The “drain test” – preliminary results (WP3)

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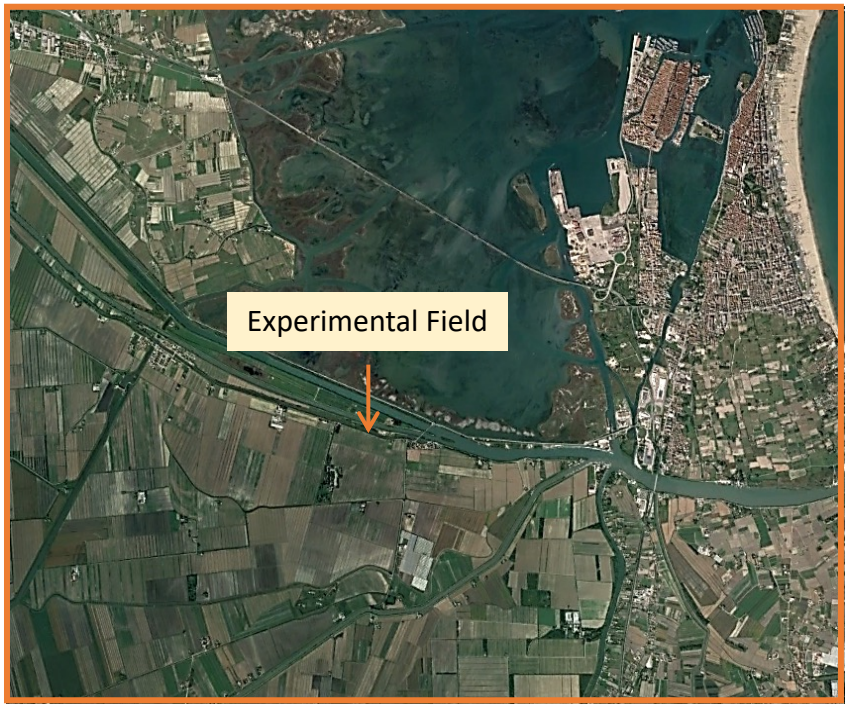
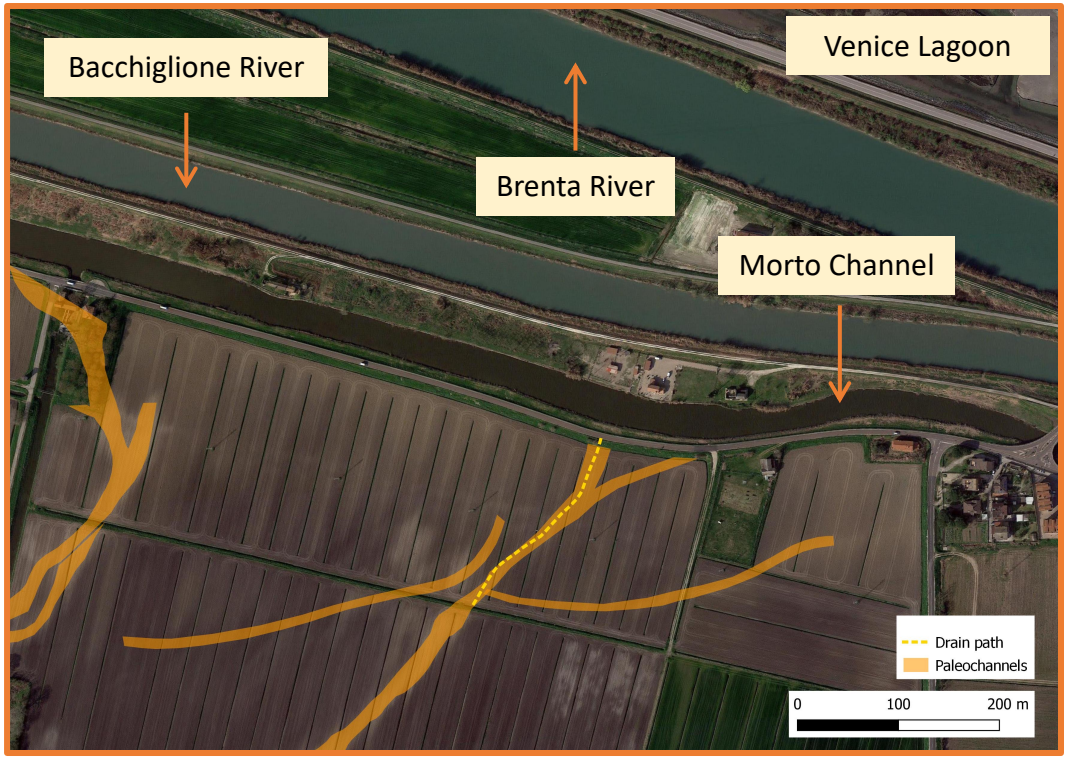
EXPERIMENTAL FIELD and DRAIN LOCATION





The drain supplies freshwater from Morto Channel to the farmland taking advantage of sandy paleochannels

- Drain depth: 1.5 m
- "Drain test": August 2, 2021 - September 7, 2021

2021 monitoring network

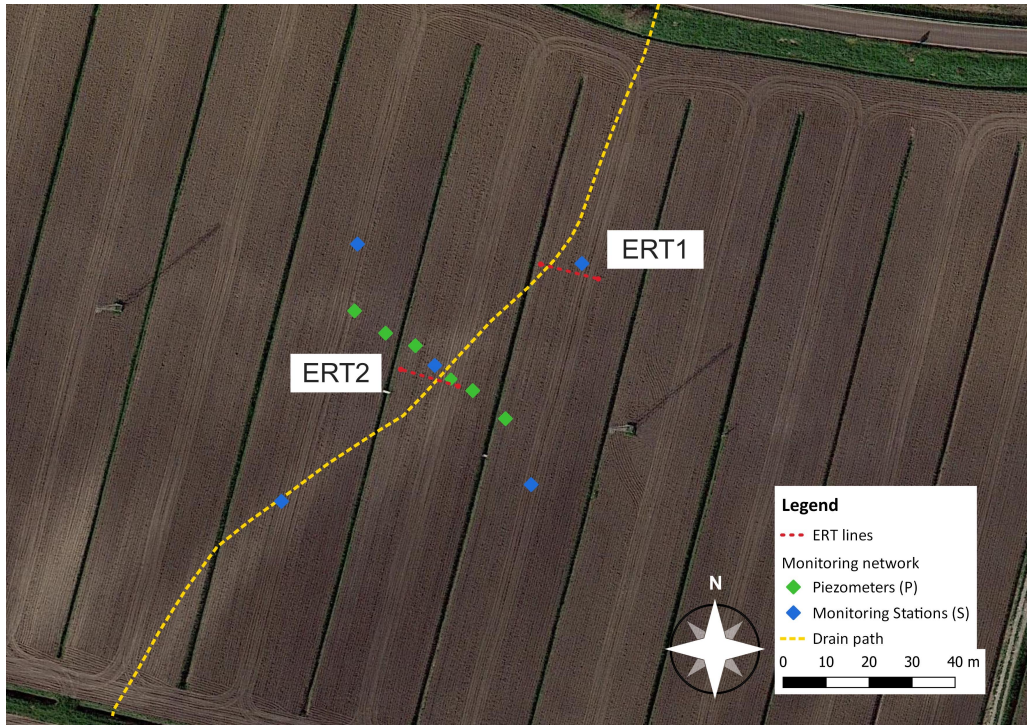
- **Monitoring stations** (S; 2019, 2020, 2021):
  - One 3m-deep piezometer for groundwater monitoring: electrical conductivity (EC), temperature, salinity, and depth data
  - Soil sensors installed at 0.1, 0.3, 0.5 and 0.7 m: EC, humidity, temperature, and matric potential data
- Additional **piezometers** (P; 2021)

