HyMeX

LIAISE

Land surface Interactions with the Atmosphere over the Iberian Semi-arid Environment (LIAISE) : Field Campaign Update

A. Boone[1], **J. Bellevert**[3], M. Best[8], J. Brooke[6], G. Canut-Rocafort[1], **J. Cuxart**[7], O. Hartogensis[7], **J. R. Miro**[8], P. LeMoigne[1], J. Polcher[2], J. Price[6], P. Quintana-Segui[4]

1 CNRM Météo-France/CNRS, Toulouse, France
2 LMD, IPSL, Paris, France
3 IRTA, Lleida, Spain
4 Observatori de l'Ebre, Roquetes, Spain
5 UIB, Balearic Islands, Spain
6 UKMO, Exeter, UK
7 U. Wageningen, Netherlands
8 SMC, Barcelona

MetMed

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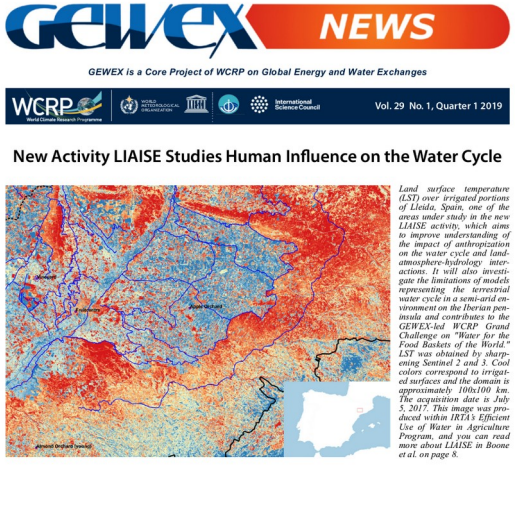
LIAISE

Science Questions

1) What are the key natural and anthropogenic semi-arid surface processes that modulate or control infiltration and runoff and govern turbulent fluxes and their spatial heterogeneity?

2. How does the highly heterogeneous (natural and anthropized) surface impact boundary layer development, mesoscale circulations and potentially precipitation recycling over this region via feedbacks with the atmosphere?

3. What is the sustainability of ground water and reservoirs in the face of expanding agricultural and farming activities, especially in light of projected future warming and drying over this region?


GEWEX NEWS

GEWEX is a Core Project of WCRP on Global Energy and Water Exchanges

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New Activity LIAISE Studies Human Influence on the Water Cycle

Land surface temperature (LST) over irrigated portions of Lleida, Spain, one of the areas under study in the new LIAISE activity, which aims to improve understanding of the impact of anthropization on the water cycle and land-atmosphere-hydrology interactions. It will also investigate the limitations of models representing the terrestrial water cycle in a semi-arid environment on the Iberian peninsula and contributes to the GEWEX-led WCRP Grand Challenge on "Water for the Food Baskets of the World." LST was obtained by sharpening Sentinel 2 and 3. Cool colors correspond to irrigated surfaces and the domain is approximately 100x100 km. The acquisition date is July 5, 2017. This image was produced within IRTA's Efficient Use of Water in Agriculture Program, and you can read more about LIAISE in Boone et al. on page 8.

WCRP World Climate Research Programme

Grand Challenges

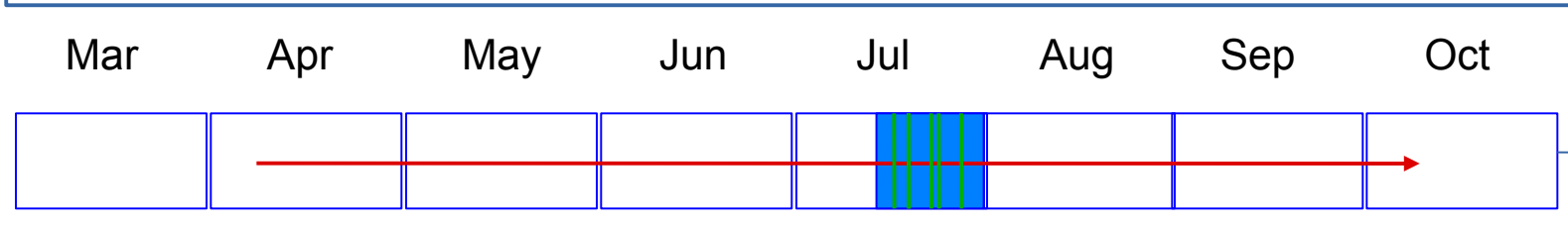
METEO FRANCE

HyMeX → Last field campaign

Strategy → Intense observations of surface and ABL when contrasts between anthropized (irrigated) and natural surfaces are a MAXIMUM and water needs LARGEST

LOP : **April-October, 2021**→ surface flux stations, sfc satellite products, lysemeters, soil moisture & T...

SOP Summer/July 15-30 → Lower atmosphere, spatially distributed surface hi-res, 5-10 **IOP**s (ATR42, RS, tethered balloons, biophysical sfc...)

