all stations (csv)
- H, LE, fCO<sub>2</sub>, R<sub>n</sub>, G, general met data

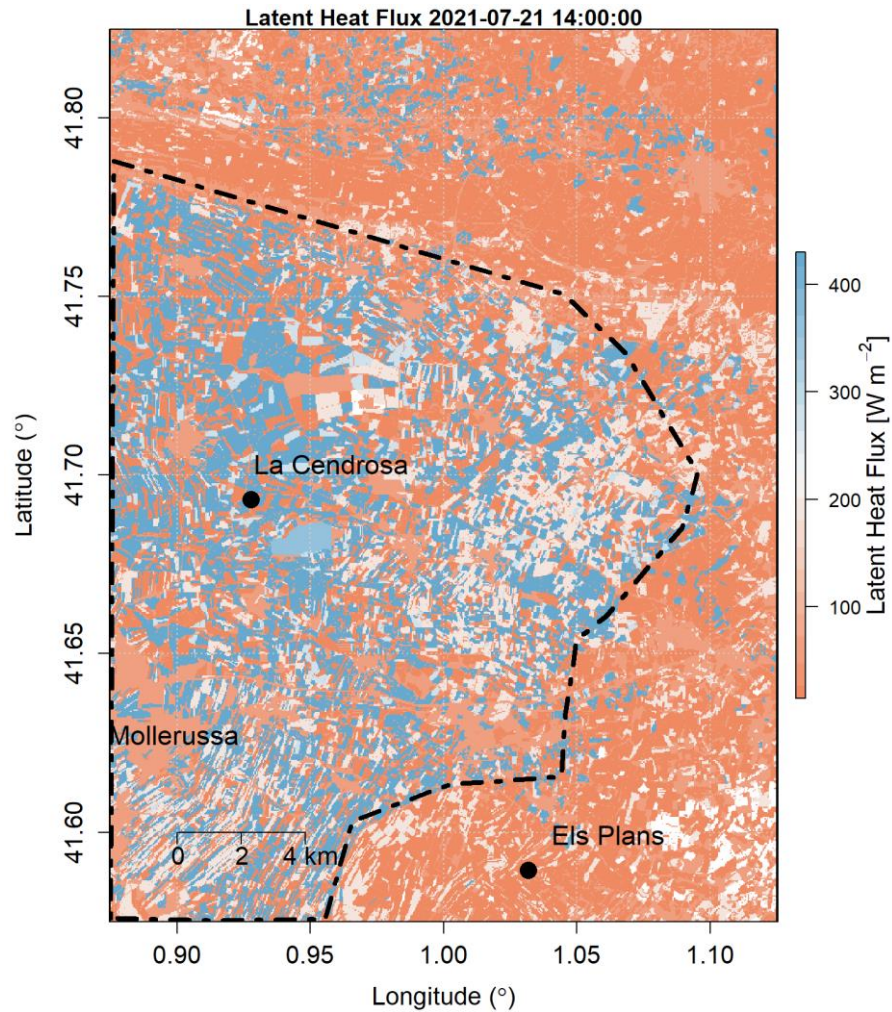


# Flux & Eco-physiological Maps

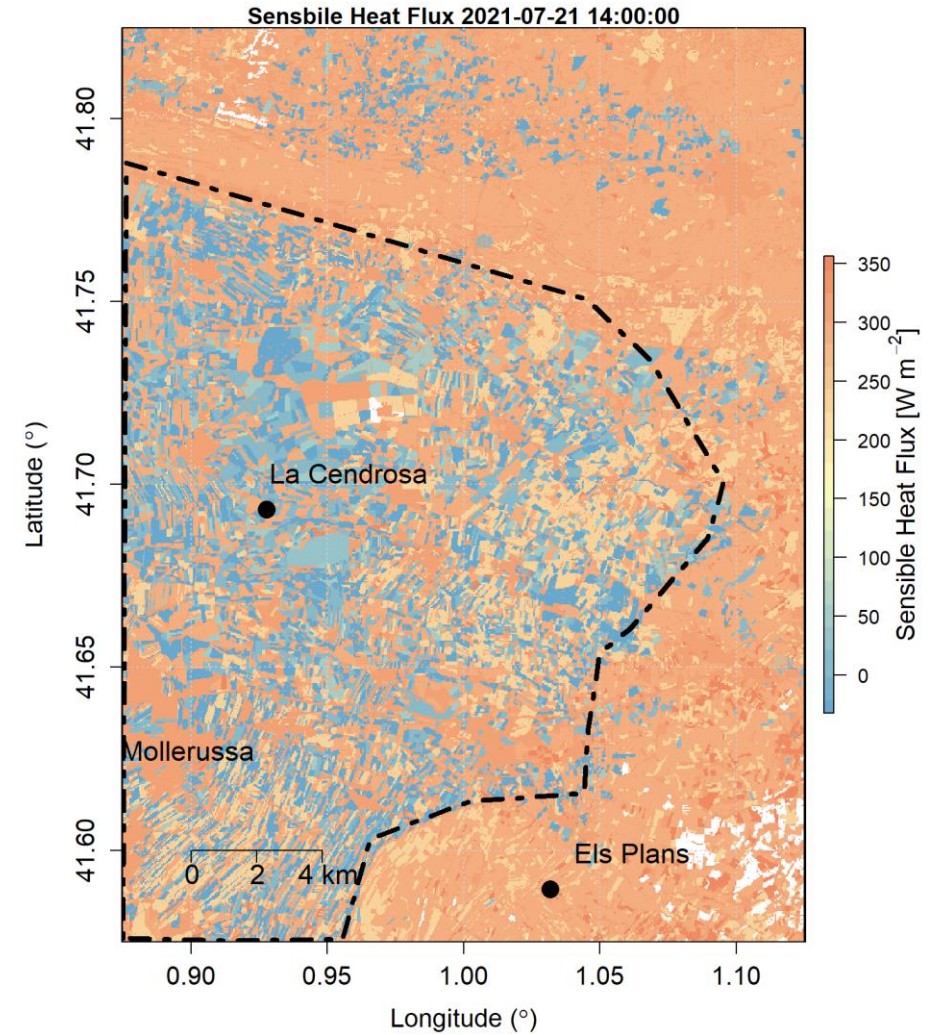
- Files – netcdf
  - Raster Form
  - Extent: ERA5  $0.25^\circ$  cell around LIAISE domain
- 30-minute EC/EB terms mapped according to land use
- Static Eco-physiological variables
  - Leaf Area Index
  - Vegetative Fraction



