

# Field Observations: Progress and Leveraging Results

Robert Zamora<sup>1</sup>, Allen White<sup>1</sup>, Clark King<sup>1</sup>, Robert Webb<sup>1</sup>, Charles W. Downer<sup>2</sup>

<sup>1</sup>NOAA Earth System Research Laboratory Physical Sciences Division

<sup>2</sup>US Army Corps of Engineers

Fifth Annual Forecast Informed Reservoir Operations Workshop 2018



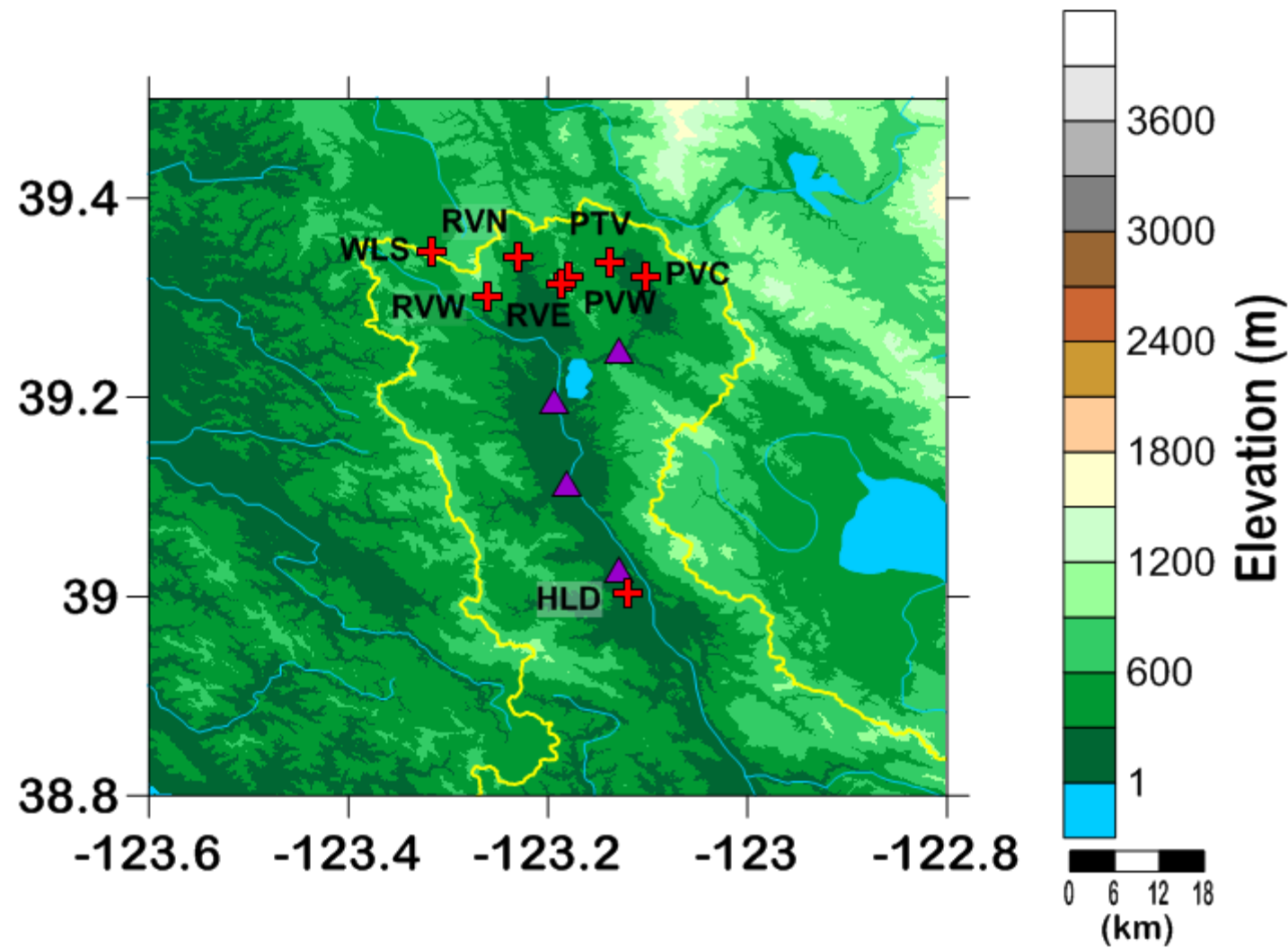
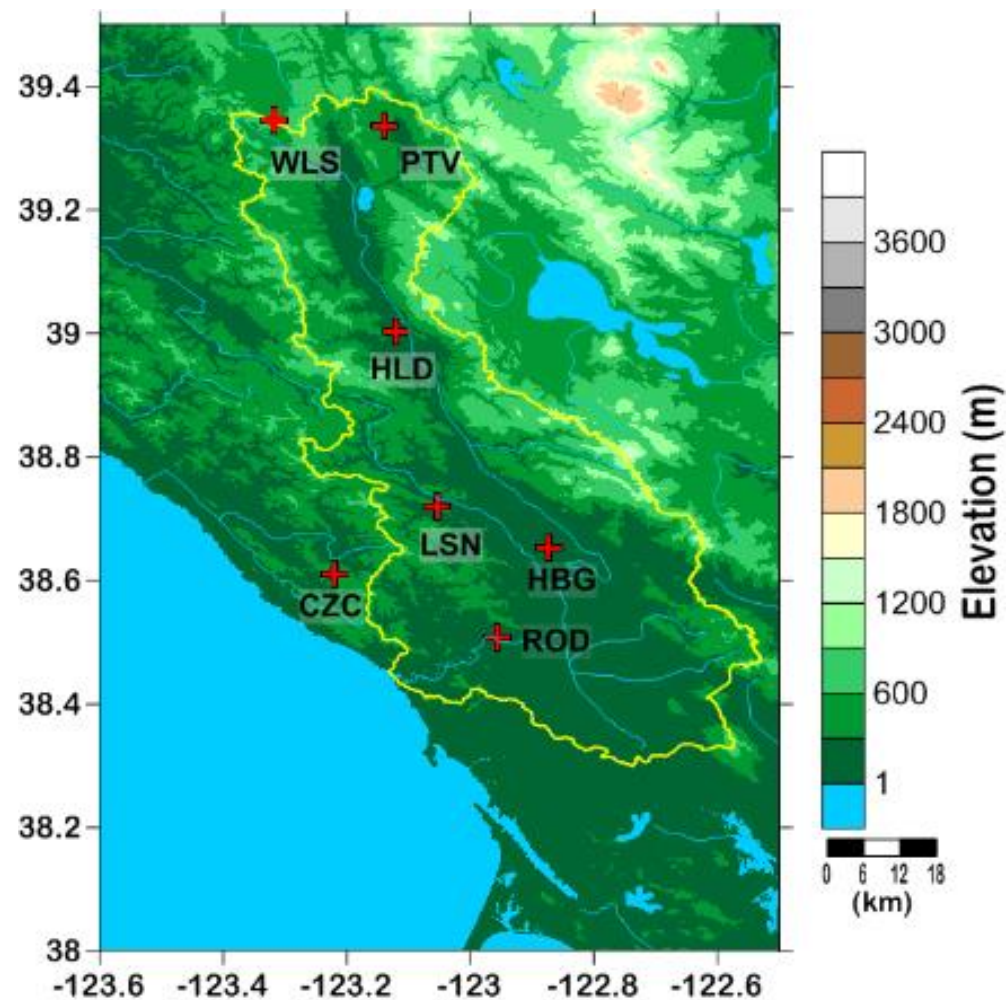
# Overview

