

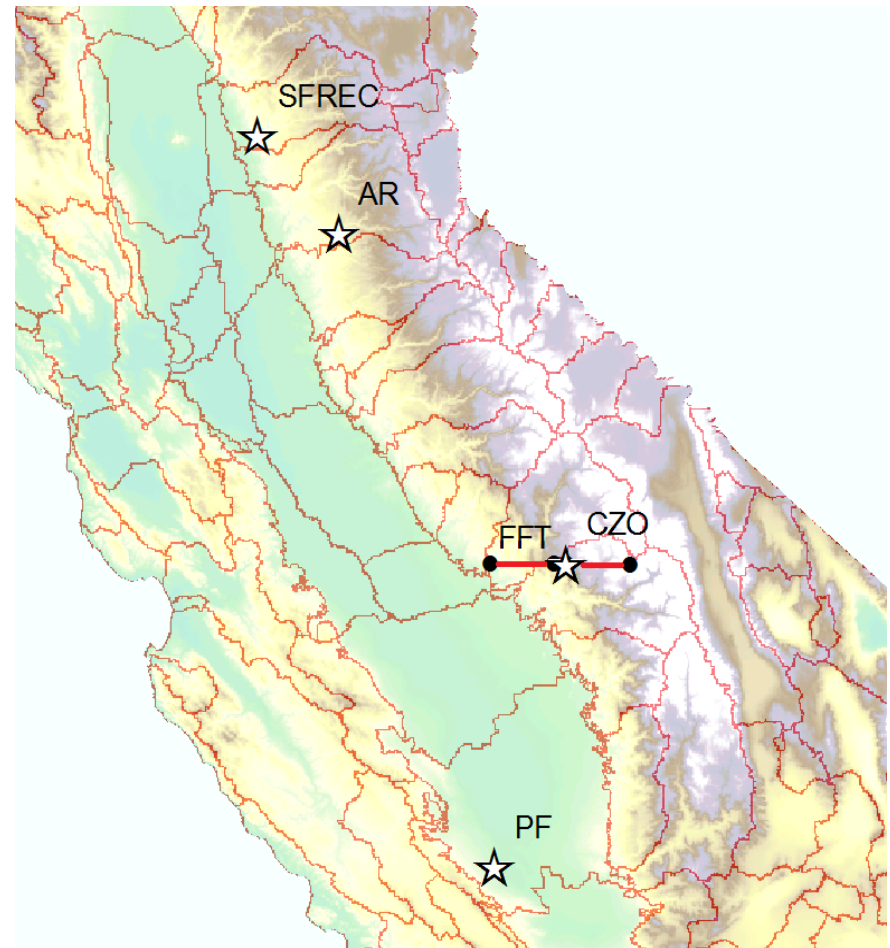
# SMAP Cal/Val – Sierra Nevada/San Joaquin Valley

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**Roger Bales** – University of California Merced, and PI CZO Southern Sierras and American River Watershed; **Toby O'Geen** – University of California Davis, and Investigator of Sierra Foothill Experimental Watershed; **Mike Goulden** – University of California, Irvine, and Co-PI CZO Southern Sierras; **Patrick Brown**, PI SCRI (USDA Specialty Crop Research Initiative), **Michael Whiting** and **Susan Ustin**, Co-PIs SCRI – University of California, Davis

# Site Description

- Type of site (one or more of these)
  - **CZO – SS** ~ 3 km<sup>2</sup> and about 300 soil moisture sensors)
  - **American River (AR)** ~ 4,500 km<sup>2</sup> and about 200 soil moisture sensors)
  - **Southern Foothill Research and Extension Center (SFREC)** ~ 33 ha and about 400 soil moisture sensors
  - **Paramount Farms (PF)** ~ 40 ha and about 50 soil moisture sensors
  - **Flux Tower Transect (FTT)**
- Measurements provided
  - Soil moisture and Temperature DECAGON EC-TM and 5-TE
  - 10, 30, 60, and 90cm
  - Soil water potential



