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What is my soil moisture sensor trying to tell me? Part II

Colin Campbell, Decagon Research Scientist
Chris Chambers, Application Support Specialist
Lauren Crawford, Soil Moisture Product Manager

Wait…what did I miss in Part I?

- How soil moisture sensors are used to make irrigation more efficient (for irrigating crops and turf)
- How soil moisture sensors are used to optimize fruit quality in a vineyard
- How soil moisture sensors are used in a rangeland study to help make grazing decisions
- Volumetric water content verses soil water potential

Today's agenda

- Soil water content data spatially (both across the landscape and over depth)
- Soil moisture data to look at treatment effects
- More irrigation data sets

Why are we doing this?

- We get requests to help interpret data sets all of the time
- It's much more efficient to discuss our ideas with 200 people instead of each person one on one

Whose voice is that?

Colin Campbell

- Developed most of our soil moisture sensors
- Extensive experience in his own research

Chris Chambers

- Troubleshoots and interprets soil moisture data every day

Lauren Crawford

- Learned from her many mistakes making soil moisture measurements

How to use today's seminar

Make comments, ask questions, challenge our assumptions

Use what you learn to make better conclusions about your soil moisture data

Poll questions 1

Did you watch Part I of this seminar series?

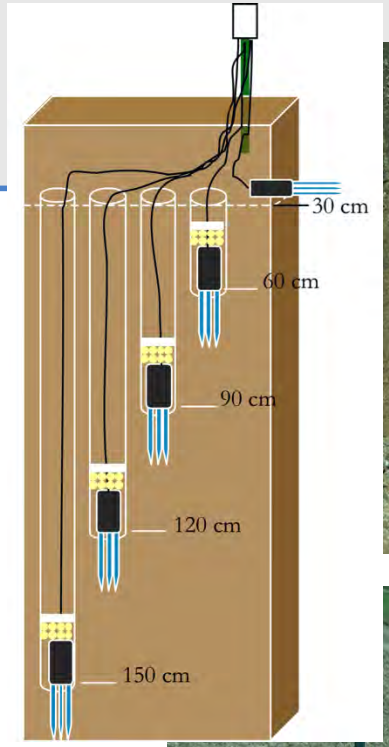
- Yes
- No

Dryland wheat soil moisture profile

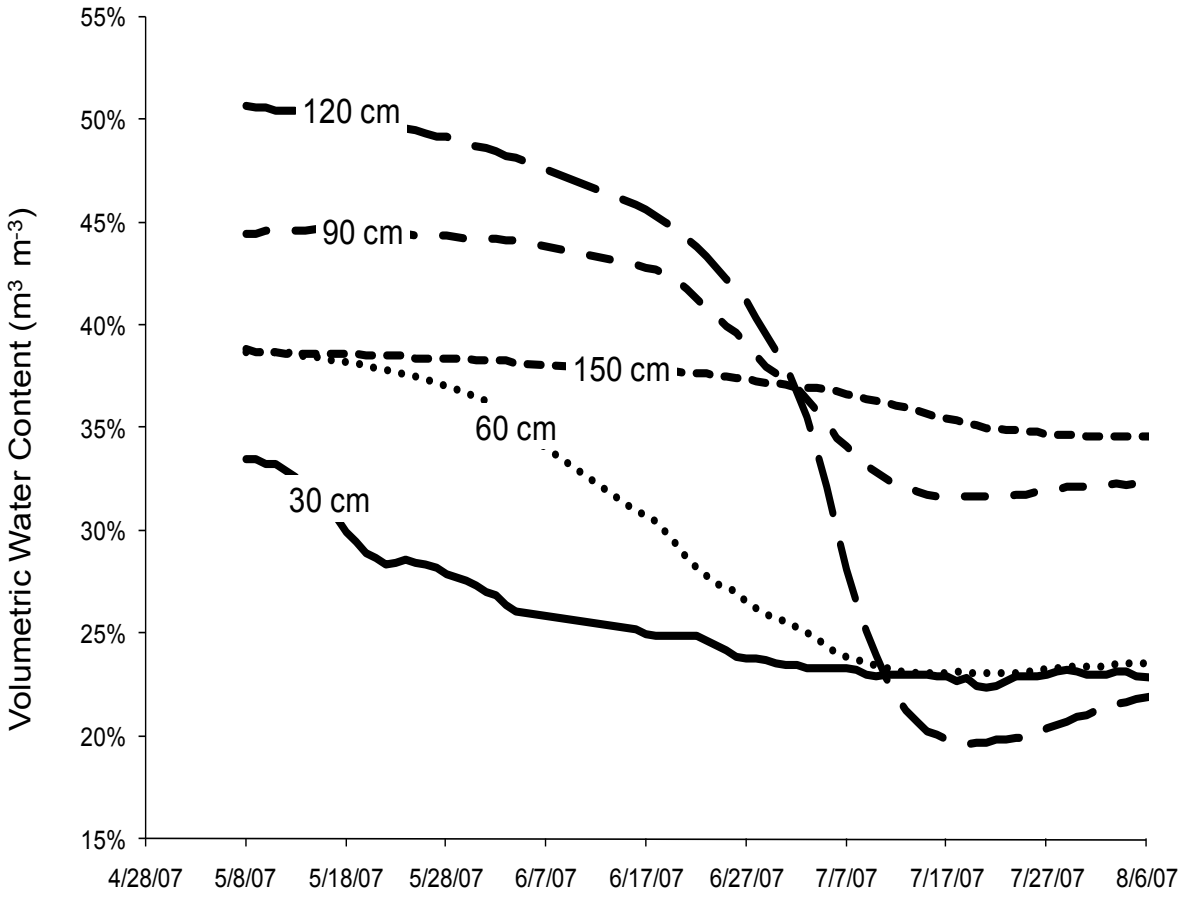
- 37 ha dry-land farm, wheat, barley, legume rotation
- Palouse silt loam, hard pan in places
- 510 mm average precipitation (primarily winter/spring)
- Continuous rotation
- Rolling hills (40 m elevation differences)

Site description

- Setup
  - 12 sites (expanded to 42 in 2009)
  - 5 depths at 30 cm increments
  - VWC, EC, temperature sensors
- Installation
  - 30 cm sensor: trench sidewall
  - 60 – 150 cm sensors: Inserted into bottom of 5 cm auger hole
  - Soil repacked