  3m-deep piezometers were installed at 5, 10 and 20 m from S2 on both sides

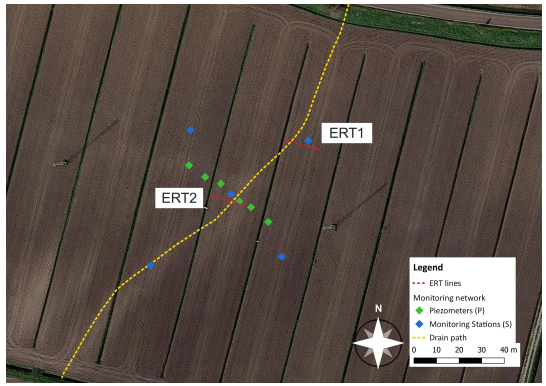
2021 monitoring network - ERT

Electrical resistivity tomography (**ERT**; 2021) S1 and S2 were equipped with ERT lines crossing the new drainage infrastructure

- Resistivity measuring device: Syscal Junior (IRIS Instruments)
- Resistivity electrode array: Dipole-Dipole
- Spacing between electrodes: 0.3 m
- ERT-line length: 14.4 m (48 electrodes)
- Depth resolution: 2.5 m
- Reciprocal check was performed for ER < 5 %



Preliminary results: ERT



ERT 1

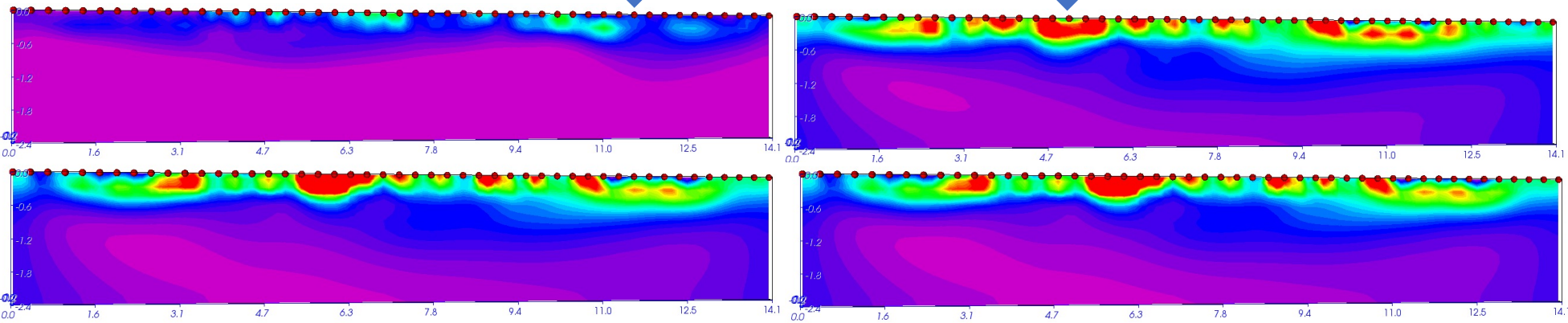
DRAIN

EST ***WEST***

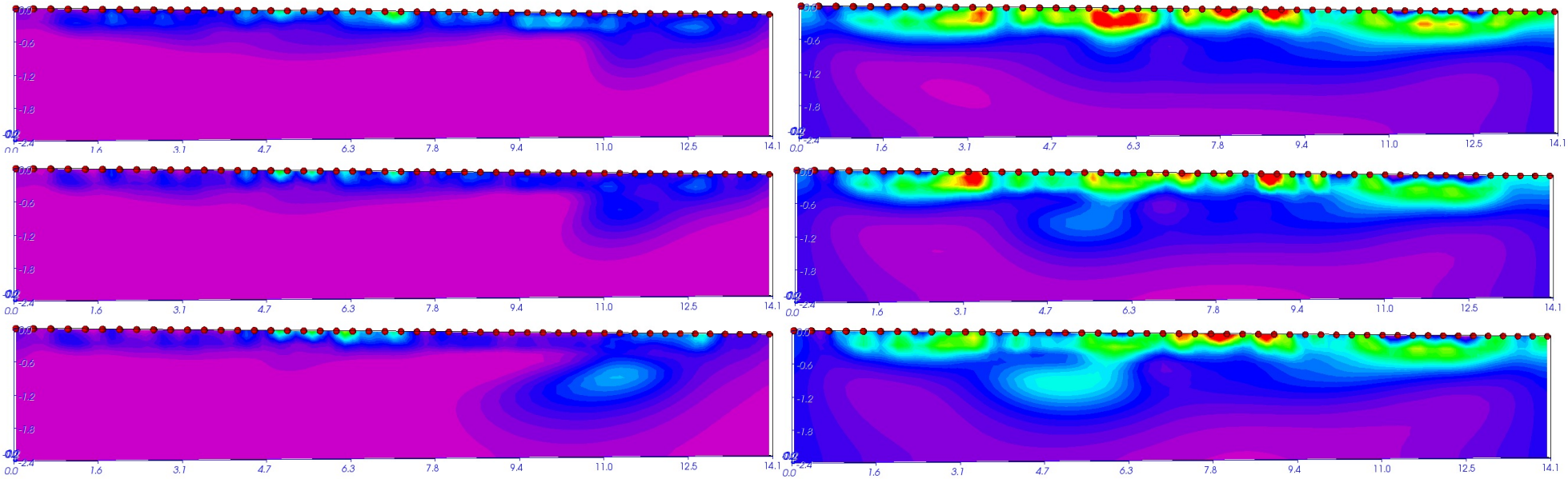
ERT 2

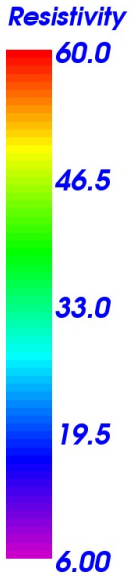
DRAIN

EST ***WEST***



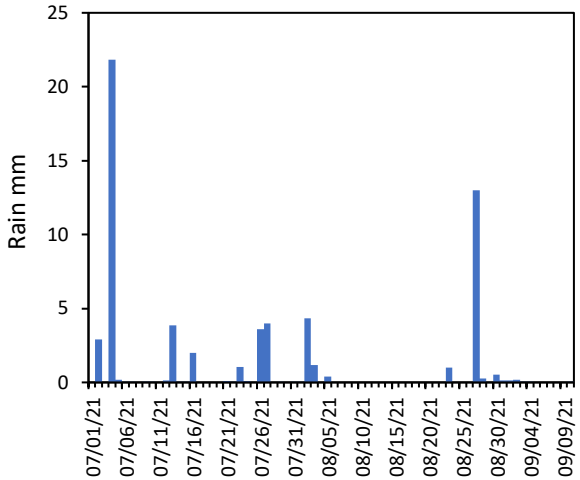
DRAIN OPENING ON AUGUST 2, 2021

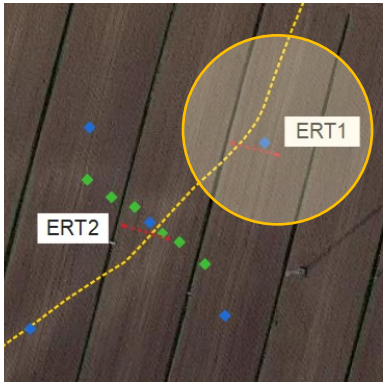




Preliminary results: RESISTIVITY PERCENT DIFFERENCE

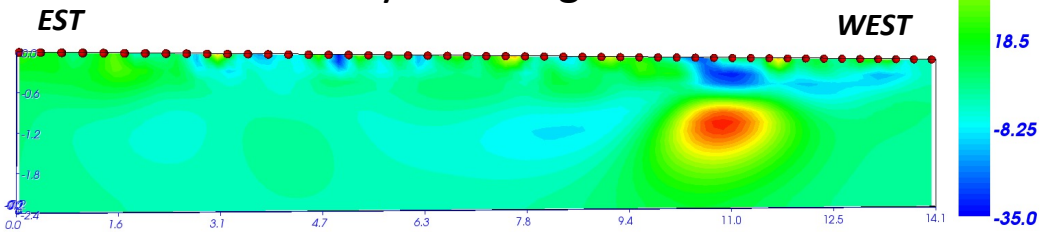
The value at each point is computed as the percent difference between two adjacent dates $\frac{Date2 - Date1}{Date1} \times 100$