## Providence Creek – main CZO instrument cluster

Elev 1700-2100 m

$T_{\text{ave}}$  8.9°C (2000 m)

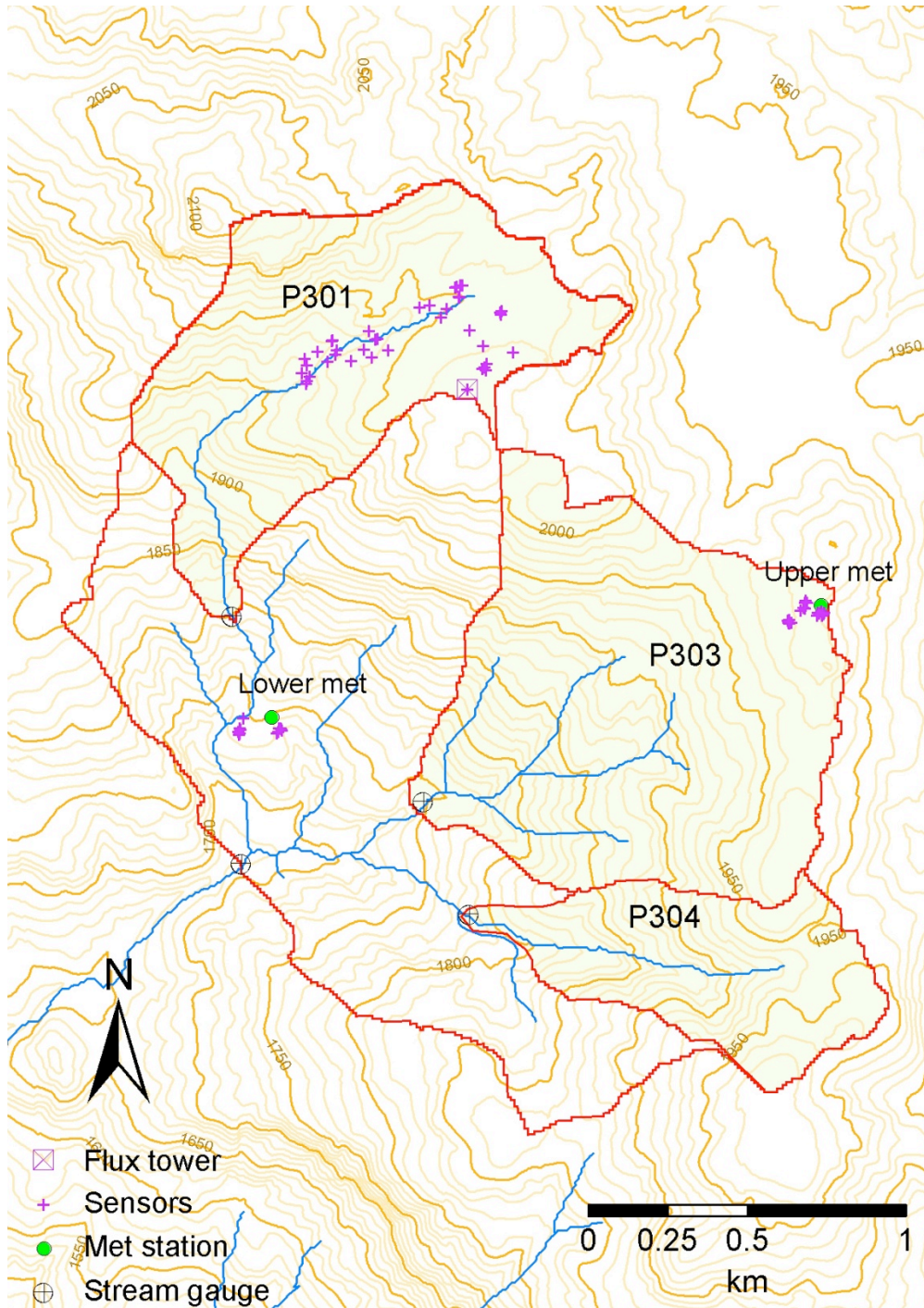
Annual precip: 1.0 m

130 dy snow

12 mo growing season –  
neither cold nor drought  
limited

White fir w/ sugar & other  
pines, incense cedar &  
patchy, dense shrubs

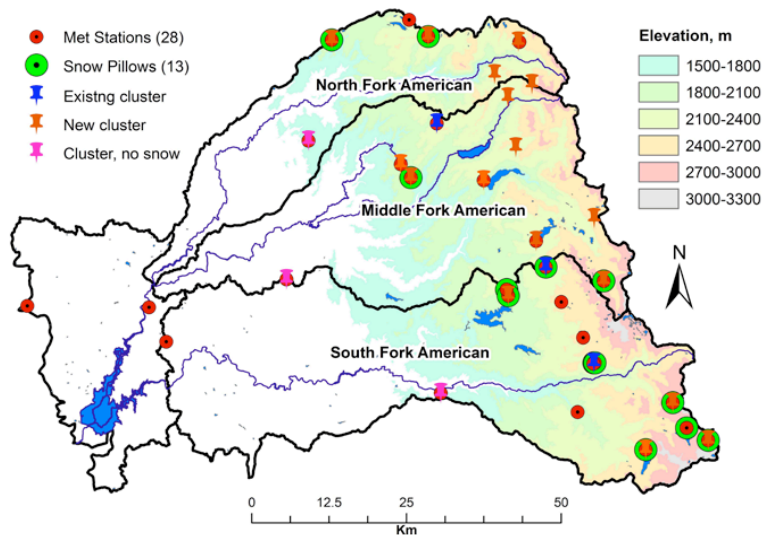
Over 400 sensors integrated  
for basin-scale, spatial  
measurements