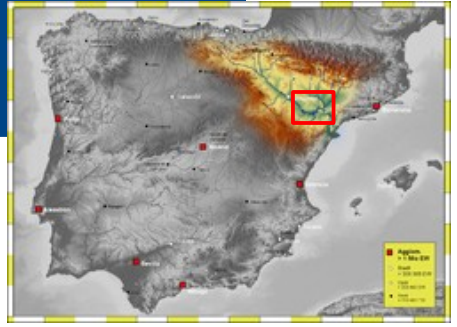


Dynamics :
-Wind profilers
-hourly RS

Turbulence :
-50m mast,
- tethered balloon,
- ATR42 aircraft
+SEB

+ numerical simulations
LES and sensitivity tests

Surface Energy Budget (SEB) Stations



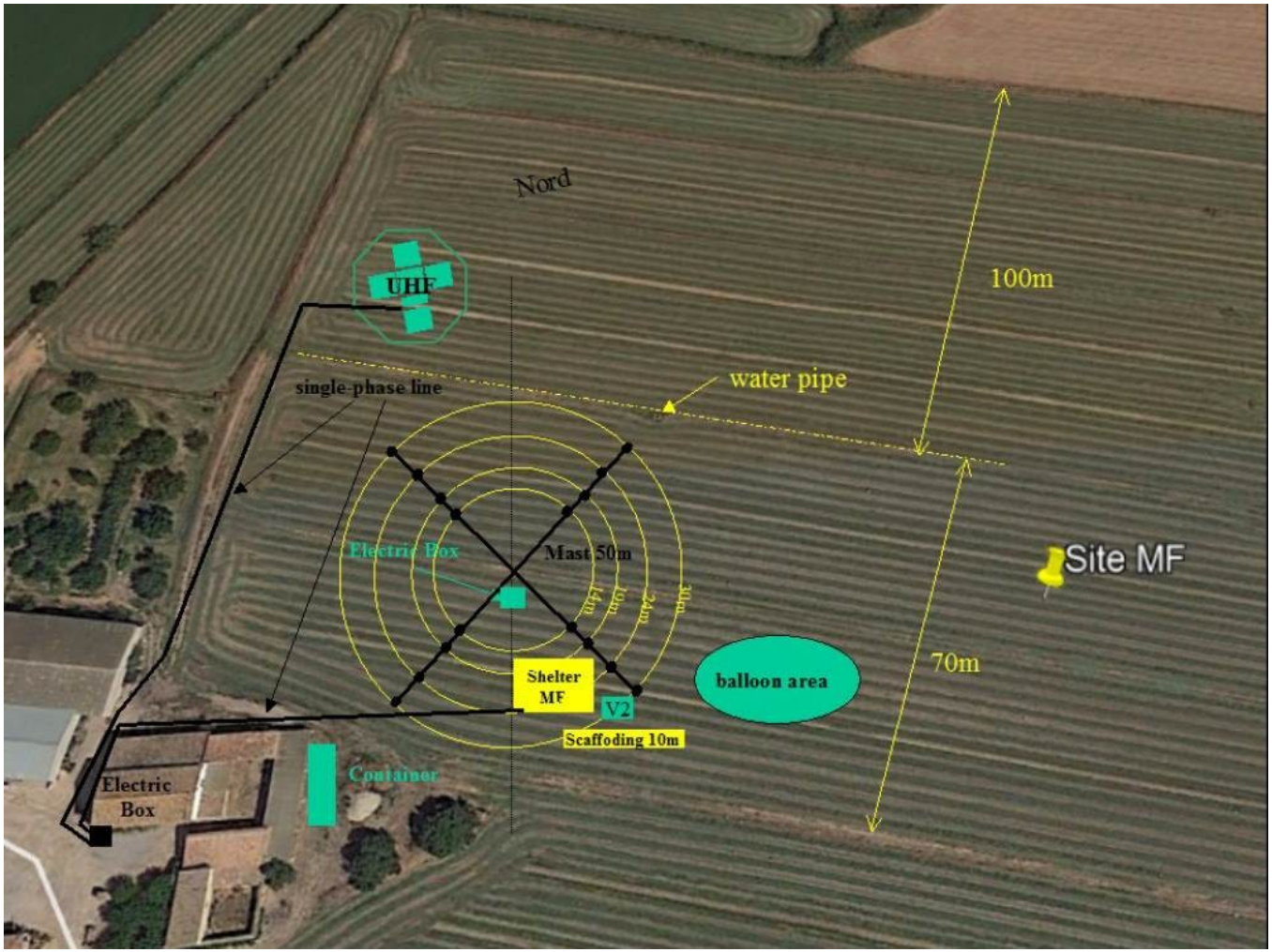
10 SEB stations: Land cover, 7 sites

- Irrigated alfalfa**
- Irrigated fruit trees (2)
- Irrigated cut grass (ET0)
- Irrigated corn (2 sites)
- Irrigated low crop (TBD)
- Irrigated vineyard
- Natural grass/bare soil **
- Lake

