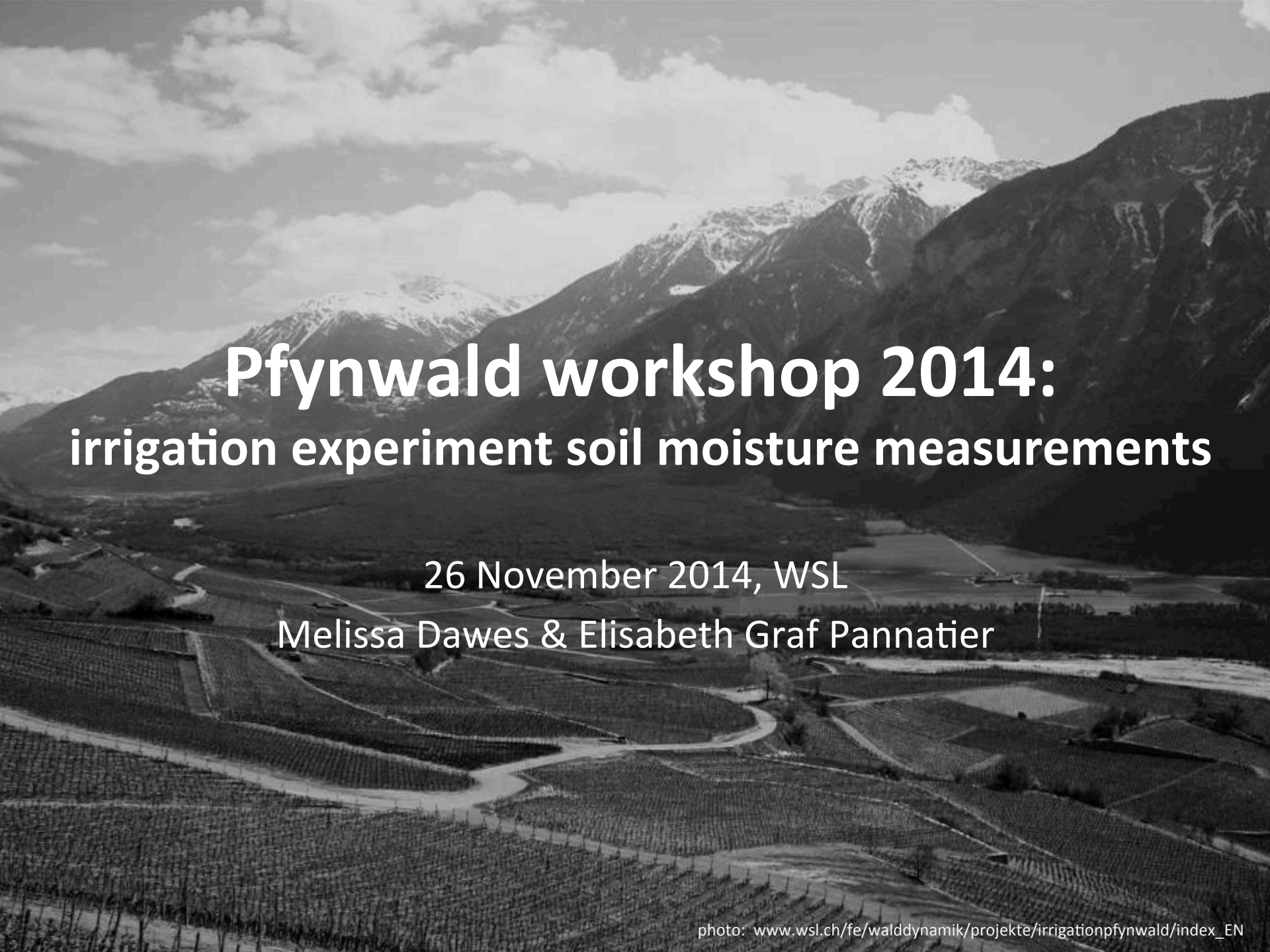


Pfynwald workshop 2014:
irrigation experiment soil moisture measurements

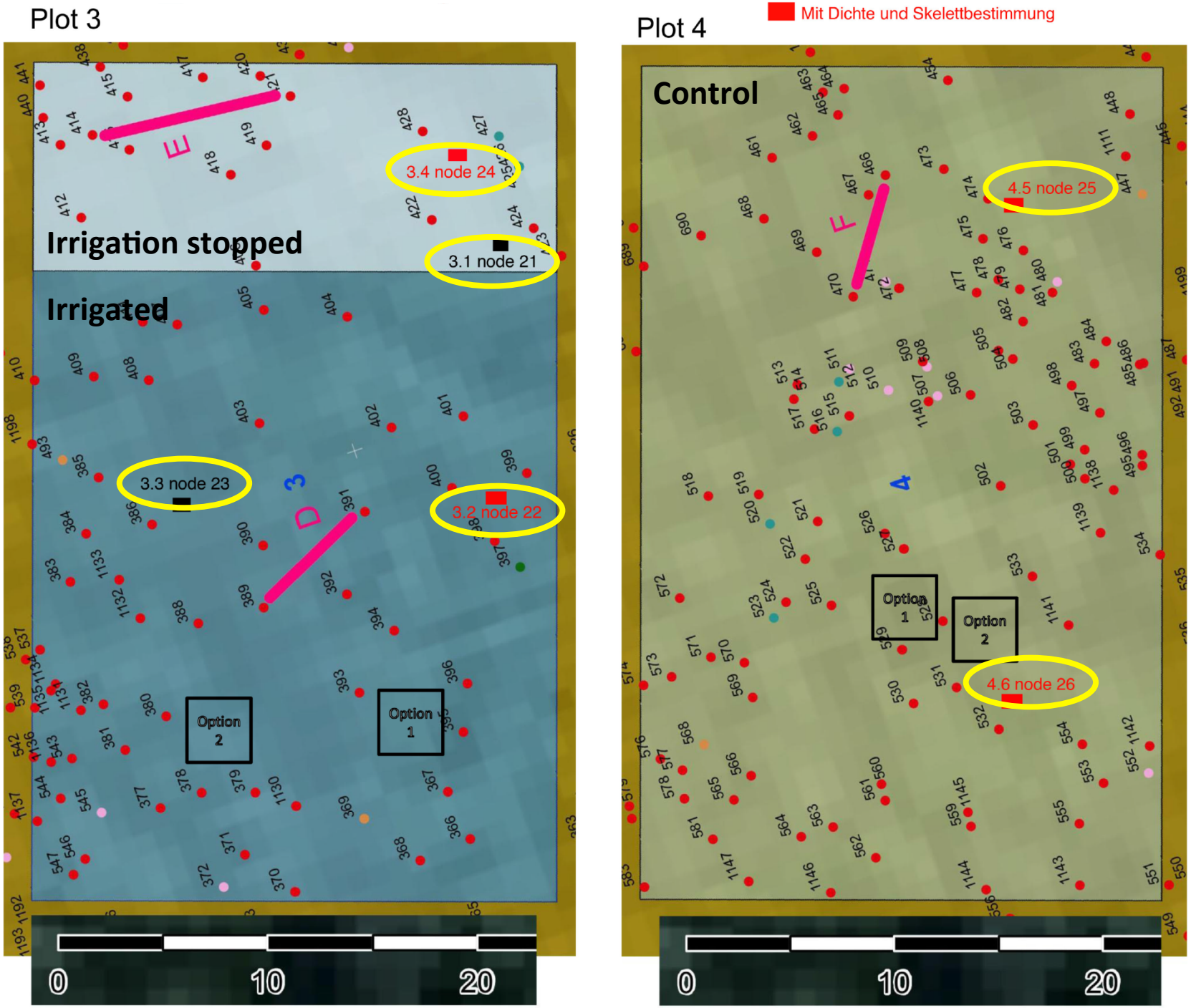
26 November 2014, WSL

Melissa Dawes & Elisabeth Graf Pannatier

photo: www.wsl.ch/fe/walddynamik/projekte/irrigationpfynwald/index_EN

Soil moisture measurements

- Old TDR sensor system in plots 1 and 2
  - Most sensors not functioning by 2013
  - No data available since April 2014
  - Plan to remove sensors in spring 2015
- New DecentLab sensor system in plots 3-8
  - Sensors installed 7-11 April 2014
  - Decagon Devices 10HS: soil volumetric water content
  - Decagon Devices MPS2: soil matric water potential and soil temperature
  - 2 locations per plot and treatment combination
  - 2 sensor depths (10 and 80 cm) at each location