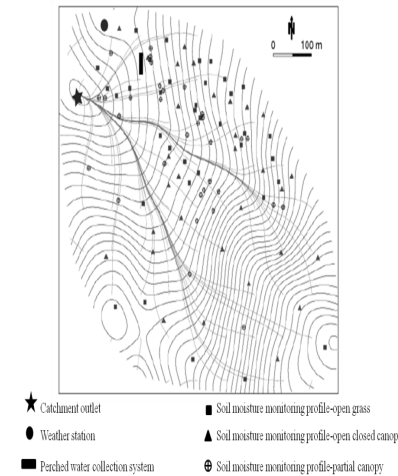


# Soil Moisture Monitoring Locations

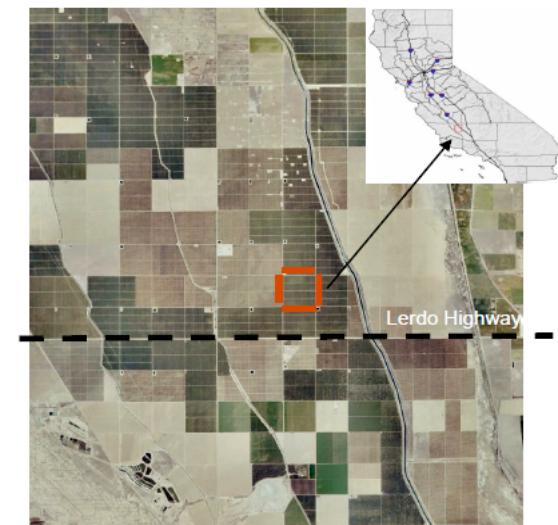
## American River



## Sierra Foothill

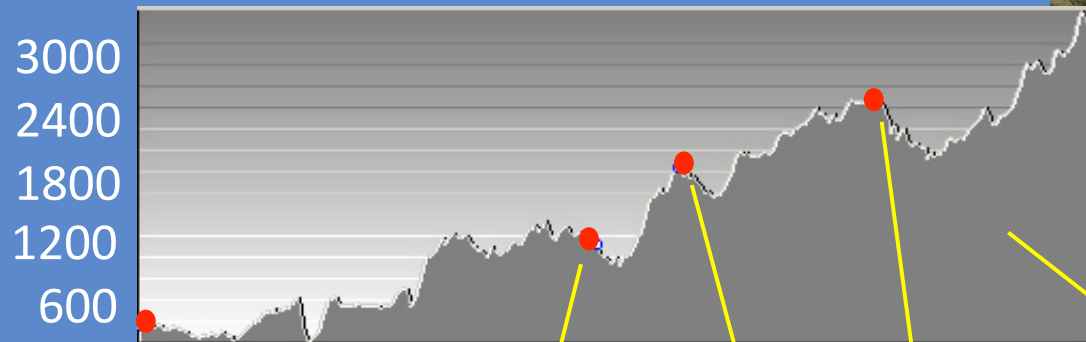


## Paramount Farms



(NSF Critical Zone Observatory)