** Including 50m tower, PBL Sampling during SOP

- Doppler lidar setup (T,q,Vr) near Els Plans (LMD)

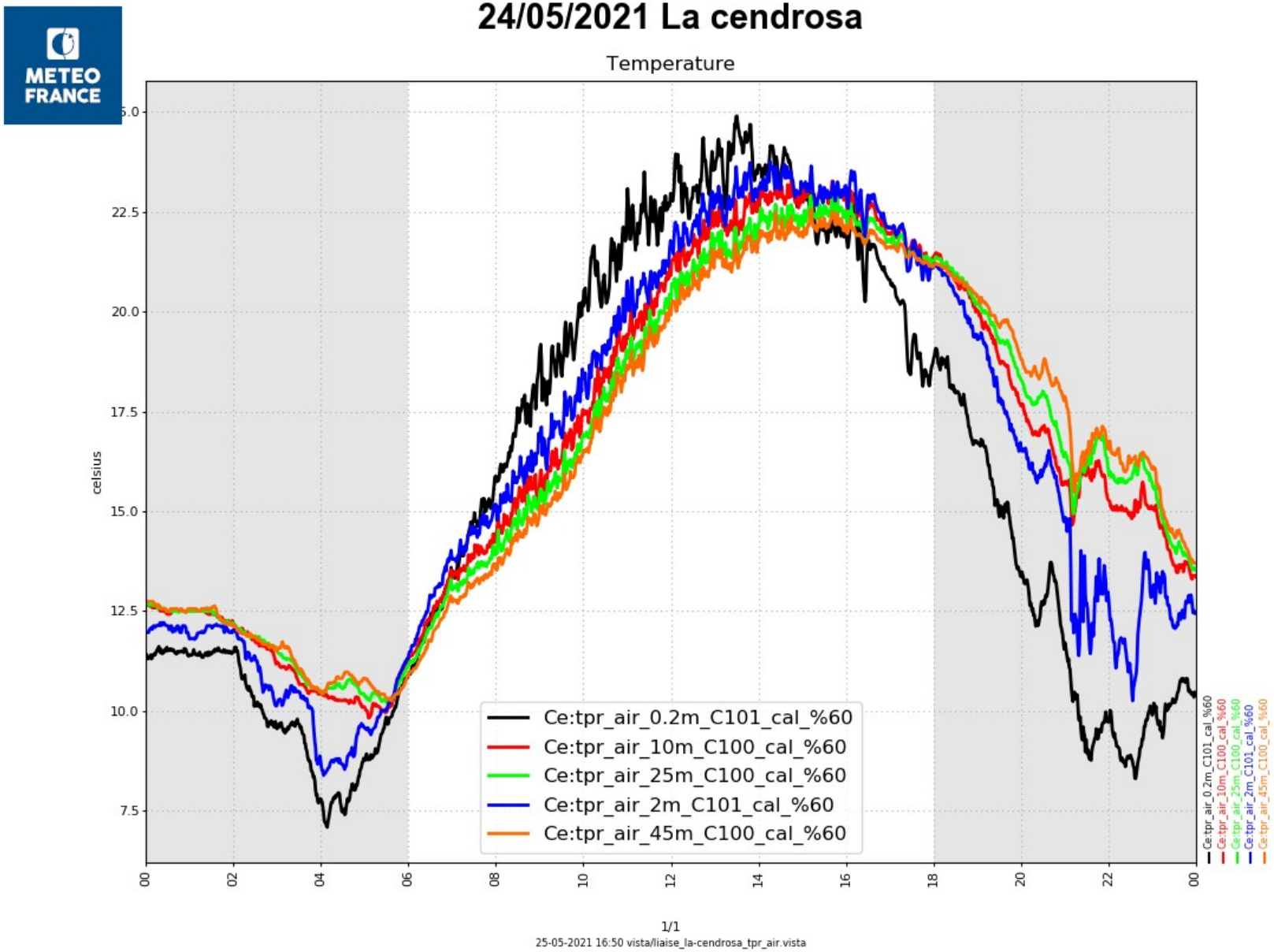
La Cendrosa (irrigated alfalfa)
→ CNRM



IRT camera
On the tower
(TRISHNA mission)

Wageningen University & Research (WUR)
Oscar K Hartogensis

La Cendrosa (irrigated alfalfa)
→ CNRM


METEO FRANCE
24/05/2021 La cendrosa
Temperature
celsius
22.5
20.0
17.5
15.0
12.5
10.0
7.5
00
02
04
06
08
10
12
14
16
18
20
22
00
Ce:tpr_air_0.2m_C101_cal_%60
Ce:tpr_air_10m_C100_cal_%60
Ce:tpr_air_25m_C100_cal_%60
Ce:tpr_air_2m_C101_cal_%60
Ce:tpr_air_45m_C100_cal_%60
1/1
25-05-2021 16:50 vista/liaise_la-cendrosa_tpr_air.vista

