

Soil Moisture Monitoring with Remote Sensors

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Treasure Valley Irrigation Conference

Ontario, OR

December 17, 2015



Plan Today

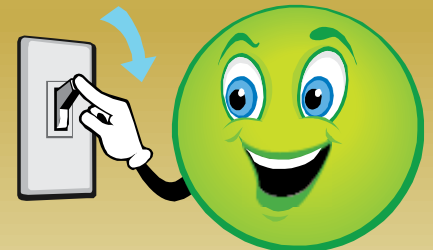


- Overview of some remote moisture monitoring platforms
- How to apply this technology



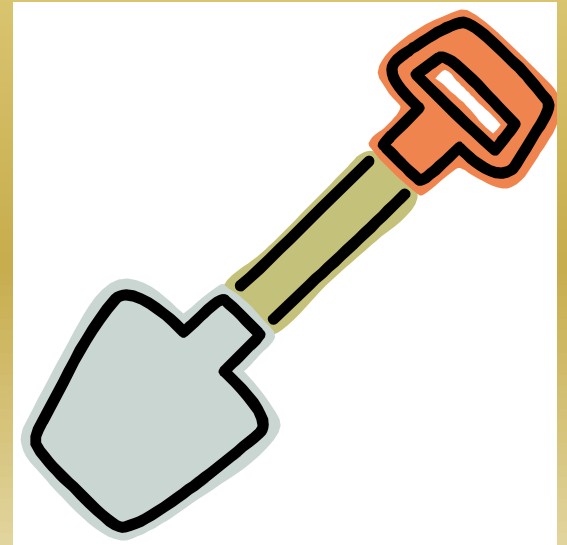
The Irrigation Goal:

- Only apply what the plant needs when it needs it
 - Can conserve water & nutrients
 - Reduce stress of over or under-watering
- Need to understand what is going on out there!
 - Soil Type
 - Plant stage and conditions



Accomplished by:

- Watermark Sensors
- Evapotranspiration
- Groundtruthing



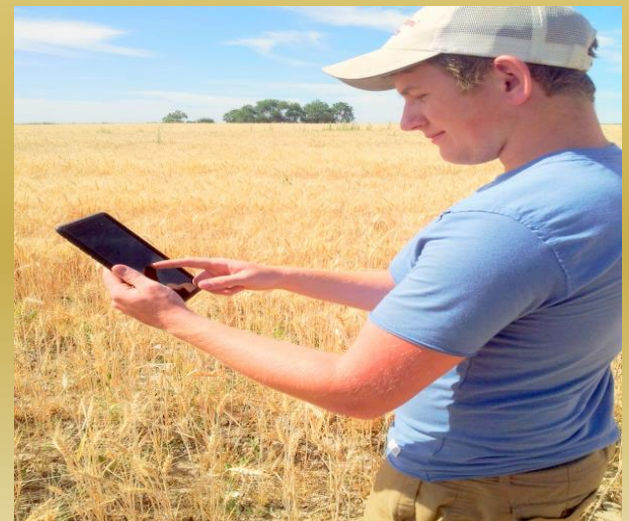
All the platforms sampled used: Watermark Sensors



Photo courtesy of Irrrometer.com

Remote access

- Provides an objective look at field conditions without being on the scene
- Access real-time data via the fad we call the internet
 - Desktop/ smartphone
 - Phablet?



Benefits

- Put sensor stations where they are needed
 - Not where it is convenient but where they will provide the most benefit
 - Varying field questions across wide expanses can make it difficult to monitor an field based on one or two spots.
 - Saves time in pulling the data from the field

Let's look at a potential application

just
another
example







This is where a mesh system can be applied to learn about an entire field

Platforms

- **SensMit Web** by iDUS Controls Ltd.
 - working with Reinke & Irrrometer
 - Reports to a computer through a base station
 - Posts and logs data to a website
- Utilized by a grid of deployed nodes
 - Data is relayed across a mesh to the base station

