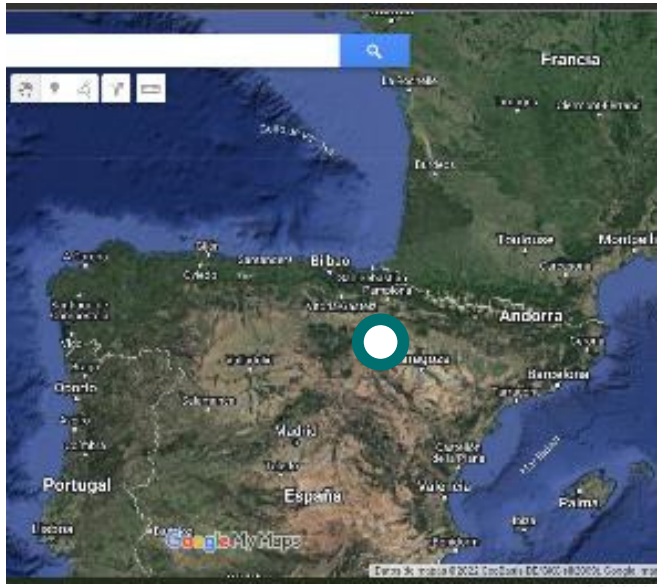
Oak coppice under different management scenarios in Moncayo (NE Spain)

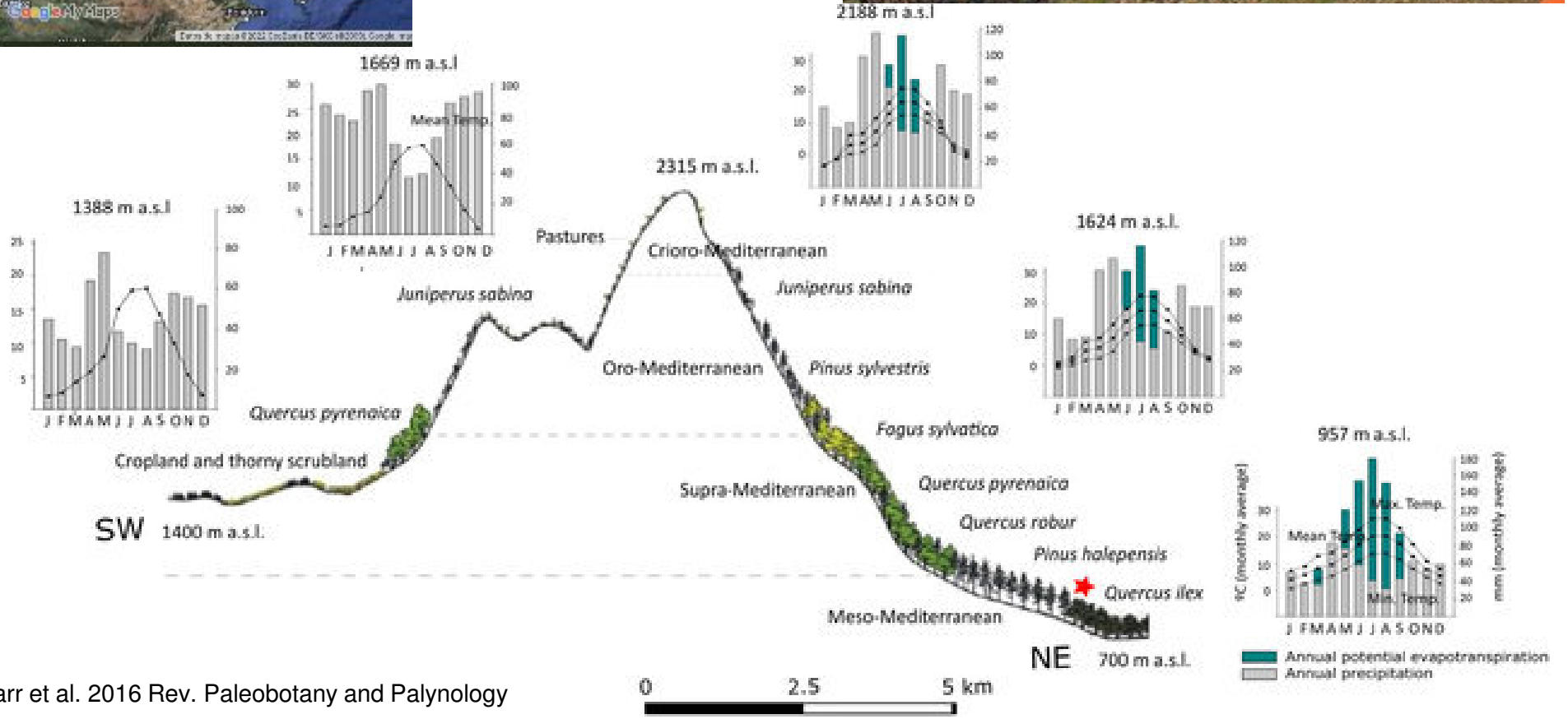
Juan Pedro Ferrio
Partner 6: ARAID/CITA

2nd Meeting MaCCMic
Bordeaux
15-16/09/2022

The site: Sierra del Moncayo



https://www.villaencanto.es/webcam-en-el-Moncayo (24/04/2022)



Aranbarr et al. 2016 Rev. Paleobotany and Palynology

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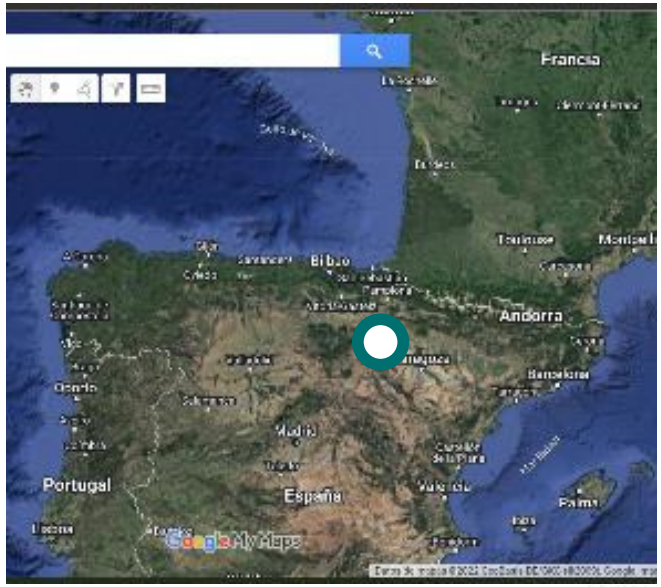

