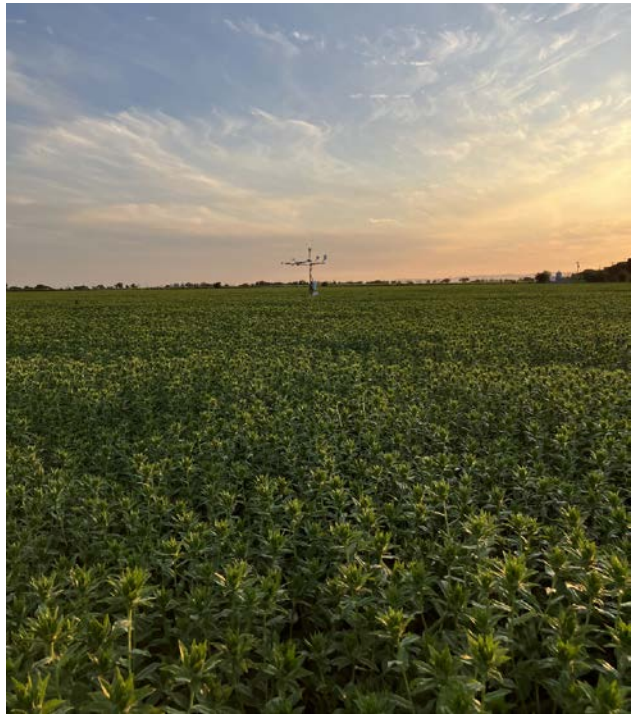
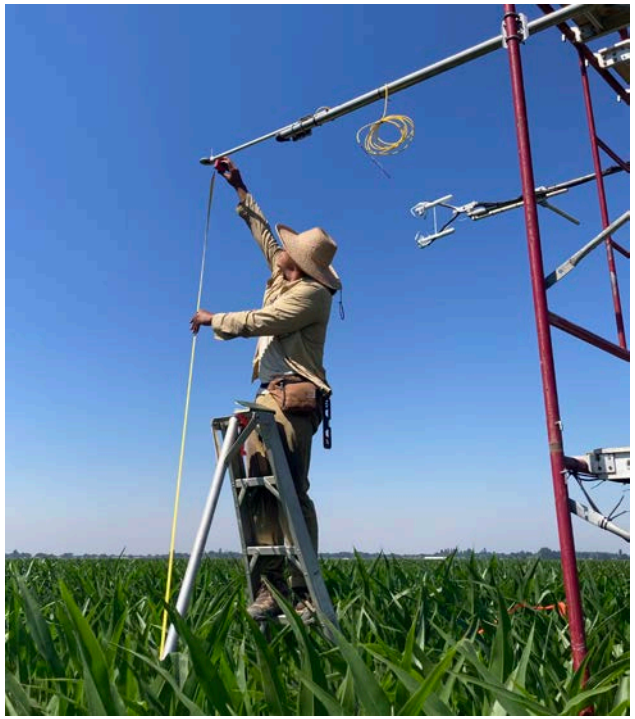
Water-Carbon Relations for Annual Drought Management in the Delta





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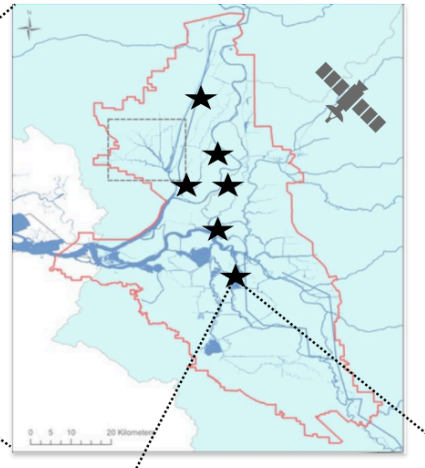
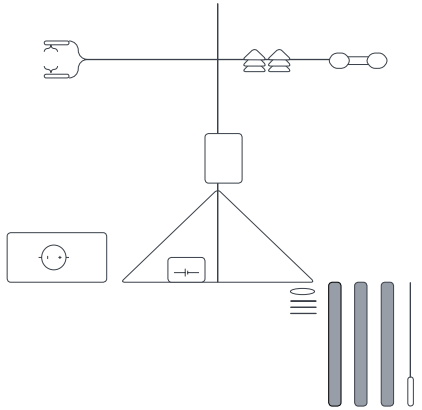
Eddy covariance gold standard for ET measurements

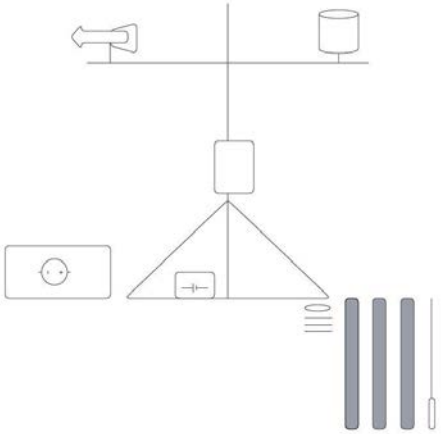
From plant to regional scale using different measurements, modeling and remote sensing

Sacramento-San Joaquin Delta

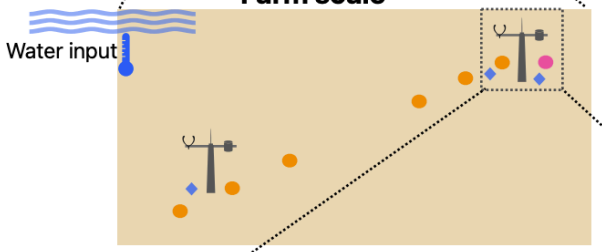


Six farms with different crops and management strategies aligned in a N-S transect to account for spatial variability in the Delta



