# Soil Moisture Monitoring with Remote Sensors

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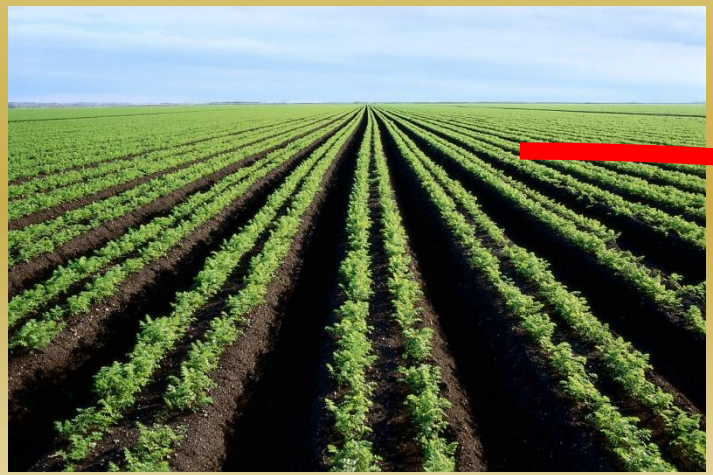
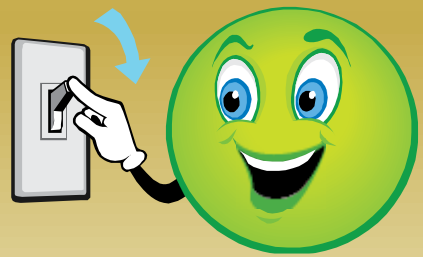
# Plan Today

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



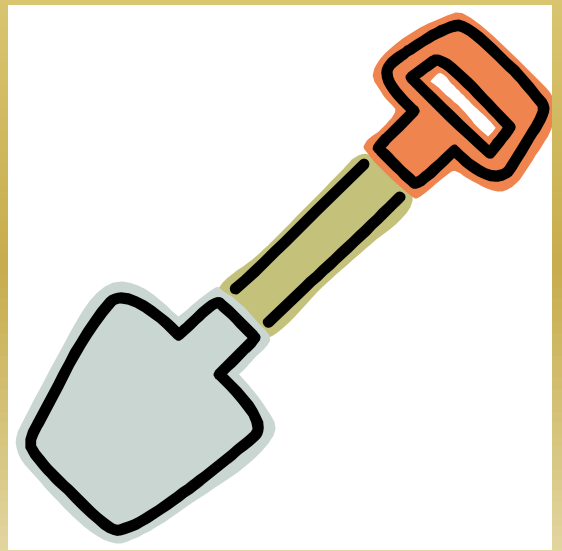
# The Irrigation Goal:

- 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



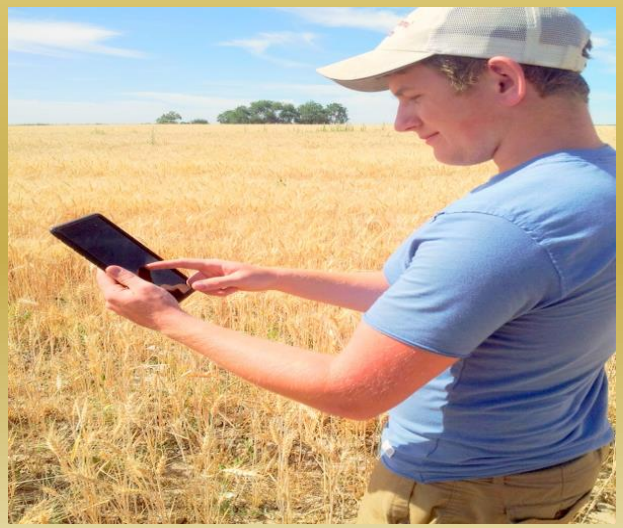
# All the platforms sampled used:

## Watermark Sensors

Photo courtesy of Irrometer.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