Plot 3
Irrigation stopped
Irrigated
3.4 node 24
3.1 node 21
3.3 node 23
3.2 node 22
Option 2
Option 1
E
D
3
0
10
20
Plot 4
Mit Dichte und Skelettbestimmung
Control
4.5 node 25
4.6 node 26
F
4
Option 1
Option 2
0
10
20

sensor installation – spring 2014

decentLab

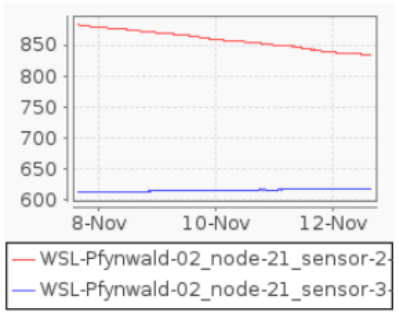
Decentralized monitoring solutions

Easy to deploy
Easy to access
Easy to maintain

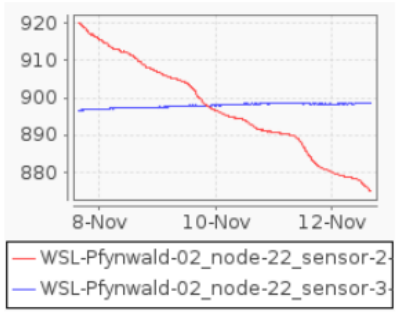
http://haze.decentlab.com/wsl-pfynwald-02/

Deployments WSL-Pfynwald-02 for WSL Forest Soils and Biogeochemistry

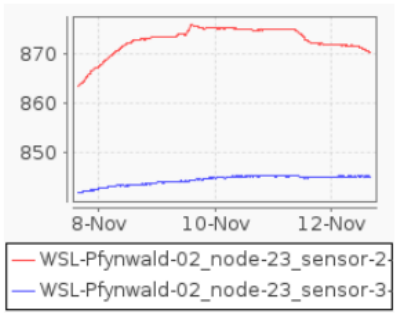
Node-21
10HS [mV]



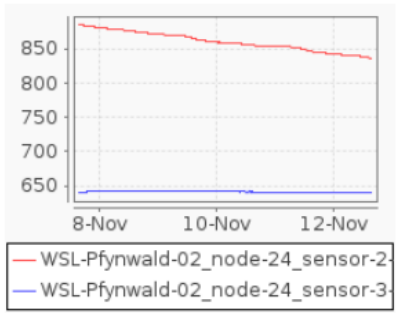
Node-22
10HS [mV]



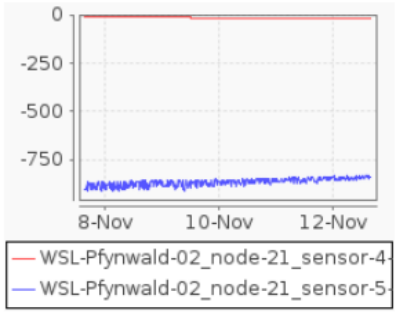
Node-23
10HS [mV]



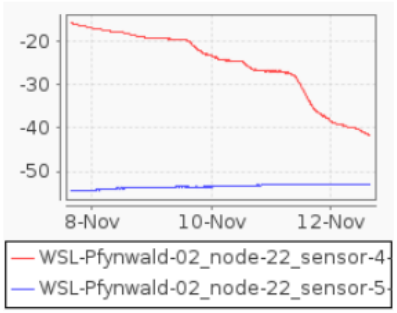
Node-24
10HS [mV]