# Example Flux Maps



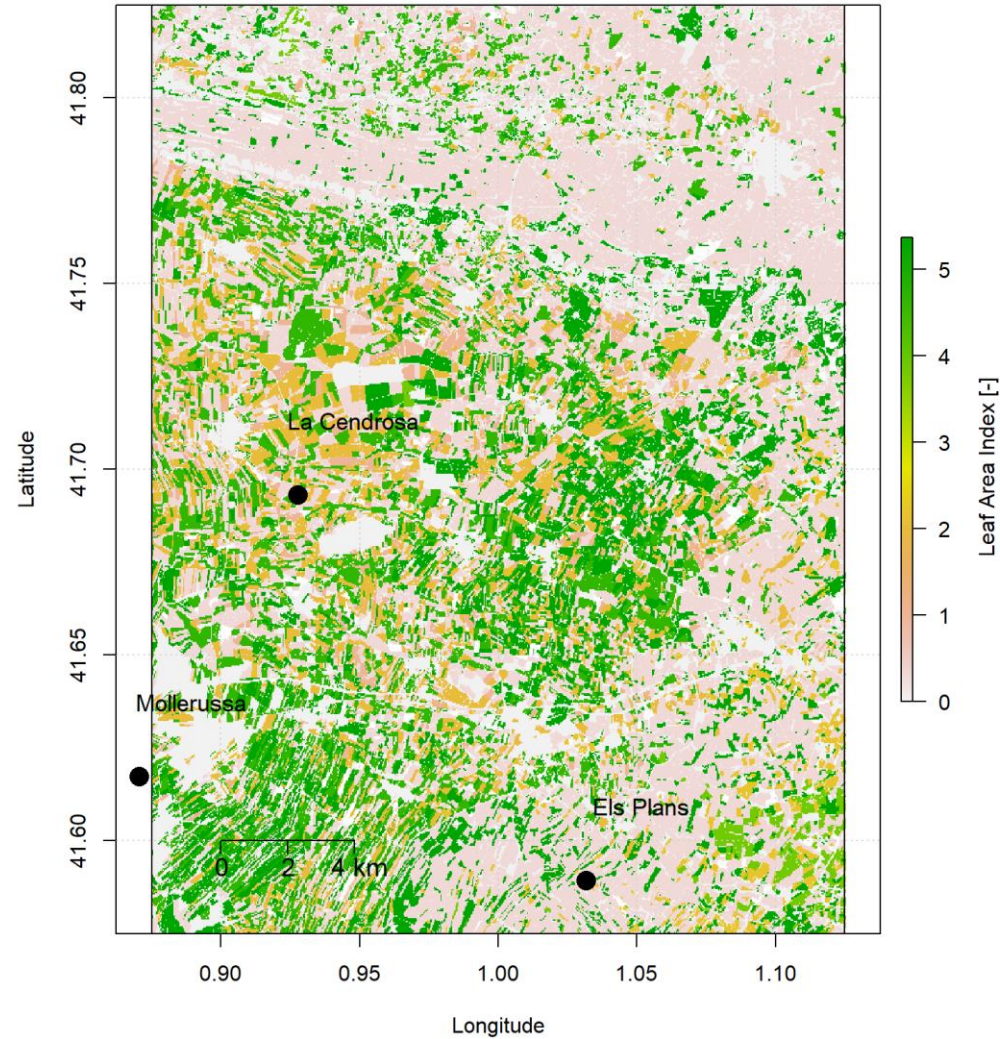
Latent heat flux for 21 July at 14:00 UTC.