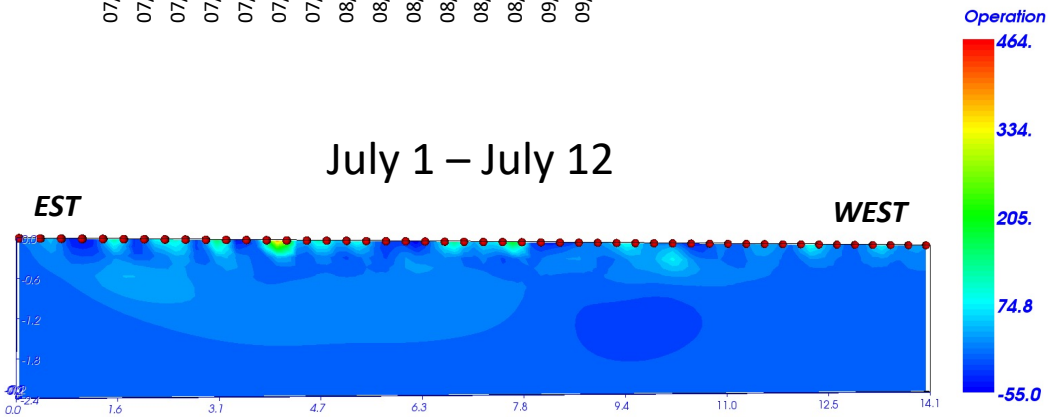


Drain opening: August 2

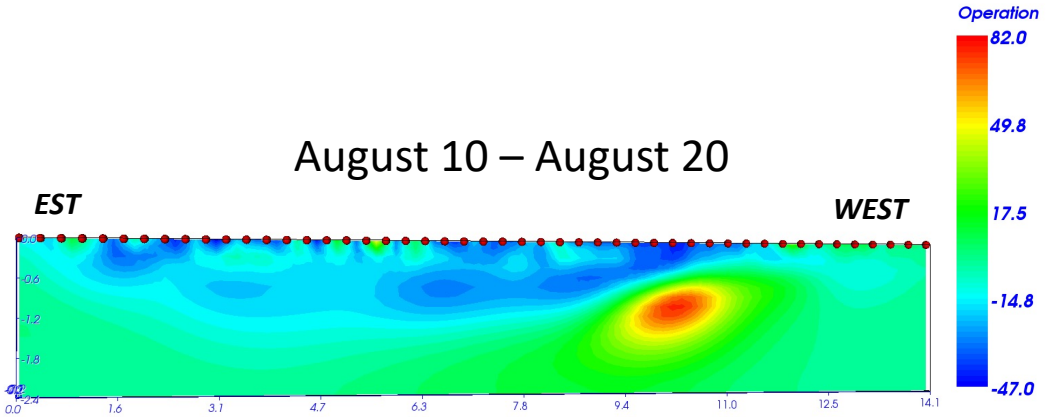
July 30 – August 10



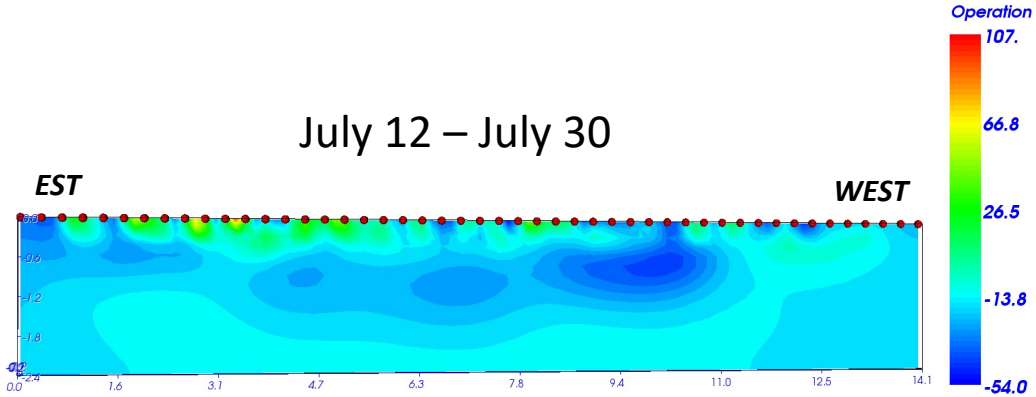
July 1 – July 12



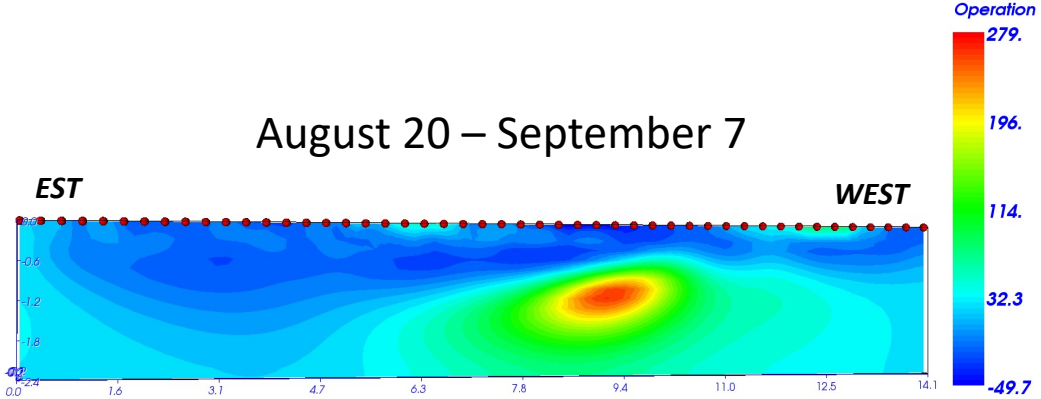
August 10 – August 20



July 12 – July 30



August 20 – September 7



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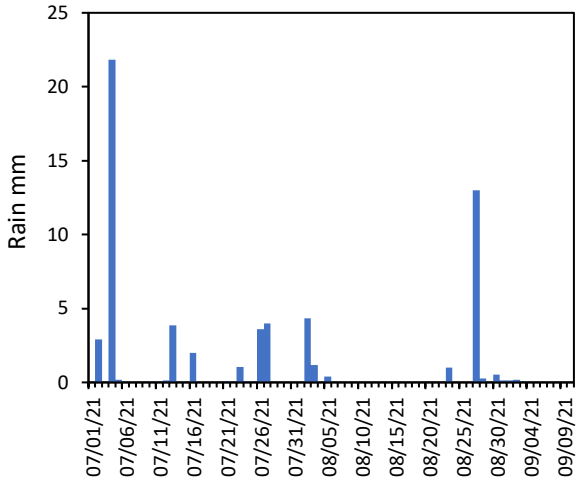
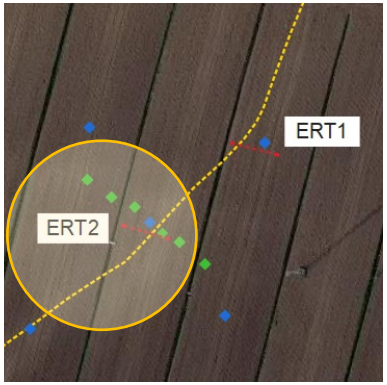
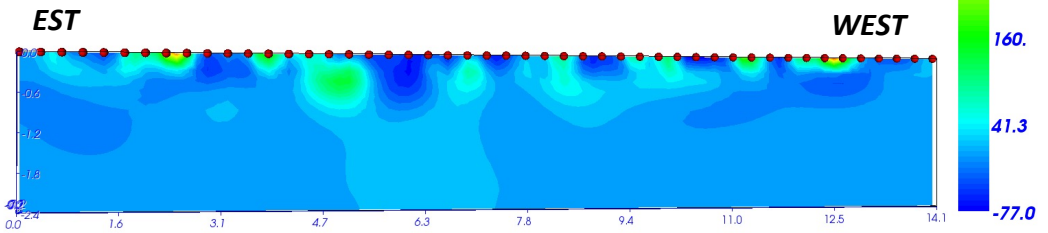