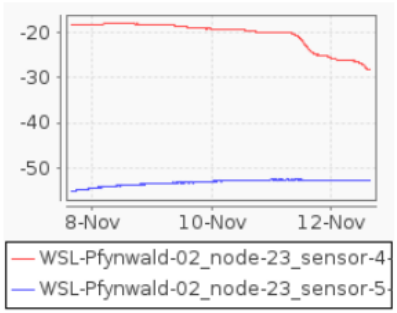
Node-21
MPS-2 Water potential [kPa]



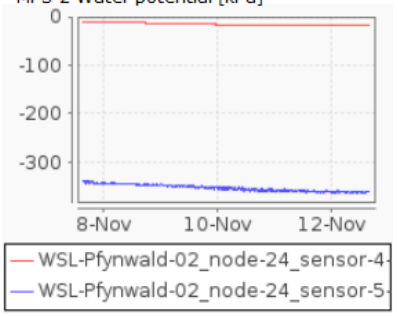
Node-22
MPS-2 Water potential [kPa]



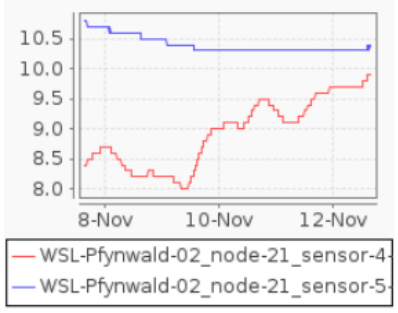
Node-23
MPS-2 Water potential [kPa]



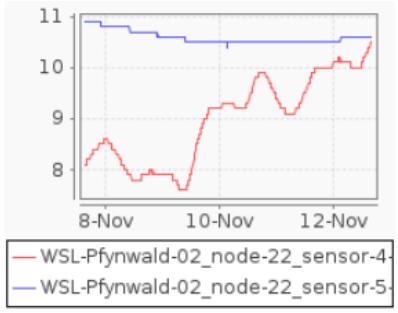
Node-24
MPS-2 Water potential [kPa]



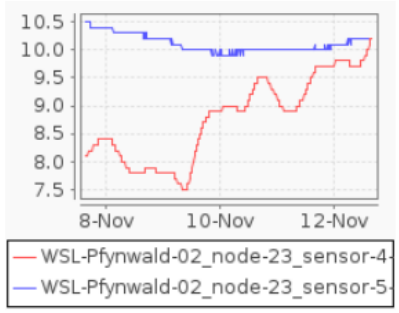
Node-21
MPS-2 Soil temperature [°C]



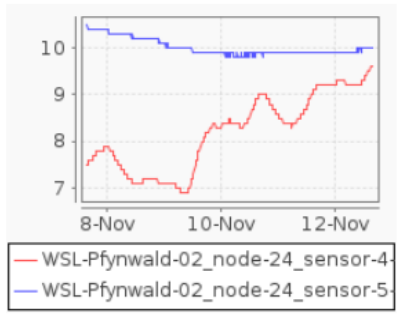
Node-22
MPS-2 Soil temperature [°C]

