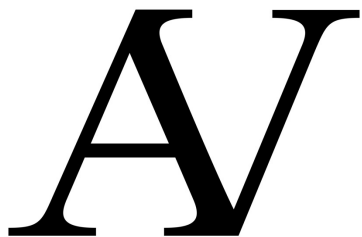


WIV 2022



Vineyard Water Management: tools, techniques and applications

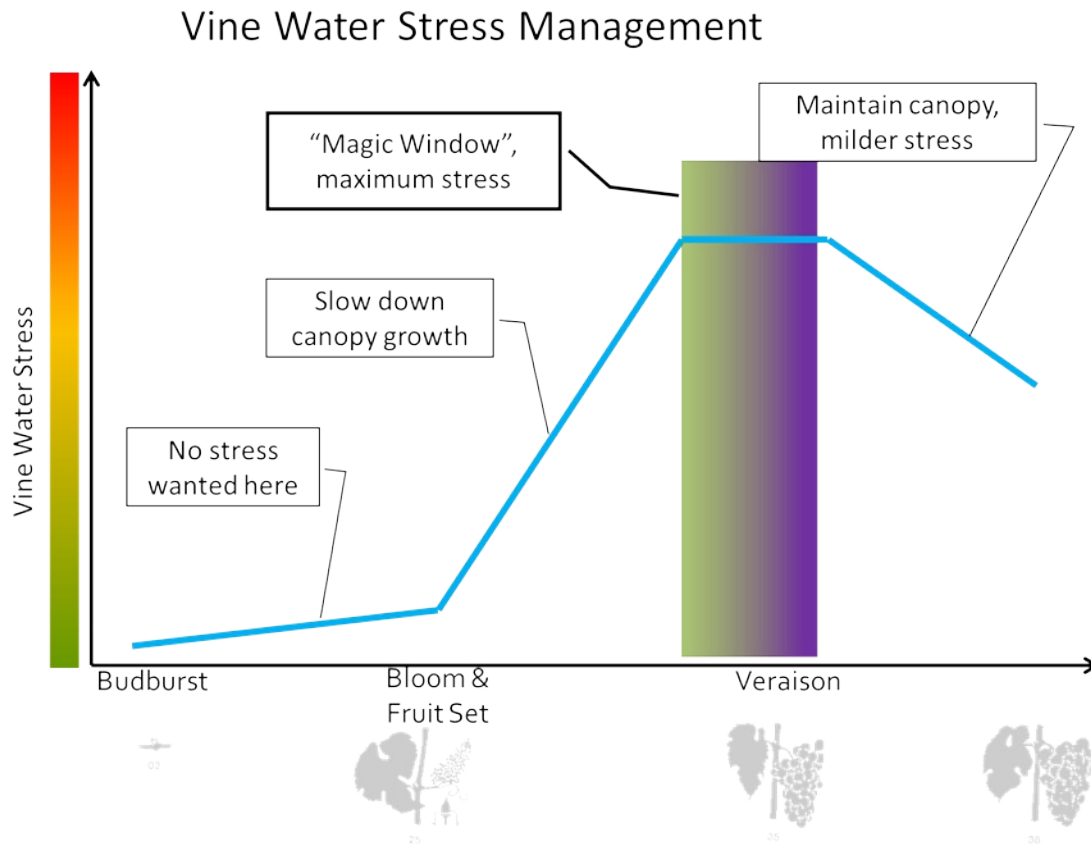


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Monitoring Vine and Soil

- Track vine water stress to hit target levels at the right time
- Track vine water stress to avoid excessive stress
- Vine water stress cannot tell us how much and how often to irrigate
- Soil moisture cannot tell us precisely how stressed the vines are
- Soil moisture monitoring can be used to schedule irrigations
- Soil moisture monitoring can indicate depth of percolation and water consumption

The vine is maturing the fruit, so measure the vine!