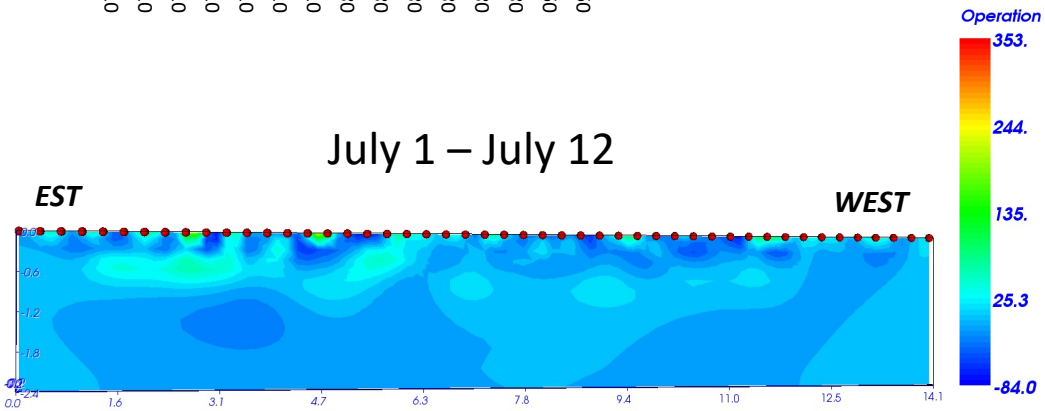


Drain opening: August 2

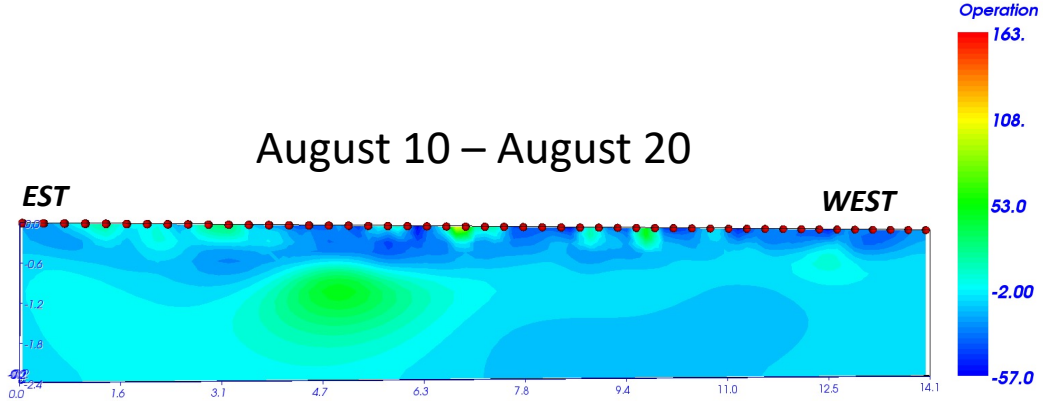
July 30 – August 10



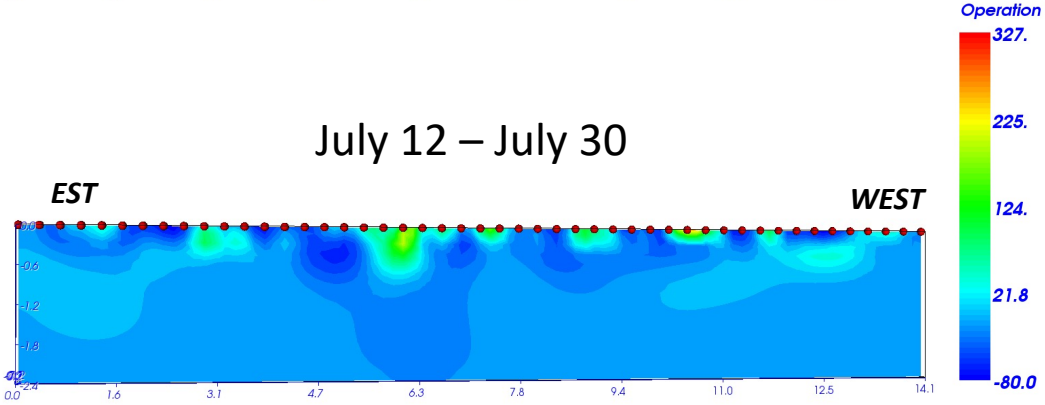
July 1 – July 12



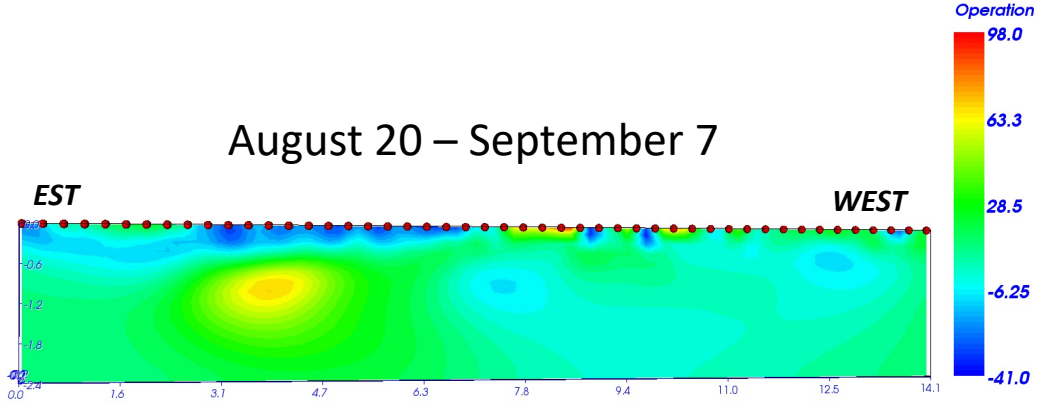
August 10 – August 20