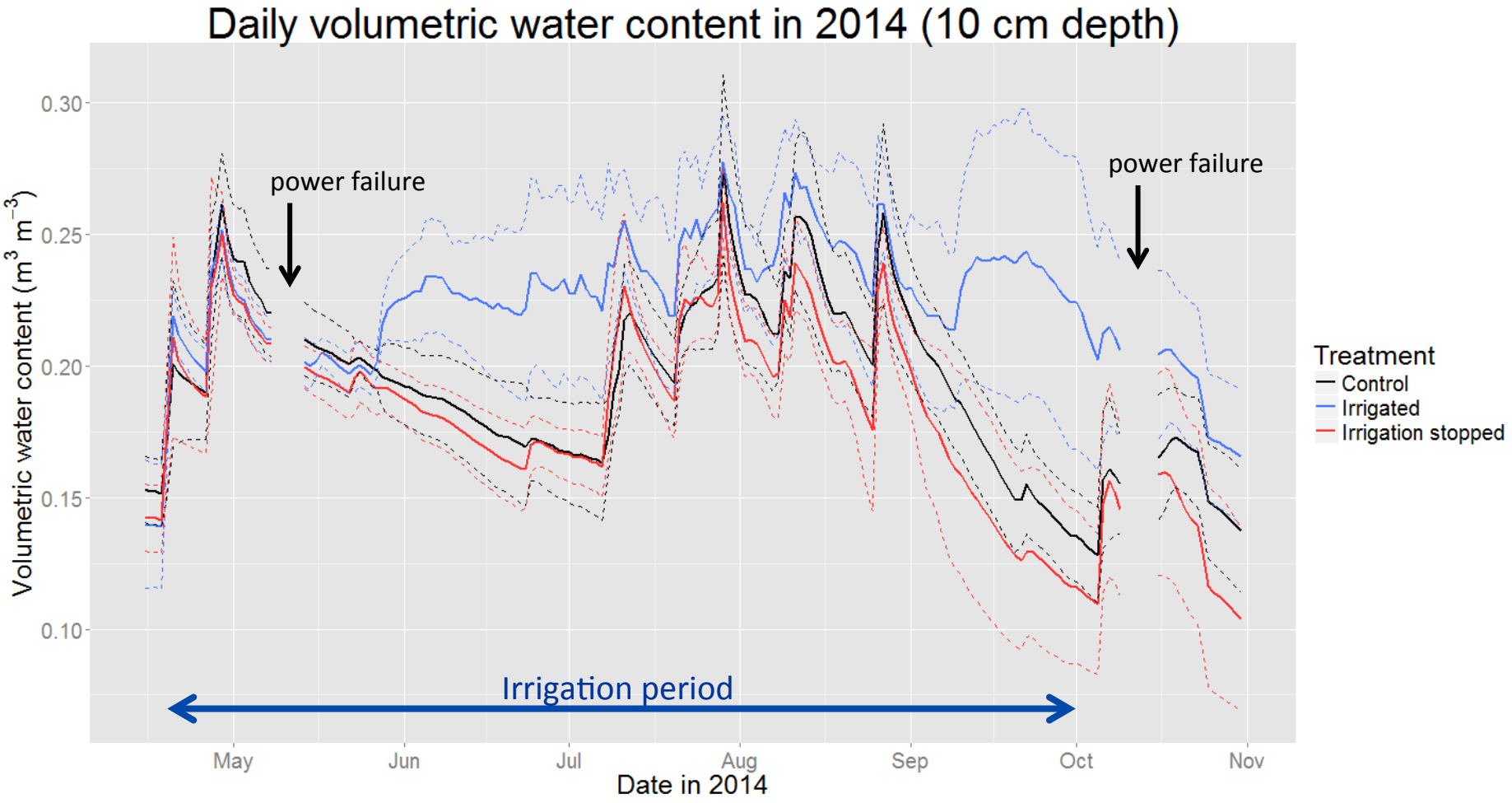


Node-23
MPS-2 Soil temperature [°C]

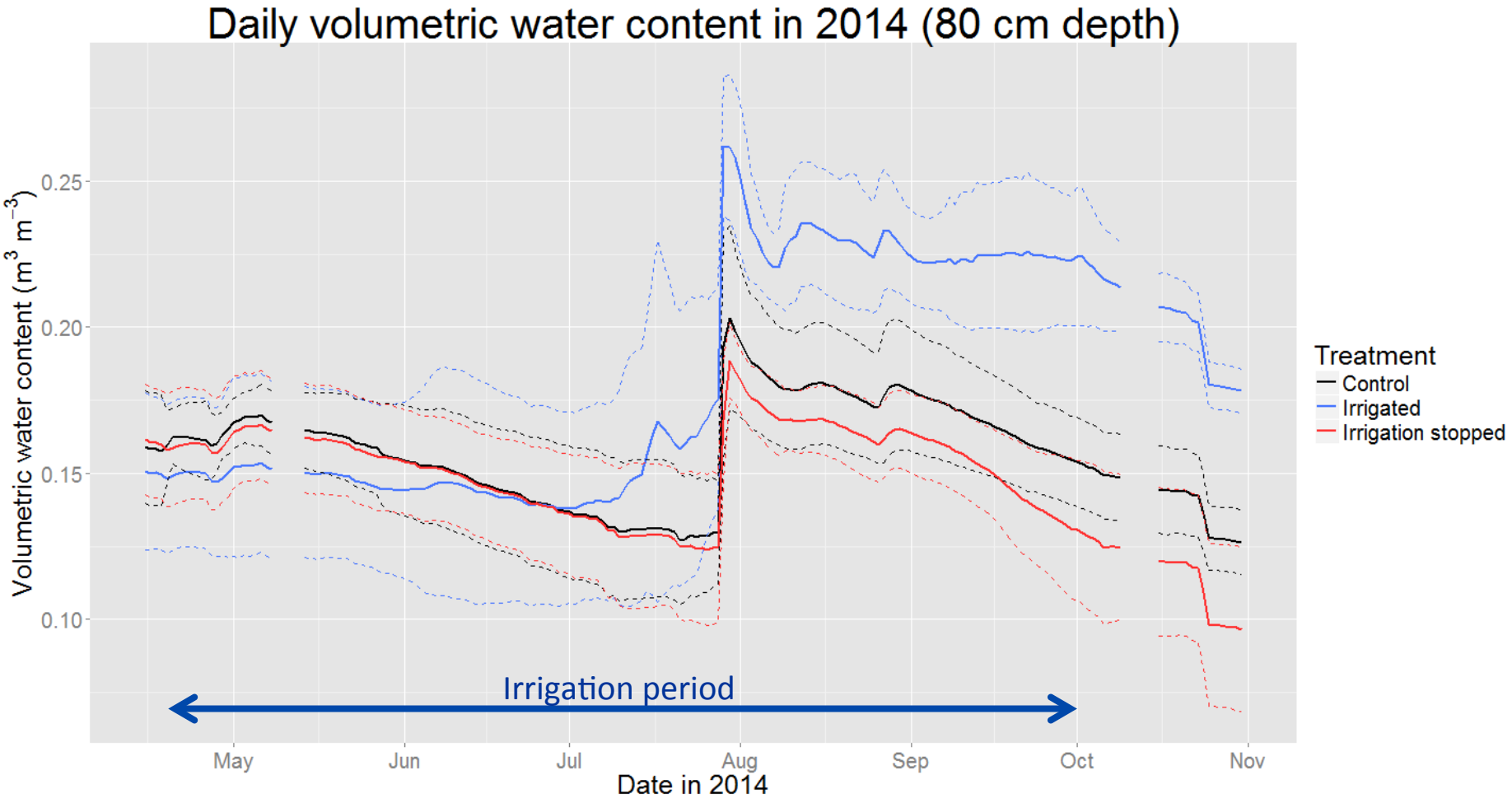


Node-24
MPS-2 Soil temperature [°C]