Elev., m E-W transect of flux towers



San Joaquin  
Experimental  
Range  
400 m

Soaproot  
Saddle  
1100 m

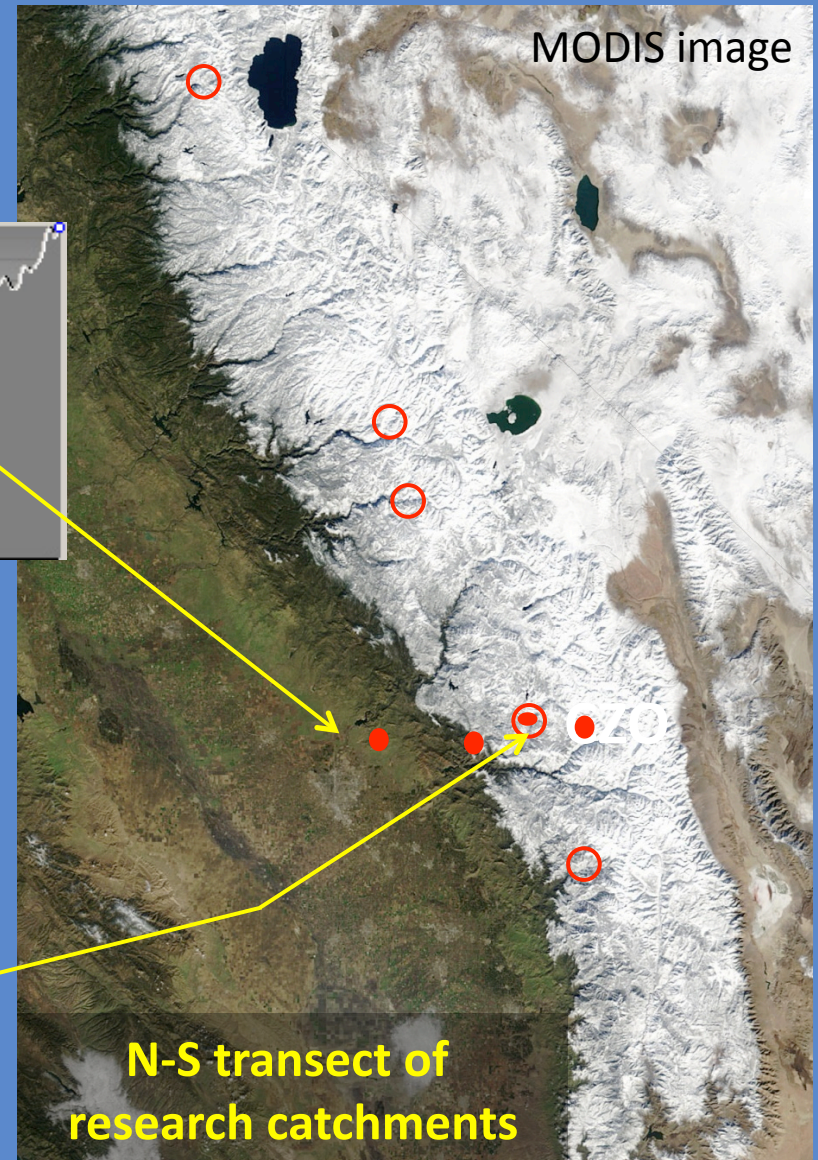
CZO  
P301  
2000 m

Shorthair  
Creek  
2700 m

Main  
CZO site