Site 1 Dry-down: Winter wheat, hilltop site

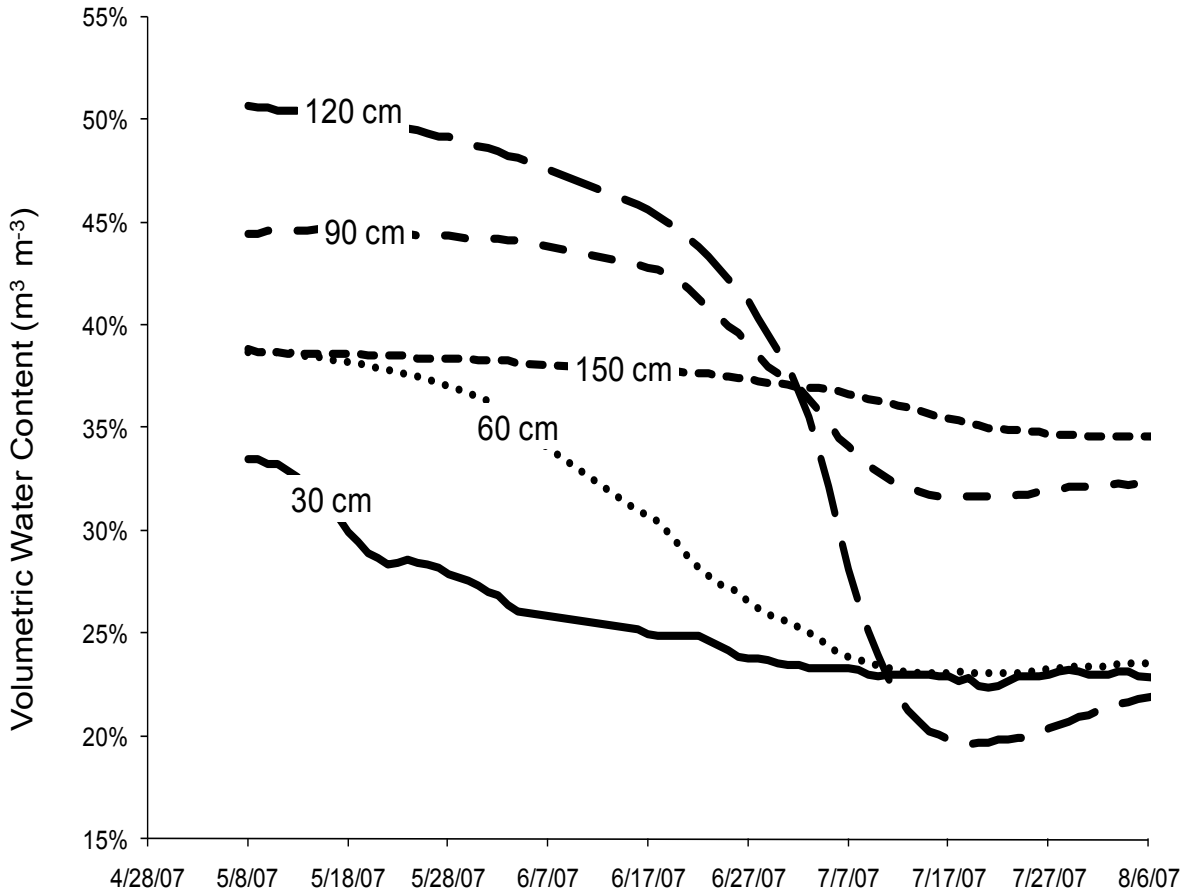


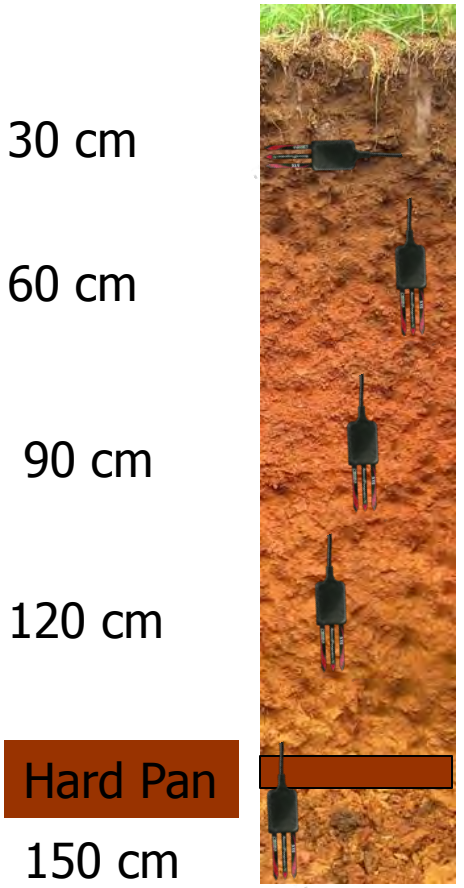
Poll question 2

The 120 cm sensor started higher and ended lower, Why?

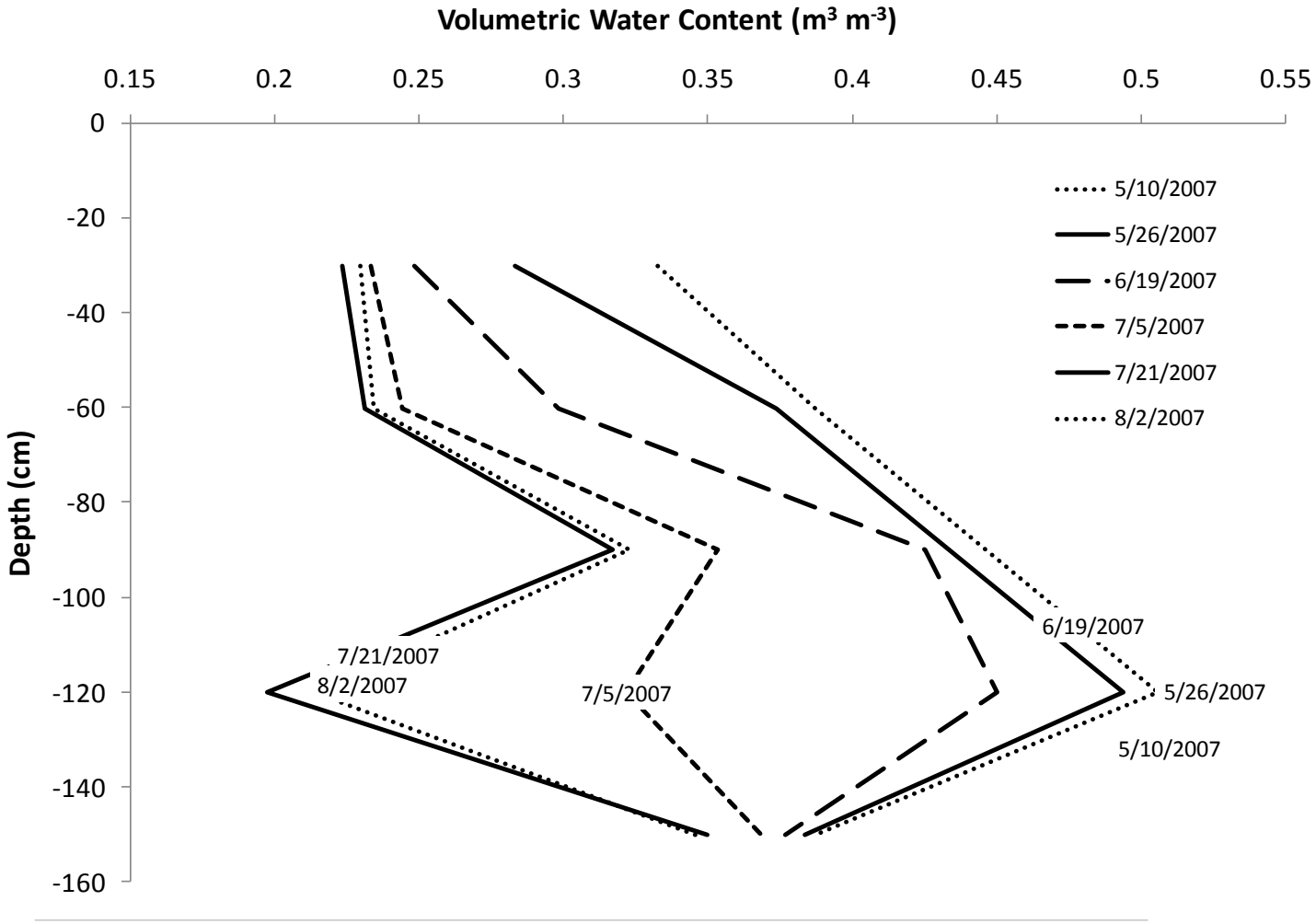
1. Low bulk density comparatively
2. Perched water from hardpan below
3. Bad installation