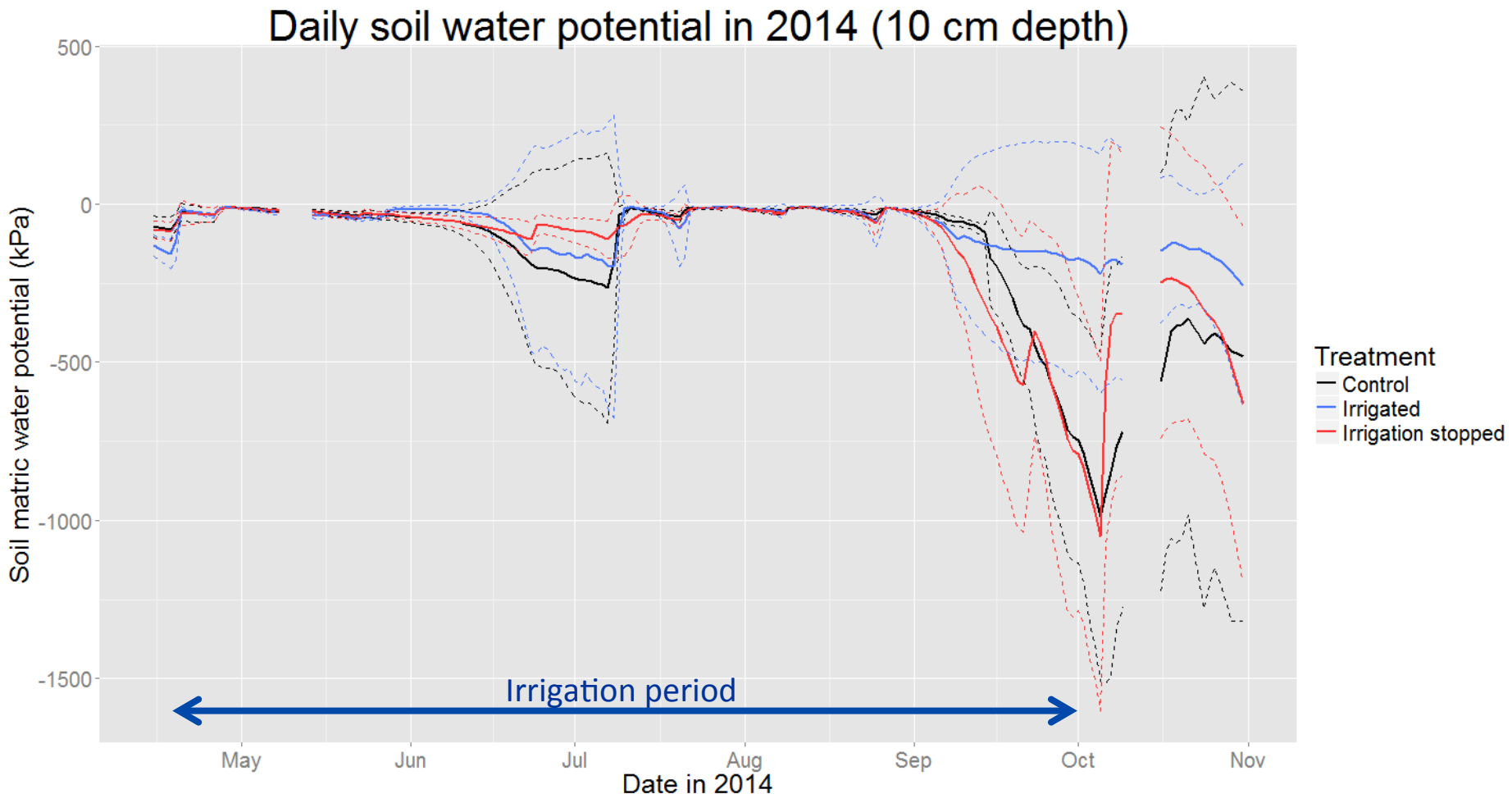




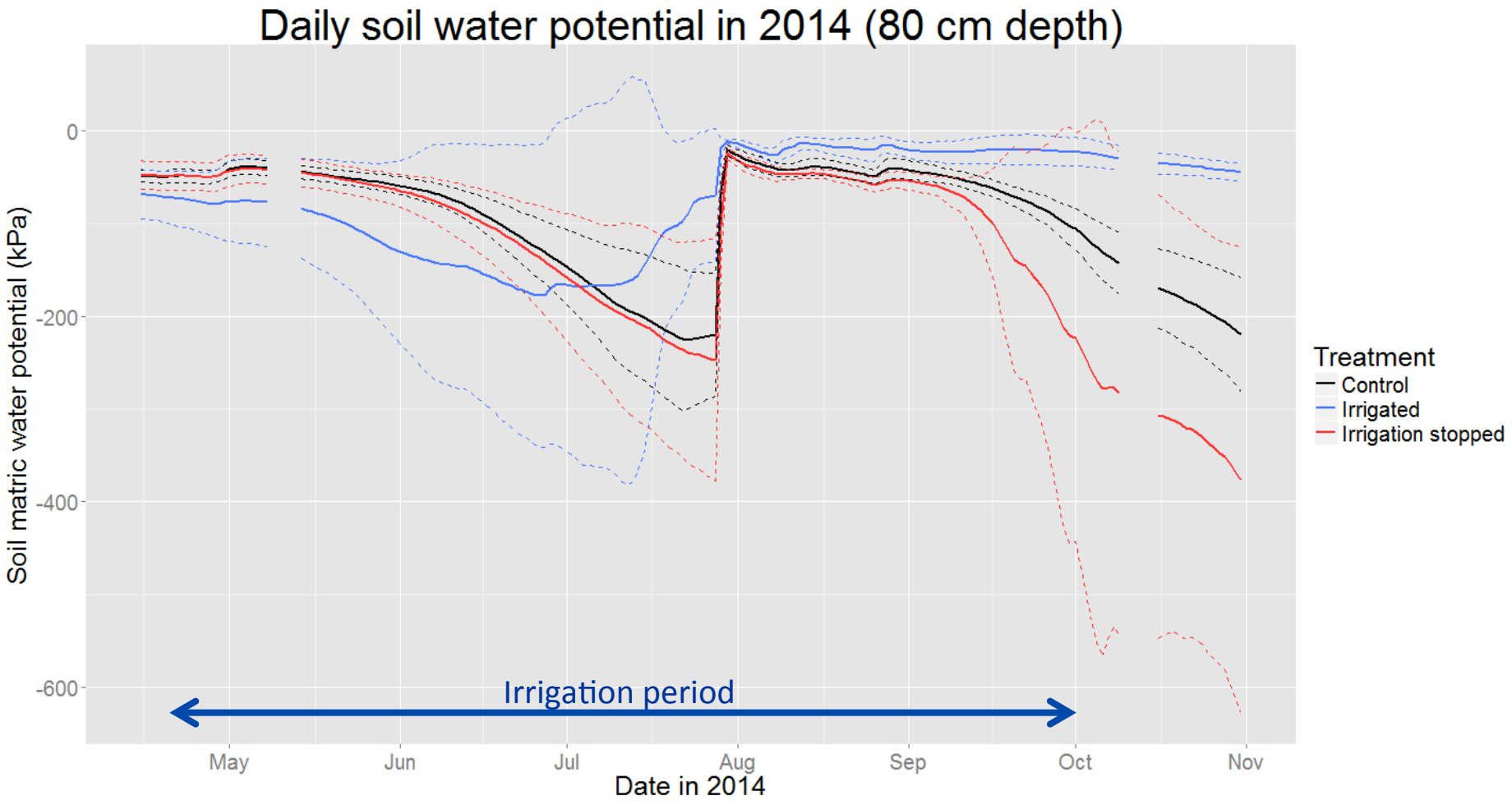
Mean values and 95% confidence intervals for each treatment group [n = 6]