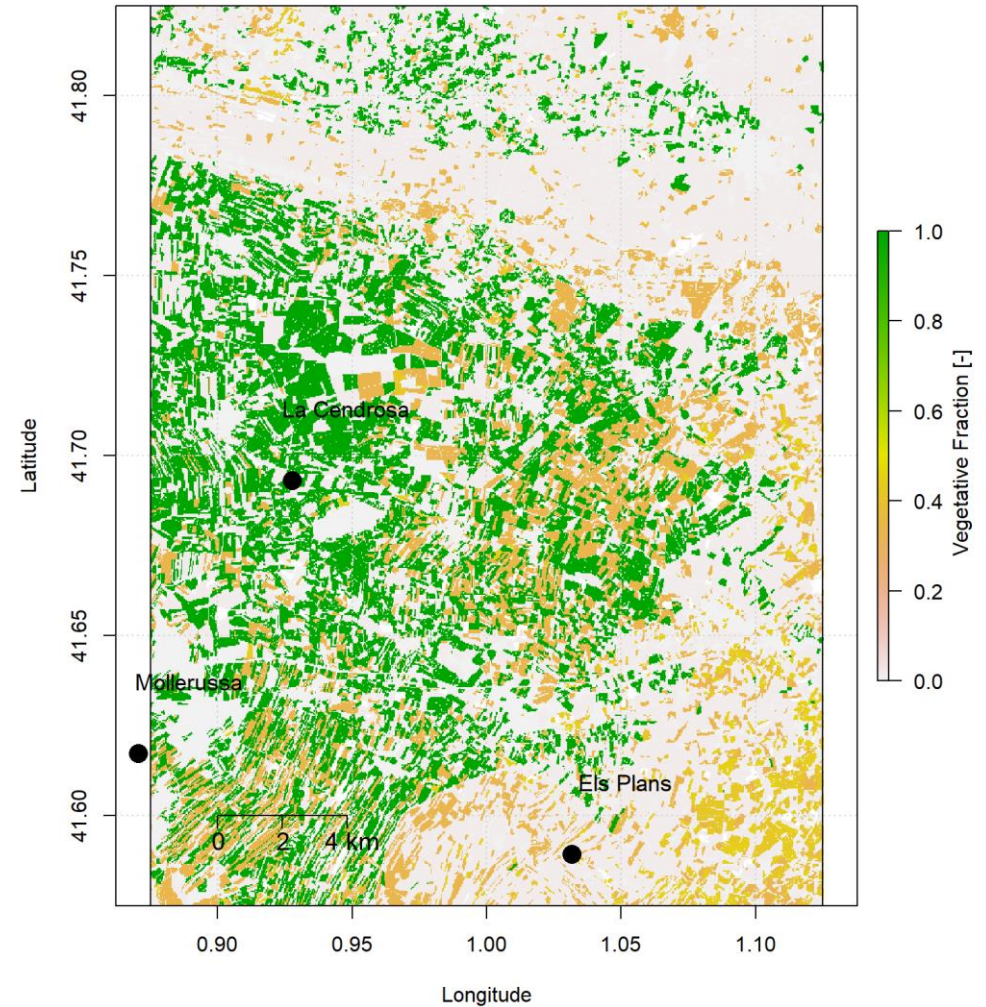
Sensible heat flux for 21 July at 14:00 UTC.

# Example Eco-physiology Maps

Leaf Area Index  
LIAISE Regional



Vegetative Fraction  
LIAISE Regional





# More Details on the Flux Maps

The surface-boundary layer connection across spatial scales of thermal heterogeneity

Mary Rose Mangan<sup>1\*</sup>, Oscar Hartogensis<sup>1</sup>, Aaron Boone<sup>2</sup>,  
Oliver Branch<sup>3</sup>, Guylaine Canut<sup>4</sup>, Joan Cuxart<sup>5</sup>, Hugo J. de Boer<sup>6</sup>,  
Michel Le Page<sup>7</sup>, Daniel Martínez-Villagrasa<sup>5</sup>, Josep Ramon Miró<sup>8</sup>,  
Jeremy Price<sup>9</sup>, Jordi Vilà Guerau de Arellano<sup>1</sup>

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<sup>2</sup>Météo-France/CNRS, Toulouse, France

<sup>3</sup>Institute of Physics and Meteorology, University of Hohenheim, Stuttgart, Germany

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<sup>5</sup>Department of Physics, University of the Balearic Islands, Palma, Spain

<sup>6</sup>Copernicus Institute of Sustainable Development, Environmental Sciences, Universiteit Utrecht, Utrecht, Netherlands

<sup>7</sup>CESBIO, Centre d' Etudes Spatiales de la Biosphère, Univ. de Toulouse, CNRS, CNES, IRD, UPS, INRAE, Toulouse, France