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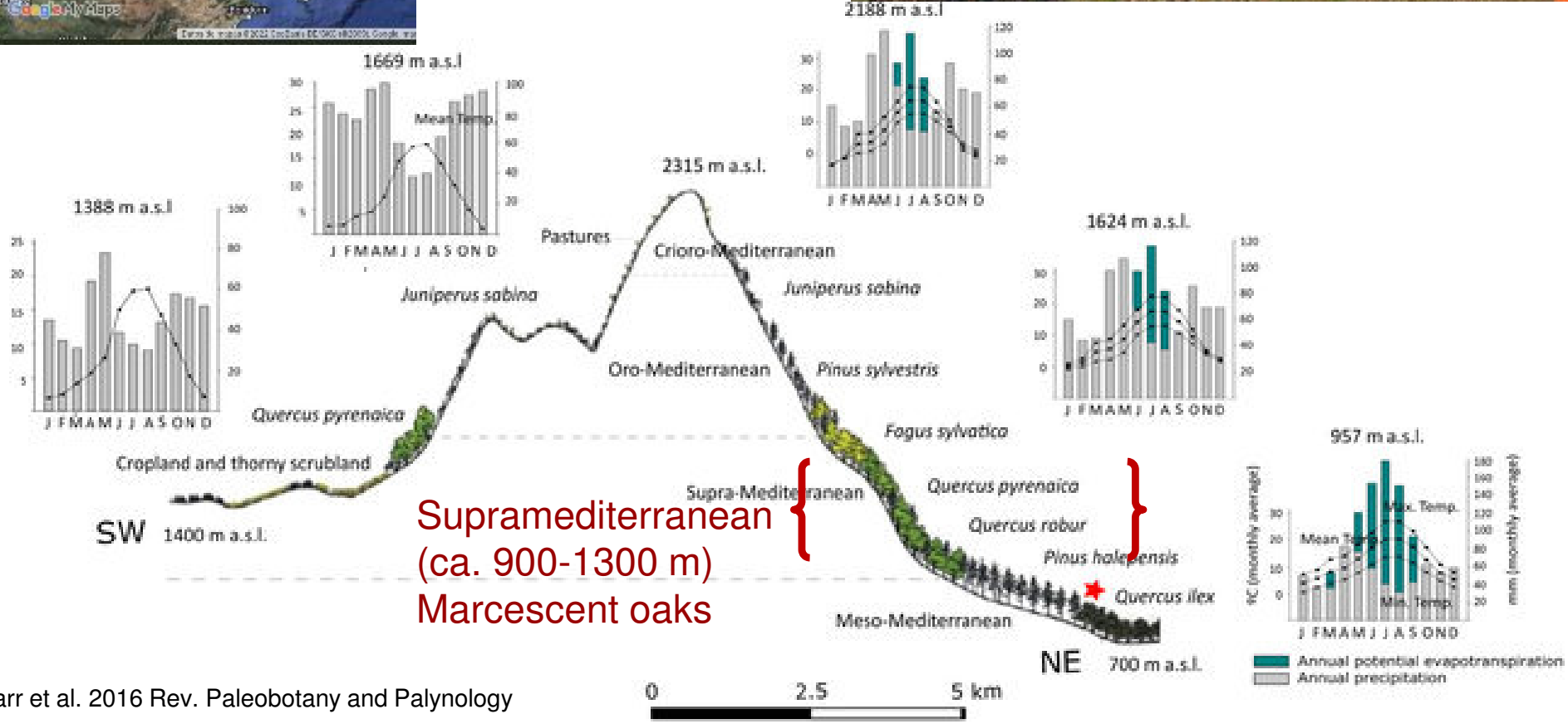

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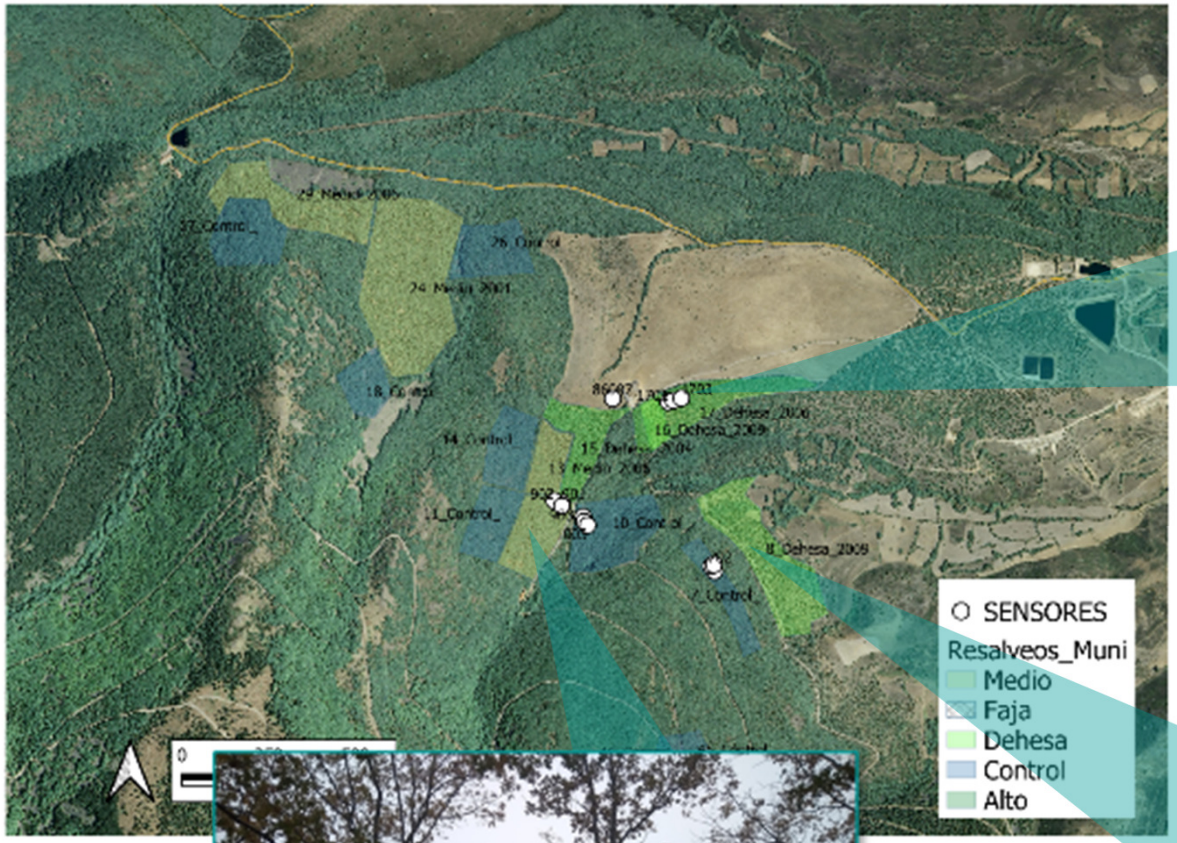
Moncayo plots