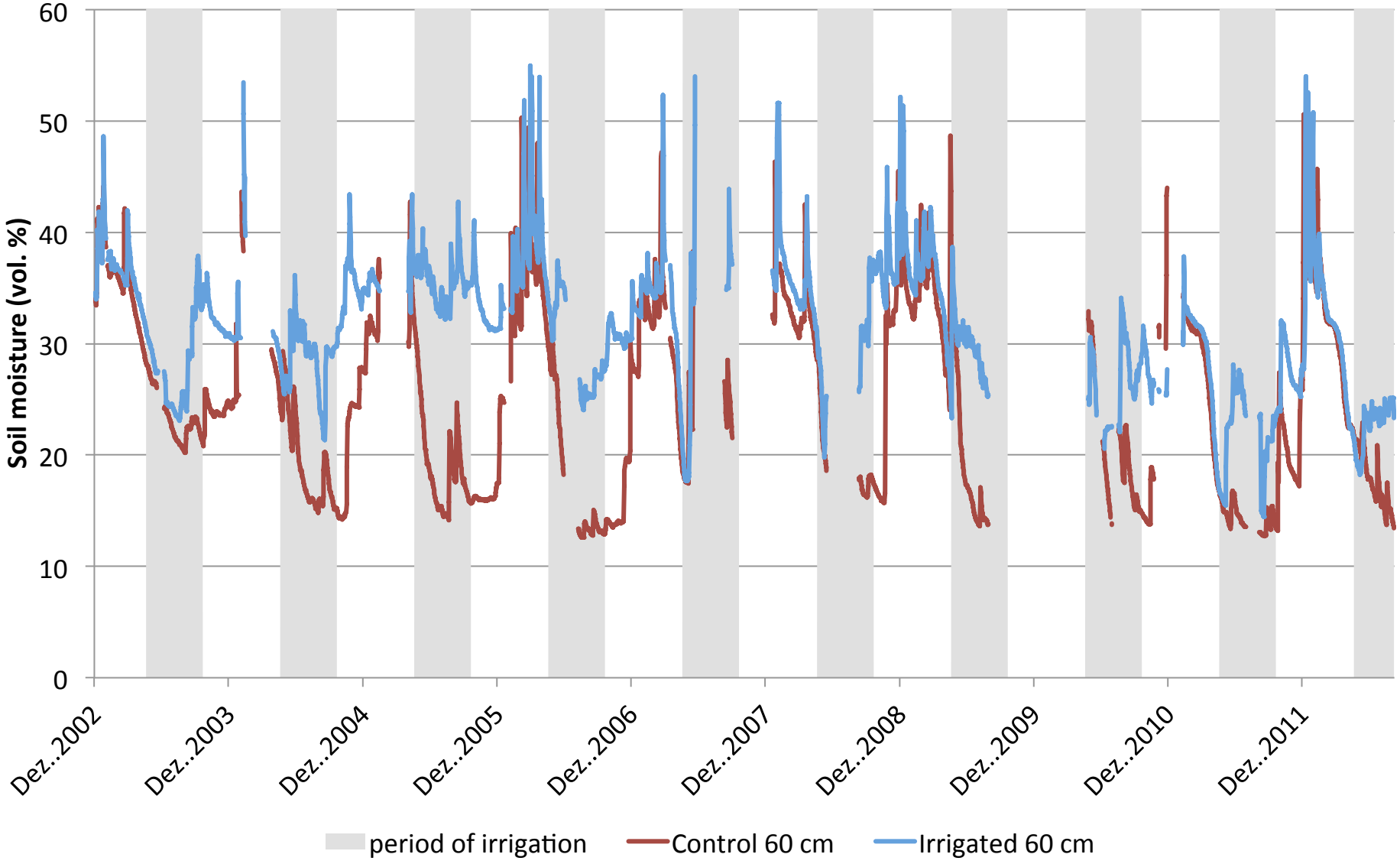
Mean values and 95% confidence intervals for each treatment group [n = 6]



Mean values and 95% confidence intervals for each treatment group [n = 6]



Mean values and 95% confidence intervals for each treatment group [n = 6]