NEON to follow same E-W transect

MODIS image

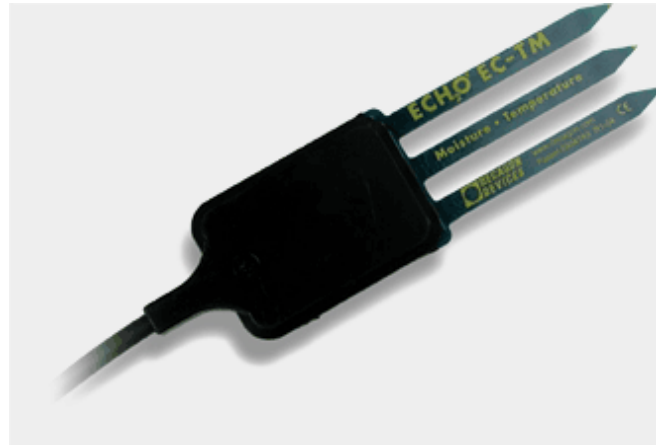




# CZO Soil Moisture Sensors



MPS-1  
Matric Potential

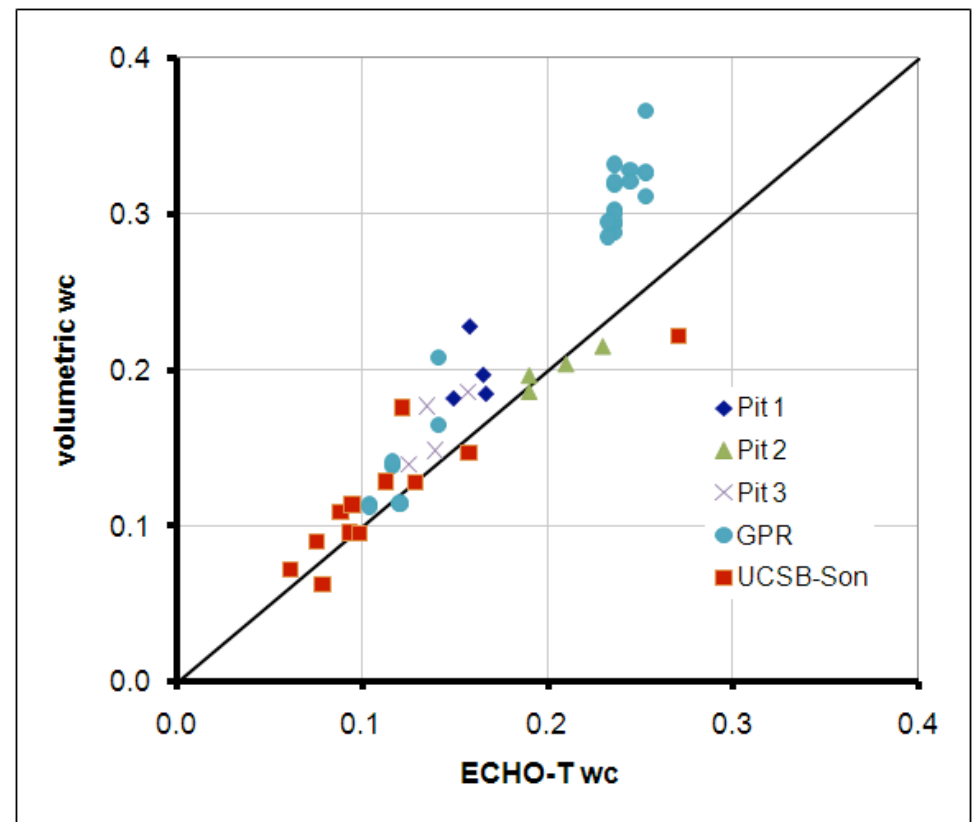
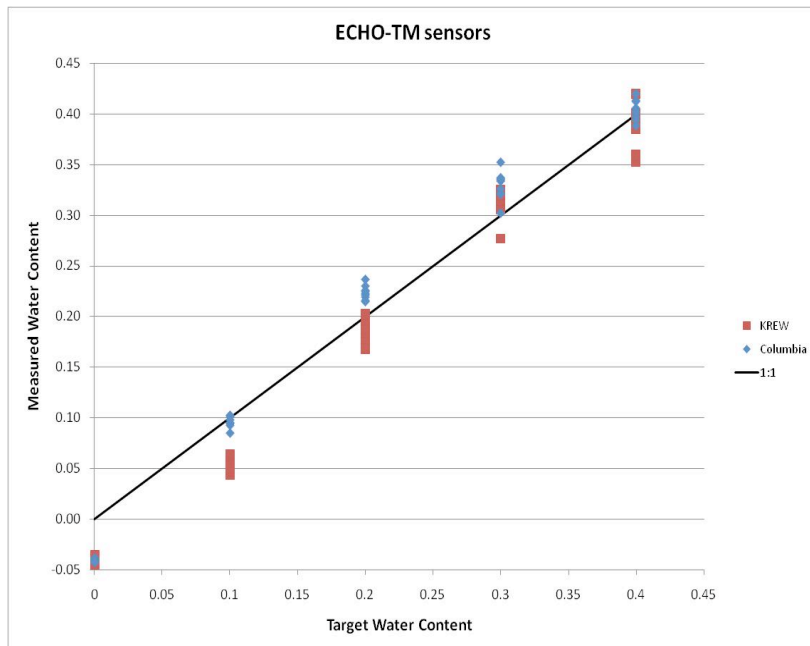