0
1,000.00 ft
2,000.00 ft
2,622.66 ft


0
1,000.00 ft
2,000.00 ft
2,622.66 ft


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

# Platforms

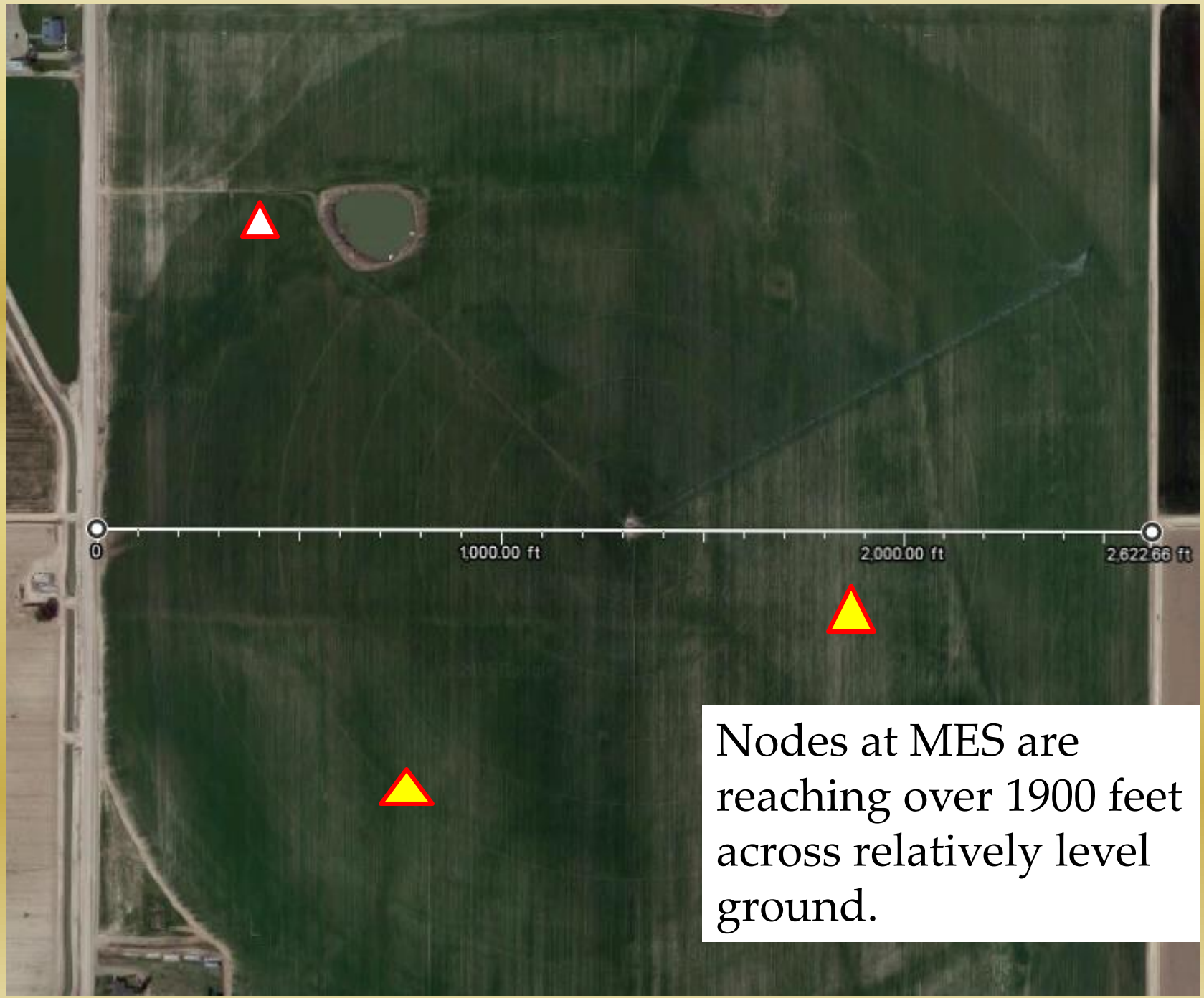
- **SensMit Web** by iDUS Controls Ltd. -working with Reinke & Irrometer
  - Reports to a computer through a base station
  - Posts and logs data to a website
- Utilized by a grid of deployed nodes