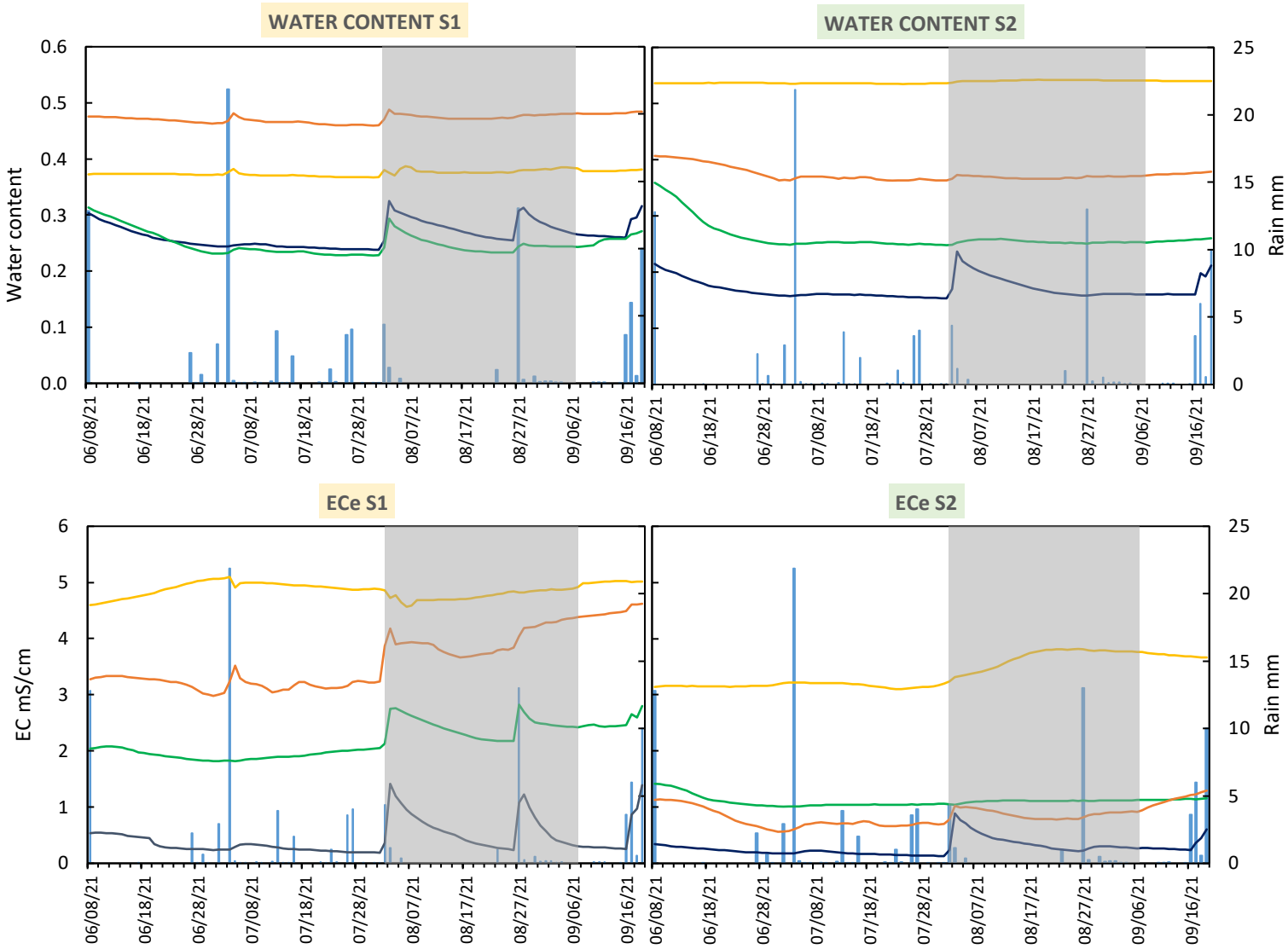
July 12 – July 30

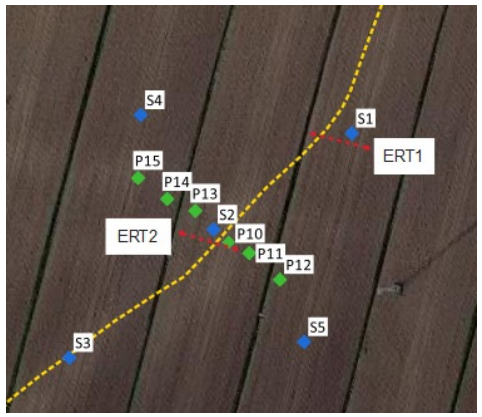


August 20 – September 7



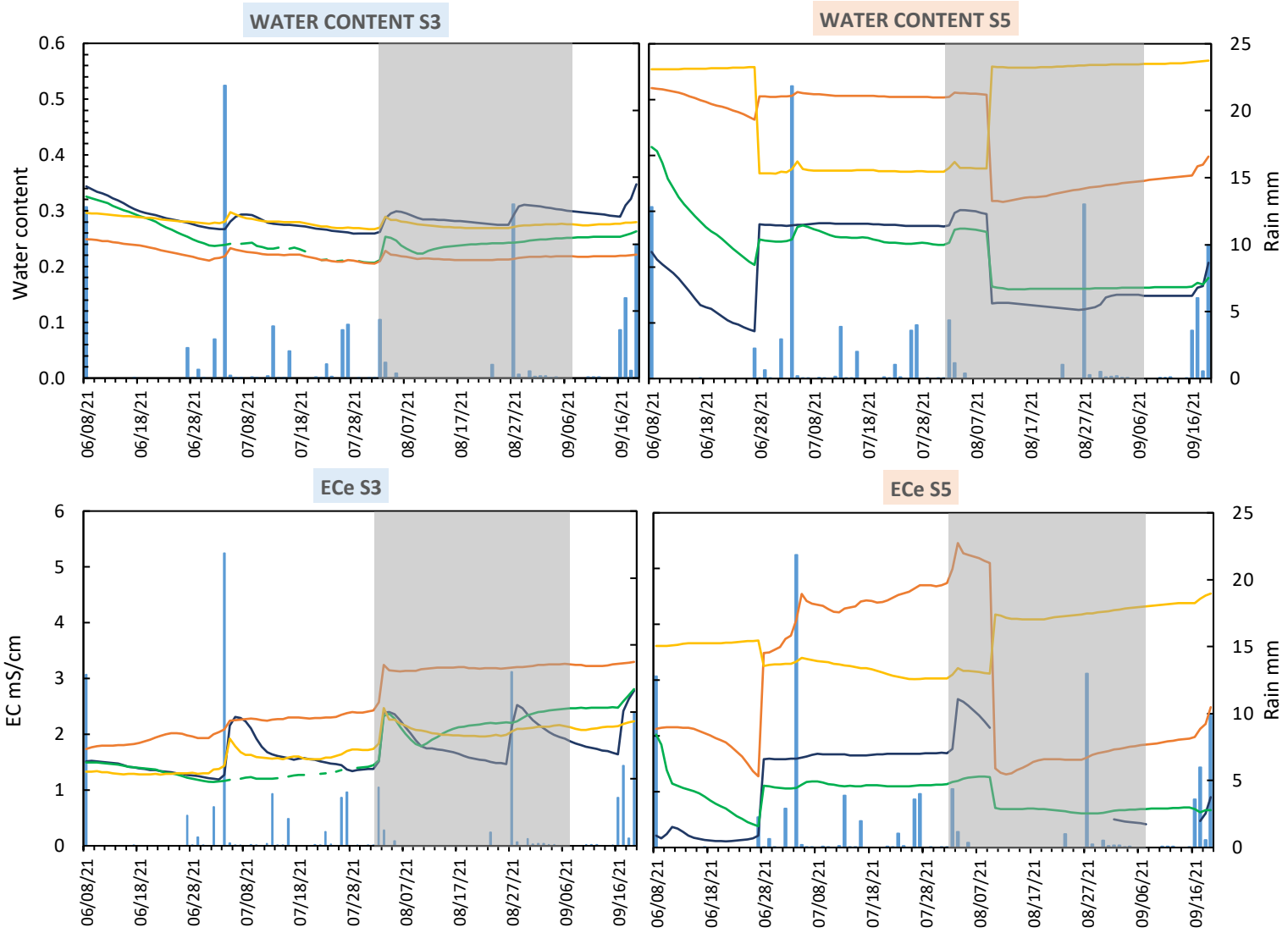
Preliminary results: soil sensors - Water Content (WC) and Saturation Extract Electrical Conductivity (ECe)

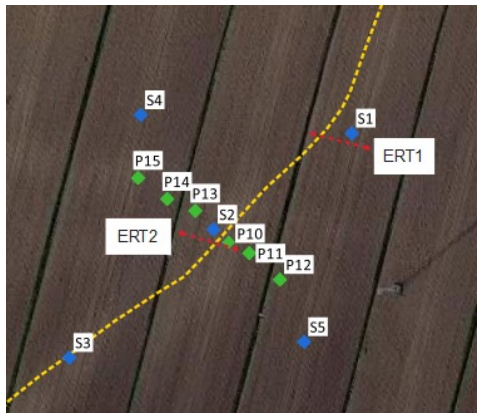




- WC and EC increased during rainfall events, particularly in the top layers
- The freshwater supplied with the drain did not affect WC and EC (slight increase of 0.7 m EC at S2)