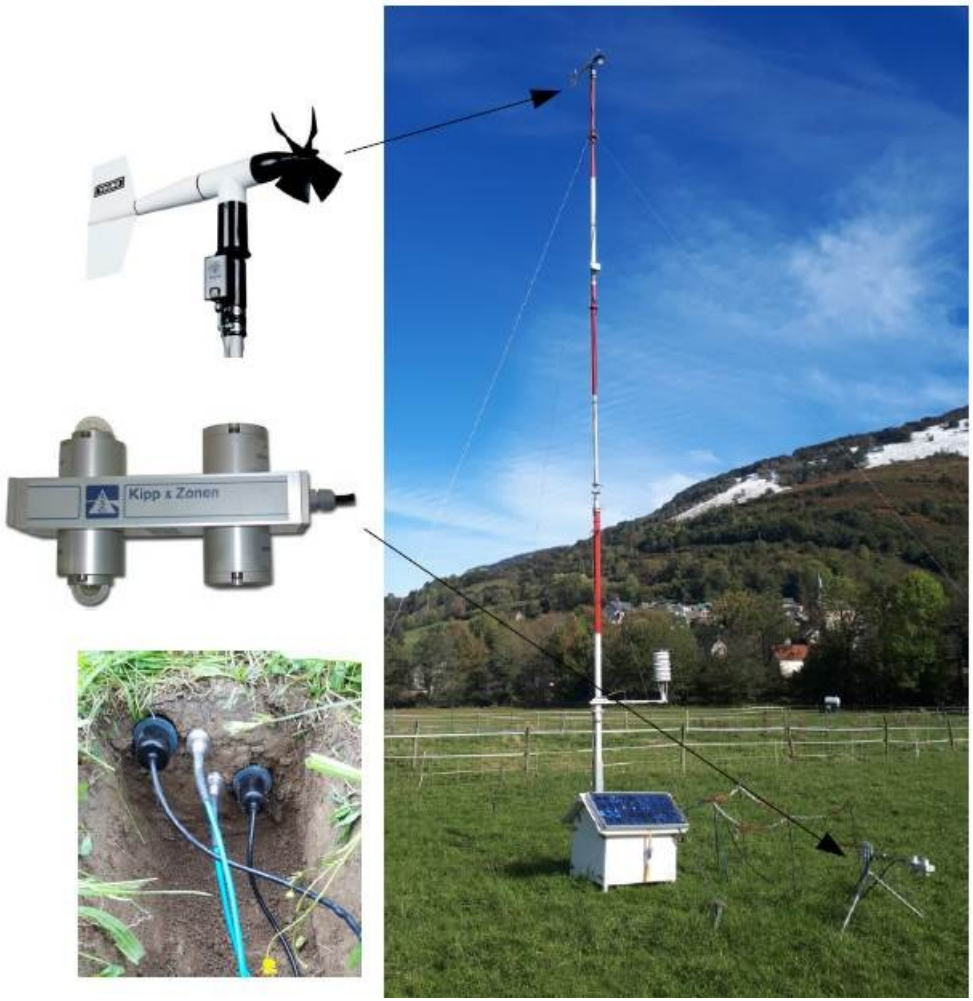
Central site: IRTA (Mollerussa)

Independent **ET estimates** (IRTA, UIB, SMC):

- 3 SEB stations (apple orchard, corn, grass-ET0)
- Satellite/remote sensing: LST-based ET & model derived (data assimilation in LSMs, merged products...)
- Lysemeters (2 fixed, + 1 mobile → corn site)
- Long path Scintillometer (WUR)

- Forecast briefing centralized here, provided by SMC (possible contrib. from ENM/Météo-France) → IOP decisions!