Main plots in Añón del Moncayo



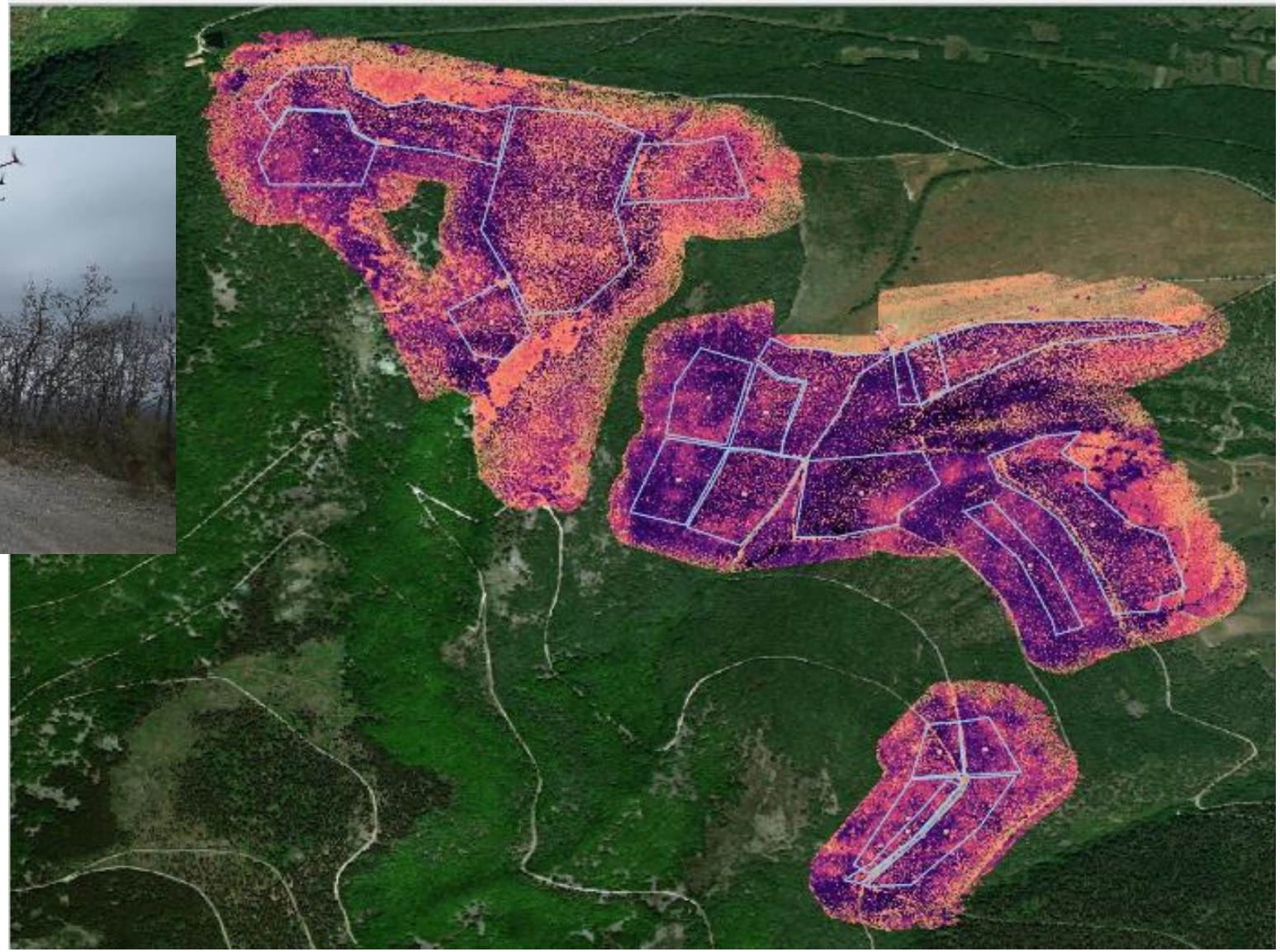
Grazing

J.P. Ferrio

Firewood

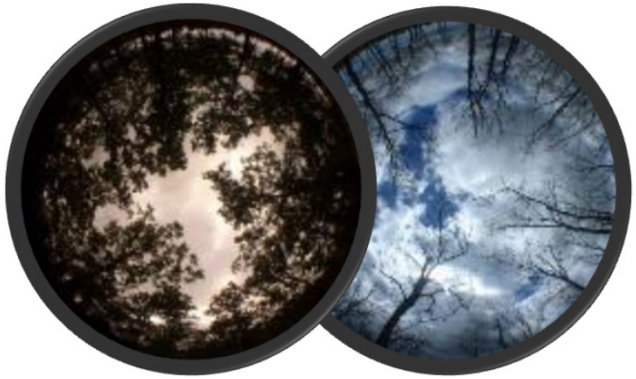
Canopy structure

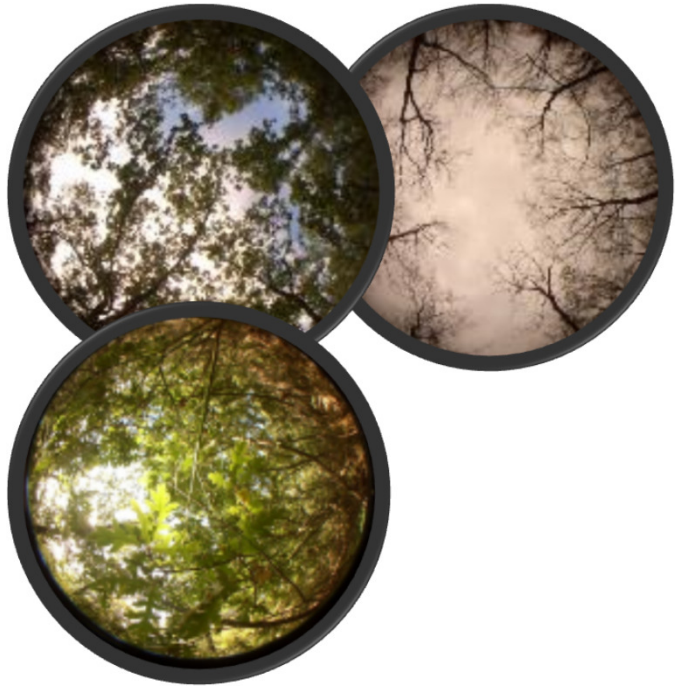
Two LiDAR flights: april (no leaves) and september
starting to process data



Canopy structure

Hemispherical pictures with and without leaves





Canopy structure

Hemispherical pictures with and without leaves

Abandonned (control)

Dehesa

Good

Control10	%Open Canopy	LAI	% Trans Tot
Leaves	15.3	2.0	24.2
No leaves	76.6	0.2	87.6

Dehesa17	%Open Canopy	LAI	% Trans Tot
Leaves	22.8	1.6	34.8
No leaves	83.9	0.1	93.2

Poor

Control71	%Open Canopy	LAI	% Trans Tot
Leaves	28.8	1.3	36.4
No leaves	55.6	0.6	72.3

Dehesa08	%Open Canopy	LAI	% Trans Tot
Leaves	35.5	1.1	45.3
No leaves	58.8	0.3	69.6

Middle forest (upper canopy)

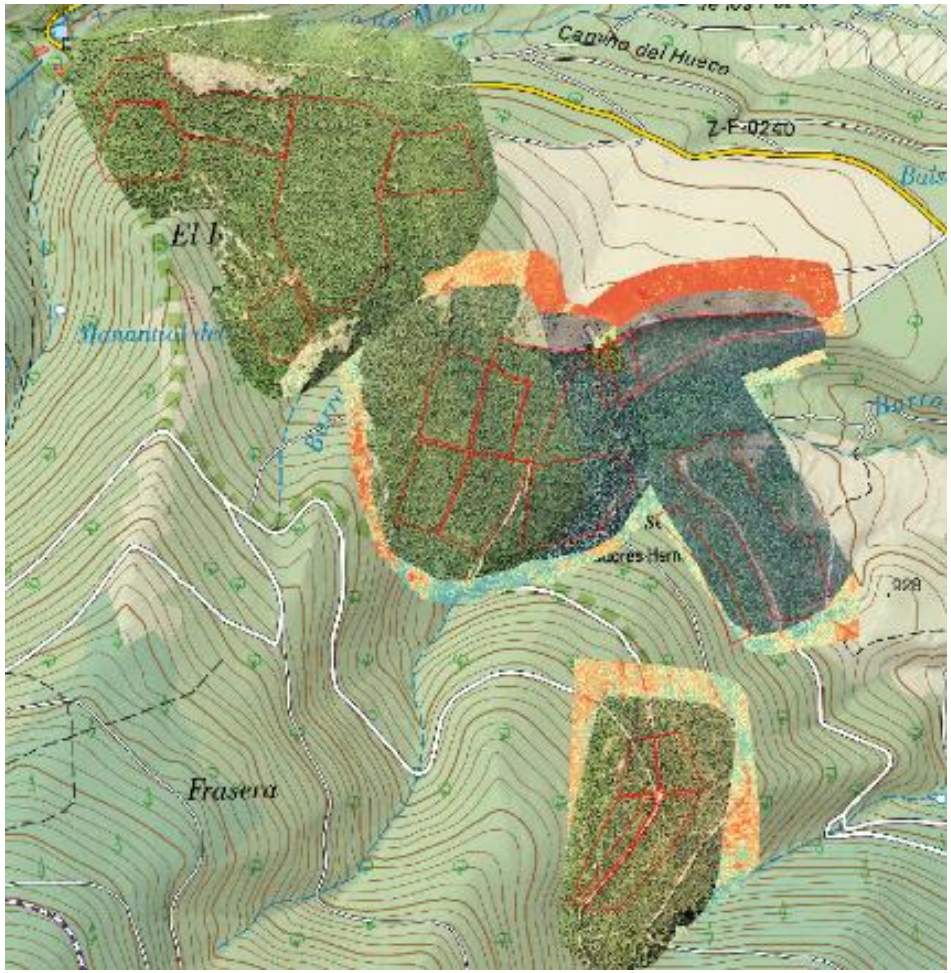
Middle forest (lower canopy)