Site 1 Dry-down: Winter wheat, hilltop site

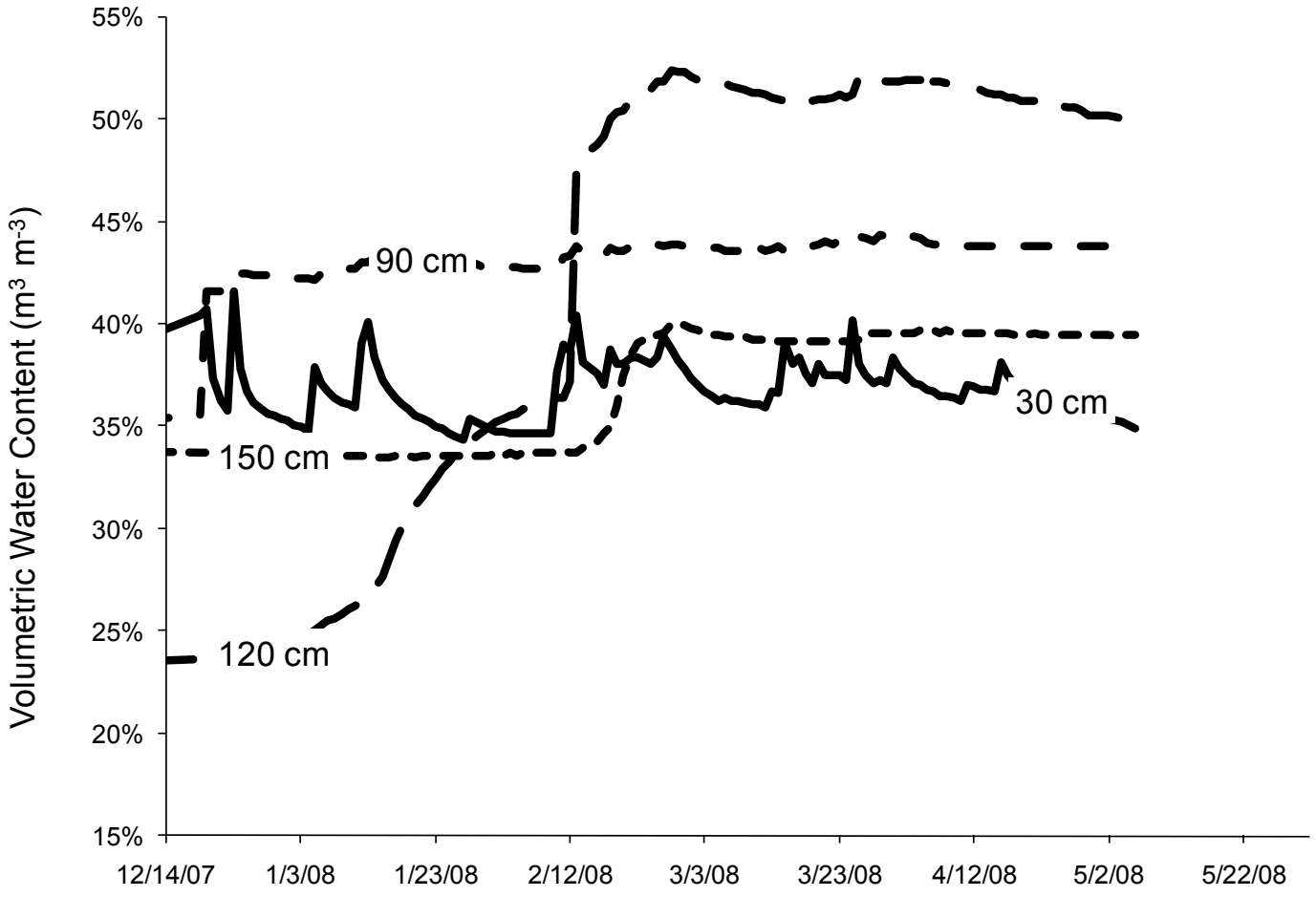




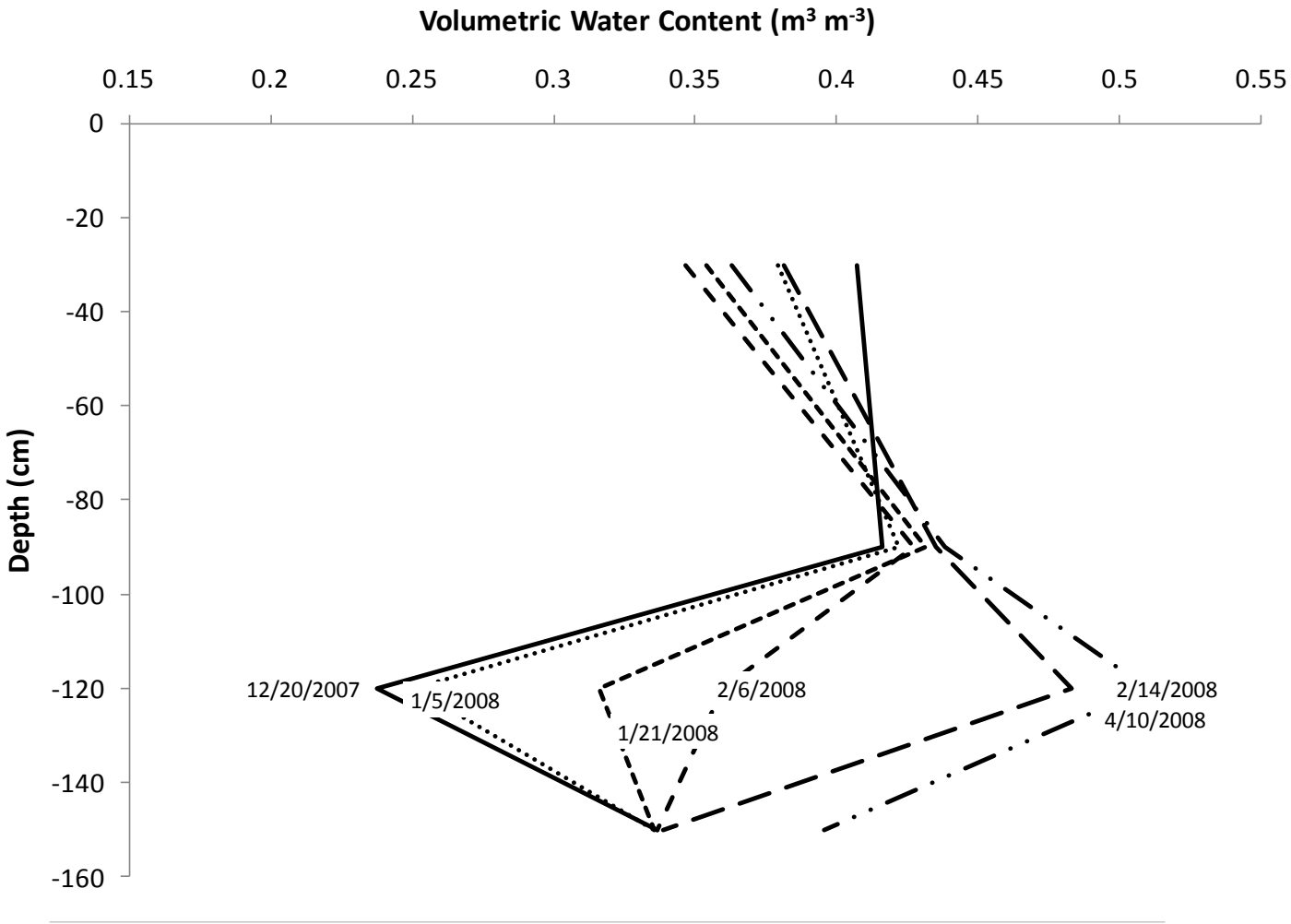
Site 1 Dry-down: Water use by depth



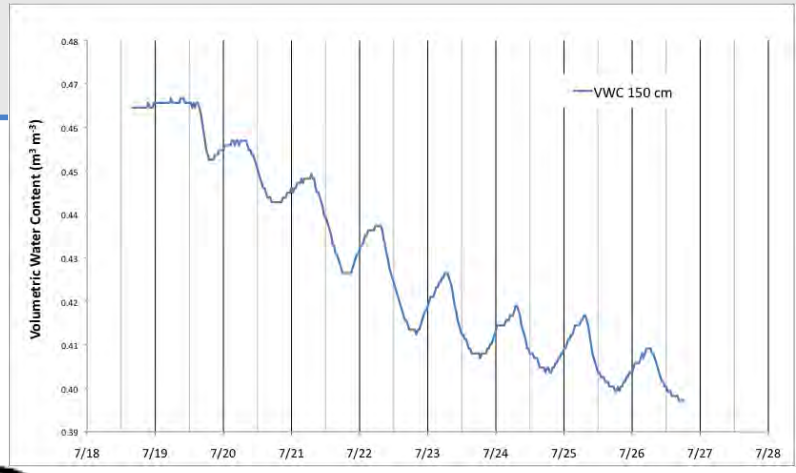
Site 1 Wet-up

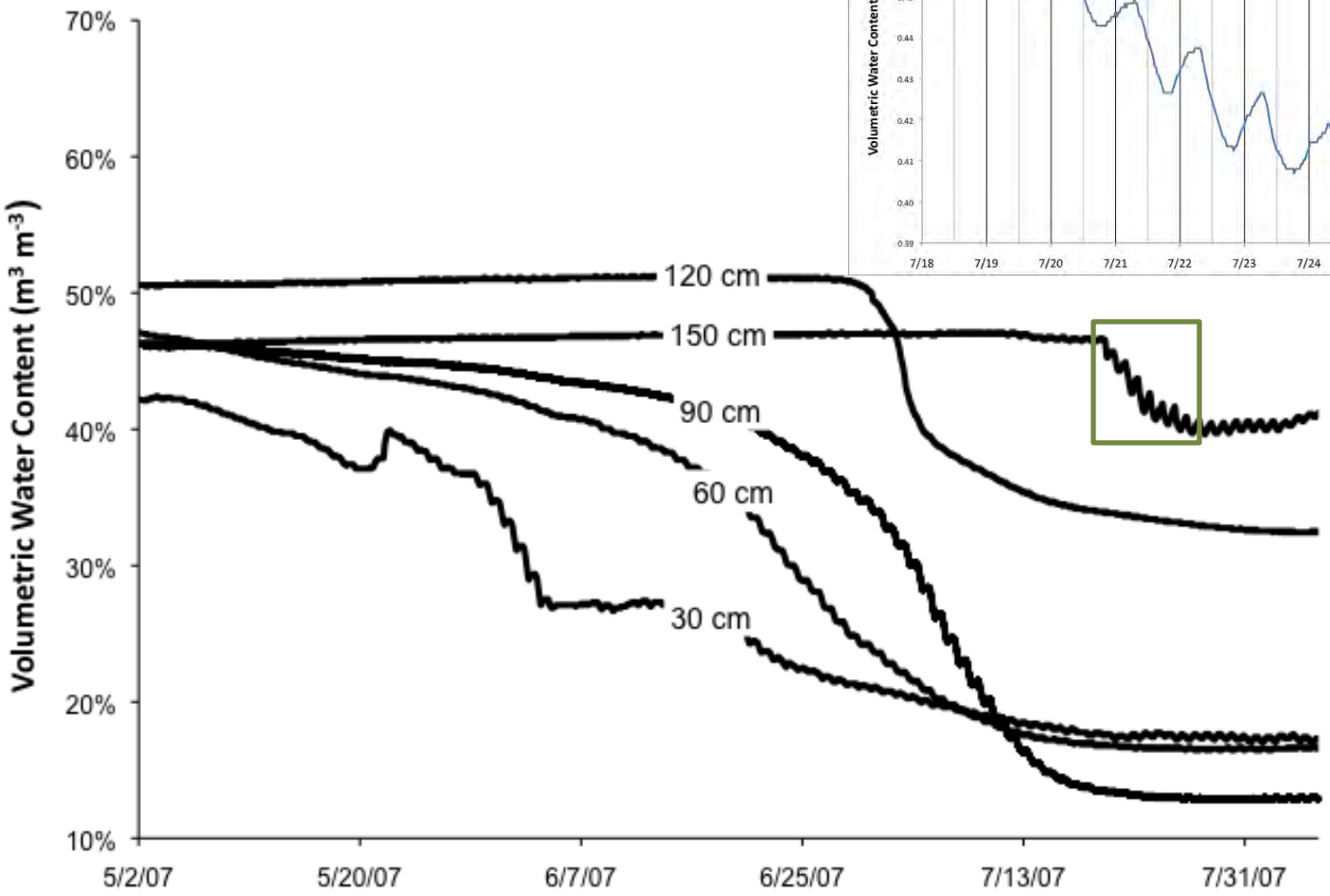

Volumetric Water Content (m3 m-3)
55%