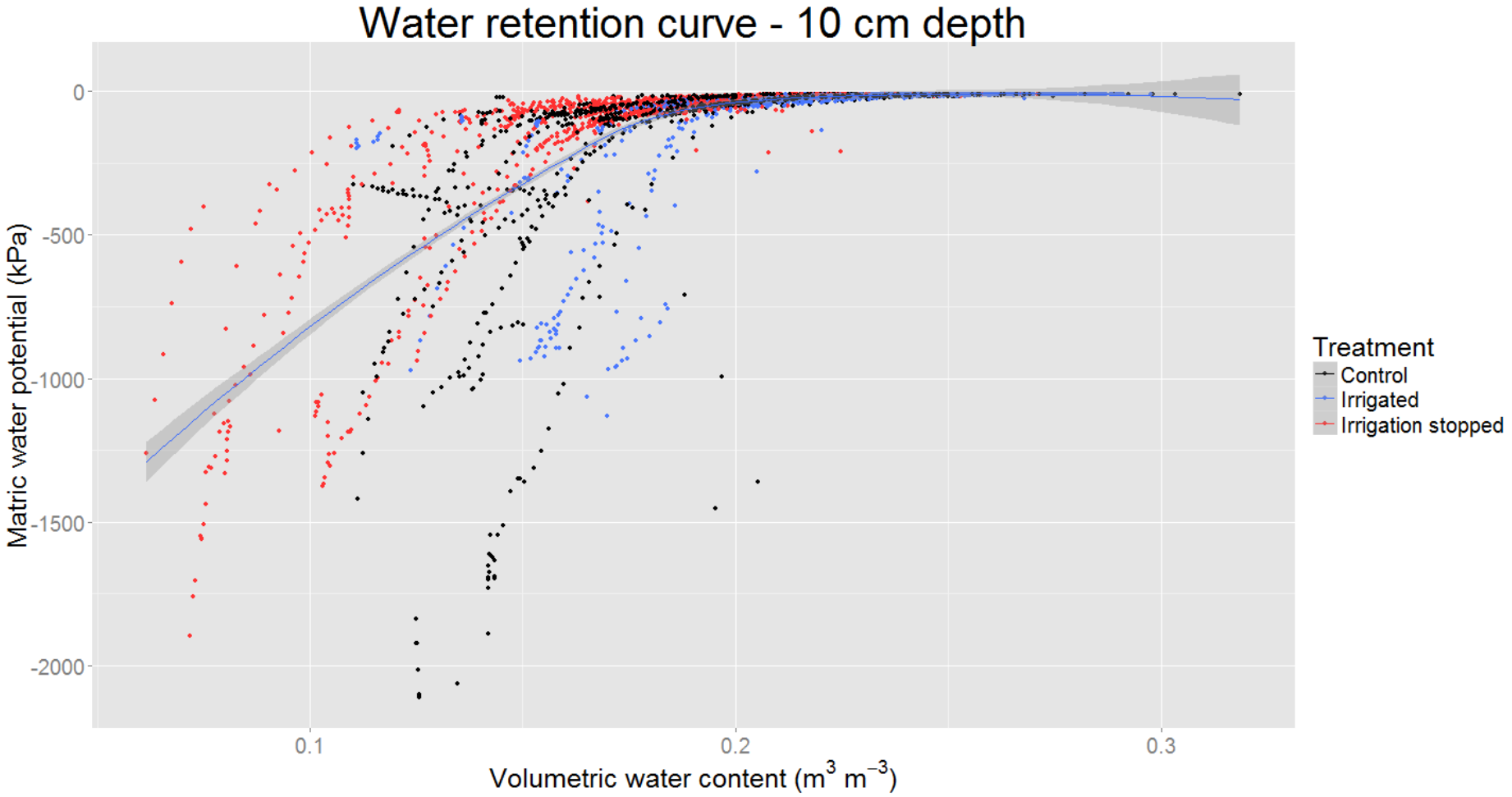


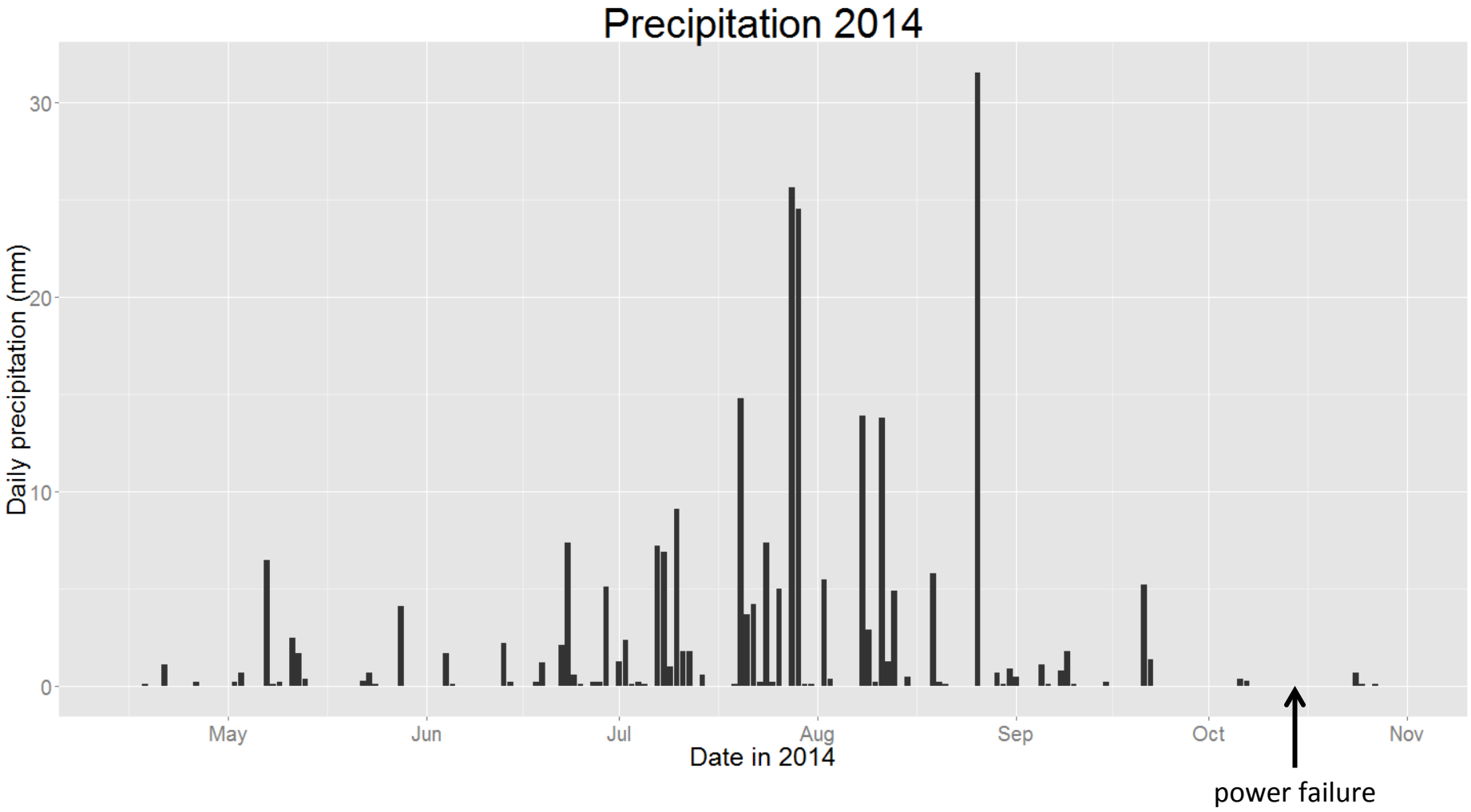
Declining irrigation effect on soil moisture over time due to increased tree biomass?