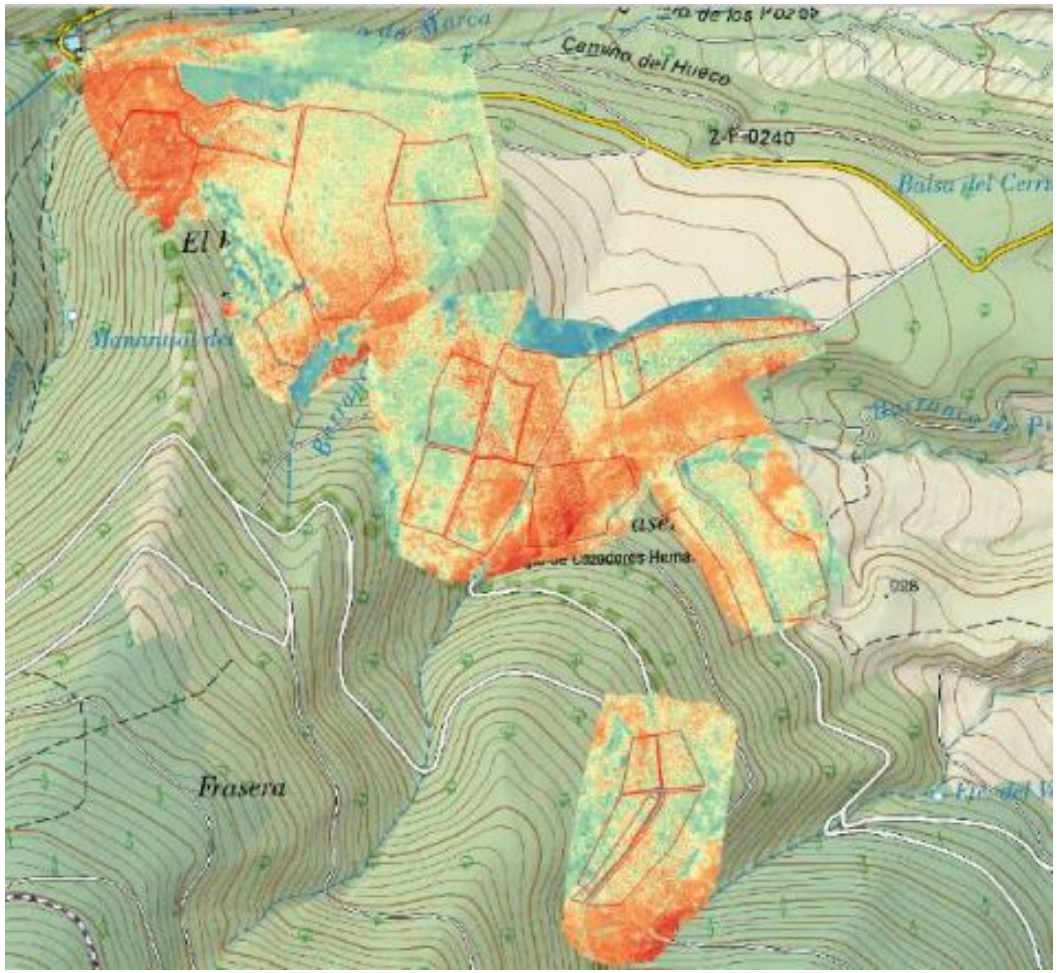
Middle09up	%Open Canopy	LAI	% Trans Tot
Leaves	22.6	1.6	37.1
No leaves	47.5	0.4	69.7

Middle09lo	%Open Canopy	LAI	% Trans Tot
Leaves	19.2	1.9	27.8
No leaves	-	-	-

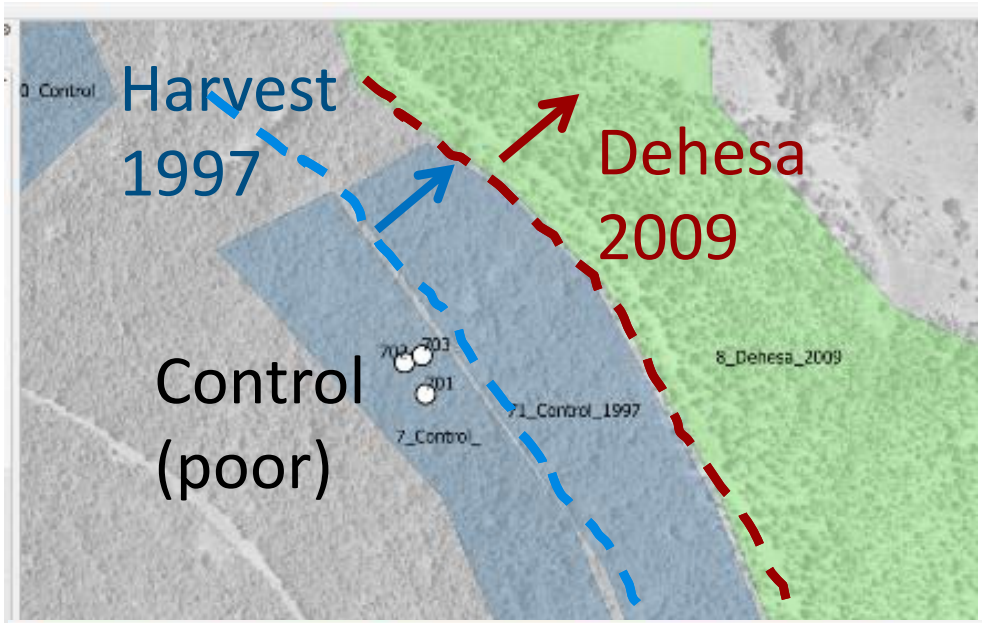
Remote sensing

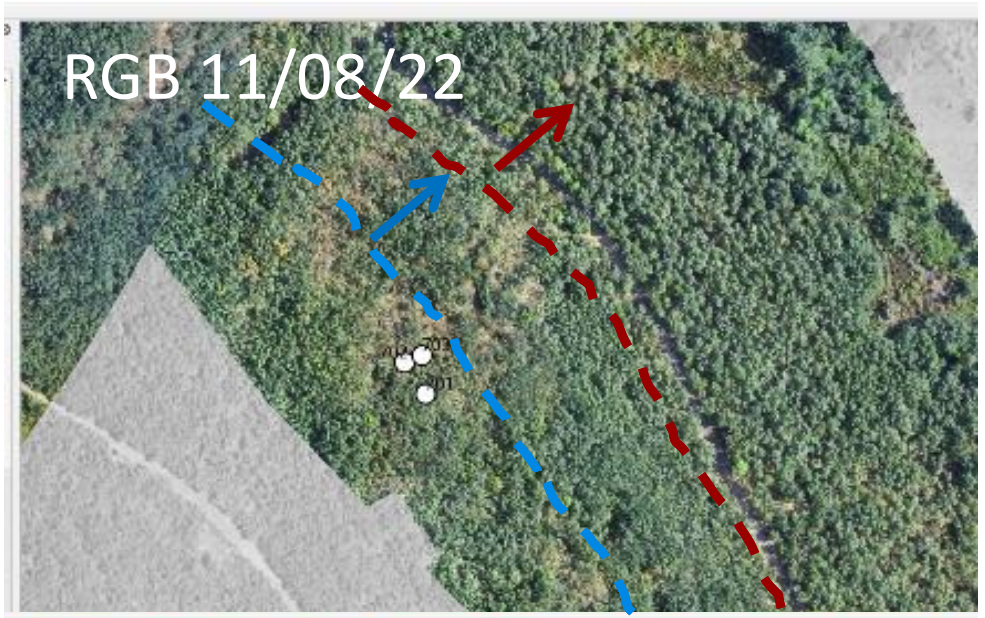
RGB, thermal & multispectral flights
(6 flights june-october 2021; 3 flights may-august 2022 +)