Plant Water Status Measurement – “Traditional” tools

Pressure Chamber



- Measures leaf water potential
- Biophysical stress measurement
- More commonly used than porometer
- Device is rugged, but heavy

Porometer

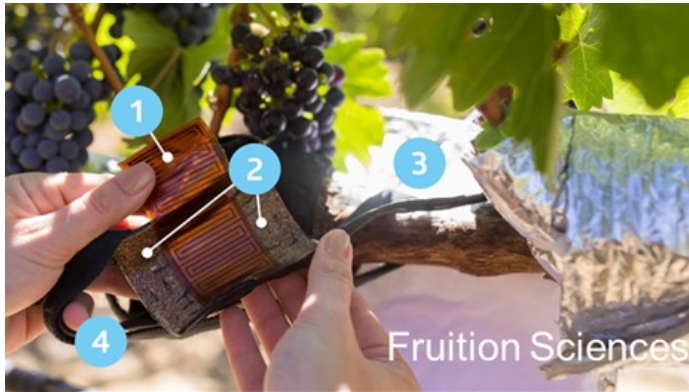
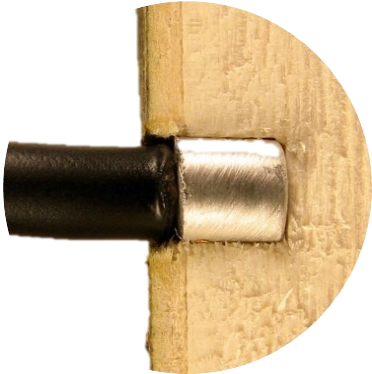
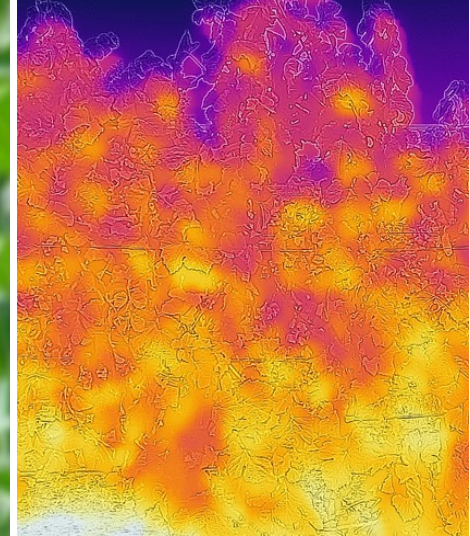
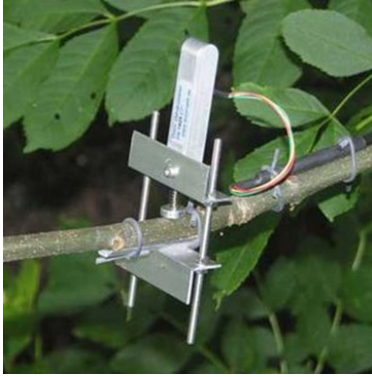


- Measures stomatal conductance
- Good indicator of physiological stress
- Requires more measurements than the pressure chamber
- Device is delicate, but easy to use

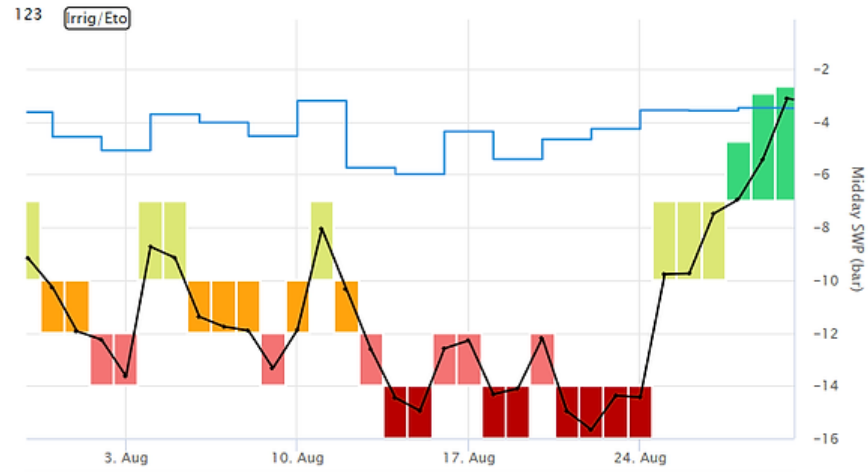
What about automation?