<sup>8</sup>Meteorological Service of Catalonia, Barcelona, Spain

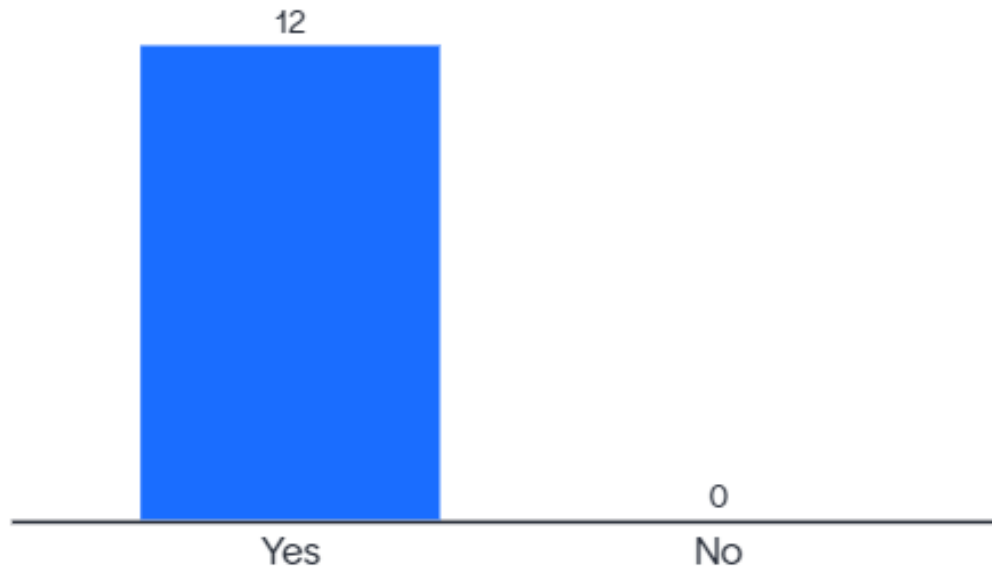
<sup>9</sup>Met Office, Exeter, United Kingdom

\*Corresponding Author: maryrose.mangan@wur.nl

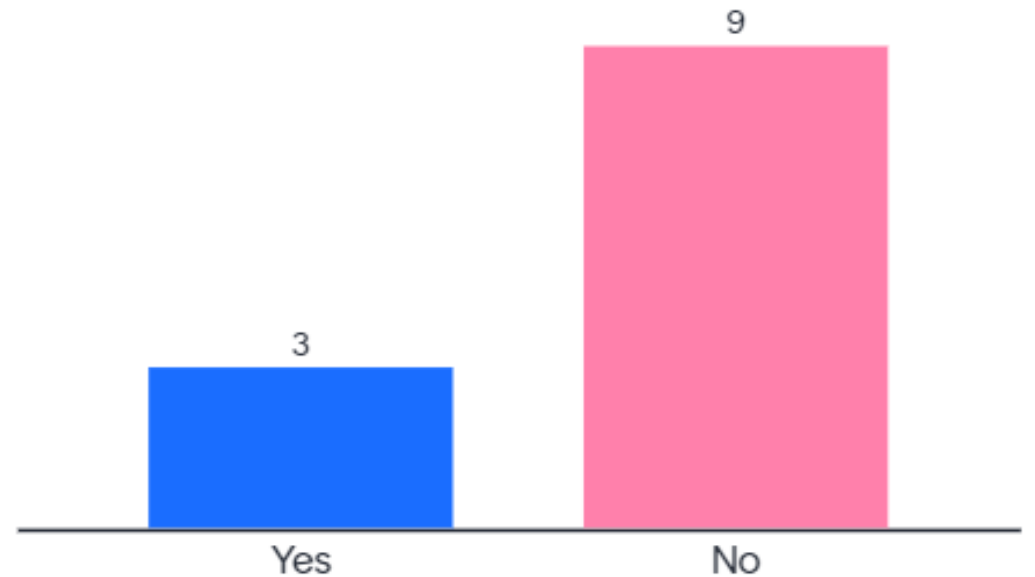
Under Review , *Agricultural and Forest Meteorology*.

# Discussion - WG1 Intercomparison Studies

- Would you be interested in participating in an intercomparison study?



- Would you be interested in leading an intercomparison study?



What variables should be included in a WG1 intercomparison study?