  Data is relayed across a mesh to the base station

# How the SensMit equipment looks

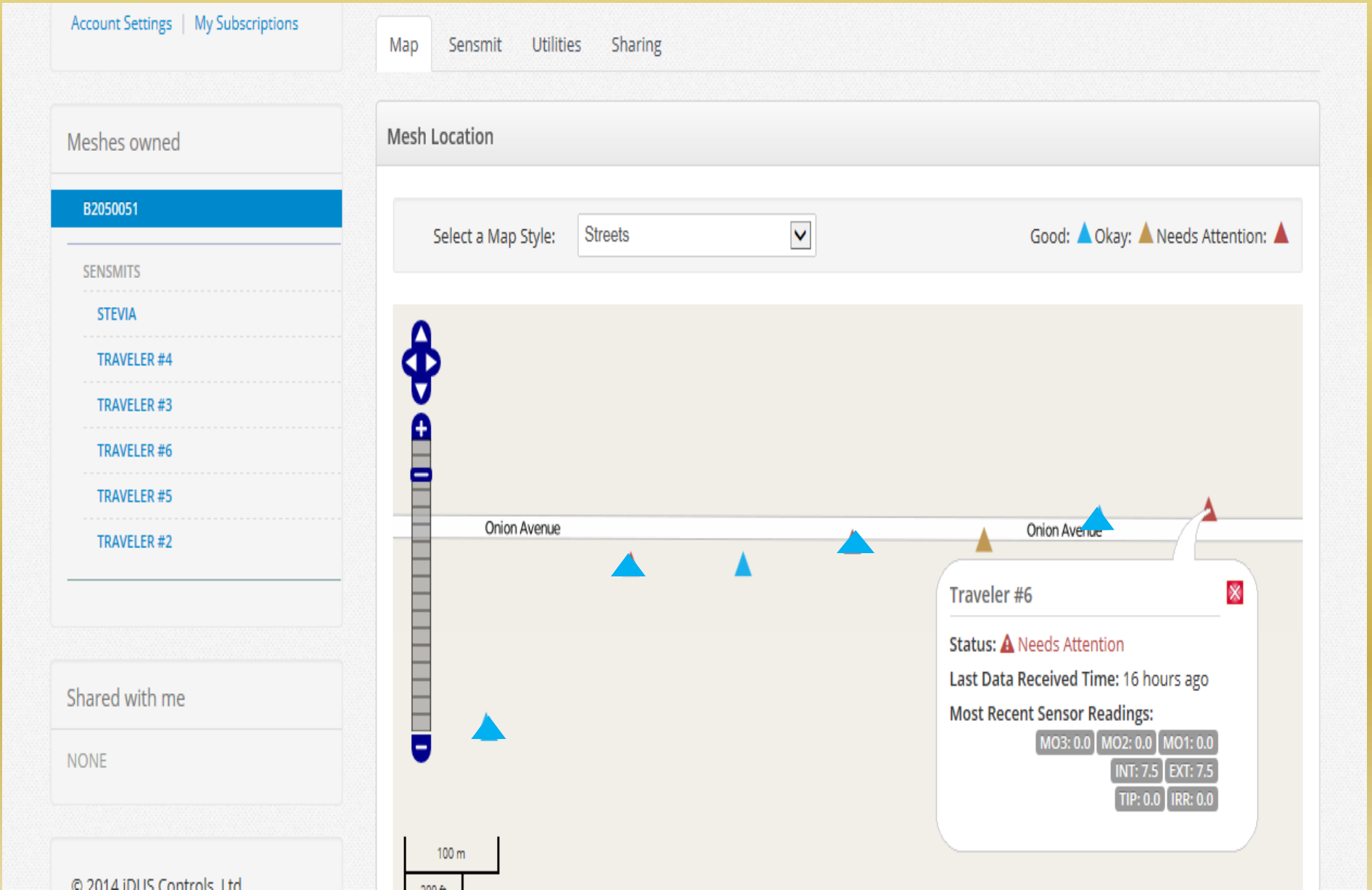