50%
45%
40%
35%
30%
25%
20%
15%
12/14/07
1/3/08
1/23/08
2/12/08
3/3/08
3/23/08
4/12/08
5/2/08
5/22/08
90 cm
150 cm
120 cm
30 cm

Wet-Up: Water use by depth



Site 3: Diurnal fluctuations at toe slope site)



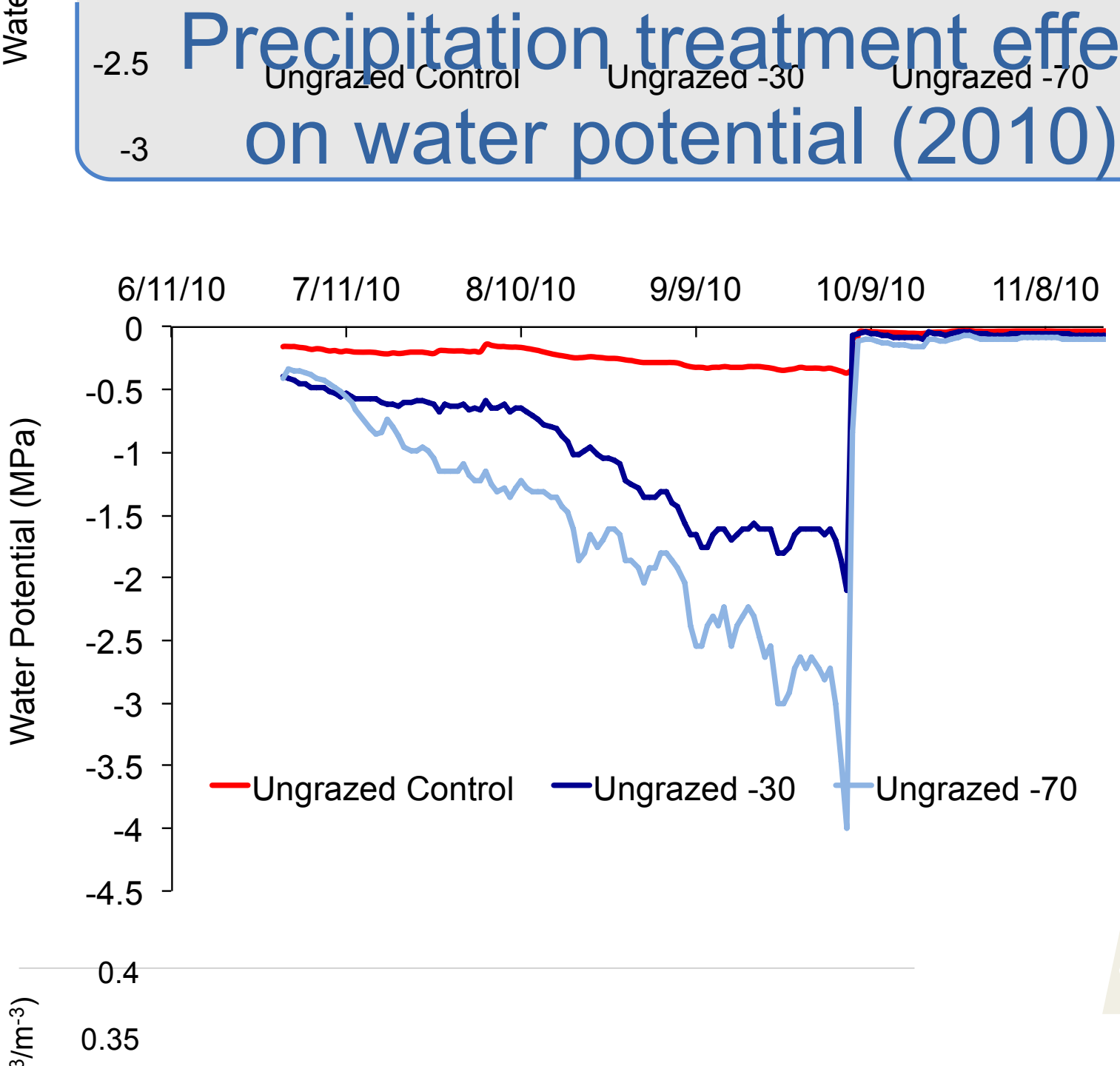


Rangeland soil moisture on the Wasatch Plateau (Utah)