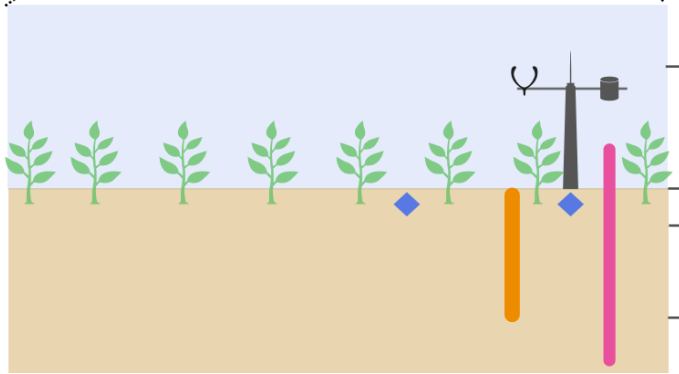


Farm scale

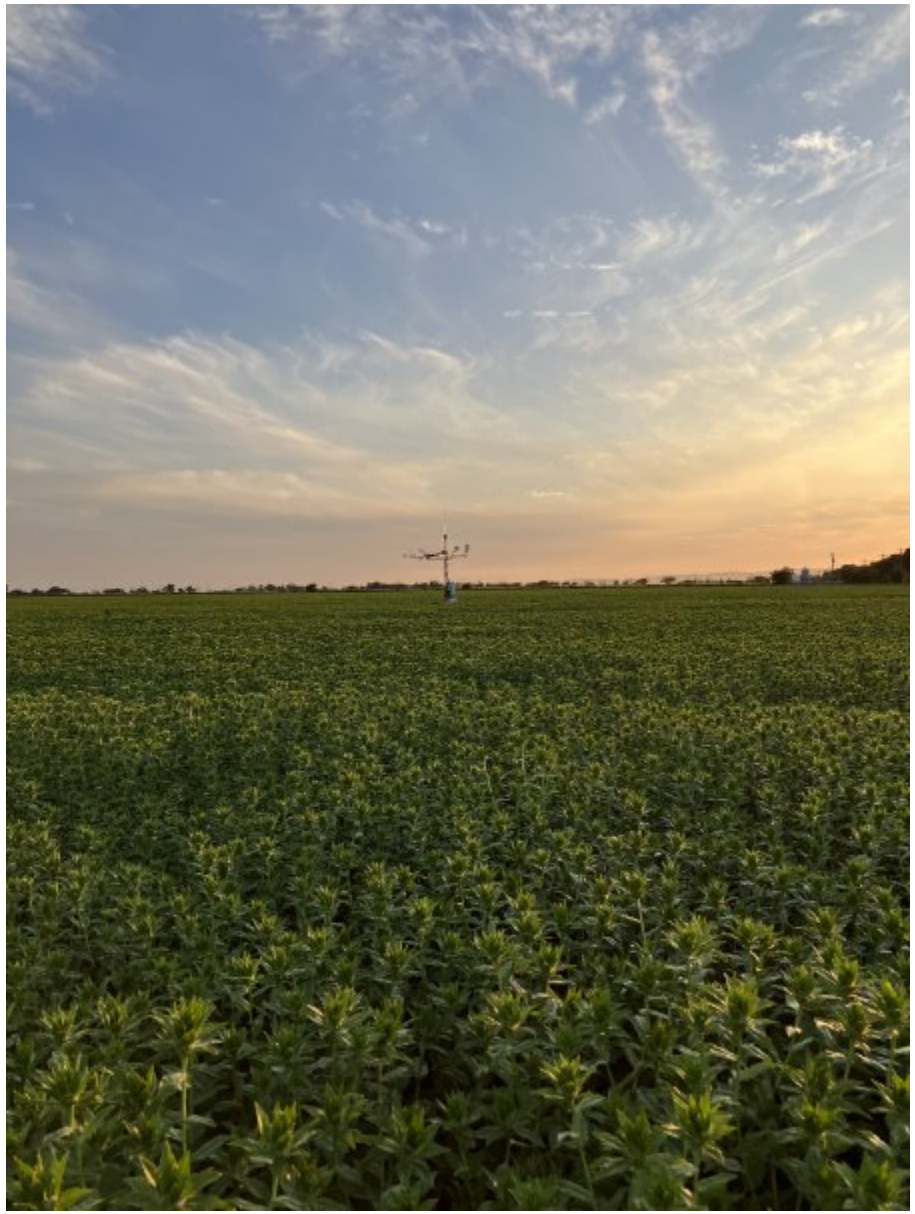


Satellite (OpenET) water loss estimation for each site

Plant scale



Main Tower	Secondary Tower
Irgason	Wind Monitor
Thermocouple	Rain Gauge
4 component net radiation	Infra-Red Radiometer x2
Air Temp/RH probe	SoilVUE x3
BaroVUE	Heat Flux Plate
SoilVUE x3	TCAV
Heat Flux Plate x2	EC5 x2
Soil TC Probe x2	
EC5 x2	
T107 Temperature Probe	
Water Level Sensor	

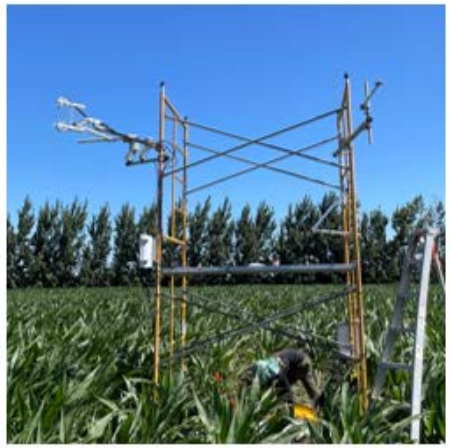


Objectives

- Monitoring drought management surface fluxes: deficit irrigation, rainfed, forgoing cash crops
- Ground-truth data set of nonstandard conditions for satellite validation
- Simultaneous monitoring of water and carbon fluxes change with the Delta drought management