- Midday or pre-dawn measurement windows
- Time and expense of shlepping equipment
- Snapshot measurement
- Weather can complicate measurements

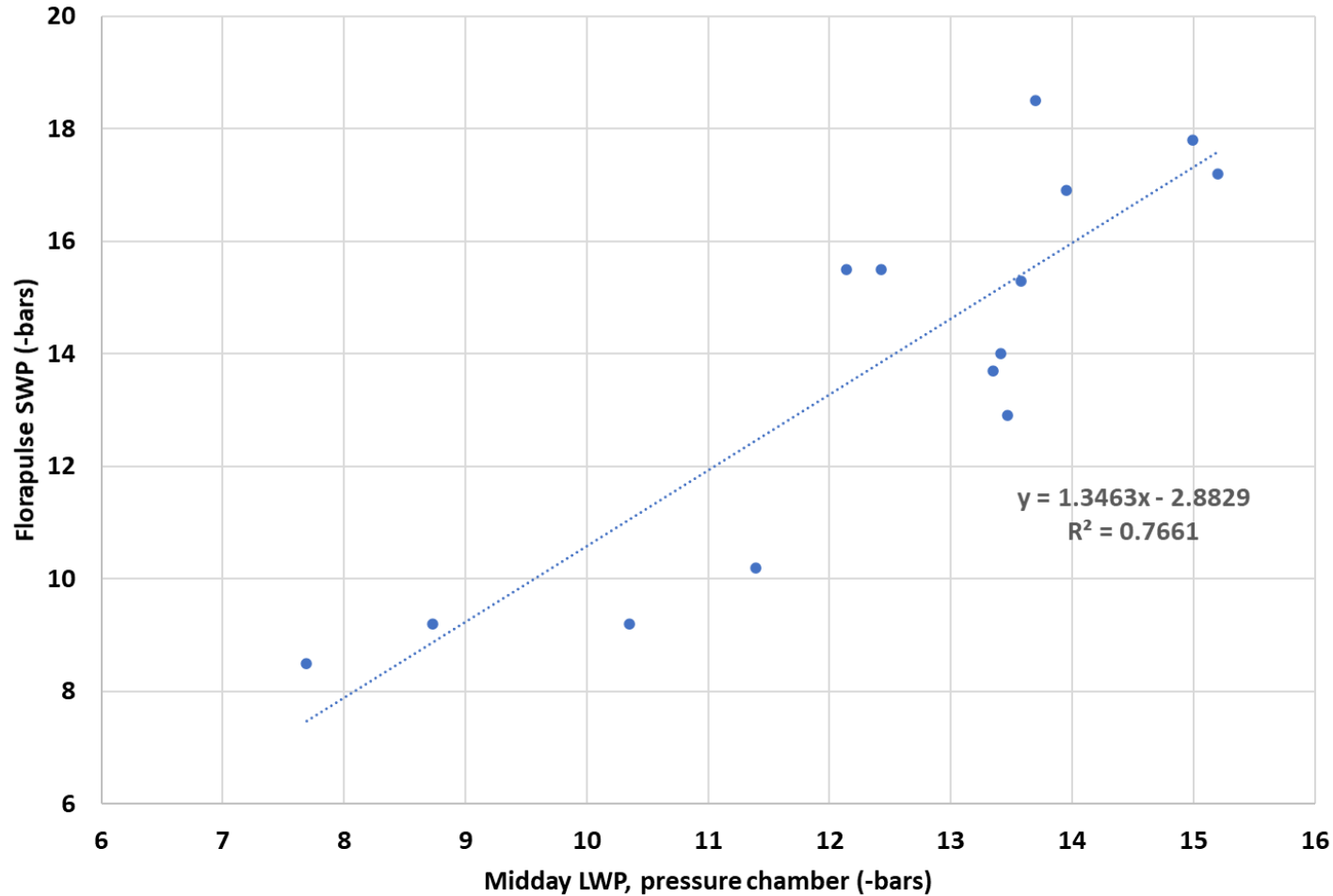
Automatable Technologies



Florapulse microtensiometer



2021 data: SWP, florapulse vs LWP, manual

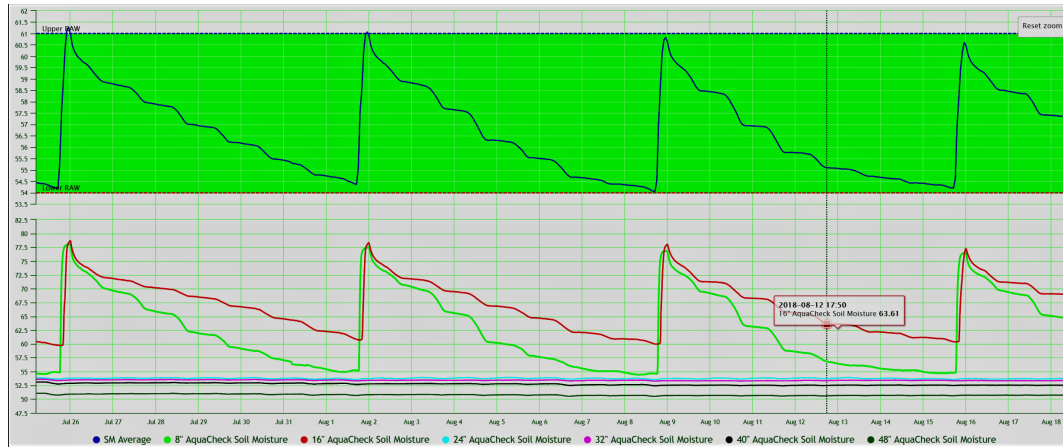


Soil moisture for irrigation scheduling

- Plant water stress measurements cannot tell us how to irrigate
 - They can only tell us if we need to irrigate more or less
 - We need other tools for irrigation scheduling
 - ET – using Penman or Energy Budget/Surface Renewal