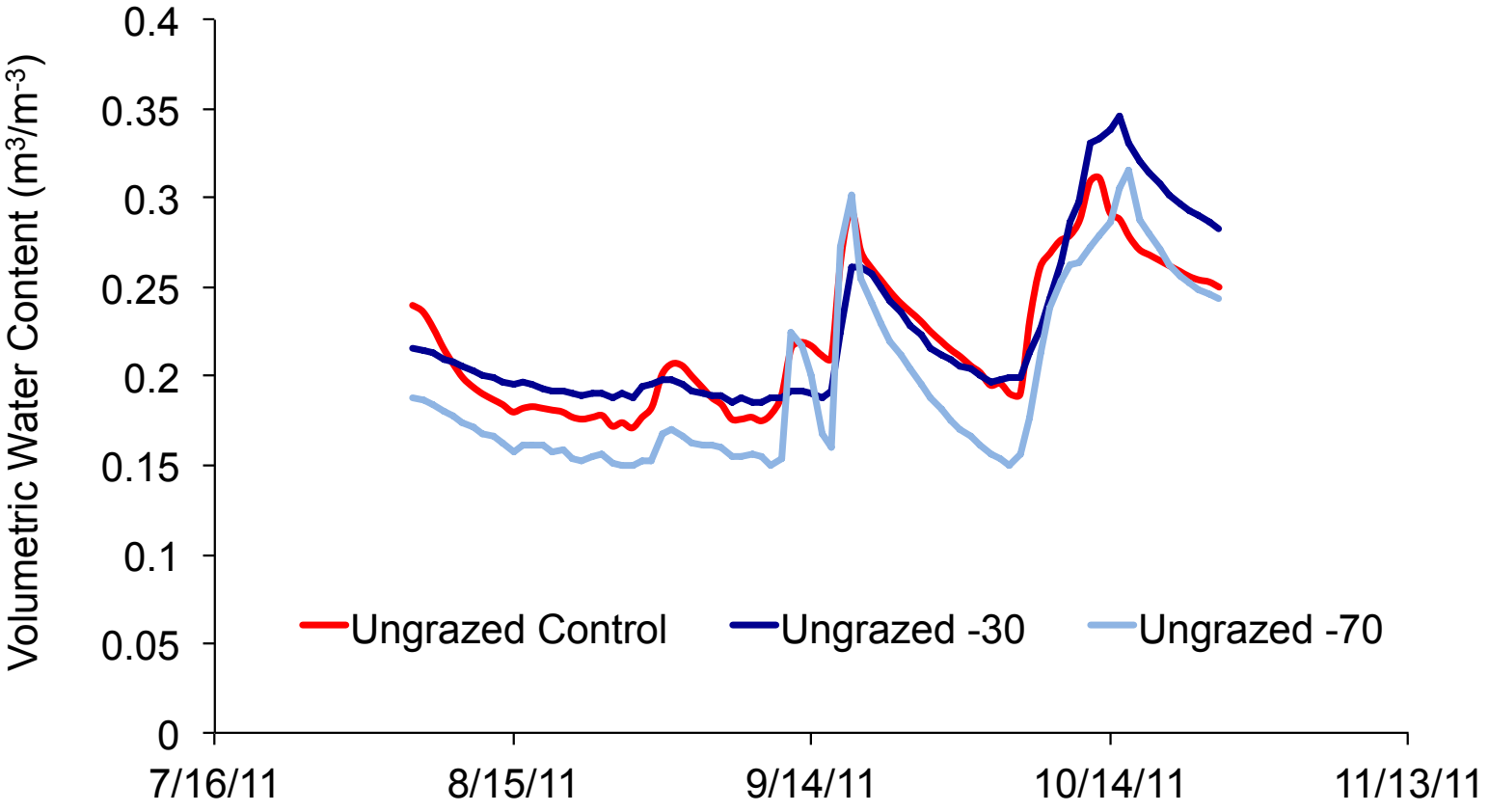
- Grazing exclosures and rainout shelters
- Volumetric water content monitored with GS3 sensors at each site.

Data courtesy of Richard Gill, Brigham Young University

Precipitation treatment effect on water potential (2010)



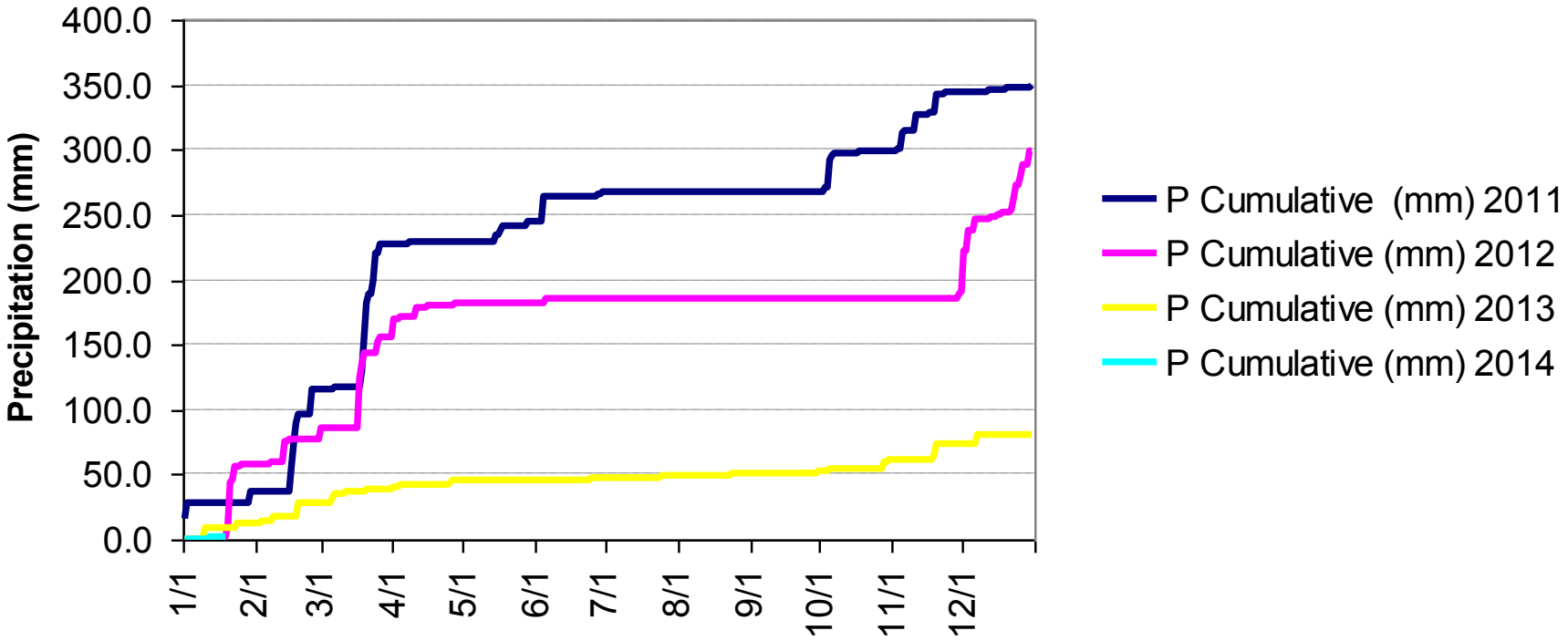
Precipitation treatment effect on water content during a high than average precip year (2011)