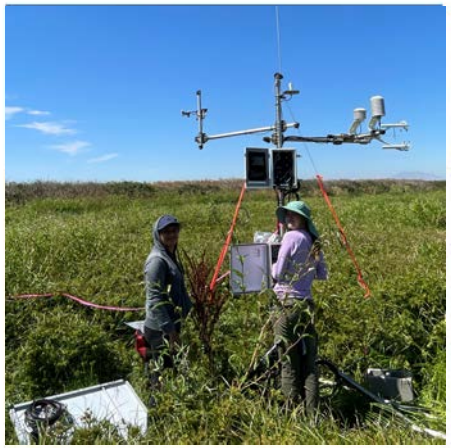
Sites/crops 2023-2024

#104 Maize



65 Fallow

Natural vegetation

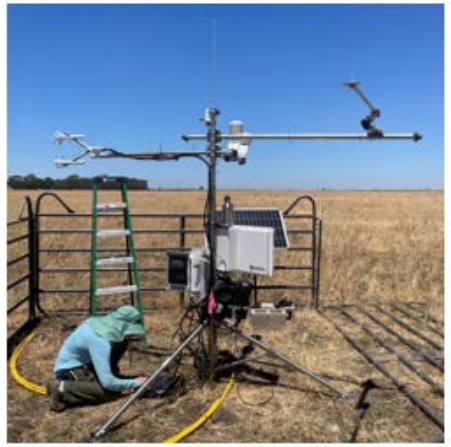


#113 Maize

Sorghum 2024

55 Safflower

90 Pasture

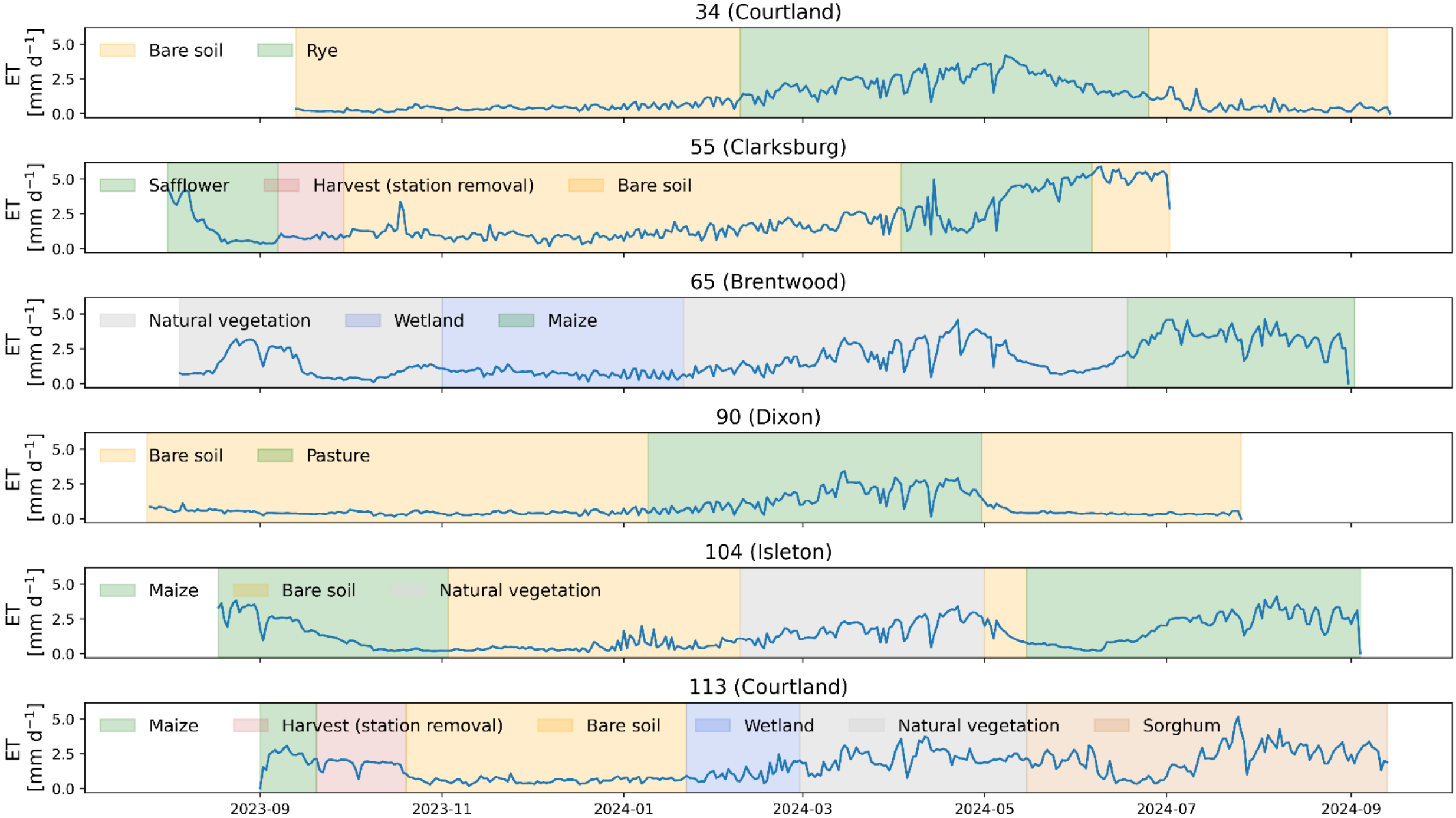