 - Can tell us how much water needs to be replaced over a given amount of time.
 - But not how much or how often we should irrigate
- Soil moisture profile probes can tell us how much and how often to irrigate

Soil moisture is best when not made complicated

- Soil moisture devices should be placed in a representative location
- But its not necessary to calibrate them or to use multiple sensors in an irrigation block
- We just need a reliable, repeatable and continuous measurement



Types of soil moisture devices

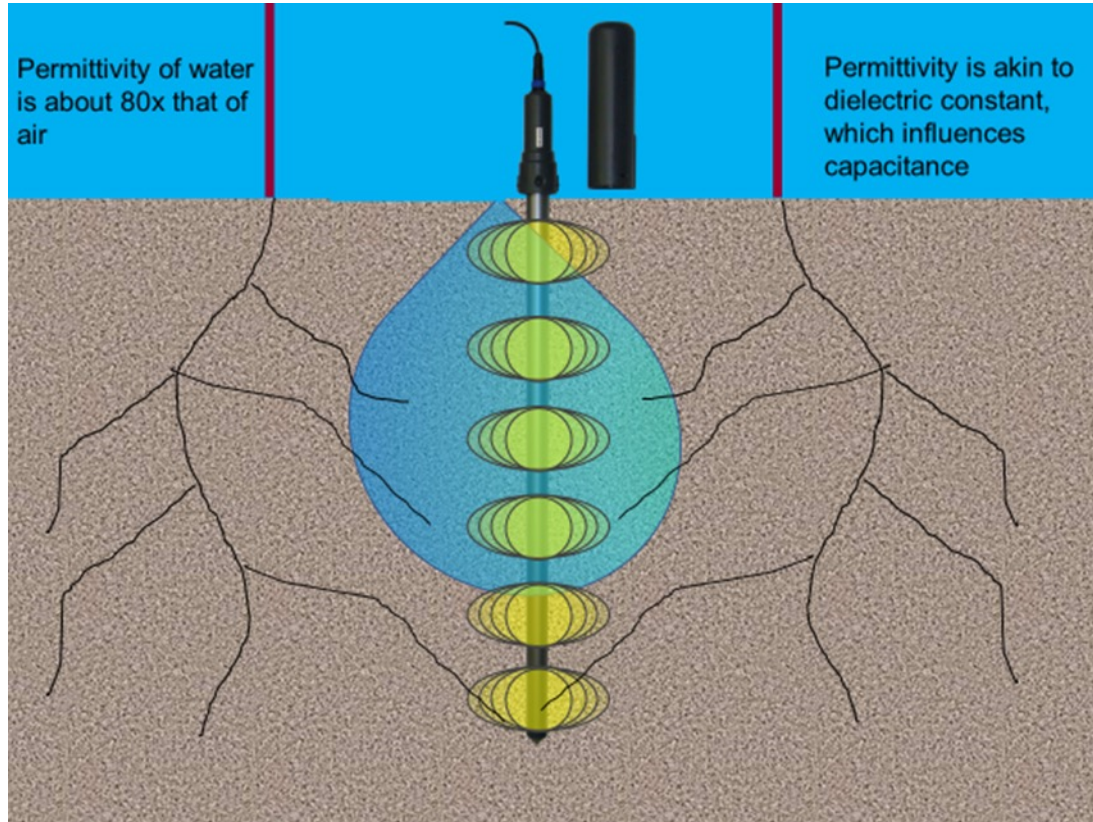
- Moisture block sensors do have limited lifespan
- Individual capacitance sensors are also prone to failure