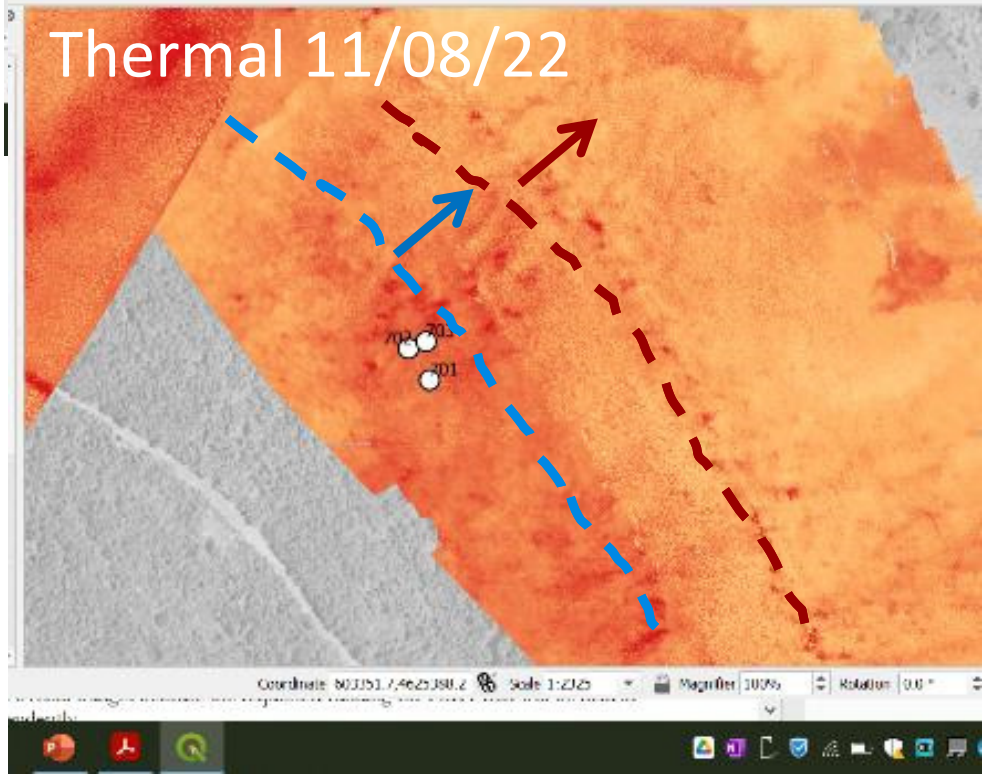


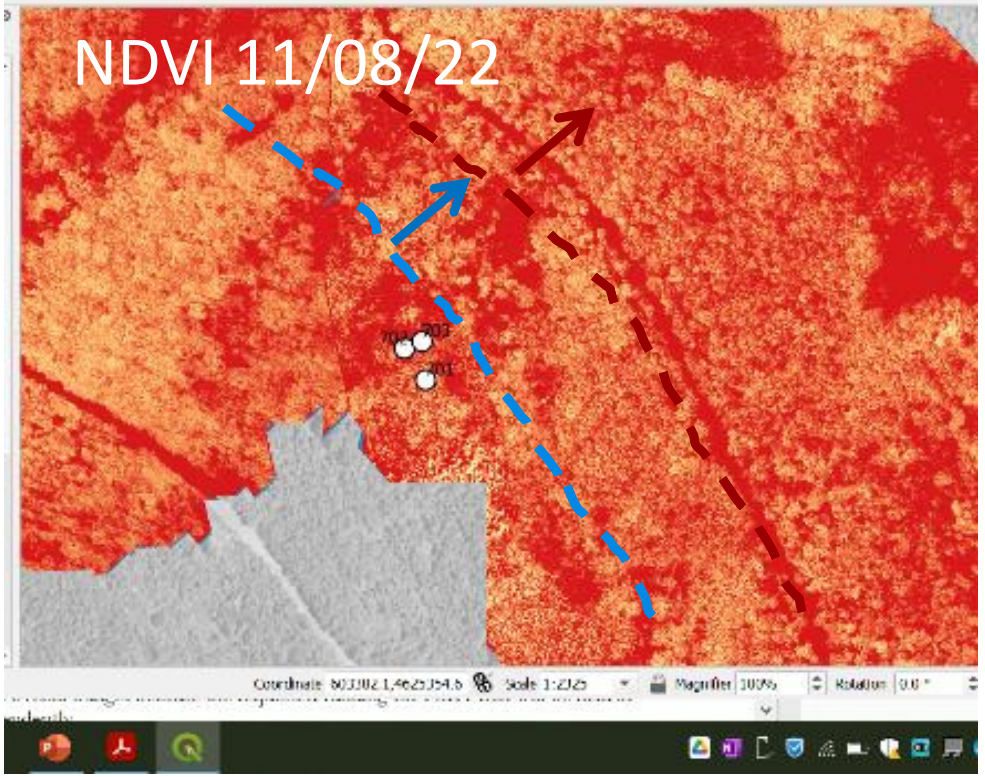


Remote sensing





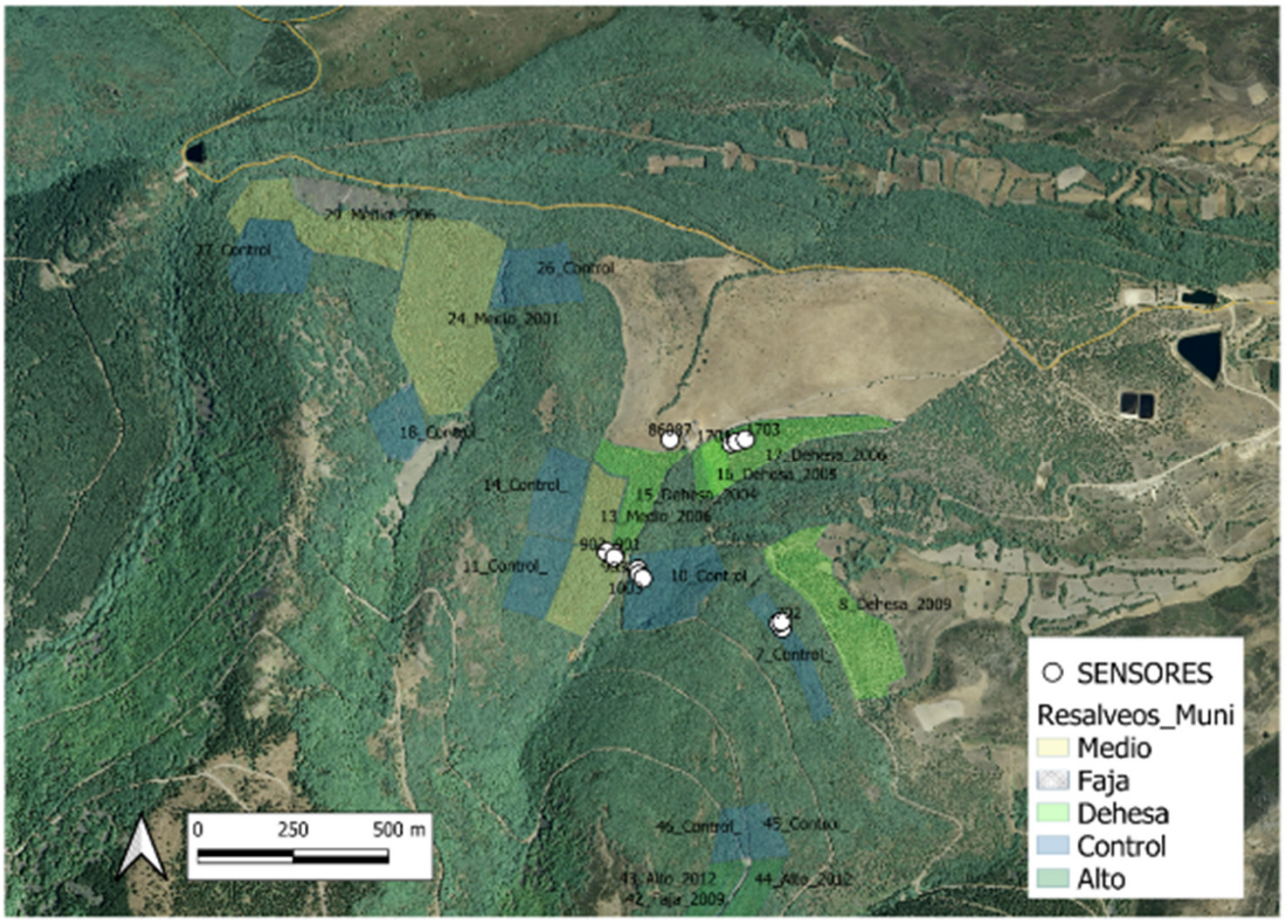




Micrometeorological stations

4 plots, 3 towers in each plot

- 2 x Control: good/poor site
- 1 x Middle forest
- 1 x Dehesa



Micrometeorological stations

Equipment

- In all towers, sensors in the upper canopy:
  - IRT (custom-made, Melexis)
  - T & RH (sensirion SHT35)

- One tower per plot, sensors upper + lower canopy):
  - IRT, T & RH
  - PAR (Solems, courtesy of INRAE) (2-3 heights)
  - Wind speed & Direction (ATMOS22)
  - Water potential below and between trees (TEROS21)

References for external climate

- **micrometeorological station (ATMOS41) in a large gap of the "Dehesa" plot** (unfortunately no data yet due to comm. problems)