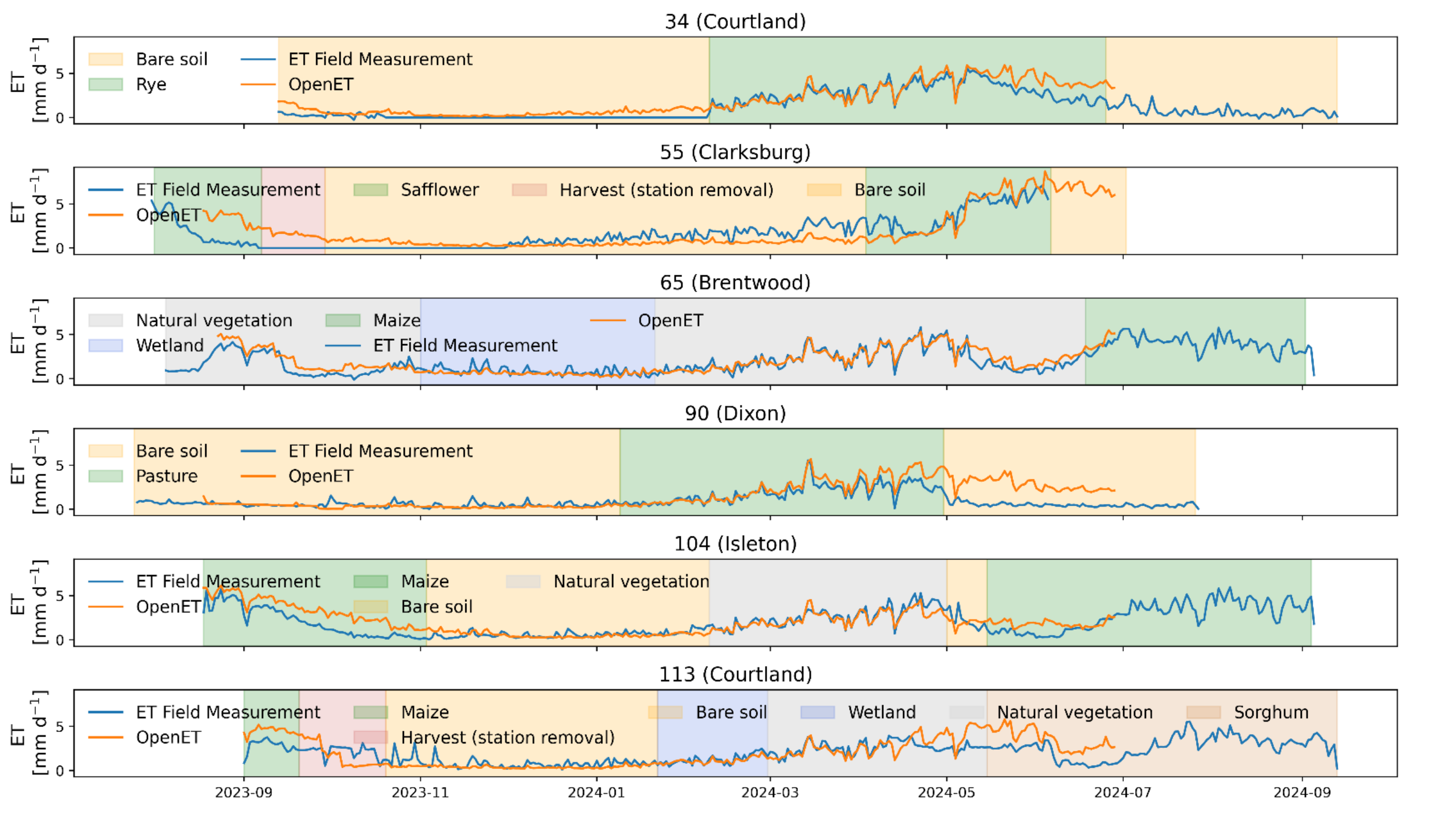
34 Winter wheat

Rye (2024)

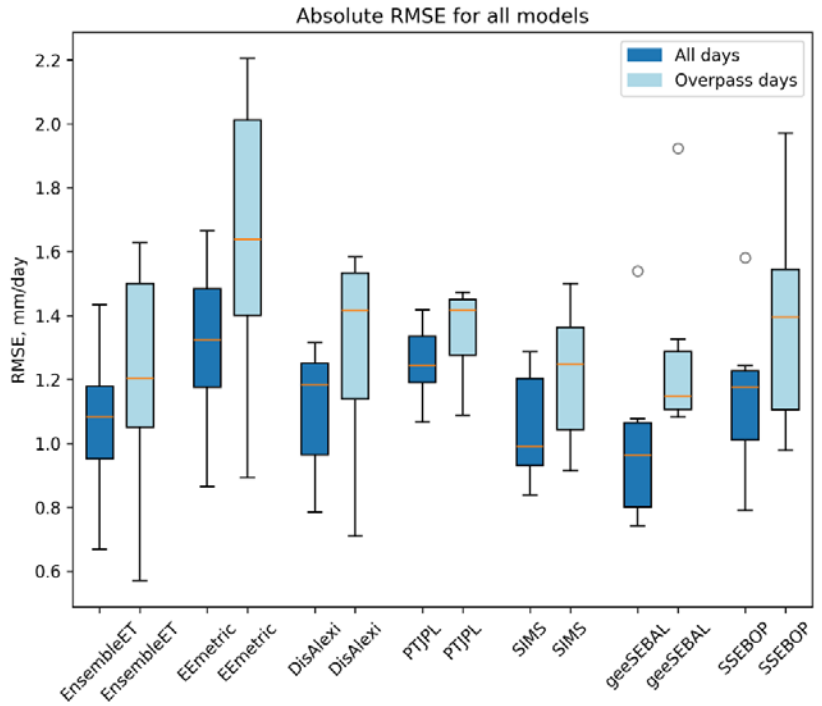
Measurements:

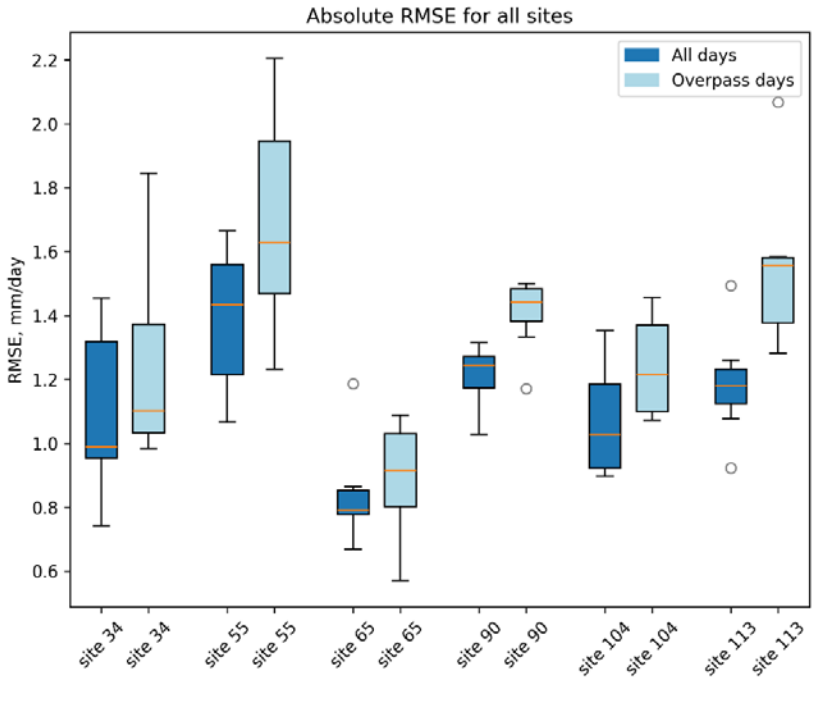
- Evapotranspiration
- Precipitation
- Soil moisture
- Runoff
- CO_2