BUT:

- Sealed, moisture probes have essentially unlimited lifespan



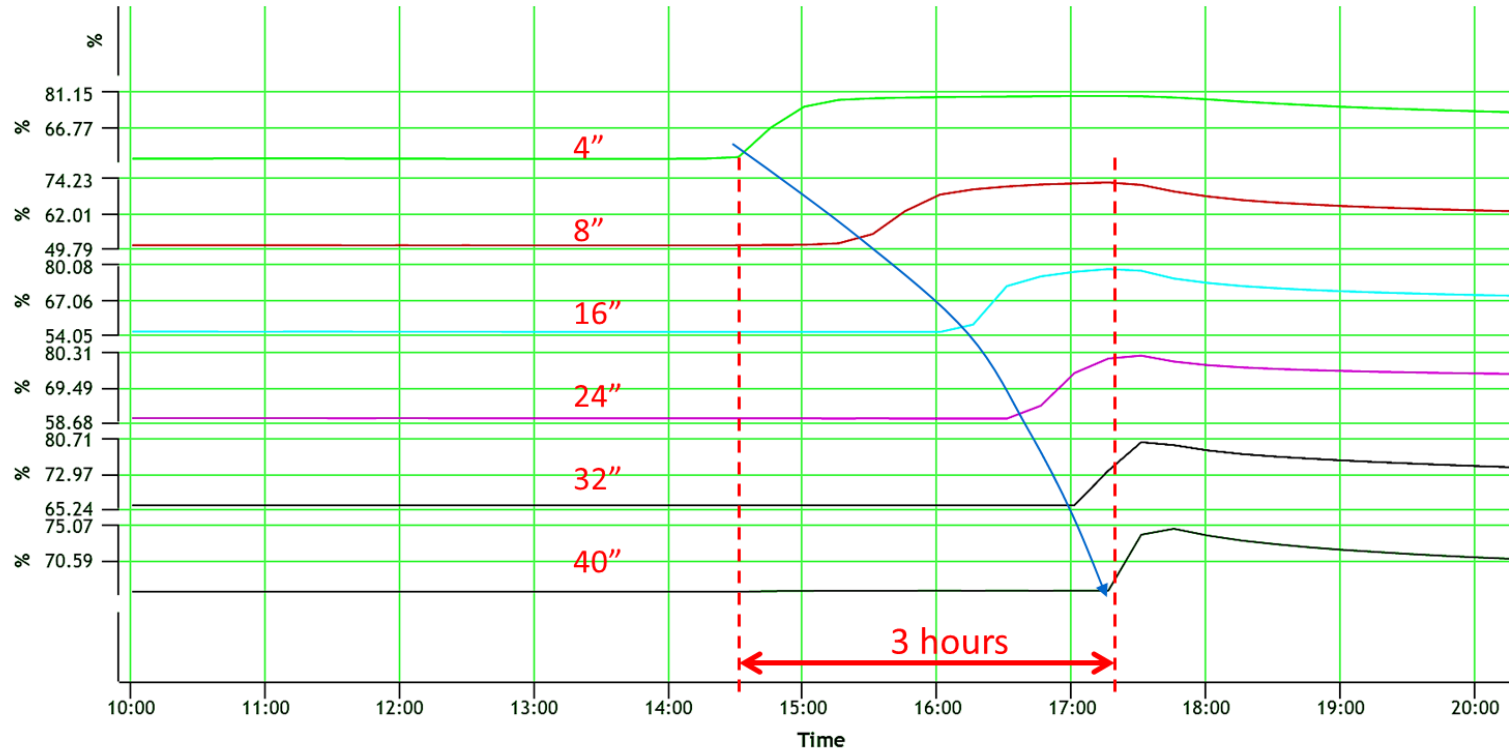
Capacitance probes use an electromagnetic field to sense moisture content