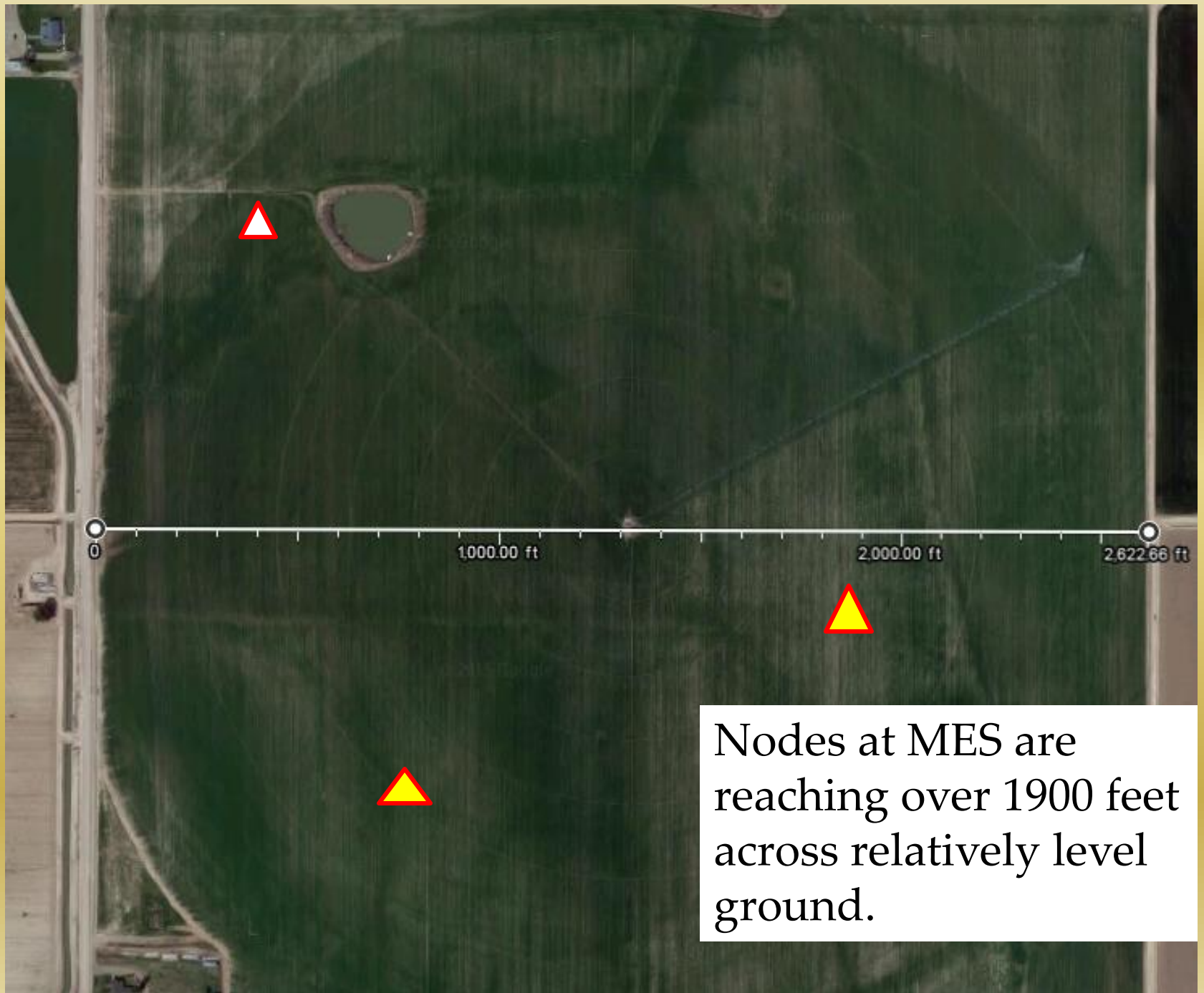


How the SensMit equipment looks



How the equipment works

- Each node can handle three moisture sensors, one soil temp and one air temp
- Nodes are solar powered
- Reports every 30 minutes
- Nodes communicate via the Fresnel Zone
 - Radio signals bounce from one to another across the mesh
 - Similar shape to a long jump rope
 - Why the nodes are 8-10' high



Nodes at MES are reaching over 1900 feet across relatively level ground.