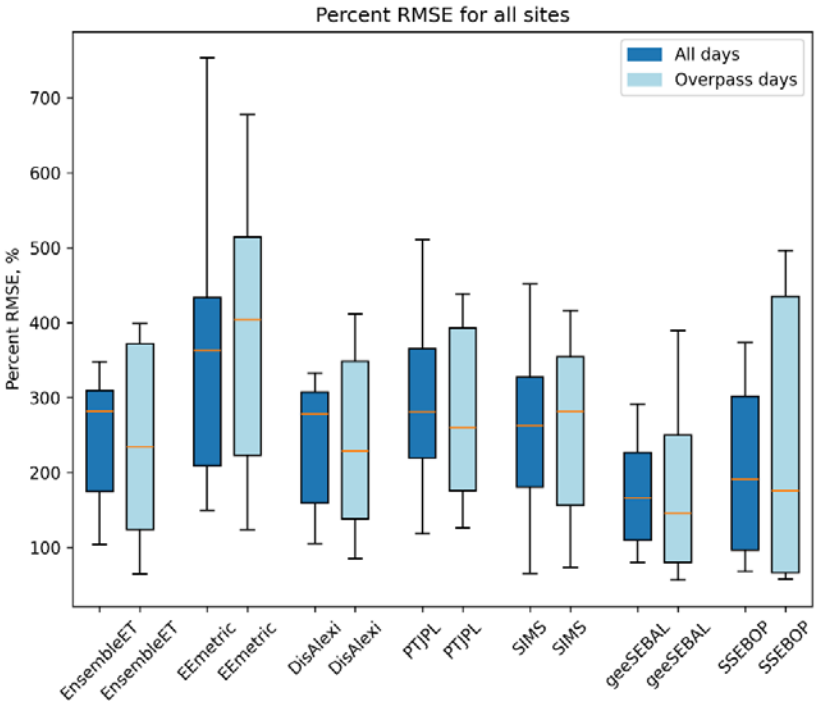

34 (Courtland)
Bare soil
Rye
55 (Clarksburg)
Safflower
Harvest (station removal)
Bare soil
65 (Brentwood)
Natural vegetation
Wetland
Maize
90 (Dixon)
Bare soil
Pasture
104 (Isleton)
Maize
Bare soil
Natural vegetation
113 (Courtland)
Maize
Harvest (station removal)
Bare soil
Wetland
Natural vegetation
Sorghum
ET [mm d⁻¹]
5.0
2.5
0.0
2023-09
2023-11
2024-01
2024-03
2024-05
2024-07
2024-09

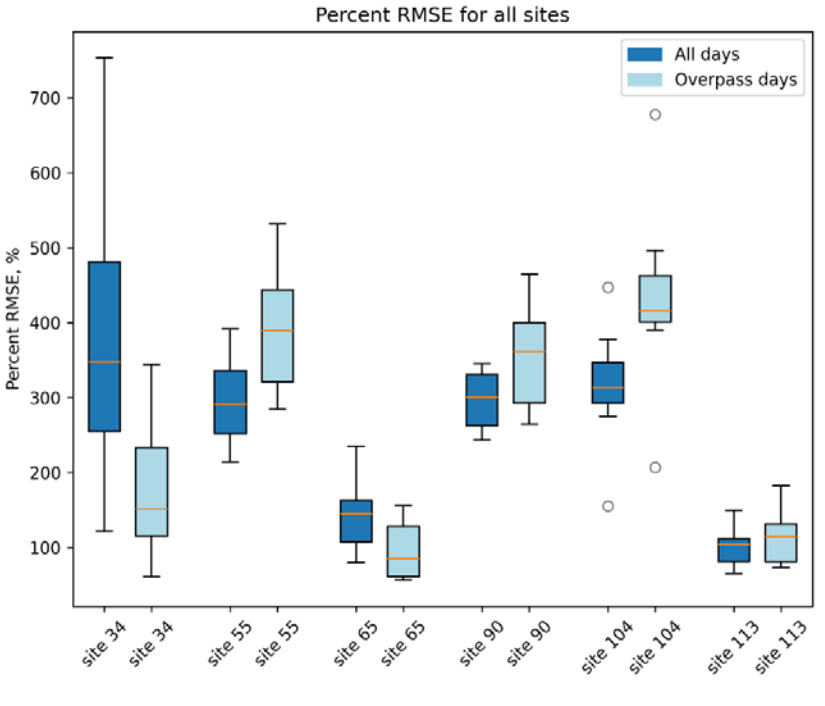

34 (Courtland)
Bare soil
Rye
ET Field Measurement
OpenET
55 (Clarksburg)
ET Field Measurement
OpenET
Safflower
Harvest (station removal)
Bare soil
65 (Brentwood)
Natural vegetation
Wetland
Maize
ET Field Measurement
OpenET
90 (Dixon)
Bare soil
Pasture
ET Field Measurement
OpenET
104 (Isleton)
ET Field Measurement
OpenET
Maize
Bare soil
Natural vegetation
113 (Courtland)
ET Field Measurement
OpenET
Maize
Harvest (station removal)
Bare soil
Wetland
Natural vegetation
Sorghum
ET [mm d^{-1}]
0
5
2023-09
2023-11
2024-01
2024-03
2024-05
2024-07
2024-09