Soil moisture measurement for drip irrigation

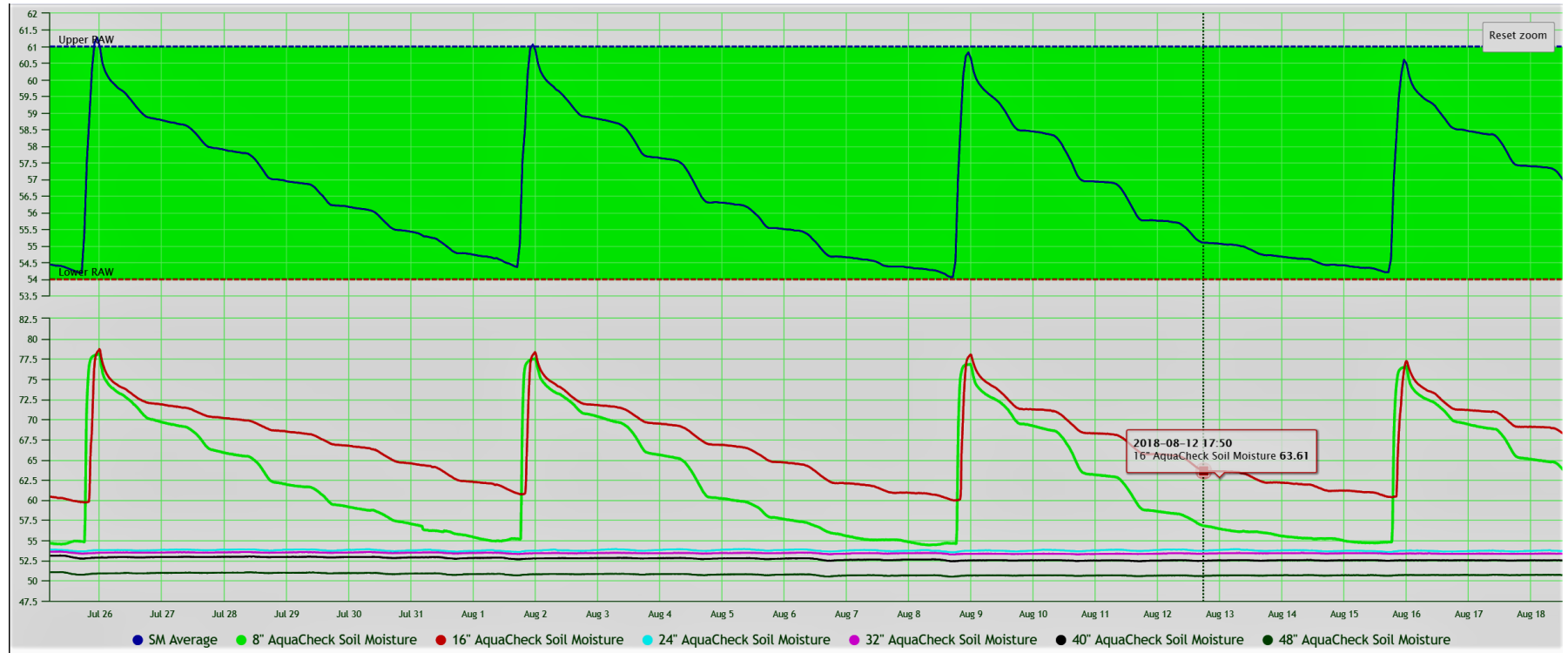
- Close placement of sensor relative to emitter is critical
- Volumetric water content calibrations are not essential nor beneficial
 - Instruments may be used uncalibrated: relative water content
 - Practical “calibrations” are noting what moisture contents are desirable for any specific location per plant water status targets

...and to determine depth of irrigation and time for profile wetting...