COUP model

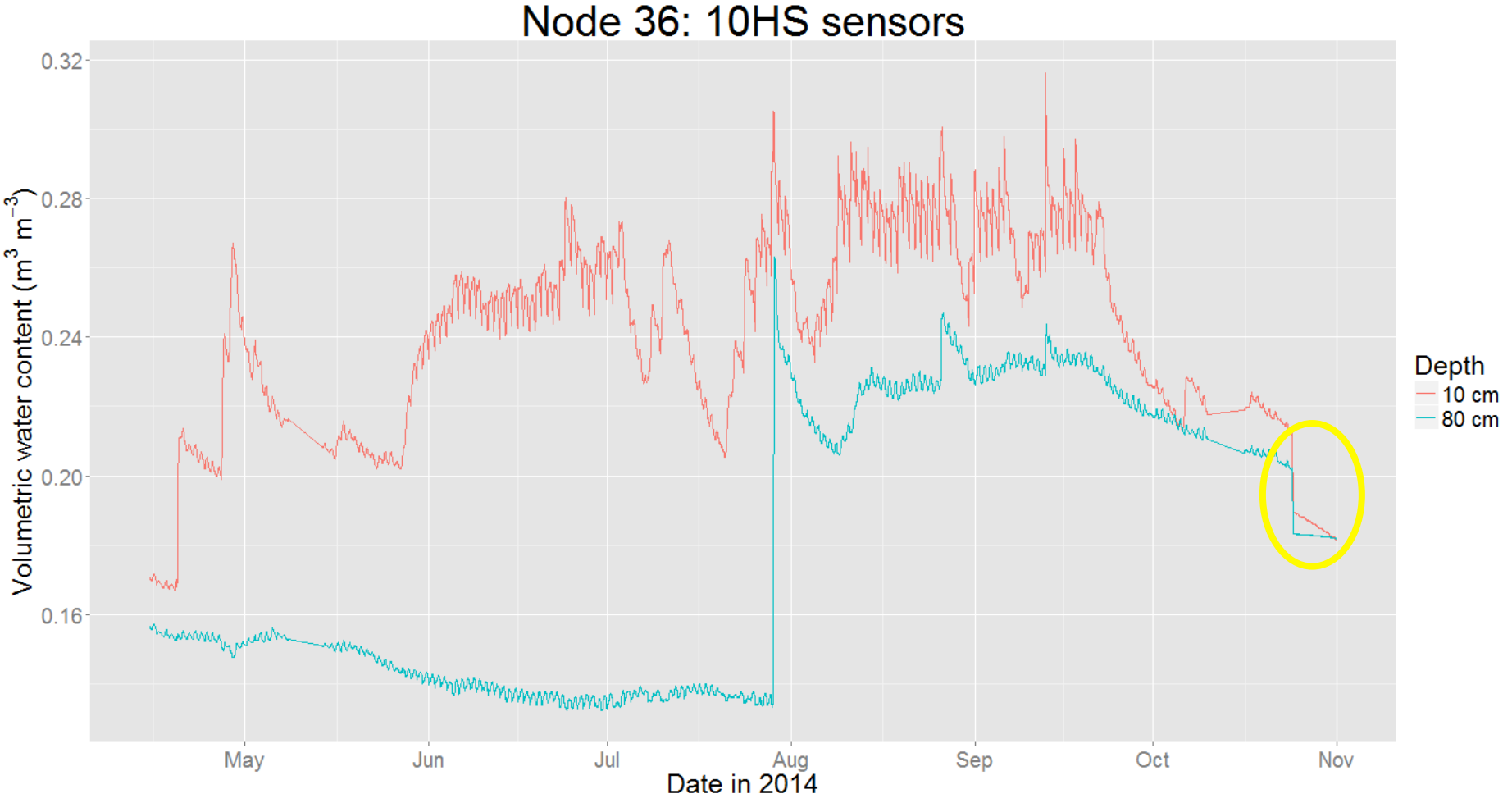
- Aims
  - Model water and carbon fluxes in this pine forest ecosystem
  - Link biomass production to soil water content
- Workshop in late spring 2015 to compile all data needed for model simulations
  - Meteorological data
  - Plant C (and N) pools and life cycle
  - Soil organic C (and N) pools

Next steps…establish water retention curve





- Wet summer!
- Data gap (all sensors in experiment) due to power failure: 10 Oct – 16 Oct



- Diurnal variation in 10HS voltage (VWC measurements) due to insufficient current in the electronic board; problem was enhanced by higher battery temperatures
- fixed on 24 Oct 2014 (after irrigation stopped for season)
- Time resolutions < 1 day (hourly) additionally difficult due to frequent missing data