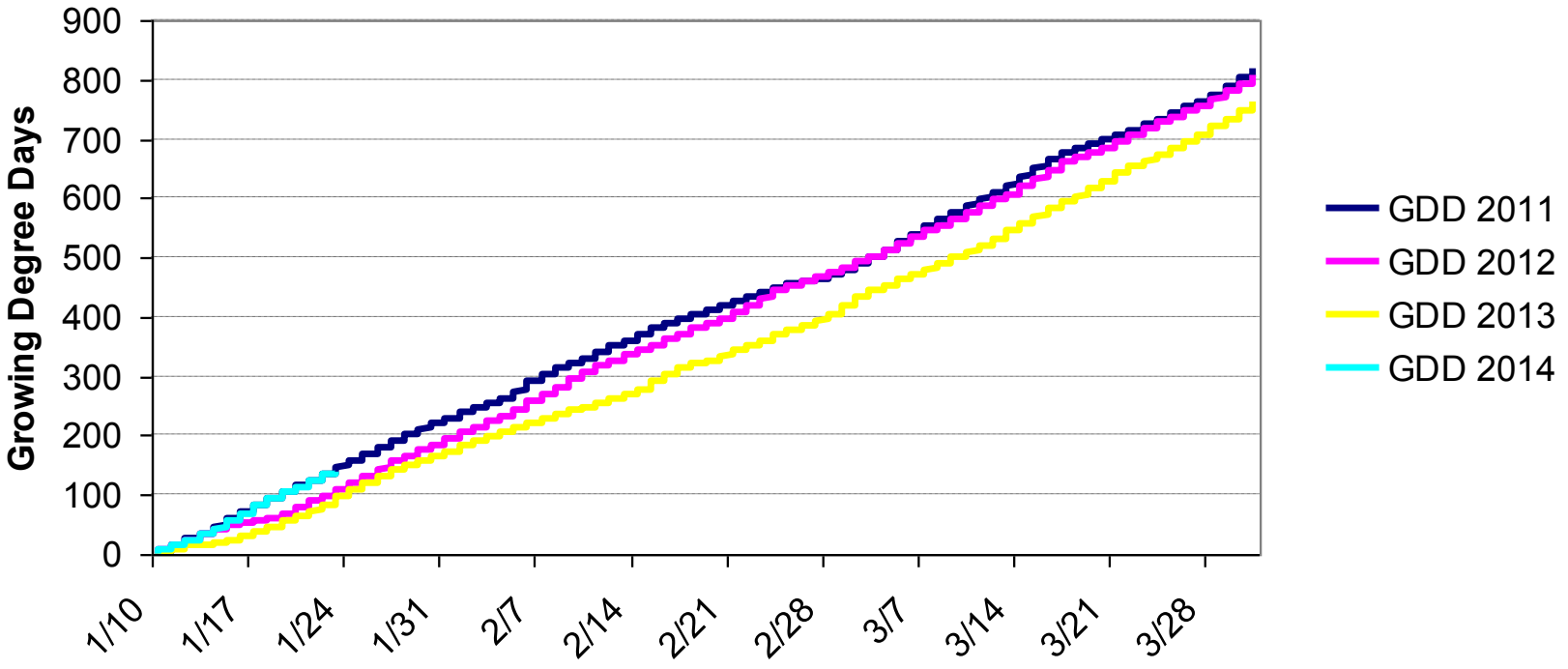
Pinot Noir with Deficit Irrigation

- Comparison of growing conditions and soil moisture conditions 2011-2014
- Loam at the top of the rooting zone, transitioning to a sandy loam, then sand
- Water content measured at four depths, averaging eight sensors per depth
- Water potential measured at one depth, averaging six sensors per depth