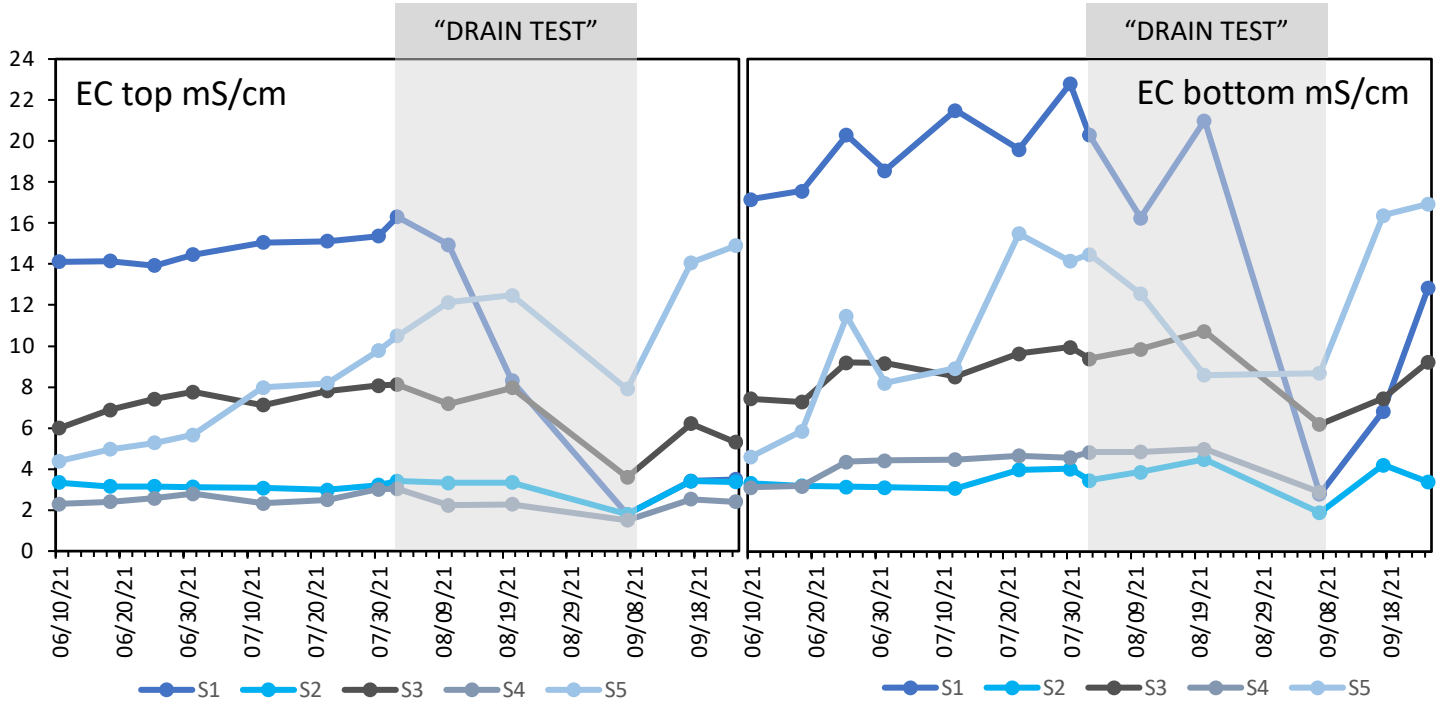
Preliminary results: soil sensors - Water Content (WC) and Saturation Extract Electrical Conductivity (ECe)

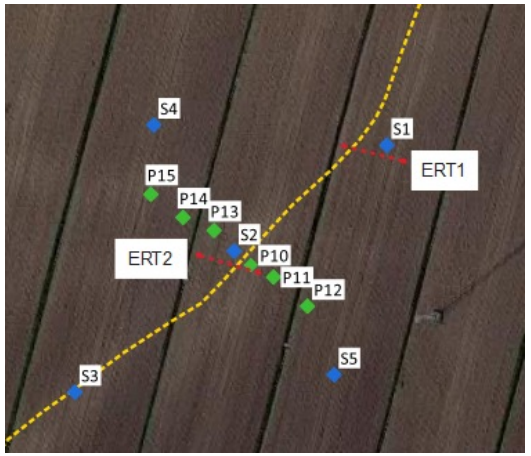




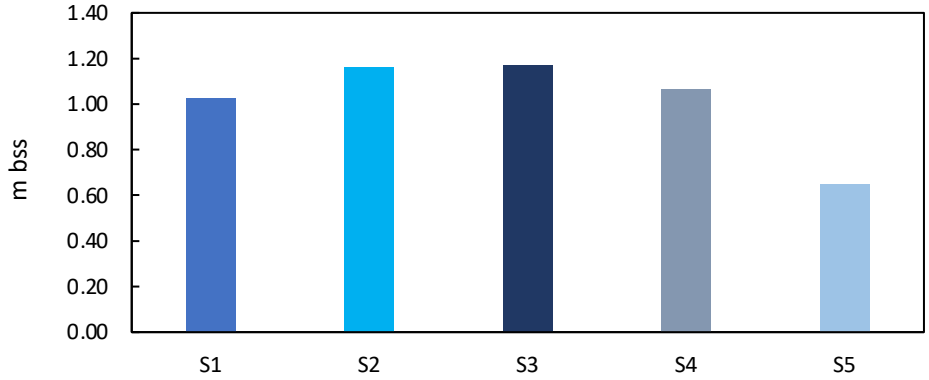
- S3: EC and WC increased during rainfall events. No drain effect
- S5: EC and WC of 0.1, 0.3, and 0.5 m layers significantly decreased, while an opposite behavior was observed at 0.7 m depth

Preliminary results: groundwater EC (S)