- **Automatic Pluviometer (Ebro River Confederation)**

2 km from sites

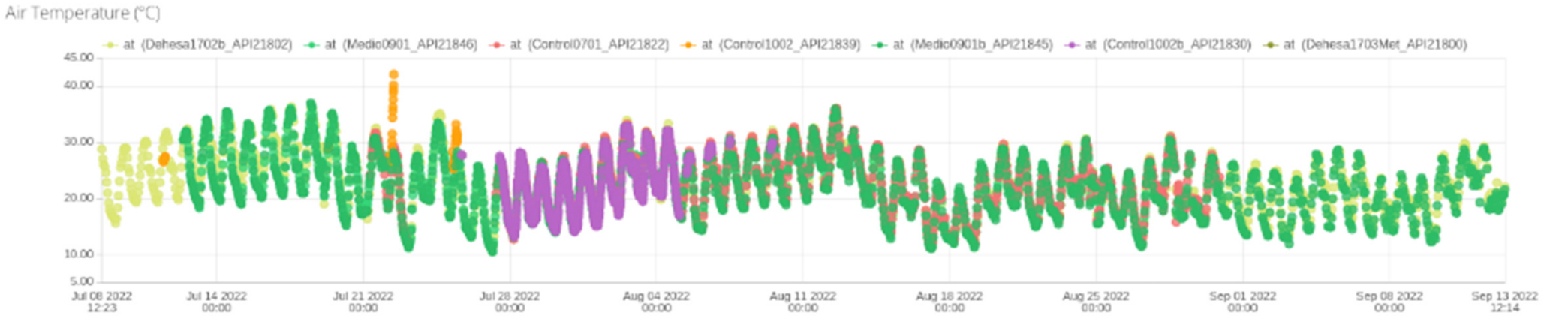
Similar altitude (855 m.a.s.l.)

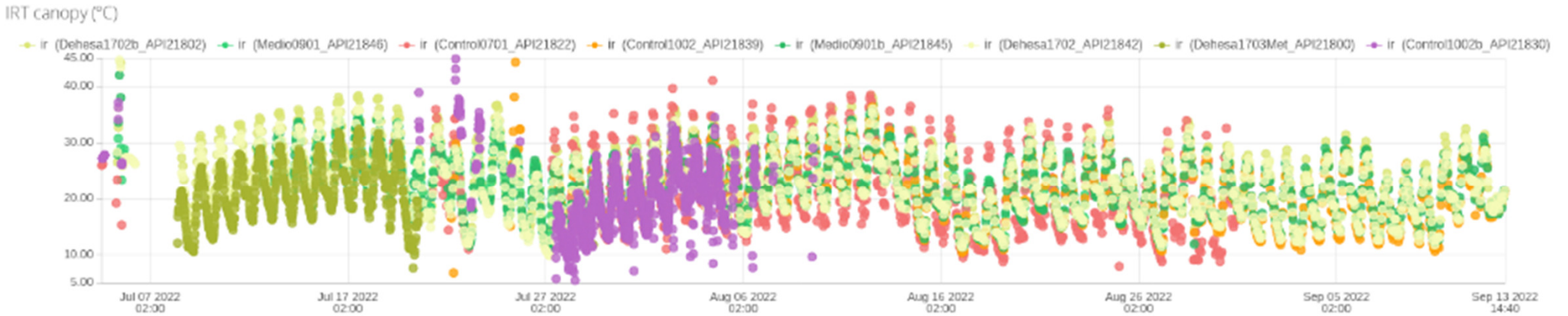
- **Full Automatic Station (Ebro River Confederation)**

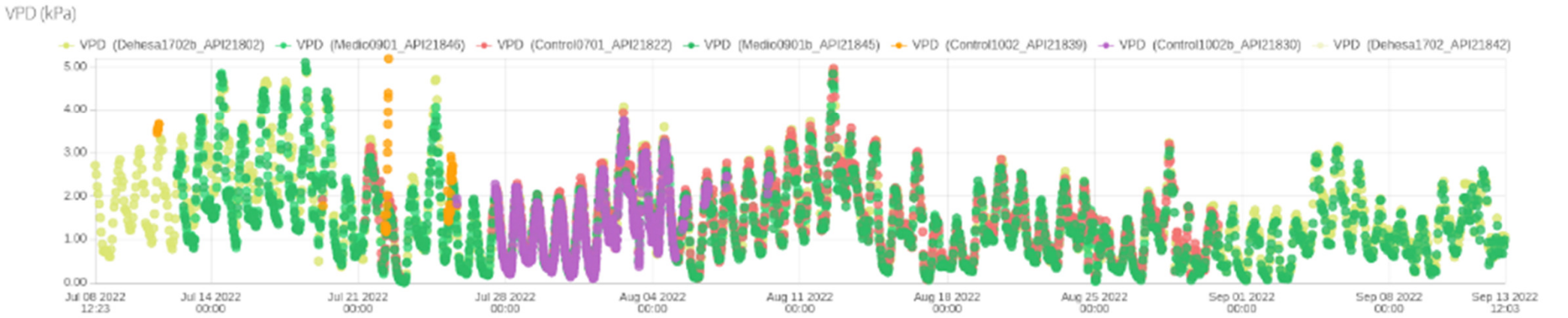
10 km from sites

Lower altitude (655 m.a.s.l.)