**evapotranspiration**

lai

plant biomass

**sensible heat flux**

land cover type

**sif**

**momentum flux**

stomatal conductance

soil temperature

**carbon flux**

**meteorological variables**

land surface temperature

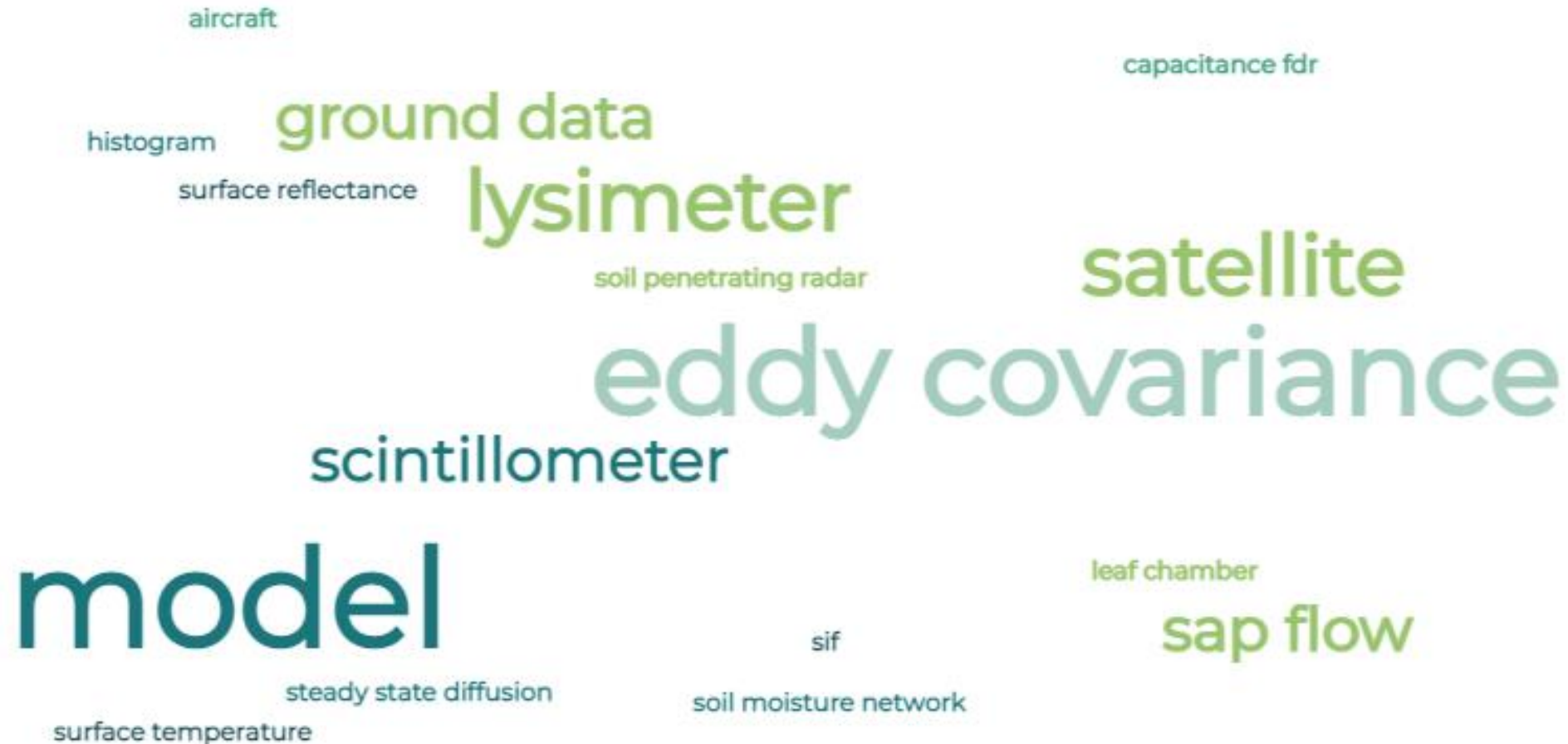
irrigation regime

**soil moisture**

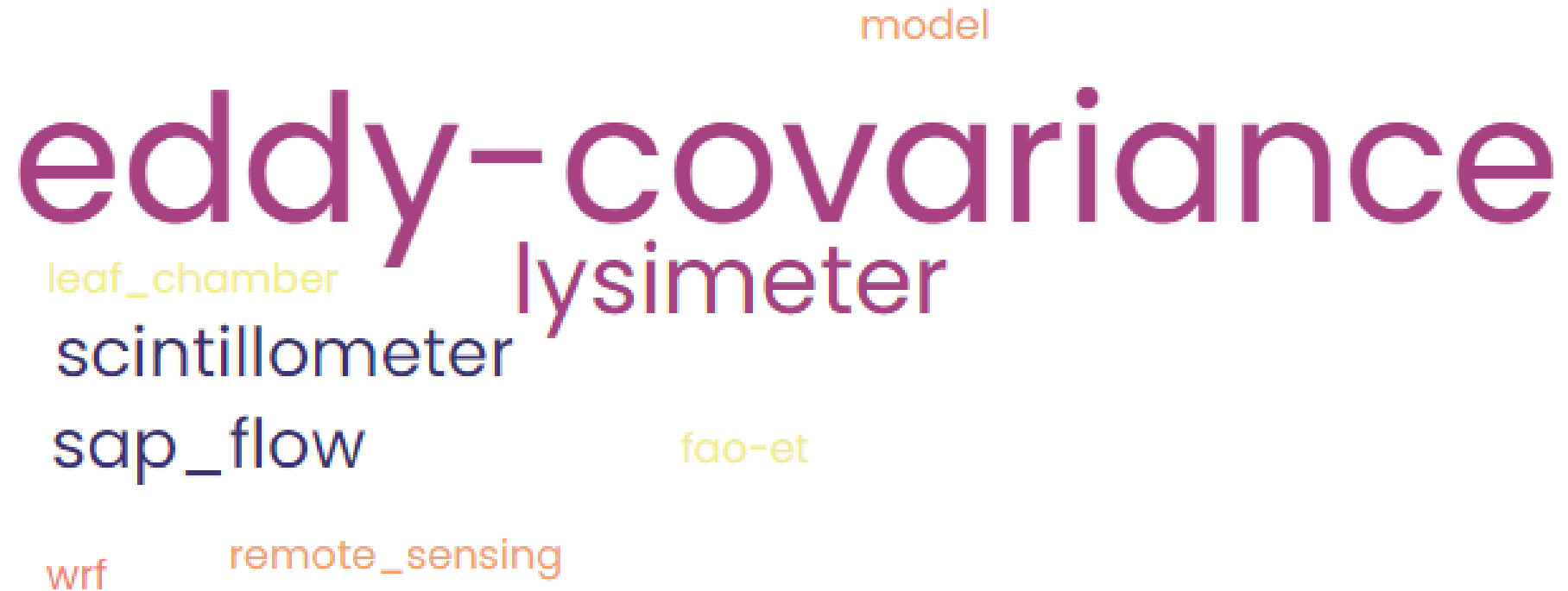
ground heat flux

radiative flux

What methods should be included for your proposed variables?



## Suggested Methods for ET intercomparison



## Suggested Methods for Soil Moisture Intercomparison

**Soil Penetrating Radar**

**GLORI**

**Remote Sensing**

**Ground Data**

**Satellite**

**Soil moisture networks**

**Steady State Diffusion**

**Capacitance FDR**

**SLAP**

# Discussion - WG1 Intercomparison Studies

- **ET methods at Mollerussa:**
  - EC
  - Flux Profile (MOST)
  - Lysimeter (100% and 60% irrigation)
  - FAO station
  - Remote Sensing? (satellite, aircraft, drones)
  - Leaf transpiration
  - Soil evaporation
  - Modelled ET data based (e.g. Penman Monteith)
  - Modelled ET



# Discussion - WG1 Intercomparison Studies