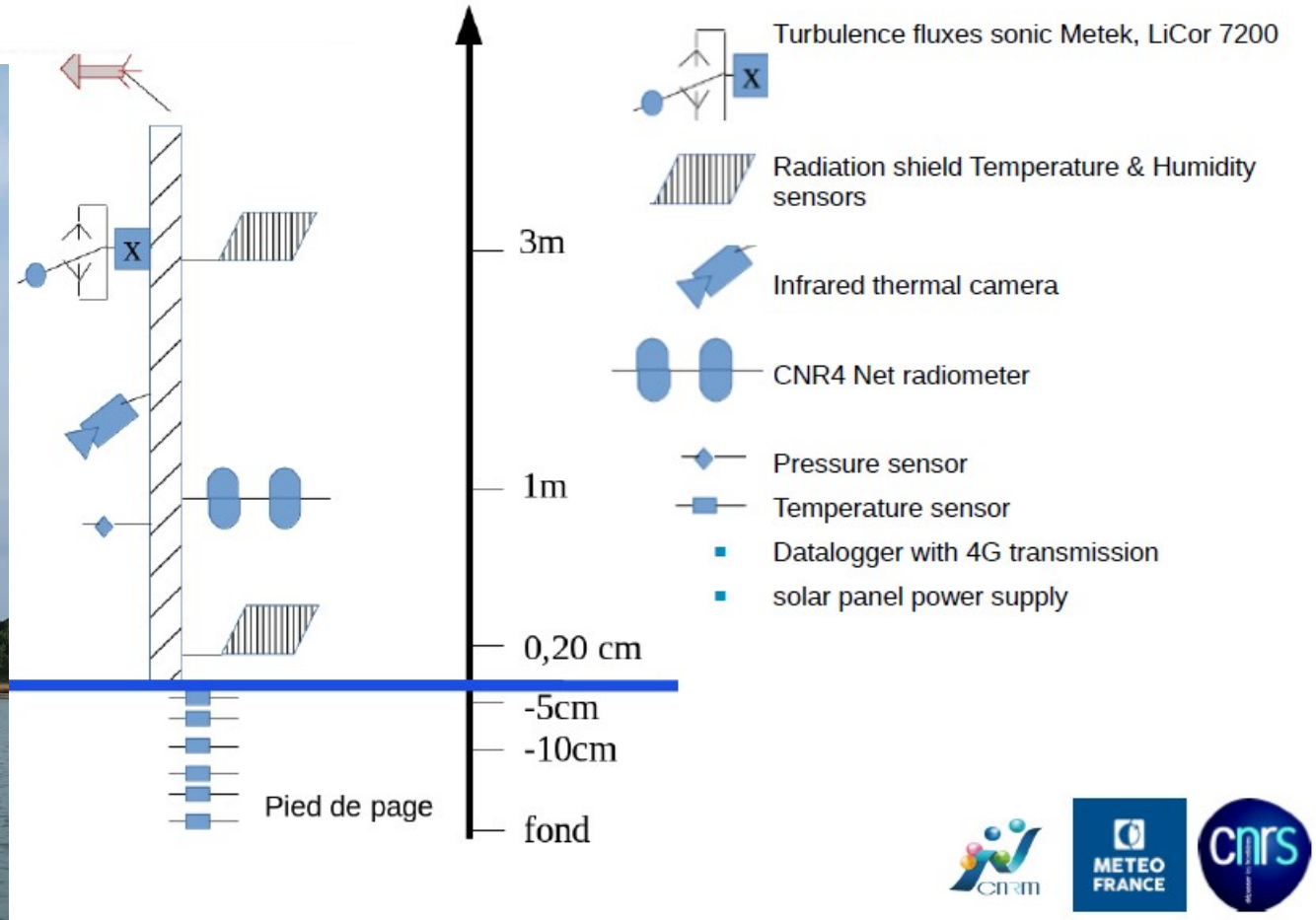
Lac Estany d'Ivars
41,683412° 0,948339°

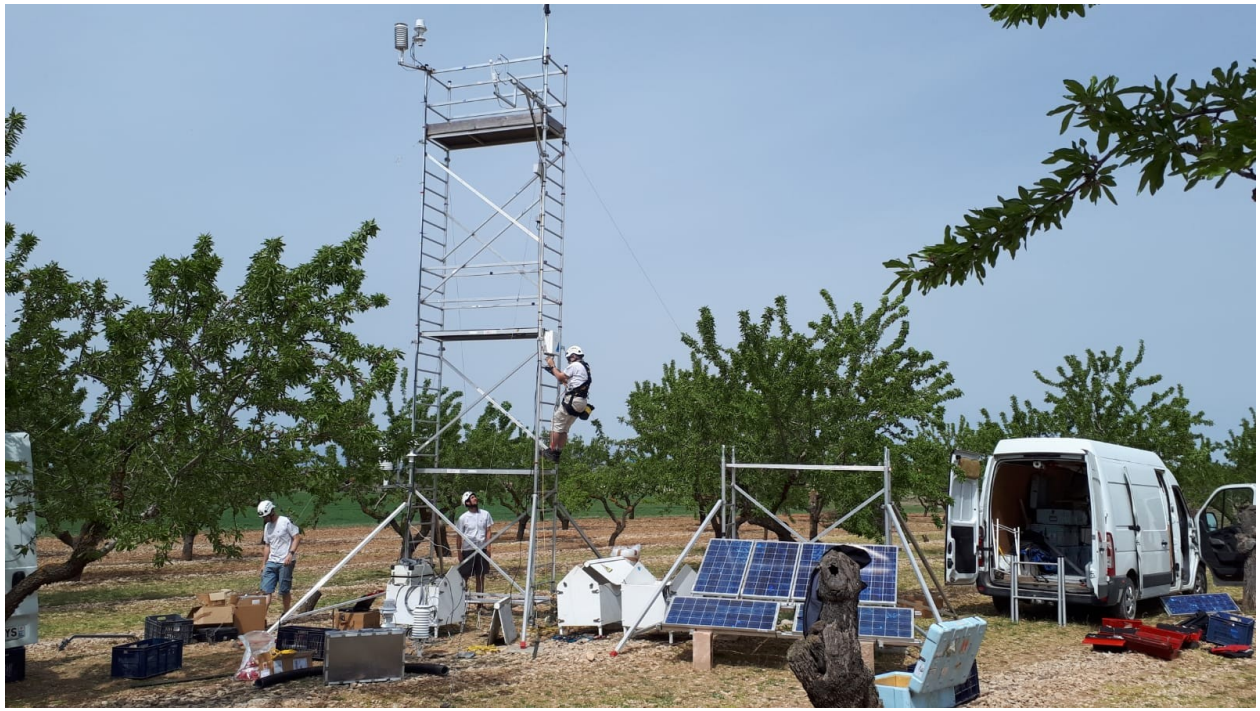


10m mast with 6 guy wires:

- Pressure sensor
- Radation Field with Temperature, Humidity sensors
- Anémometer 10m (Young)
- Rain gauge
- CNR1 Net Radiometer
- Soil Moisture & temperature sensors
- Datalogger with 4G tramsmission
- ground installation $10m^2$
- solar panel power supply

Catamaran


Young anemometer (dd,ff))
Turbulence fluxes sonic Metek, LiCor 7200
X
Radiation shield Temperature & Humidity sensors
Infrared thermal camera
CNR4 Net radiometer
Pressure sensor
Temperature sensor
Datalogger with 4G transmission
solar panel power supply
3m
1m
0,20 cm
-5cm
-10cm
Pied de page
fond



Drip-Irrigated Almond Grove

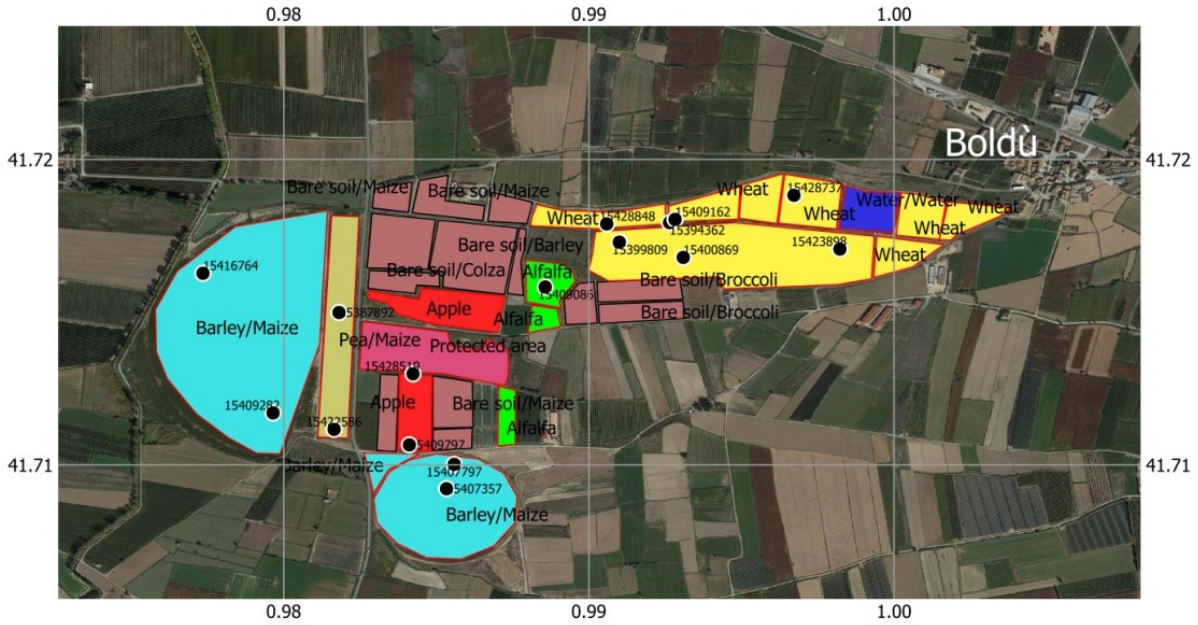
- Near Preixana (dry zone)
- 10m winds, radiation components, eddy-cov
- soil moisture, T
- 2 source-energy budget (LSM) modeling
- CNRM

Drip-Irrigated vinyard

(ESA-WineEO project)

- Near Voldu (SE domain)
- remote sensing applications, ET estimation
- LSM modeling
- CESBIO

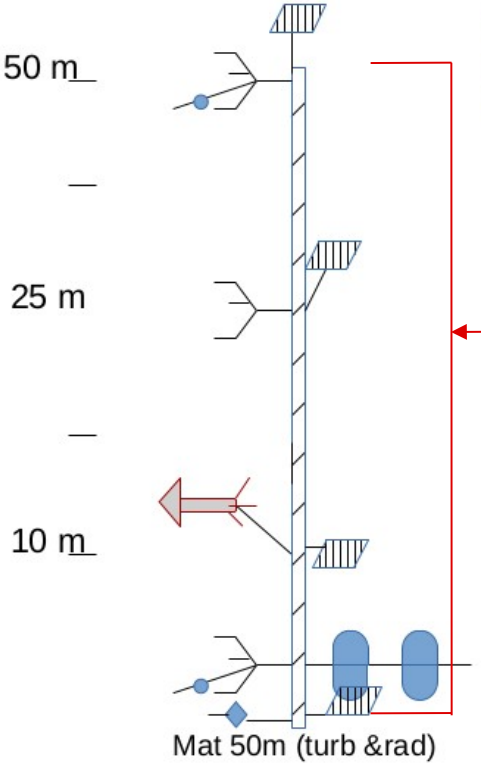
Soil Moisture/Irrigation Monitoring Network