Micrometeorological stations



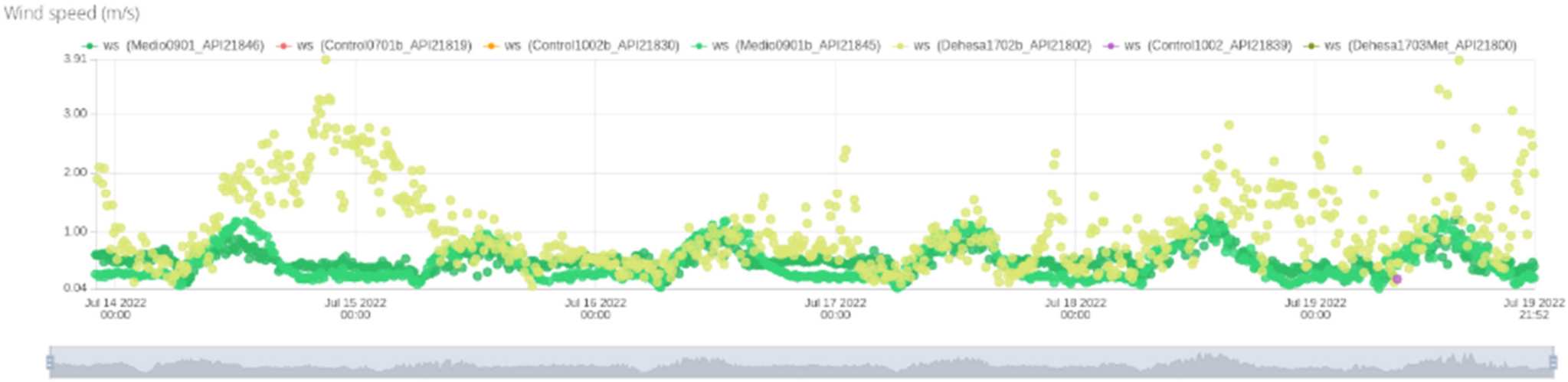




Data starting from July, progressively covering all plots

Micrometeorological stations

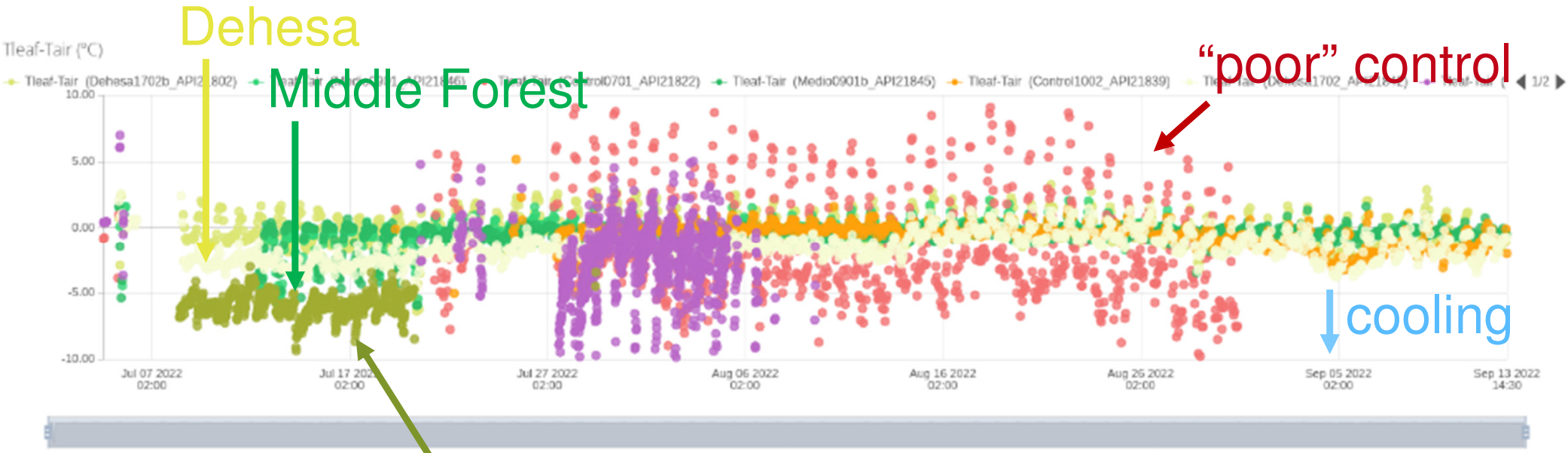
Generally largest differences in microclimate with “Dehesa”
(high wind speed, different daily T pattern)



Micrometeorological stations

Raw Tleaf-Tair values (calculated on-line)

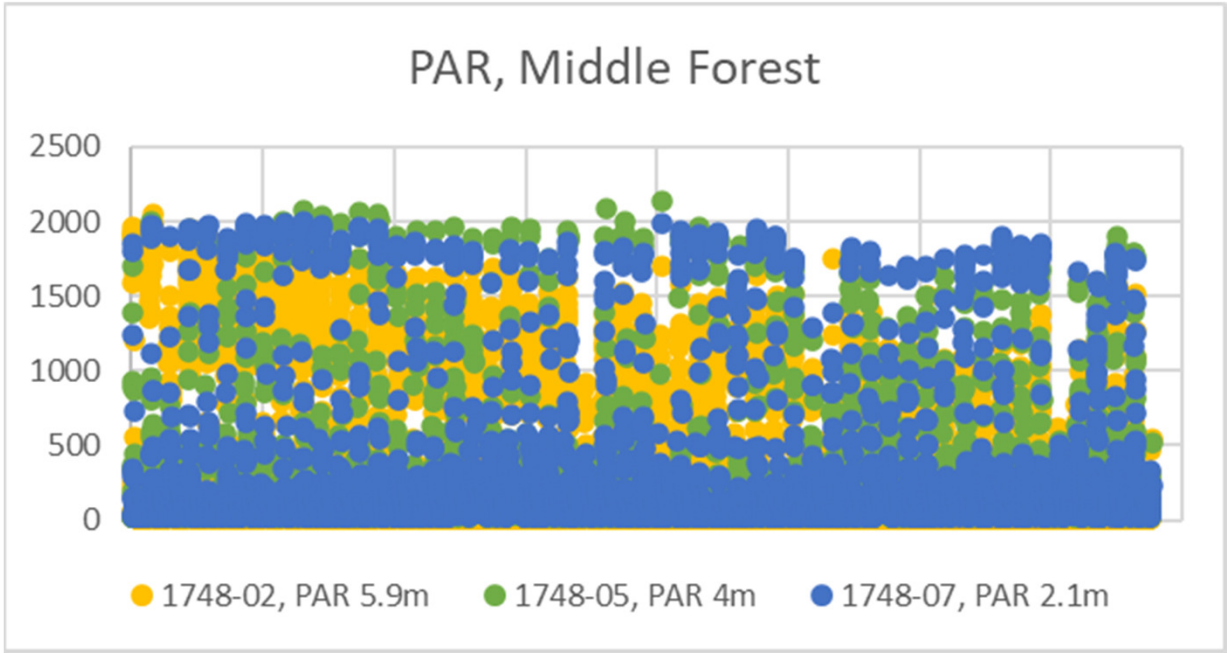
- highest leaf cooling: Middle forest, Dehesa (less senescence)
- Large fluctuation in “poor” control (most senescent)
- Slight recovery of cooling after last rains in august (ca. 30 l/m2)

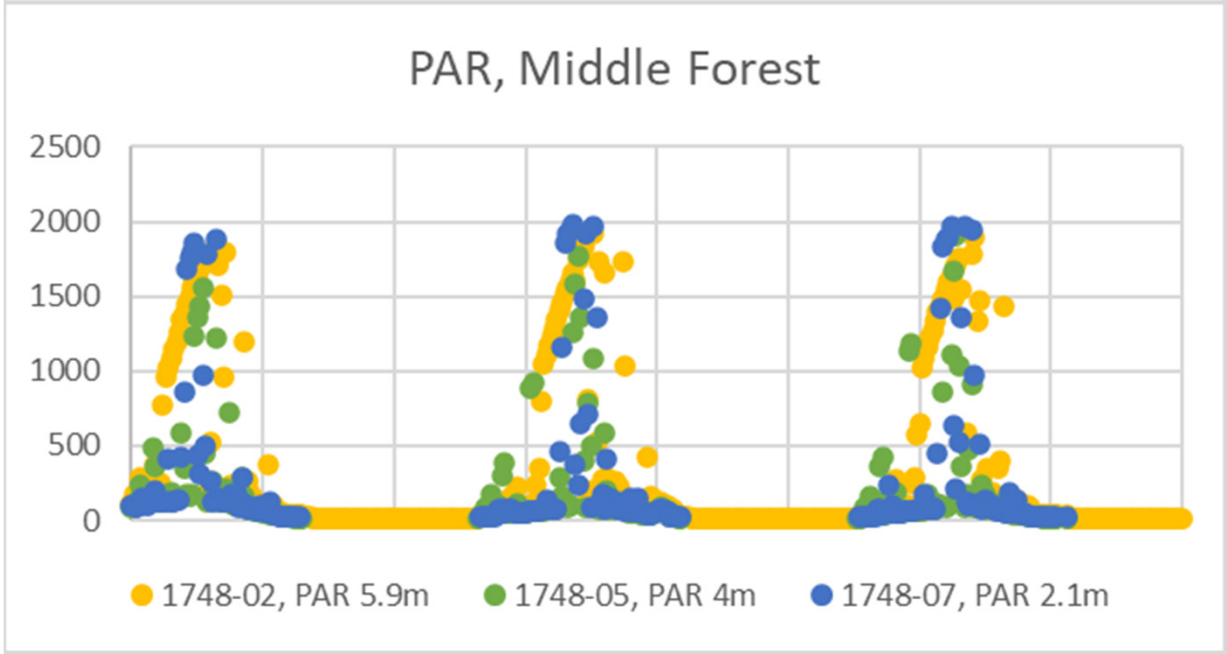


IRT shows an “offset” if canopy is not dense (=sky temperature)

Micrometeorological stations

PAR data
(just collected
on Monday)