Absolute and percentage RMSE for models and sites

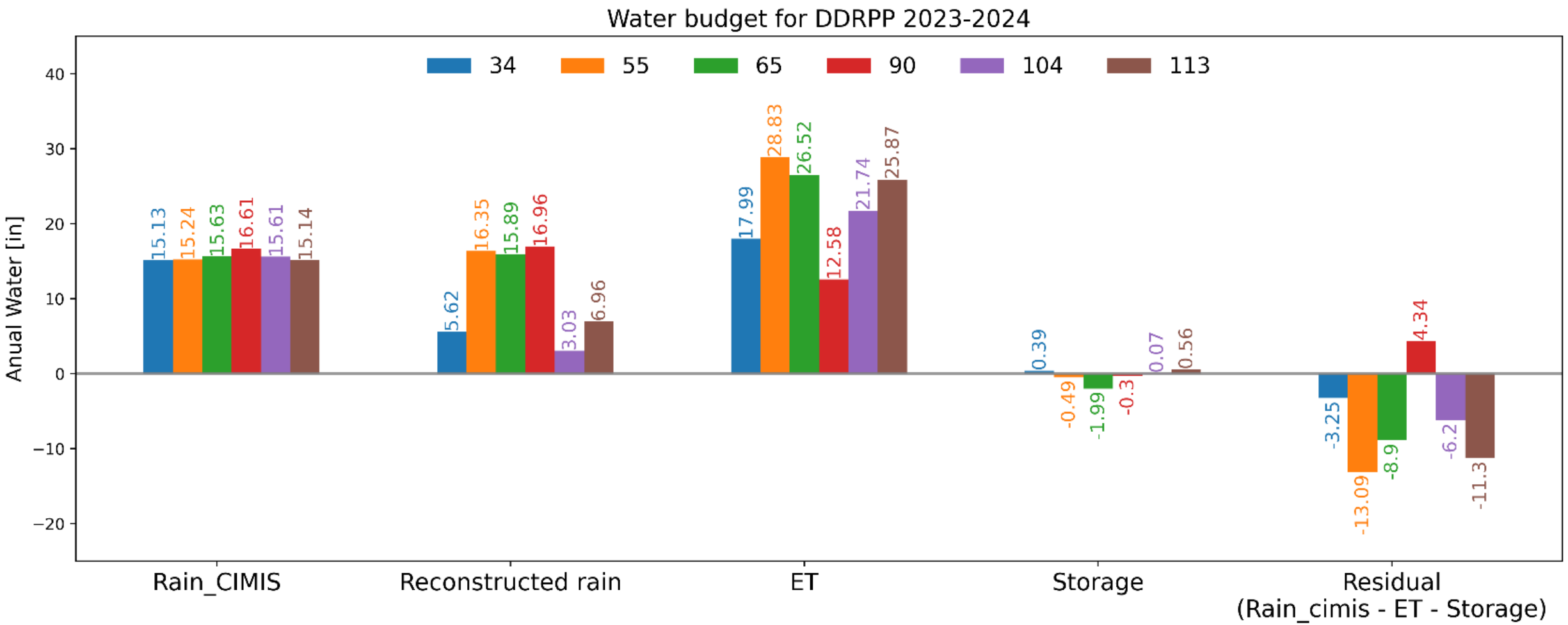




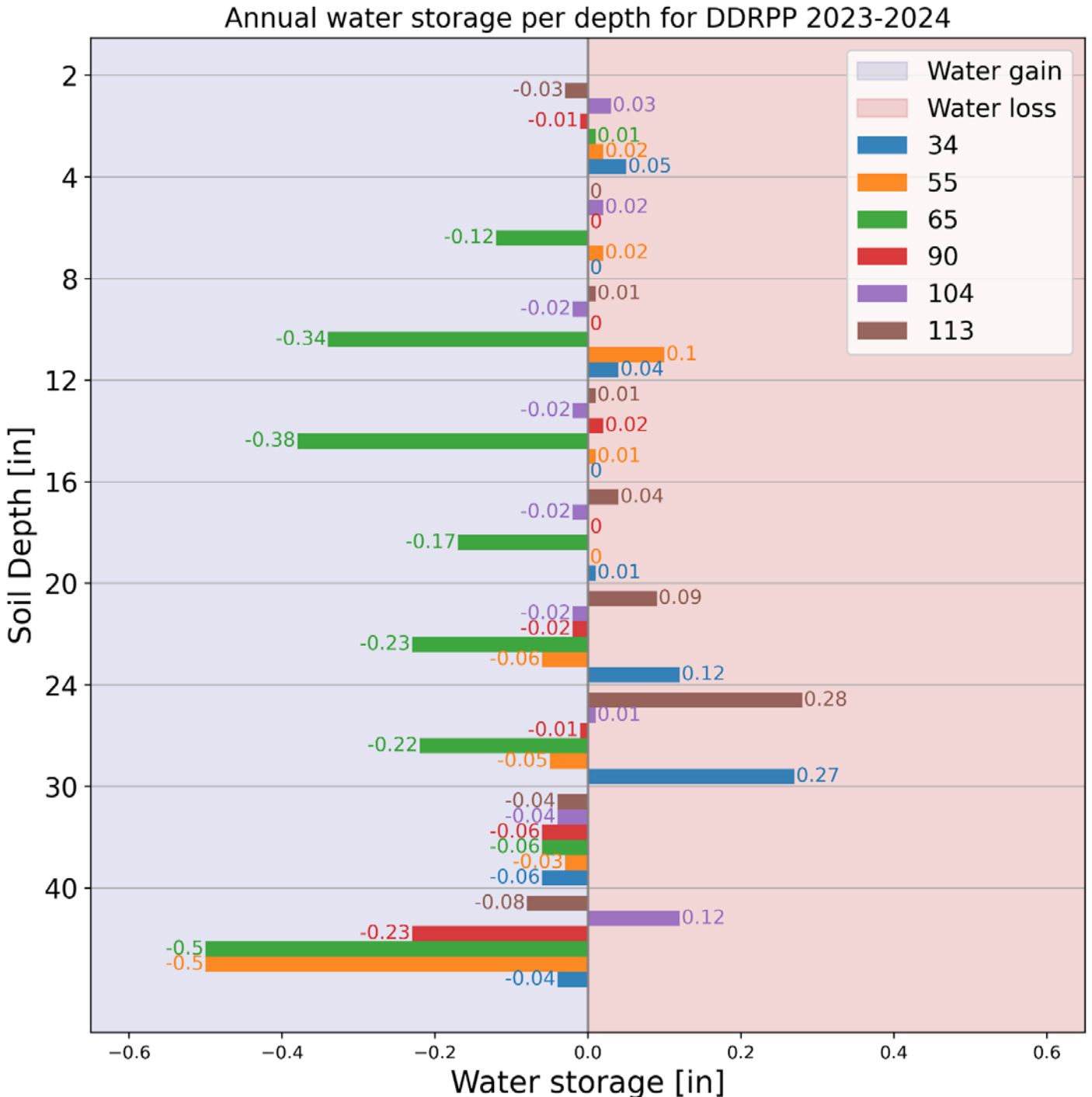




Measured and estimated water budget components

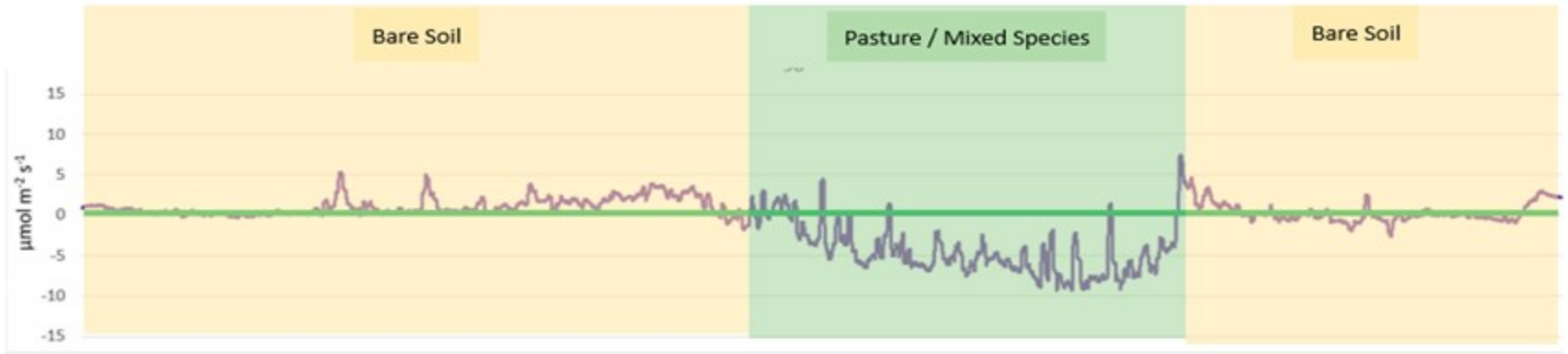


Some crops and locations have higher potential for water gains or losses depending on the crop root system and seepage