How the website looks

[Account Settings](#) | [My Subscriptions](#)

Map

Sensmit

Utilities

Sharing

Meshes owned

B2050051

SENSMITS

STEVIA

TRAVELER #4

TRAVELER #3

TRAVELER #6

TRAVELER #5

TRAVELER #2

Shared with me

NONE

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Mesh Location

Select a Map Style: Streets

Good: Okay: Needs Attention:

Traveler #6

Status: Needs Attention

Last Data Received Time: 16 hours ago

Most Recent Sensor Readings:

MO3: 0.0

MO2: 0.0

MO1: 0.0

INT: 7.5

EXT: 7.5

TIP: 0.0

IRR: 0.0

100 m

How the website looks

SensMit Web

Clinton Shock ▾

Logout

Welcome back Clinton.

[Account Settings](#) | [My Subscriptions](#)

Meshes owned

B2050051

SENSMITS

STEVIA

[TRAVELER #4](#)

[TRAVELER #3](#)

[TRAVELER #6](#)

[TRAVELER #5](#)

[TRAVELER #2](#)

Shared with me

NONE

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Sensmit [Stevia]

[View in Mesh Analyzer](#)

[Configure](#)

Moisture

Temperature

Diagnostics

Moisture Data

Custom ▾

Max: 50 cB ▾

☐ Filter outliers ☐ Wet Up



Date Range:

Custom ▾

From:

June 18, 2014

01:00:00

To:

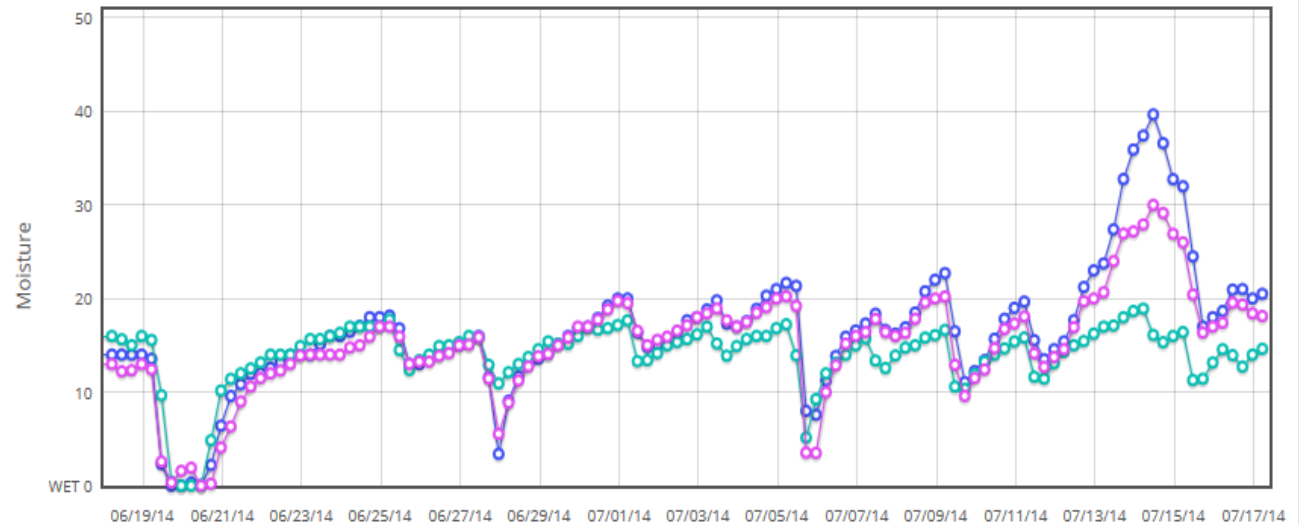
July 17, 2014

10:21:33

Apply

Selected Sensor ☒ Irrigation ☐ Rainfall ☒ Moisture 1 ☒ Moisture 2 ☒ Moisture 3

[Moisture Sensor Guide](#)



Platforms

- **AgSense by Wagnet**
- Communicates with cell phone technology to post to a website
- Does not need a base station nearby but does need cell service
- Provides soil temperature and handles 4 soil moisture sensors



How the Wagnet equipment looks



How the Wagnet website looks

saved and the data is being retrieved.