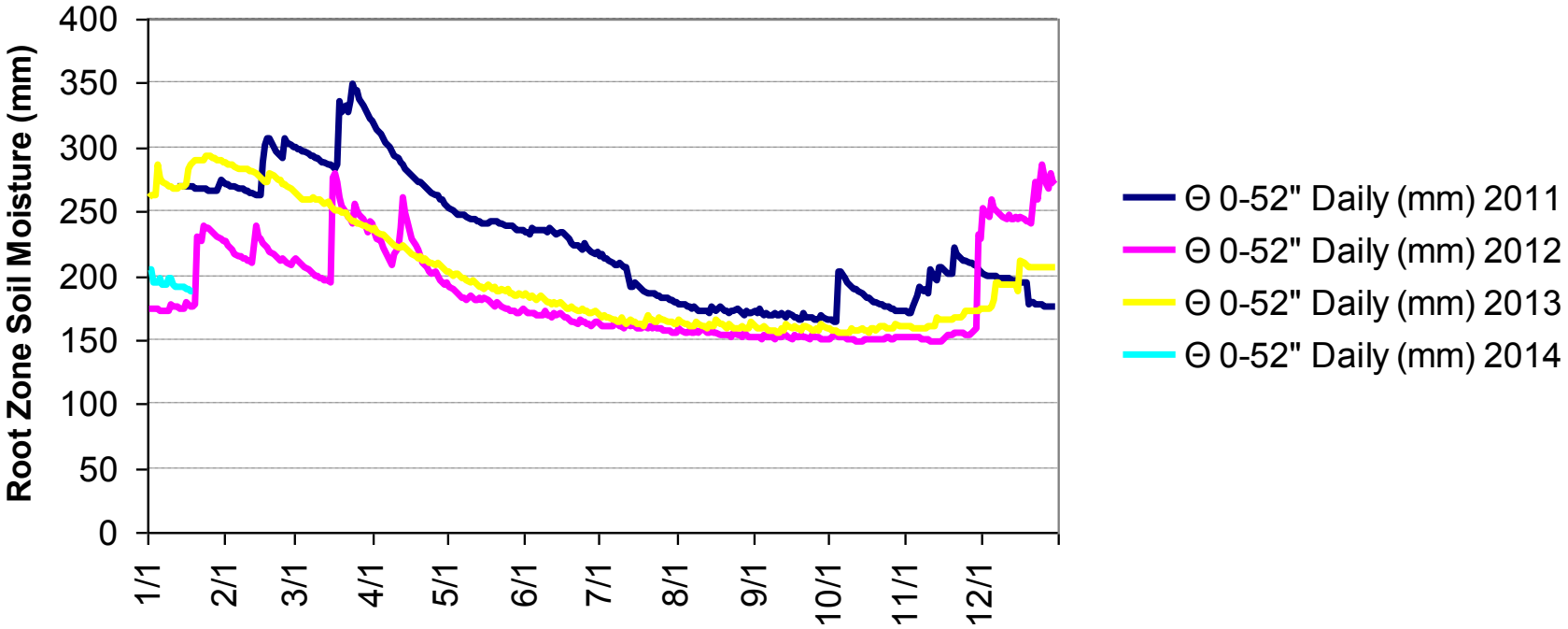
Precipitation Comparison 2011-2014



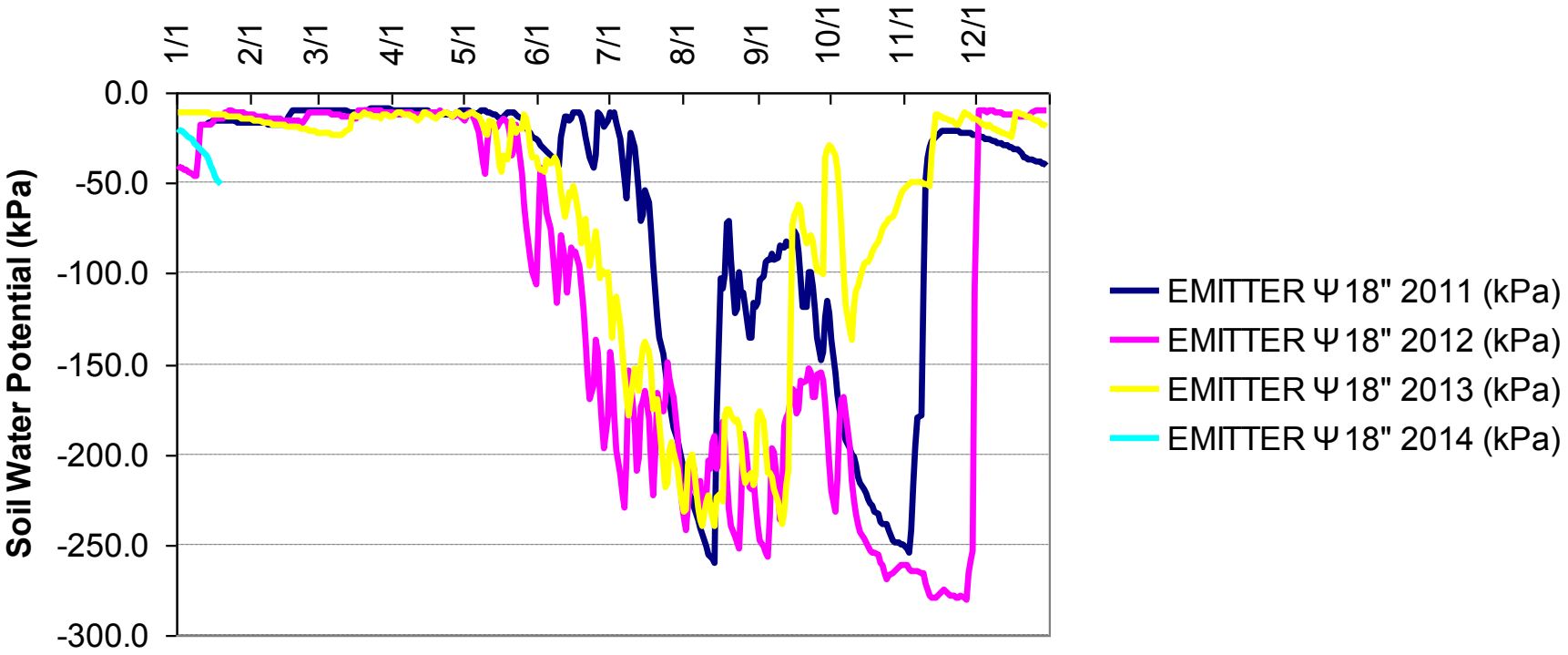
GDD Comparison 2011-2014



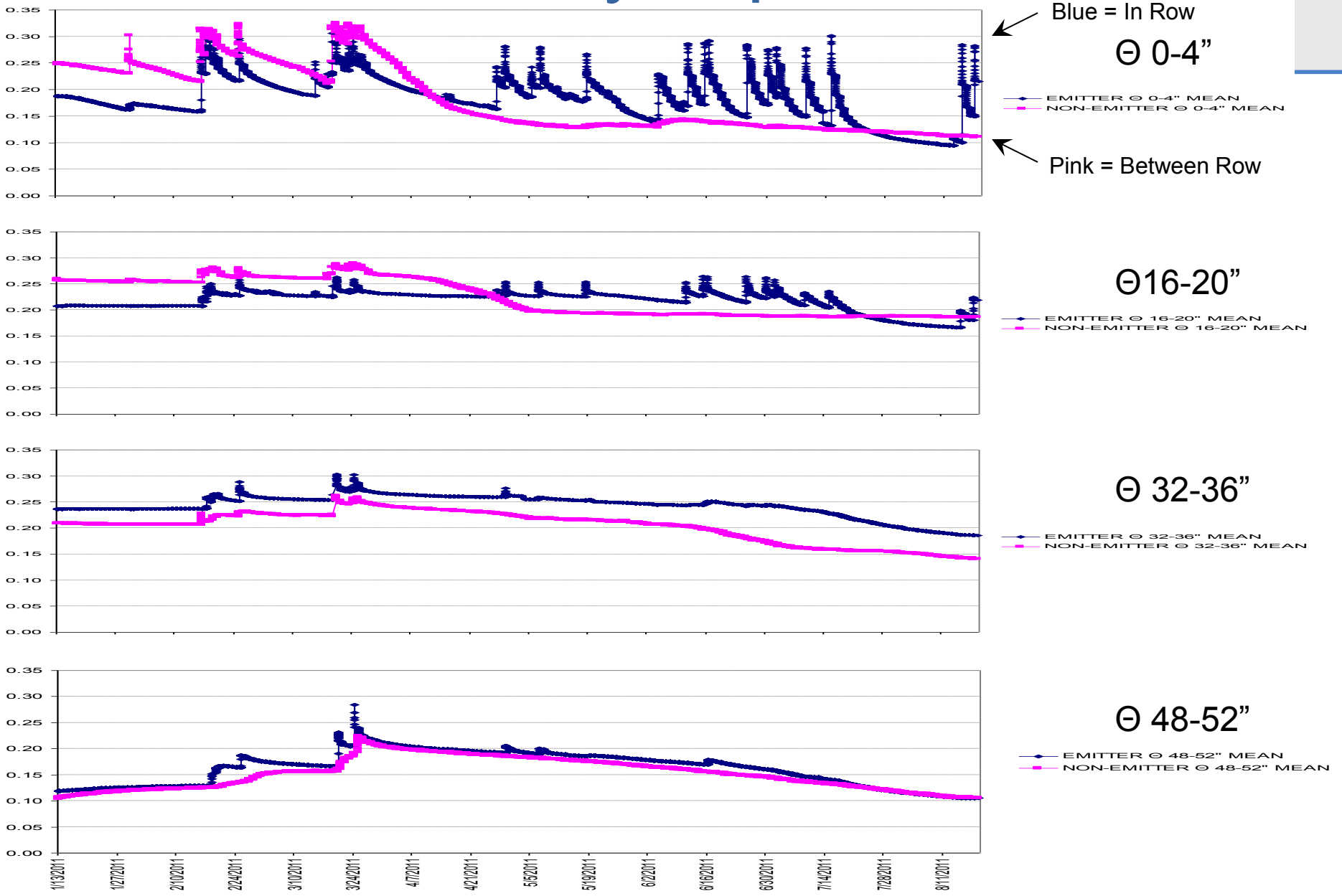
VWC Comparison 2011-2014



Water potential comparison 2011-2014



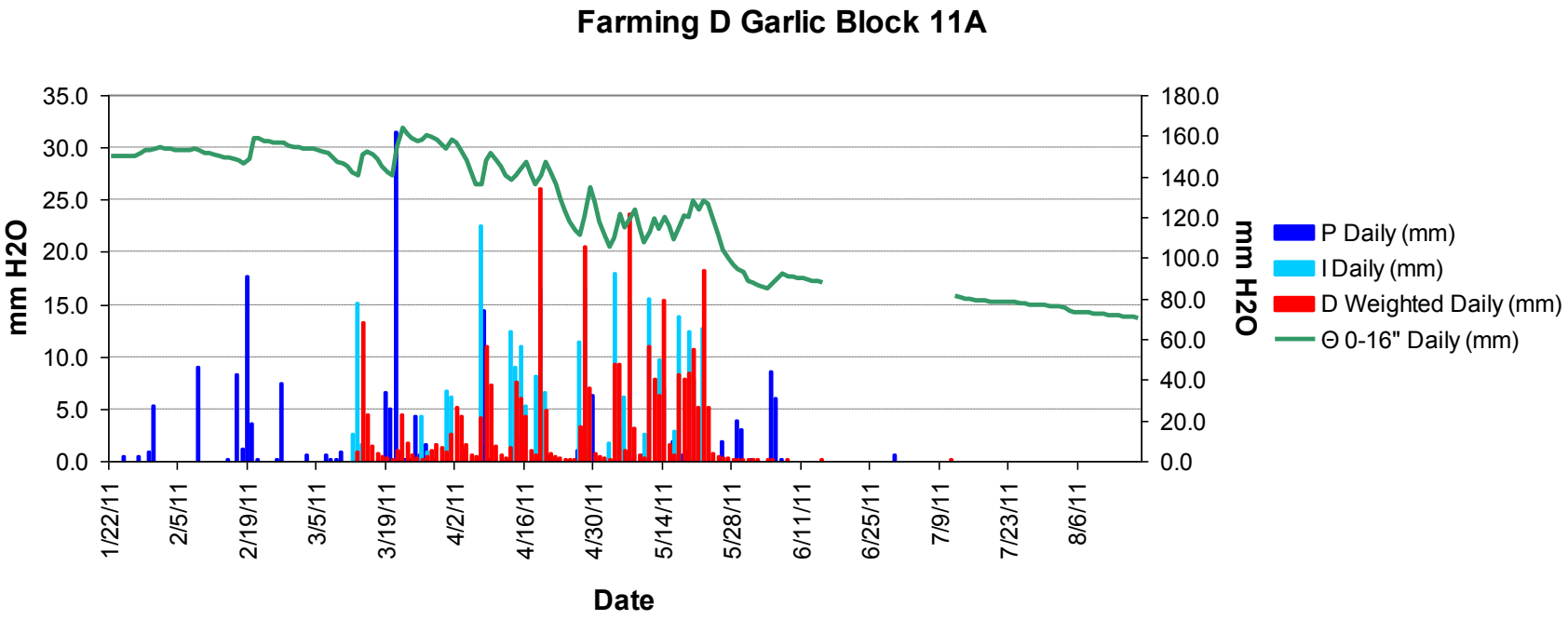
VWC by depth in 2011



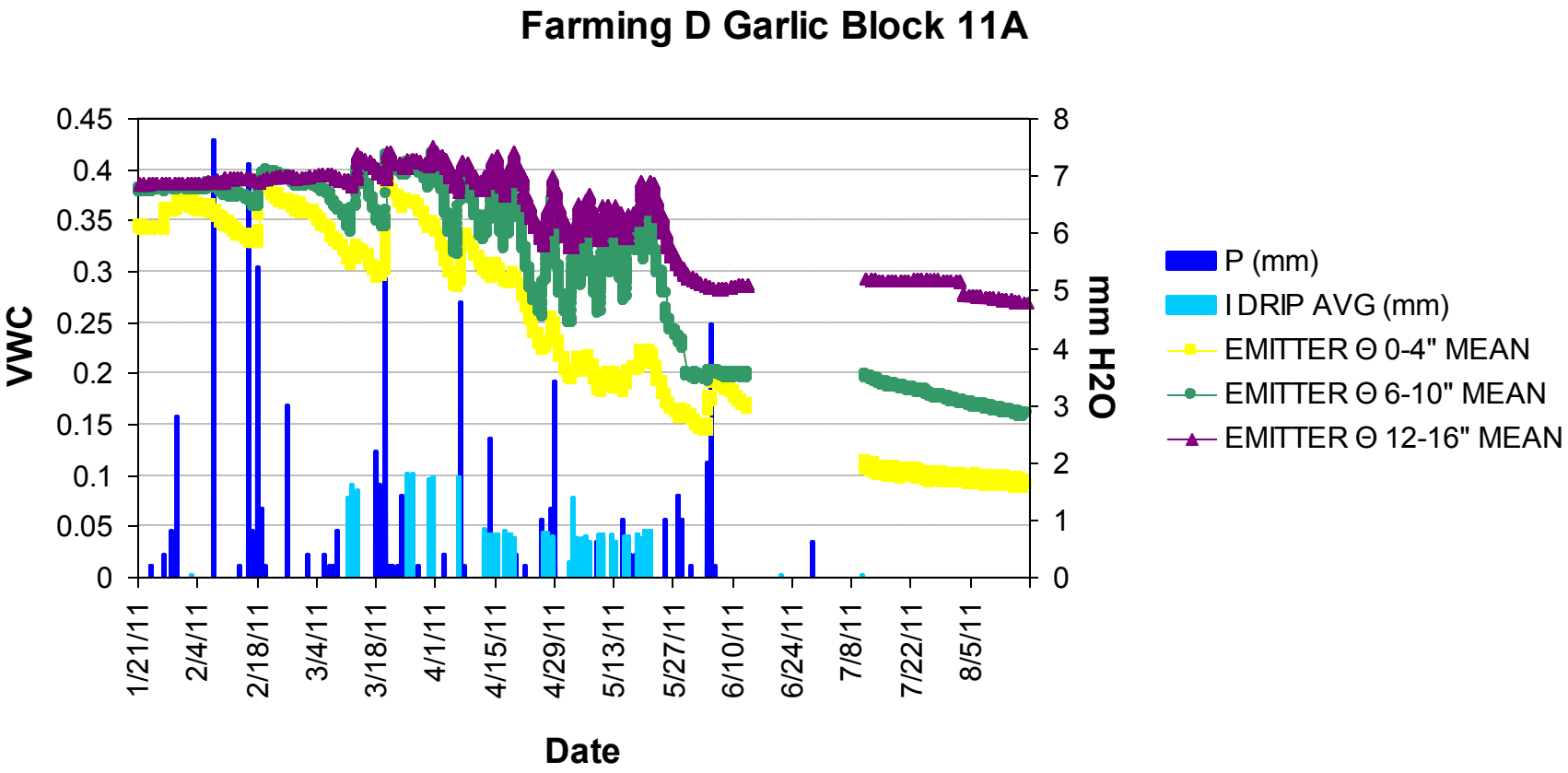
Water balance in irrigated garlic

- Precipitation, irrigation monitored
- Drainage under root zone monitored with two drain gauges per site
- Soil water storage monitored at three depths with 10HS water content sensors
- Water potential measured at one depth with MPS-2 sensors at six locations