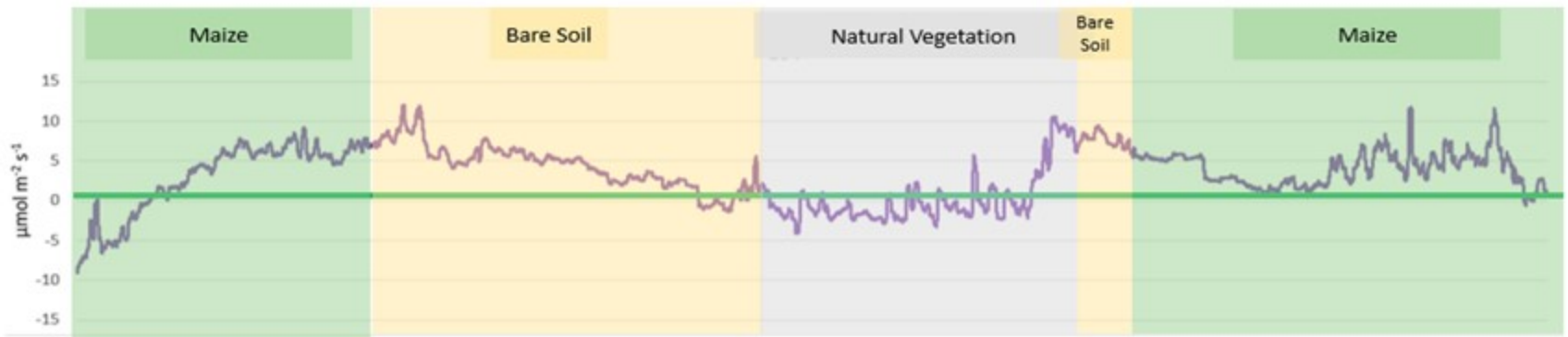


Daily CO_2 Flux

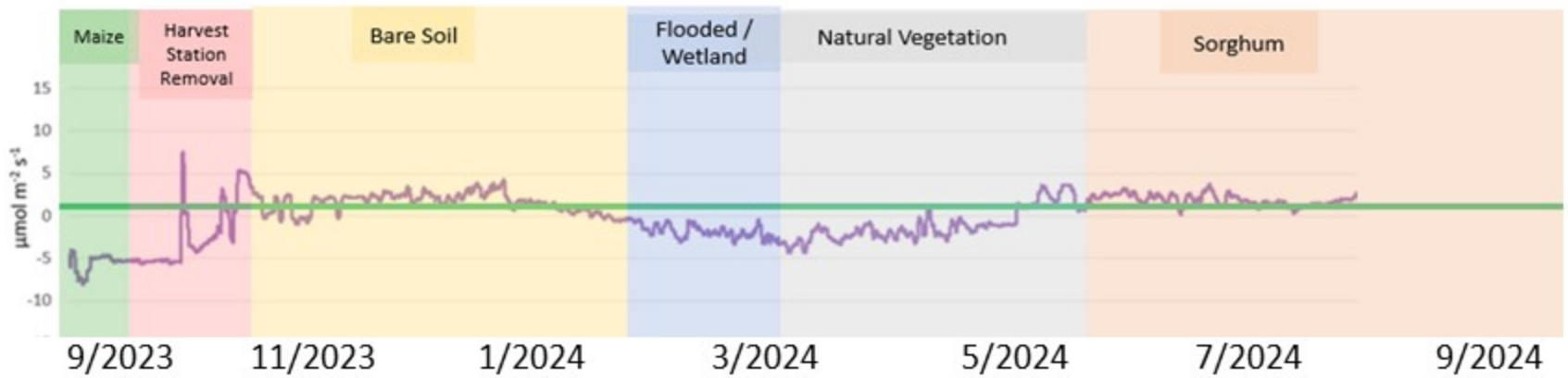
90



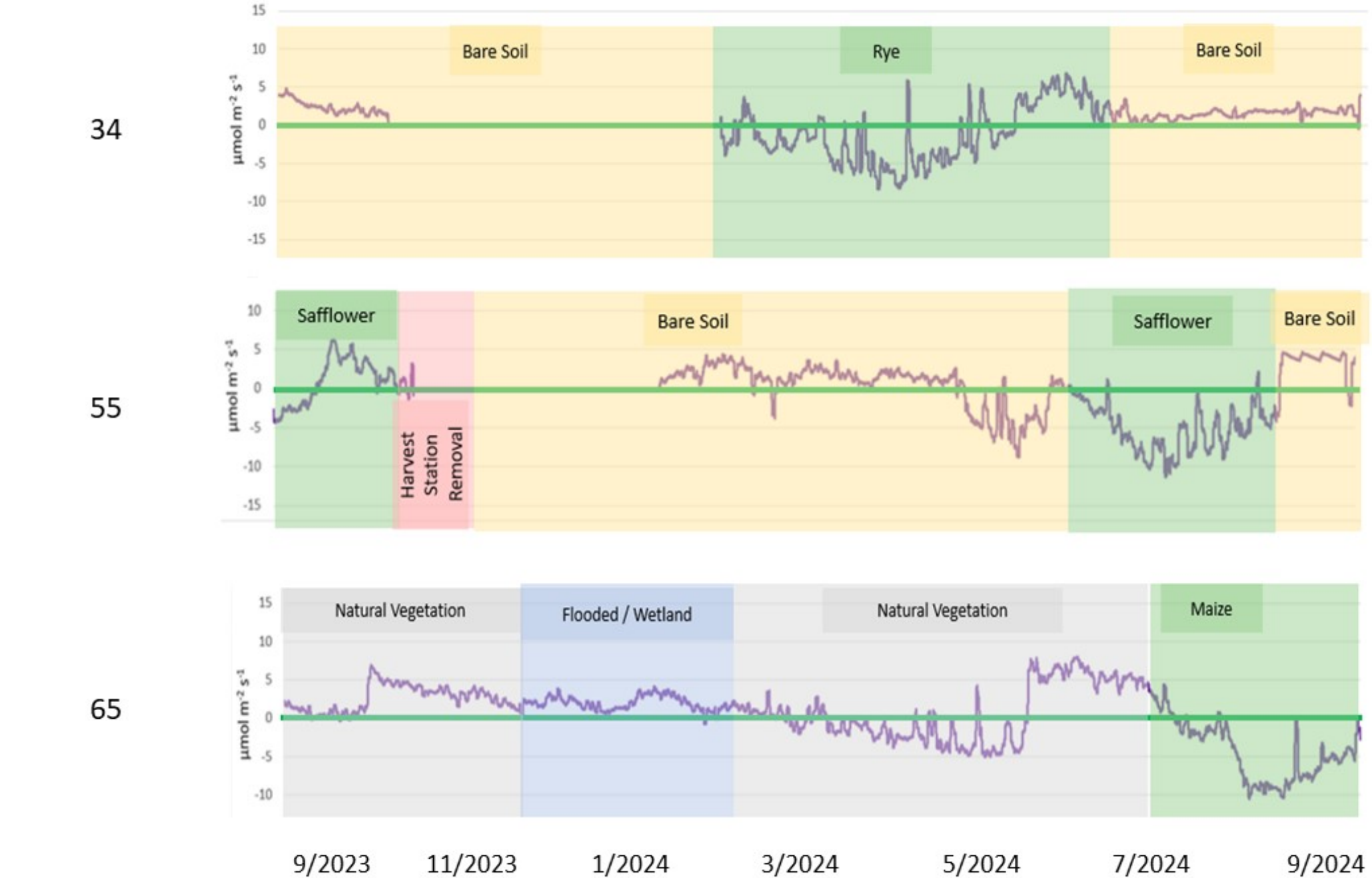
104



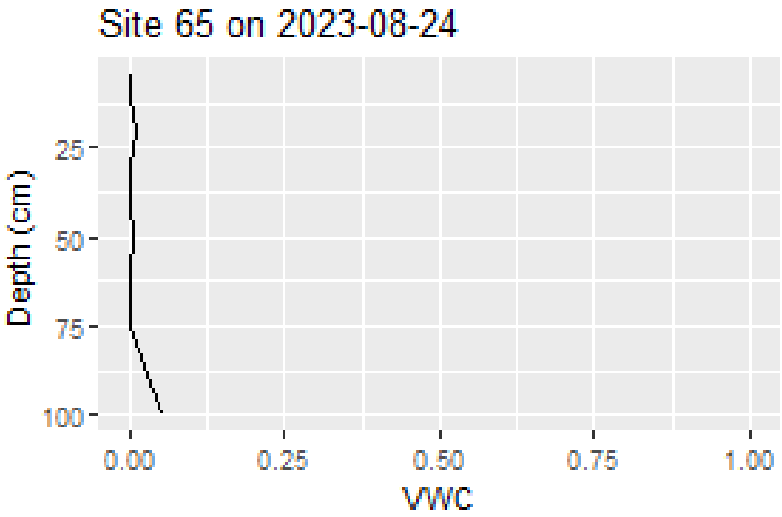
113



Daily CO_2 Flux



Soil moisture:
a case when the water comes from river seepage



Thanks for your attention!

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