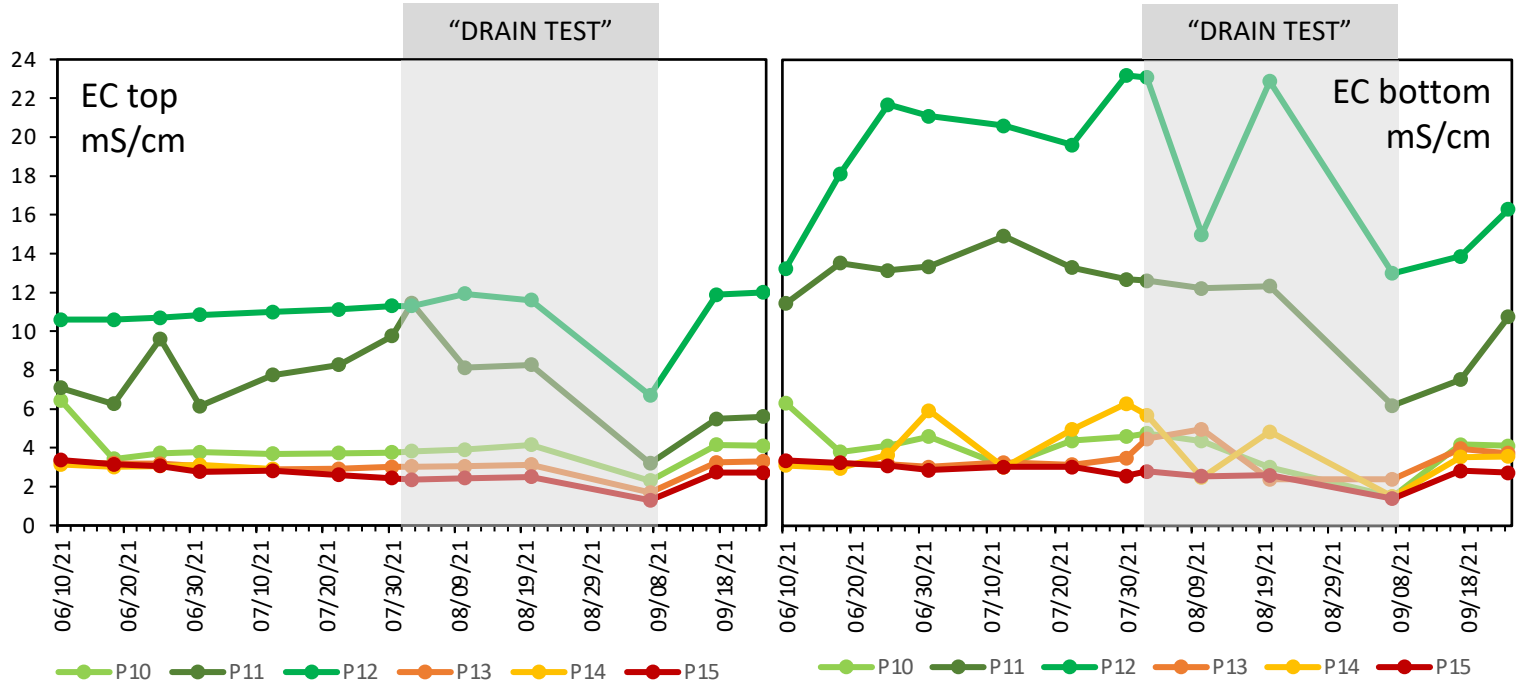


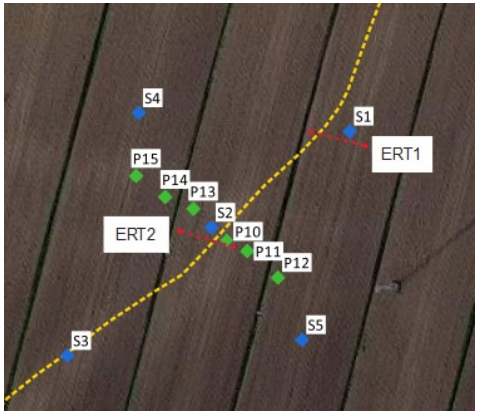
Average depth to the water table below the soil surface (bss)



- Decrease of groundwater EC after 8/20
- Greatest effect at S1
- Groundwater EC increased at all stations after drain closure

Preliminary results: groundwater EC (P)





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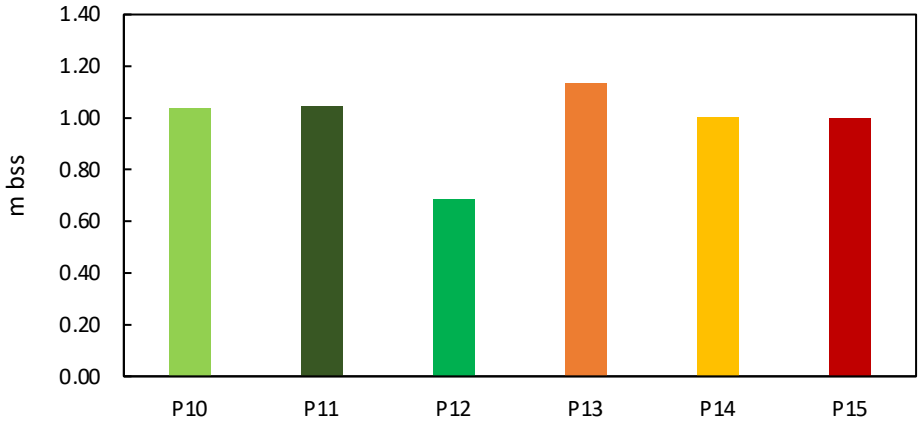


- Decrease of groundwater EC after 8/20
- Groundwater EC increased at all piezometers after drain closure

CONCLUSIONS

- **Electrical resistivity tomography (ERT)**

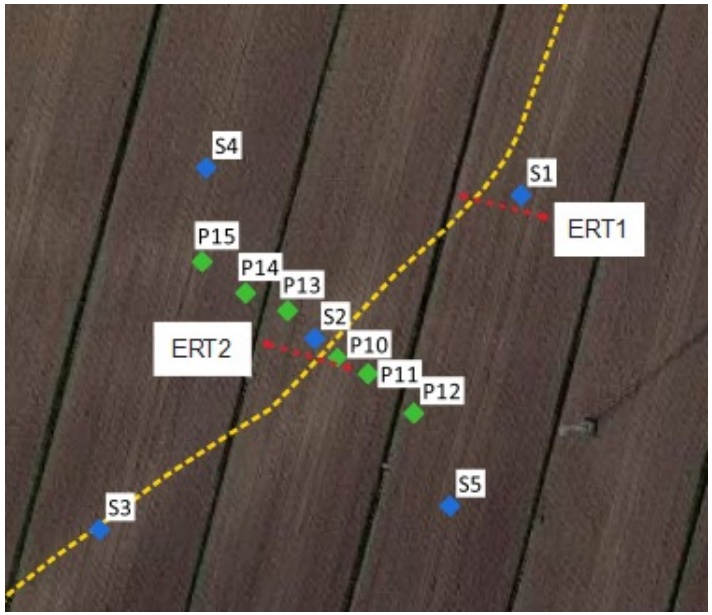
The freshwater supplied to the farmland caused the increase of resistivity

- **Groundwater EC (piezometers)**

The drain effect on groundwater was highly heterogeneous. However, EC increased after drain closure at all piezometers (both top and bottom)

- **Soil sensors (WC and EC)**

The effect of drain activity was not evident on soil WC and ECe. However, further investigation and data analysis are needed.



What's next? New "drain test" during maize growing season to investigate the effect of freshwater supply on plant stress and final yield

Thank you for your attention