Refresh

Chart Options

Click to Hide

Series

Units are in US and Imperial measurements

- | | | | | |
|---|---|---|---|----------------------------------|
| <input checked="" type="checkbox"/> WM1 8.00" | <input checked="" type="checkbox"/> WM2 8.00" | <input checked="" type="checkbox"/> WM3 8.00" | <input checked="" type="checkbox"/> WM4 8.00" | <input type="checkbox"/> Temp5 |
| <input type="checkbox"/> WM Average | <input type="checkbox"/> WM Avg Change | <input type="checkbox"/> WM Sum | <input type="checkbox"/> WM Sum Change | <input type="checkbox"/> Battery |
| <input type="checkbox"/> Signal Strength | | | | |

Time

1 Day

2 Days

1 Week

1 Month

Start Date 7 / 18 / 2015

End Date 7 / 25 / 2015

Use Date

Other

100 Y-min

0 Y-max

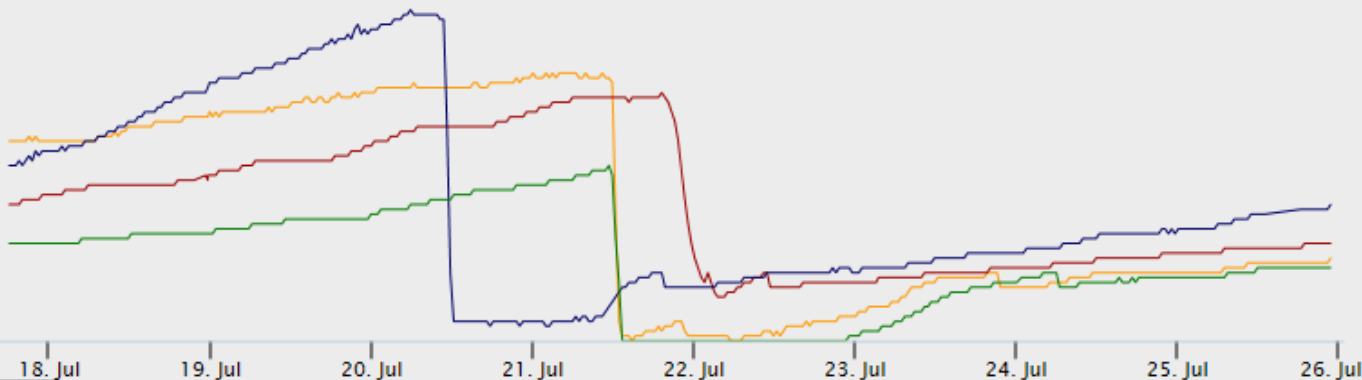
WM Sum/Average Exclusions

☐ 1-foot

8.00" / WM2 8.00" / WM3 8.00" / WM4 8.00"