- The map of crops and the soil moisture network deployed in late March 2021 (M. Le Page, CESBIO and D. Tous de Moner, SAF-Samping) → Irrigation+ project (ESA & HILIAISE)

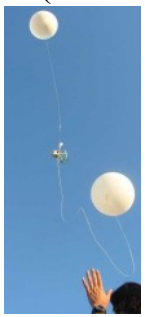
- Soon to be complimented by a SEB station from Univ. Hohenheim (as we speak!)

Turbulence on the 50m mast- 3 levels



DTS cable (TUD)

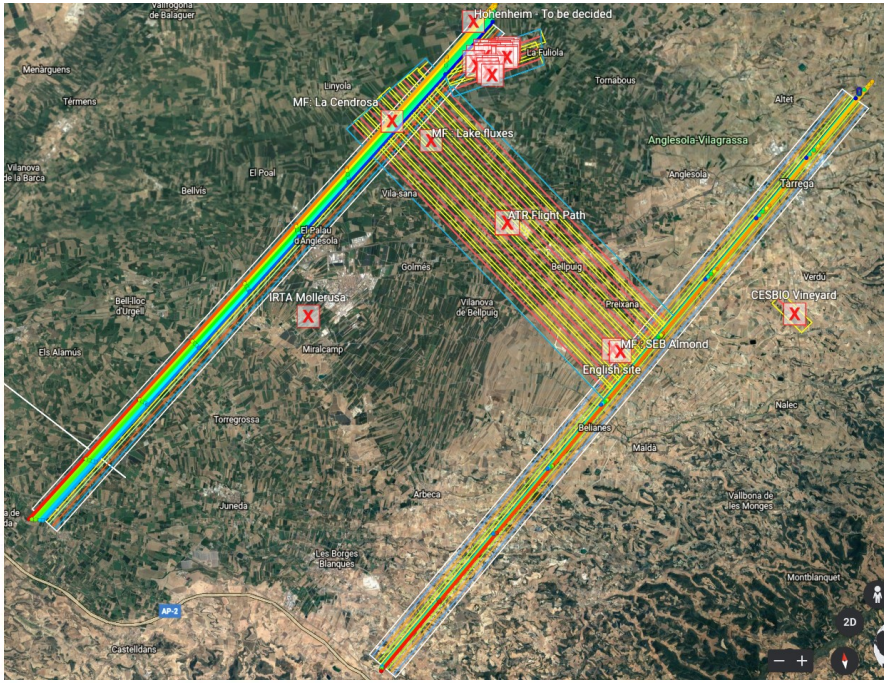
RS (3+ km)



Turb. (T,q,V)

UHF: V→ 500-3000m

HyMeX

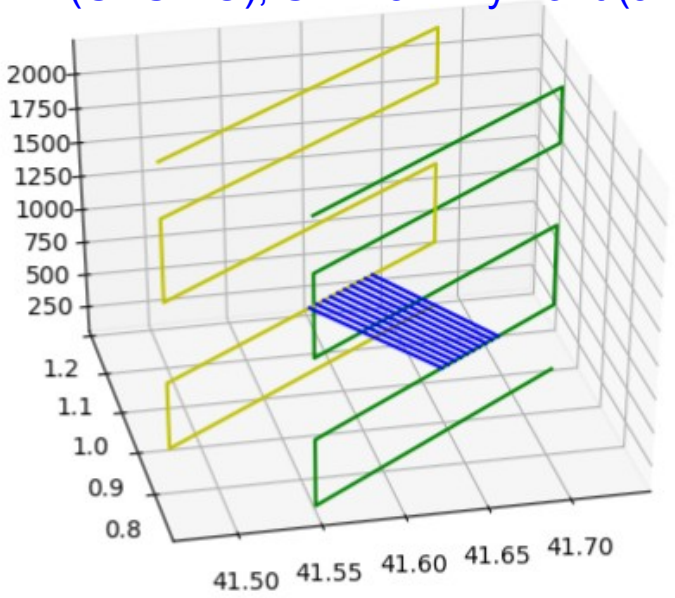


- Midday flight (11h-15h TU)
- 5-6 flights within the 15 SOP days
- Possibility of flying twice (morning and afternoon) during 1 IOP

SAFIRE

- 4-5 flight hours from Toulouse
- Stacked 30-km-long legs within the CBL
- 2 vertical plans, above irrigated and semi-arid areas
- 1 sounding at start of each plan
- Hyperspectral horizontal scanning in between