# How the equipment works

- 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



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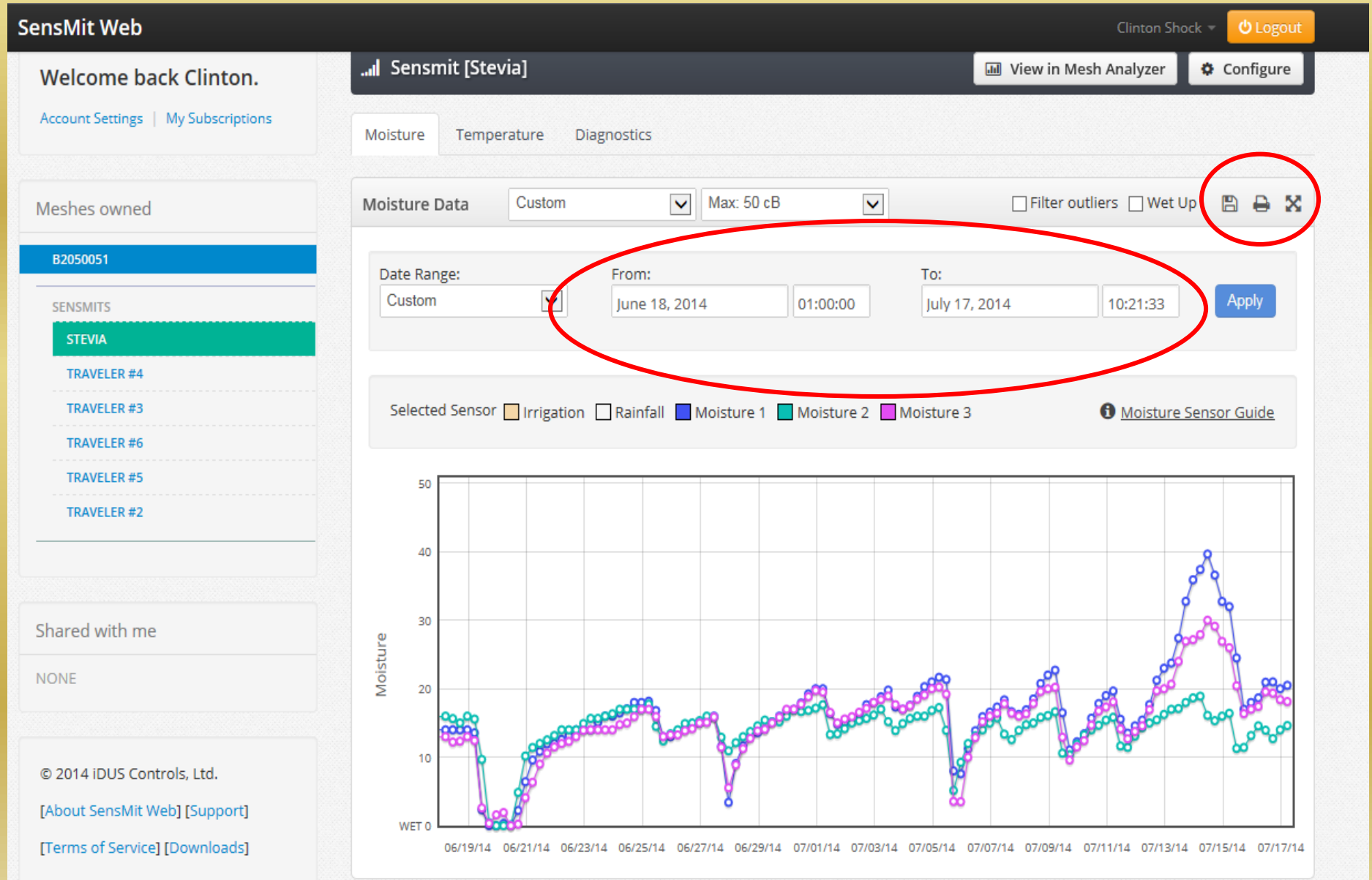
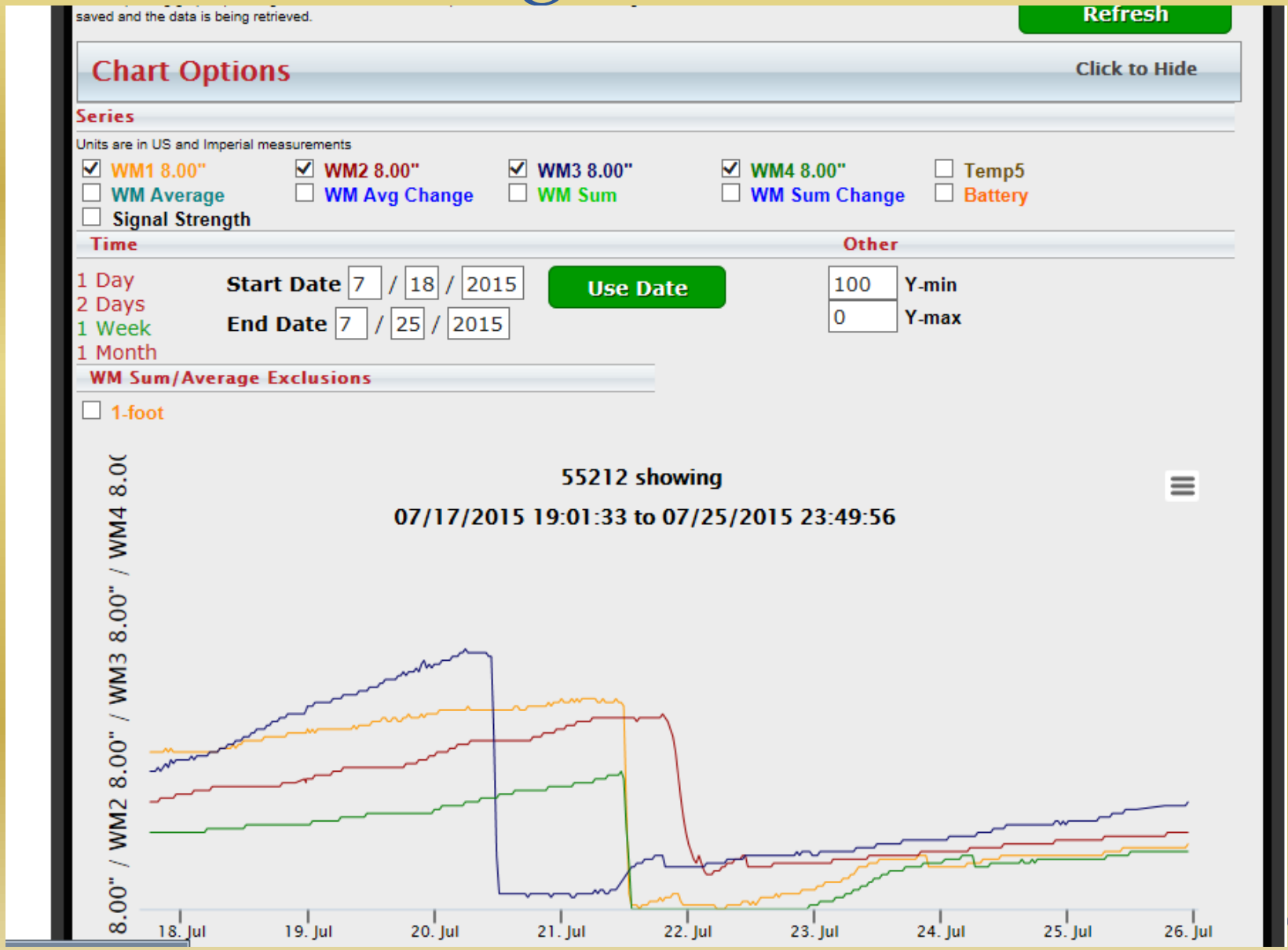