55212 showing

07/17/2015 19:01:33 to 07/25/2015 23:49:56



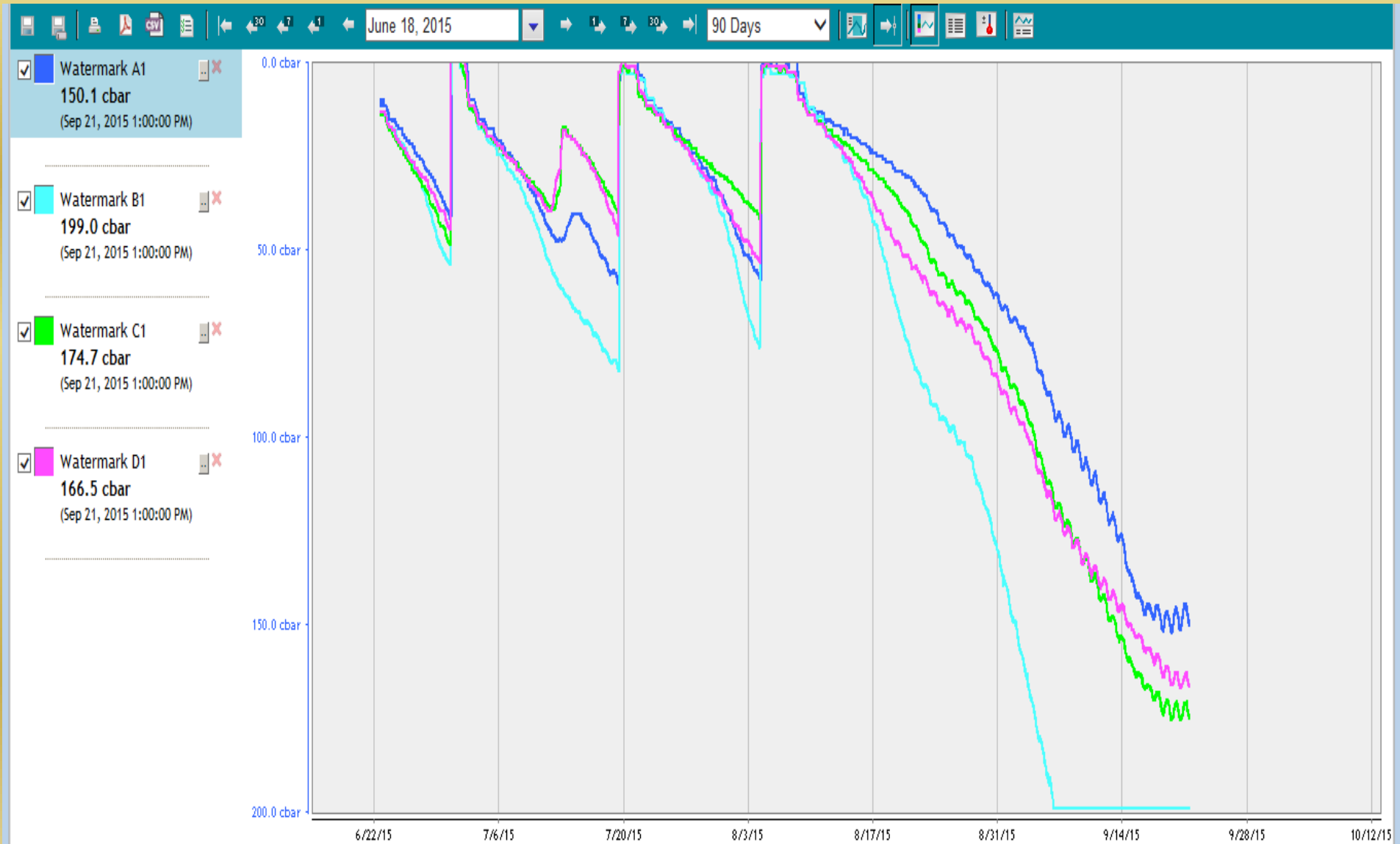
Platforms

- **McCrometer Connect**
- Utilizes cell phone technology to post data to a website
- Does not need a base station nearby but does need to have cell service
- With the proper accessories, one station can handle up to 12 sensors