ECH<sub>2</sub>O-TM  
Water Content, Temperature



5TE  
Water Content,  
Temperature,  
Conductivity

# Echo-TE Lab/ Field Calibration



# Description of the Project Supporting the Site and Your Research Focus

- The proposal identifies three existing monitoring sites in the Sierra Nevada Mountains, that combined with existing and planned instrumentation provide the necessary data for understanding forest and oak woodland hydrology across a large range of elevations.
- In addition, we include an optional agricultural site near Bakersfield, CA.
- Data have been collected at these sites since 2008, and will continue for many years in the future;
- Research focus mostly on changing climate (precipitation/temperature/snow melt on functioning of natural and agriculture ecosystems (drought, water use)

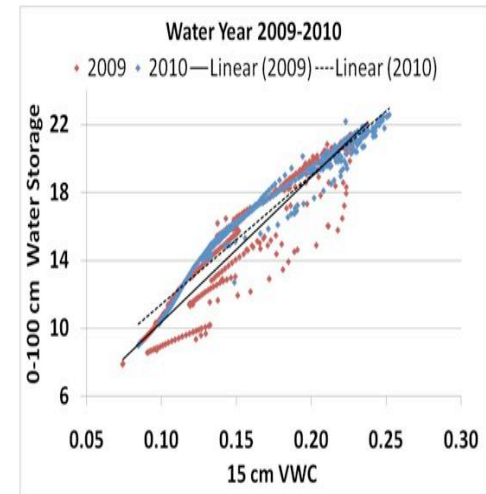


# Description of the Project Supporting the Site and Your Research Focus

- Southern Sierra Critical Zone Observatory (NSF), co-located with Kings River Experimental Watershed (USFS); co-location of NEON measurements planned
- Streamflow, meteorological data since 2004; soil & vegetation characterization, LIDAR coverage, snow & soil moisture since 2008, flux towers
- Additional sites under Sierra Nevada Adaptive Management Project (CA-DWR & USFS) – R. Bales
- Sites are integrated in **Sierra Nevada San Joaquin Hydrologic Observatory** that focuses on data and information that are relevant to hydrologic management and research in the 60,000 square kilometer – R. Bales

# Issues

- Most of the sensors discussed here are existing
- Data are freely available
- More field calibration is needed
- We will deploy additional sensors to
  - (1). Relate near-surface soil moisture to soil profile storage,



- (2) Upscale local soil moisture measurements to the watershed scale (using synoptic measurements)
- Consider to use selected sites at CZO as core validation site
  - Goal: Integrate CZO with SMAP