# Platforms

- **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

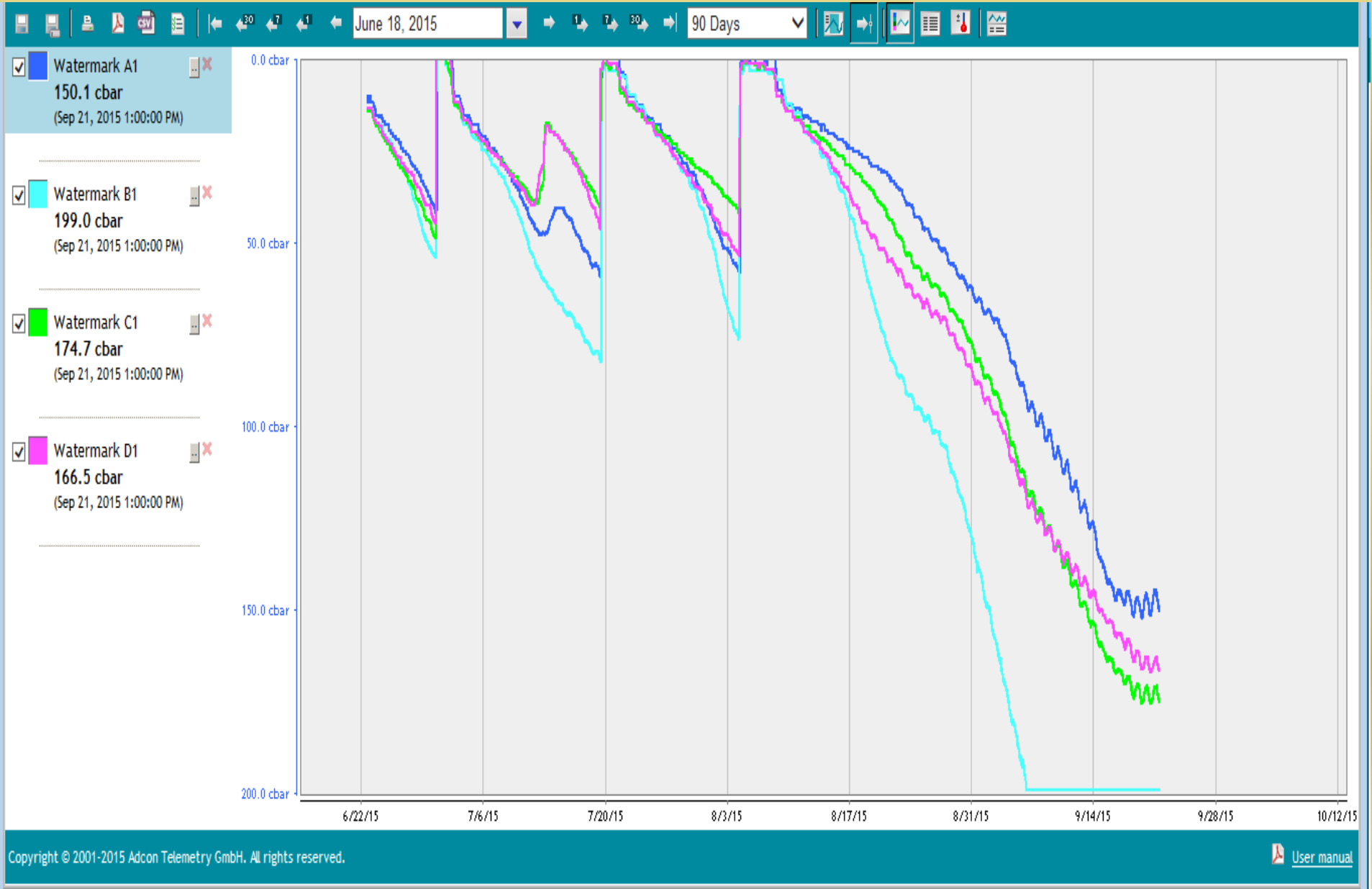


# Platforms

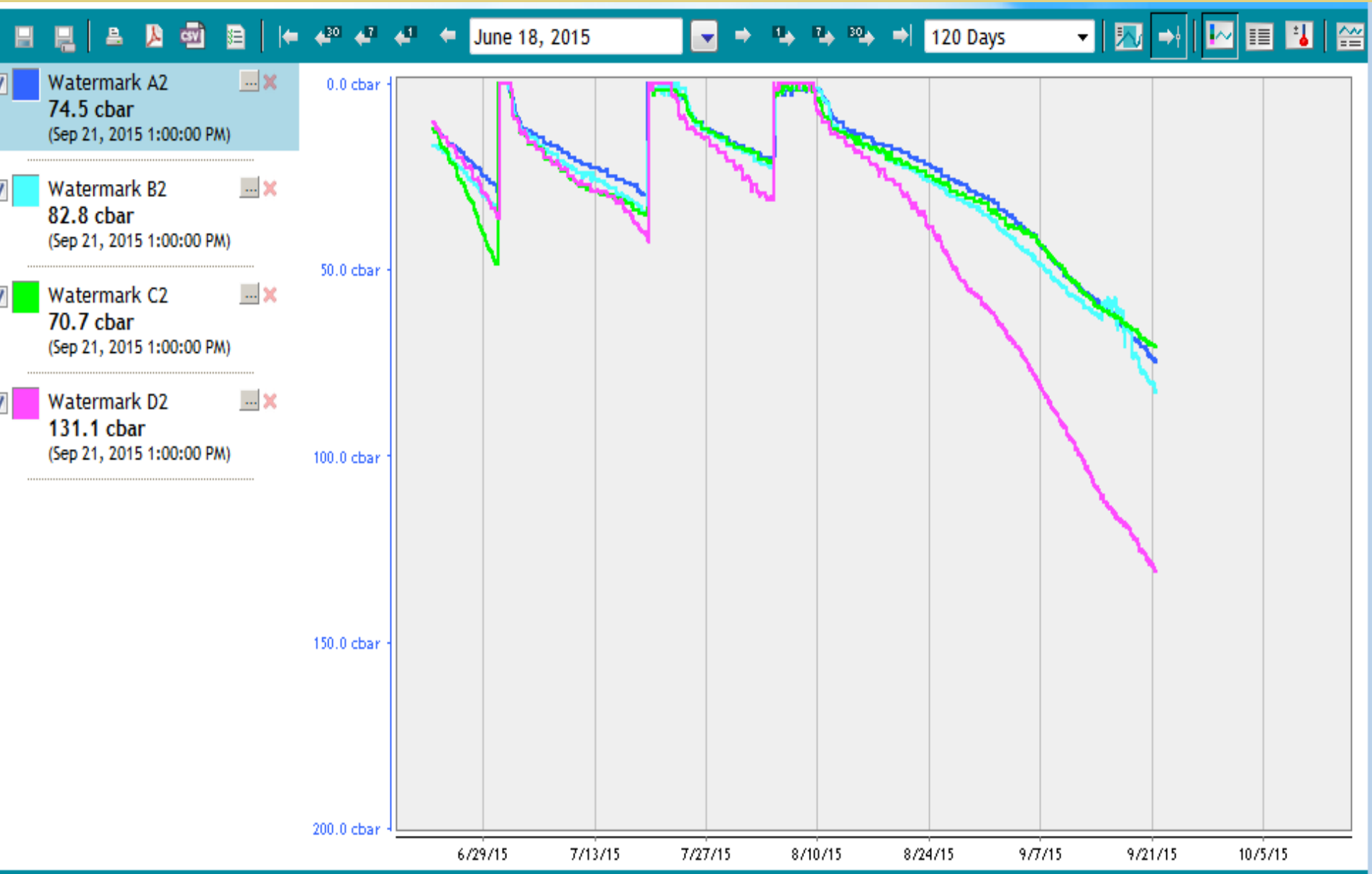
- **McCrometer Connect**
- Utilizes cell phone technology to post data to a website
- Does not need a base station nearby but does need to have cell service
- With the proper accessories, one station can handle up to 12 sensors

# 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?