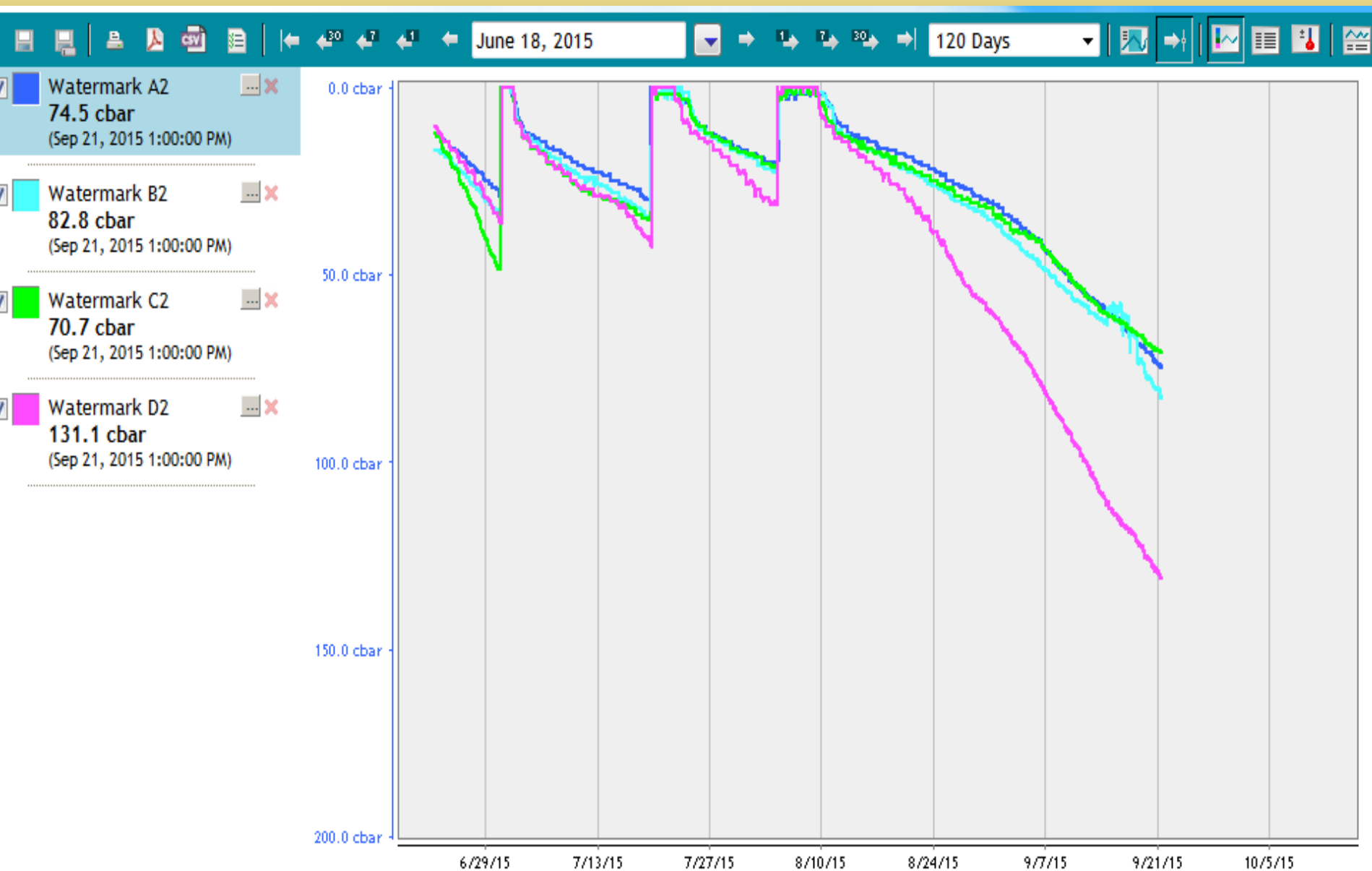
How the McCrometer equipment looks



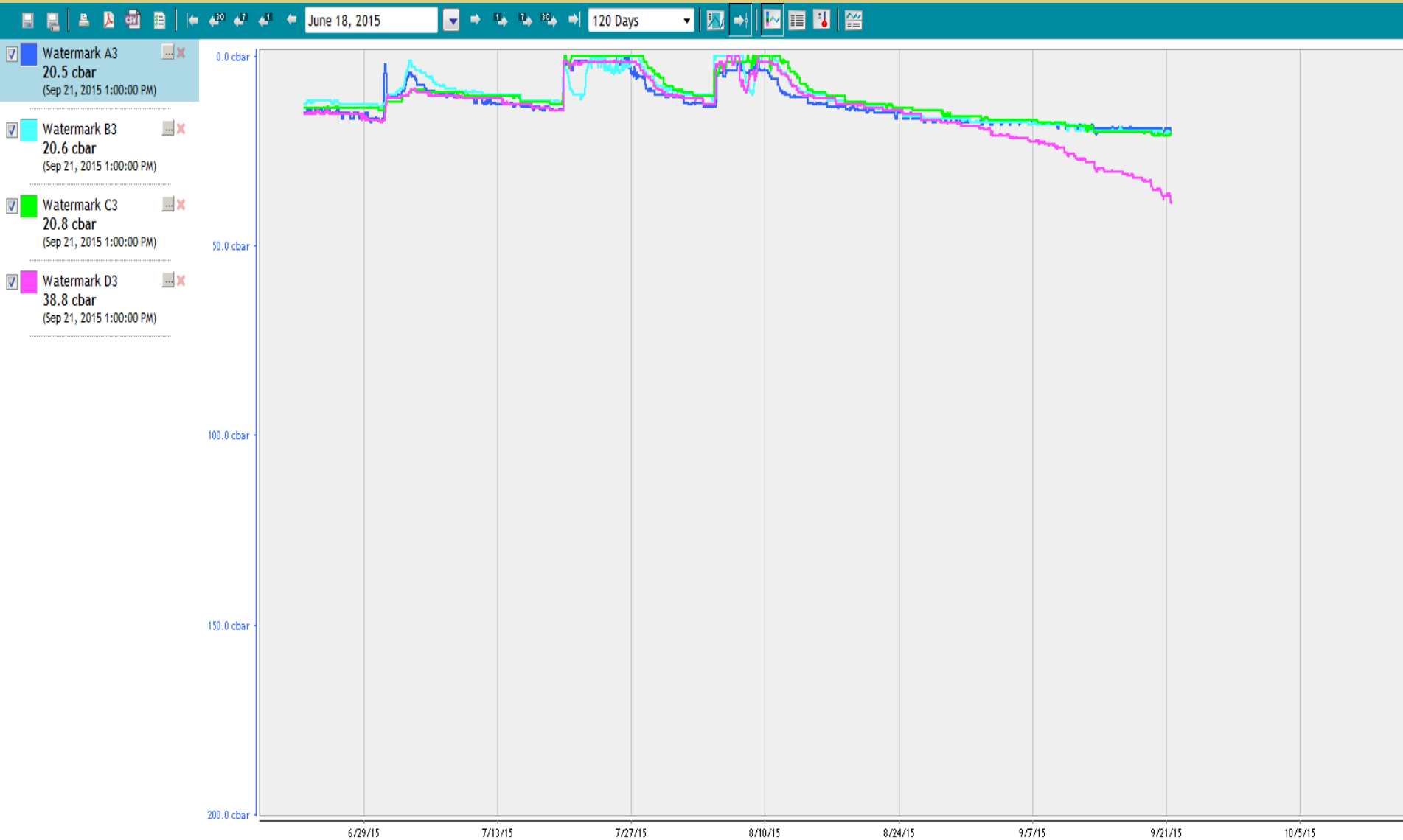
How the McCrometer data looks



How the McCrometer data looks



How the McCrometer data looks



Going forward

- One of the next steps is to work on grower adaptation
 - Some production industries see irrigation management as one of the next big frontiers



In conclusion...

- All of these have up front costs of equipment in addition to yearly subscription fees
- Can and will be a useful tool for growers who learn more and more about irrigation management
 - Especially true as the irrigation methods change over time (pivots, drip)

Thank you!

Are there any questions?



INEPTITUDE

IF YOU CAN'T LEARN TO DO SOMETHING WELL,
LEARN TO ENJOY DOING IT POORLY.