Surface → SM from GLORI (CESBIO), SIF from HyPlant (JFZ)



Approx. heights of legs:

-300m
-600m
-1200m
-1800m
-2500m

→ Current Actions:

- **Flight planning** meetings with SAFIRE-ATR42 (ongoing: about to submit flight plan
  Request)
    - NASA (SLAP→ soil moisture, L-band) waiting for internal approval,
    - King's College (ESA, HyTES → LST) planning stage

- **UAVs, balloons** → final preparations, coordination (Wrenger, Cuxart, respectively)

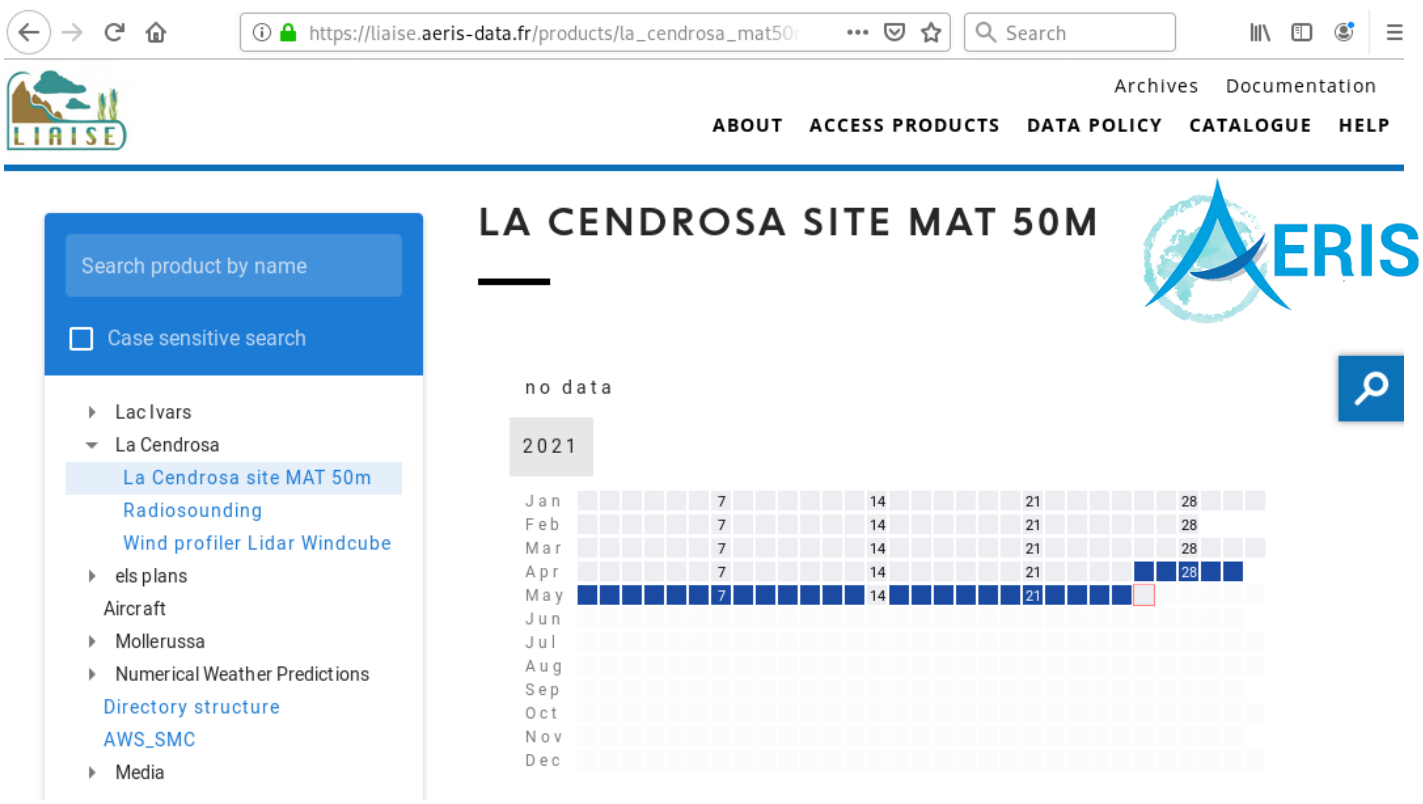
- **Forecast center**: SMC. Some contributions possible from Météo-France (ENM), UKMO real time LIAISE-specific runs over the region available
  → Briefing Center at Mollerussa (IRTA). Flight decisions morning Day-2

- **LOP installations** → late March to early June (NOW!)

- **SOP installations** → starting in June → July (UHF, scintillometers, biophysical….)

- Setting up the **LIAISE database** with **AERIS**
  → Will provide real time campaign support (quick looks etc.) on a LIAISE Campaign website
  → Data will be stored here, access by request

https://liaise.aeris.fr



https://www.hymex.fr/liaise