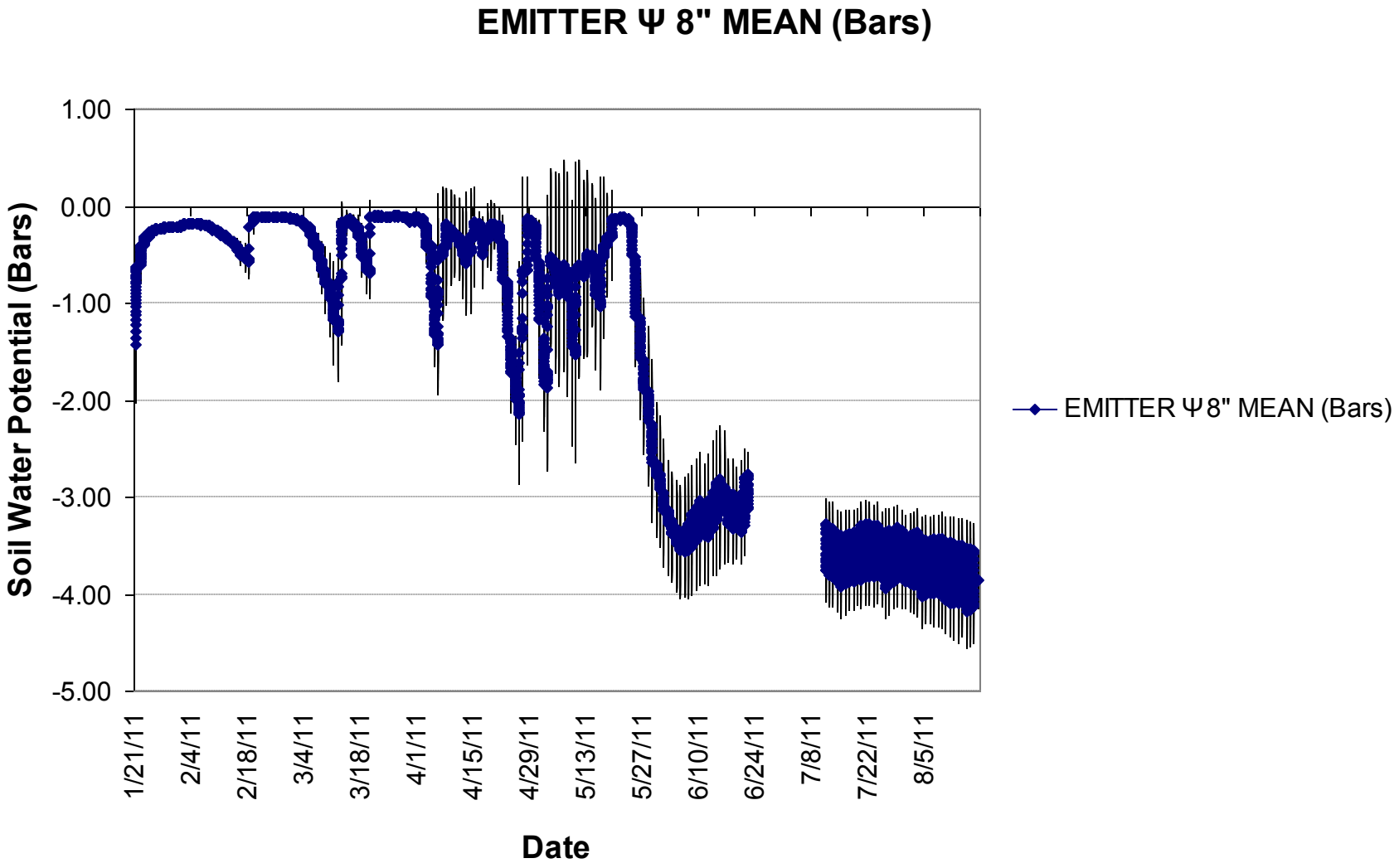
Field Sensor Network:
Precipitation, Irrigation, Drainage, & SWC (Garlic)



Field Sensor Network:
Soil Volumetric Water Content By Depth (Garlic)



Field Sensor Network:
Soil Water Potential (Garlic)



Thank you for sharing!

- Larry Parsons and University of Florida
- Water & Earth Sciences (www.waterearthsciences.com)
- Lab Ferrer (www.lab-ferrer.com)
- Umiker Vineyards (www.clearwatercanyoncellars.com)
- Richard Gill and Brigham Young University
- James Leary and CTAHR Maui County Cooperative Extension Service

QUESTIONS?

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