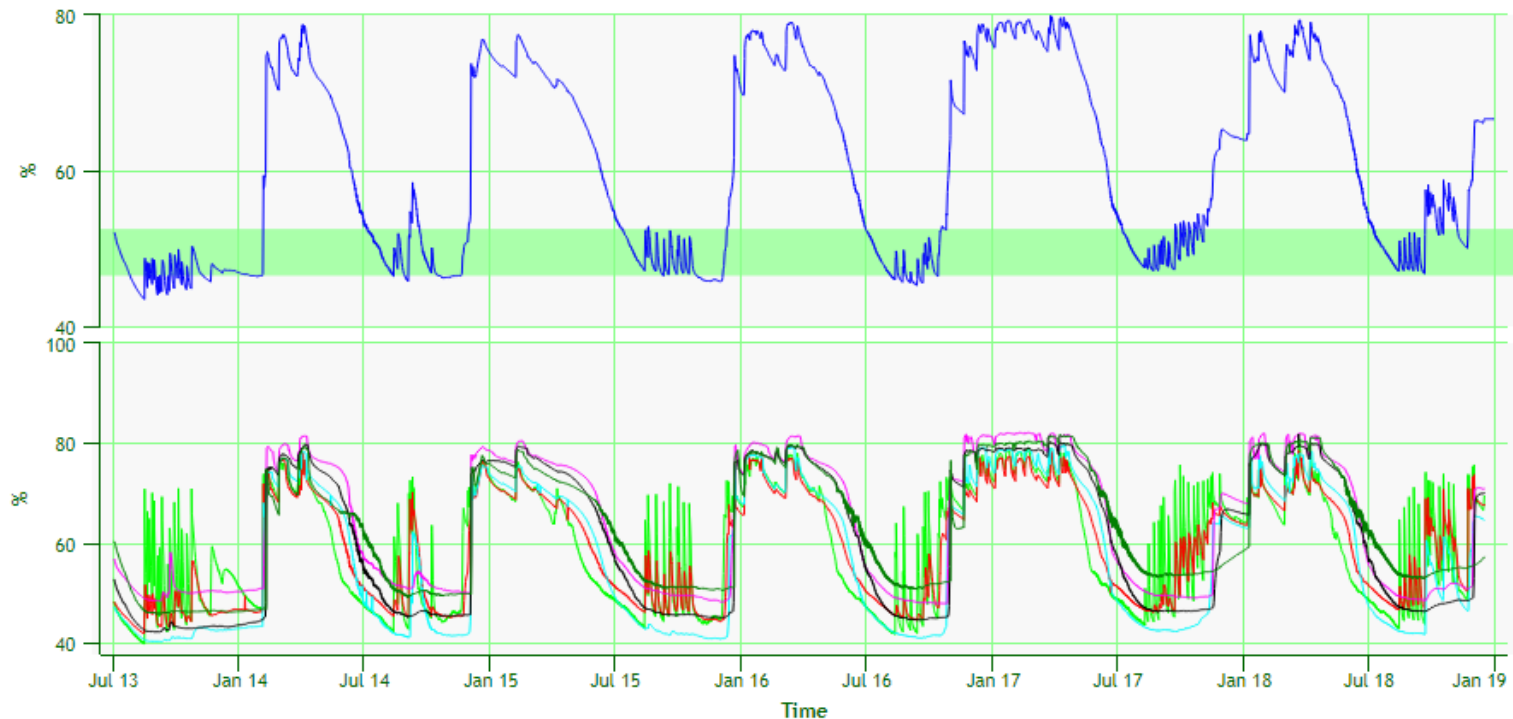


— [5104:20] Block 14 SM Average — [5104:6.1] 4" AquaCheck SDI-12 Probe — [5104:6.2] 8" AquaCheck SDI-12 Probe
 — [5104:6.3] 16" AquaCheck SDI-12 Pr... — [5104:6.4] 24" AquaCheck SDI-12 Pr... — [5104:6.5] 32" AquaCheck SDI-12 Pr...
 — [5104:6.6] 40" AquaCheck SDI-12 Pr... — [5104:21] Block 14 Irrigation On/...

...and for timing of precise irrigations



Using historical irrigation as reference



— [654:30] Avg Soil Moisture Row 40 — [654:3.1] Row 40 8" AquaCheck Probe — [654:3.2] Row 40 16" AquaCheck Pr...
— [654:3.3] Row 40 24" AquaCheck Pr... — [654:3.4] Row 40 32" AquaCheck Pr... — [654:3.5] Row 40 40" AquaCheck Pr...
— [654:3.6] Row 40 48" AquaCheck Pr...

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