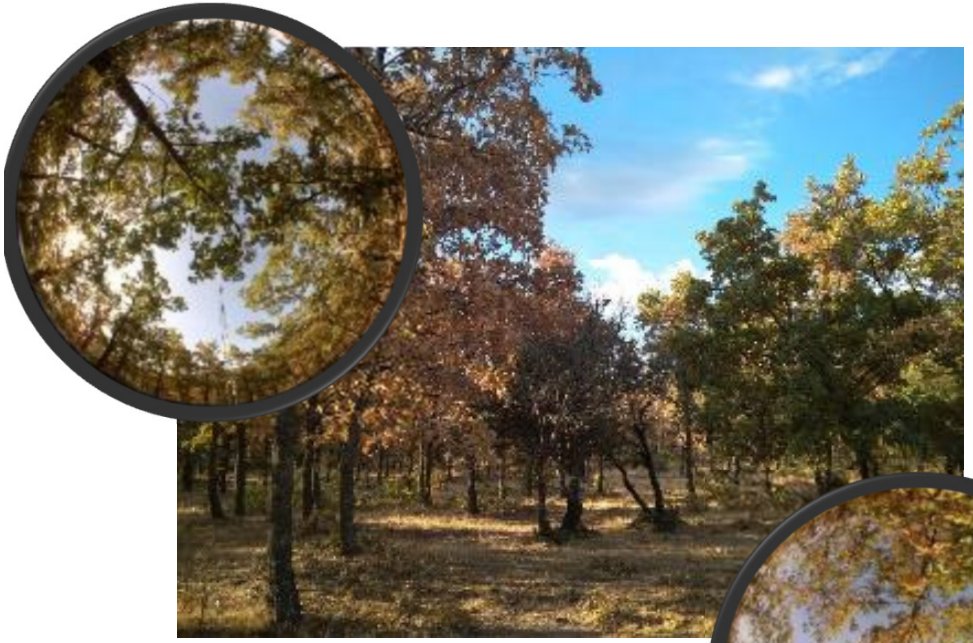


Summer 2022 drought

Summer 2022 severe drought:
Early senescence (July-August)

Summer 2022 drought

Summer 2022 severe drought: Early senescence (July-August)



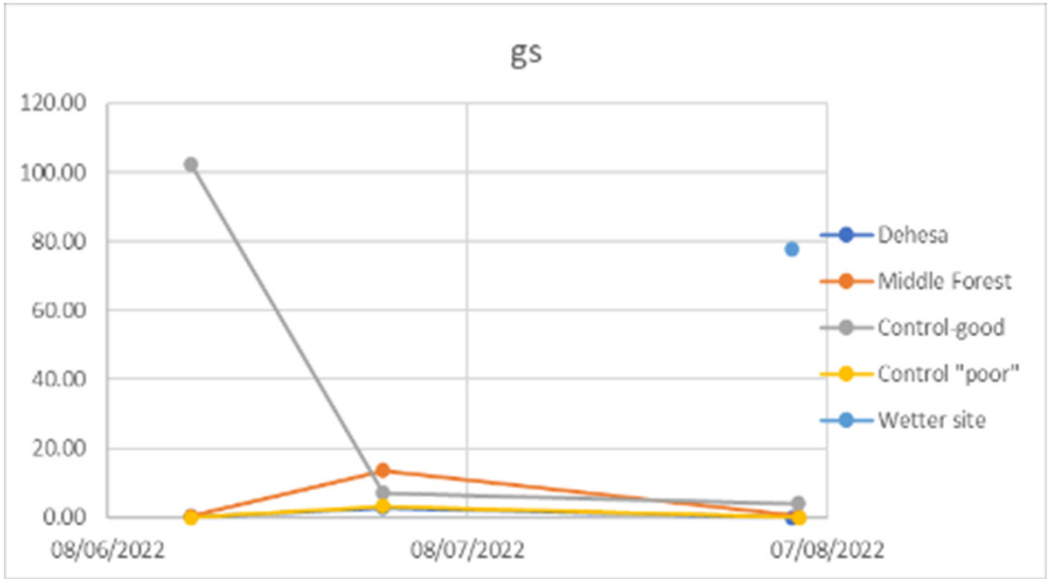
Dehesa

Control (good)

Control (poor)

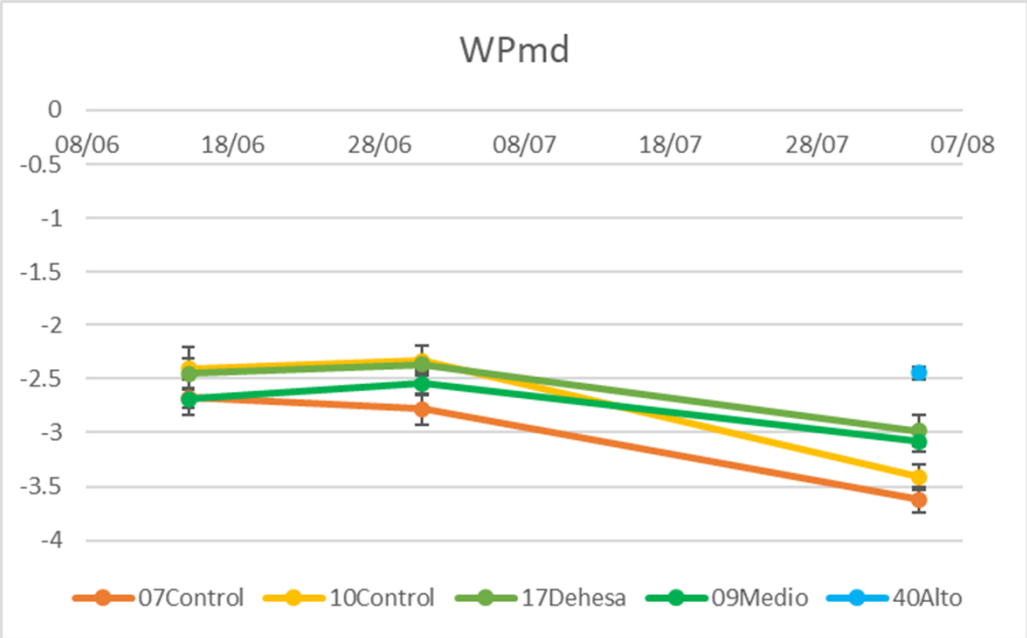
Summer 2022 drought

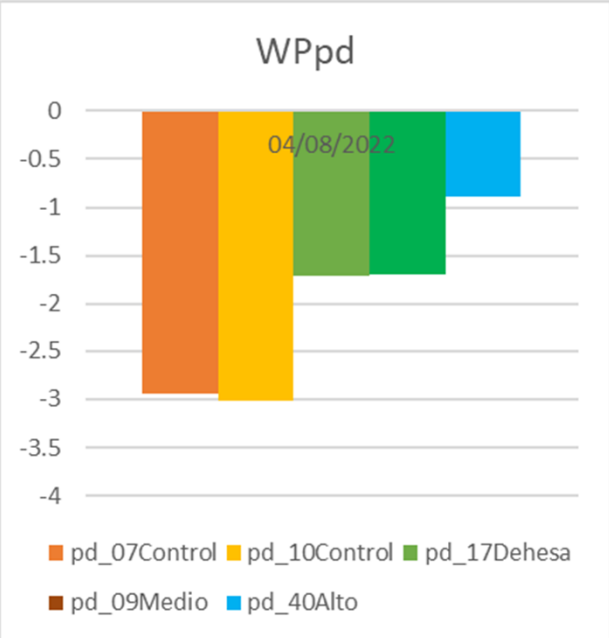
Summer 2022 severe drought:



From the first measurement (15-June):
Very low gs, WPmd -2.5 MPa

Drought stress *ca.* 15 days after full leaf expansion!



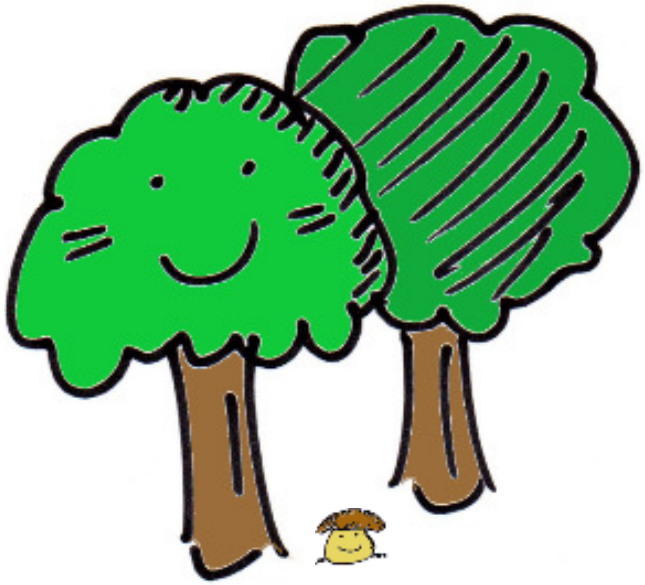


Summer 2022 drought

Not only drought, but also fires…

Fortunately did not reach the study area,
but very close…

Gracias! Merci!



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