- A bit of history (From Air Quality to Hydrometeorology)
- The combined observing strategy
- A quick look at the PSD observations in Redwood and Potter Valley (histograms and available water capacity)

Acknowledgement  
DWR SCWA and USACE

# History

- Original soil moisture observations supported California air quality meteorological surface energy balance model validation (1999)
- Legacy sites established at Cazadero (CZD), Rio Nido (ROD), and Healdsburg (HBG) (2003)
- Cazadero and Healdsburg augmentation to six and four level soil pits (2008)
- DWR sponsored two level sites installed at Lake Sonoma (LSN), Willits (WLS), Potter Valley (PTV), Hopland (HLD) (2010)
- SCWA sponsored six level sites installed at Potter Valley West (PVW), Potter Valley Central (PVC), Redwood Valley North (RVN), Redwood Valley East (RVE), Redwood Valley West (RVW), Middletown, (MDT), and Santa Rosa (STR) (2016)
- Completed the addition of 50 cm probe depths at the DWR sites (July 2018)

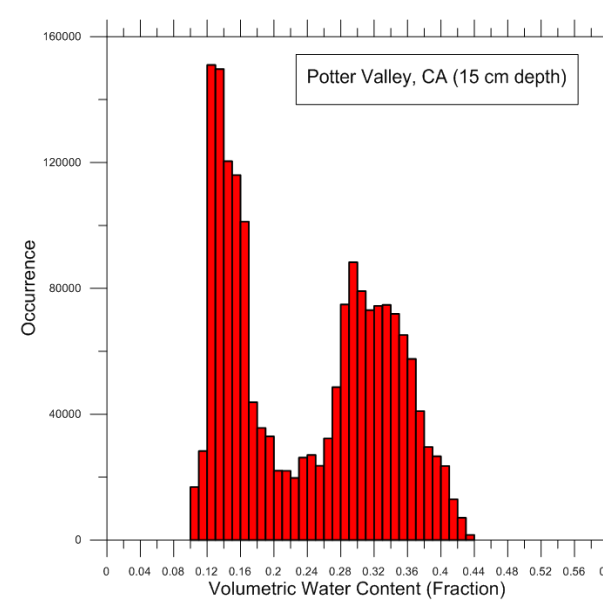
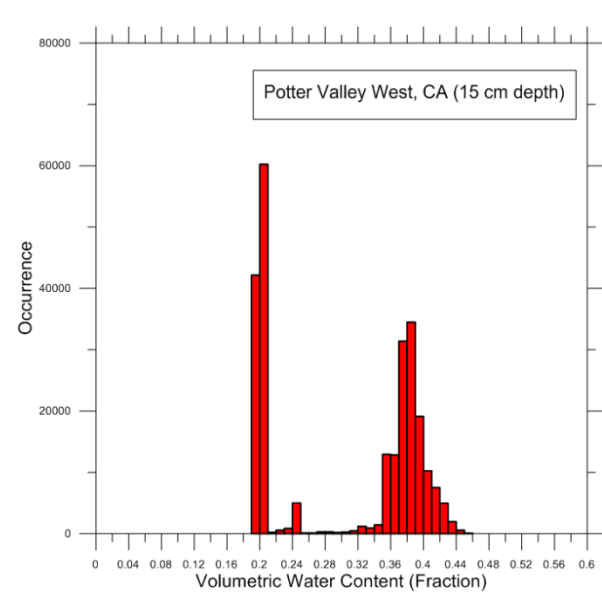
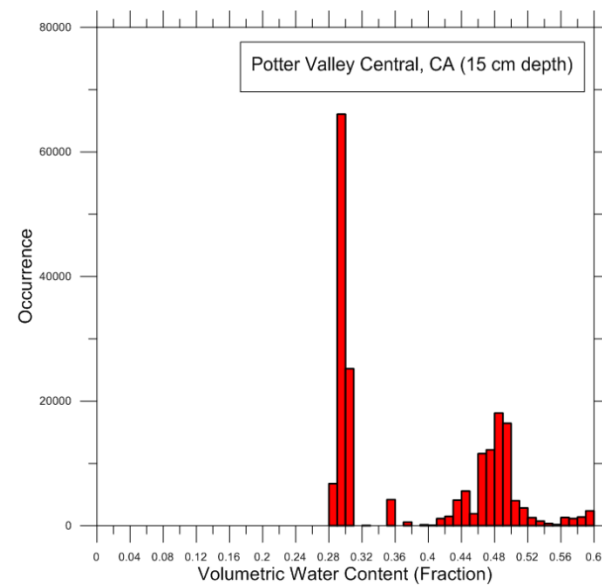
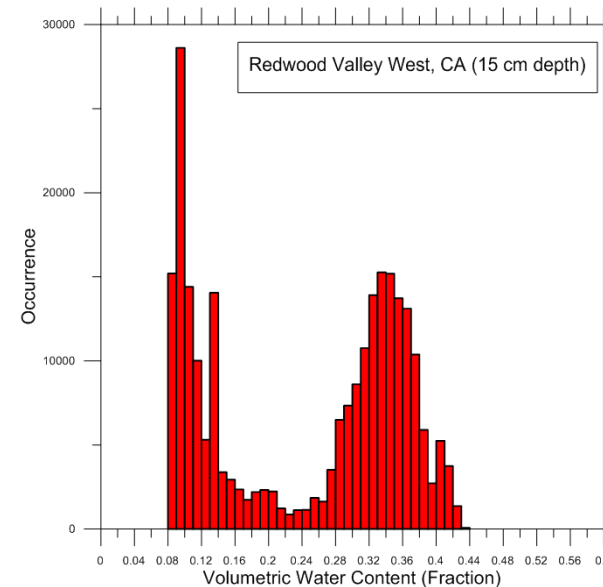
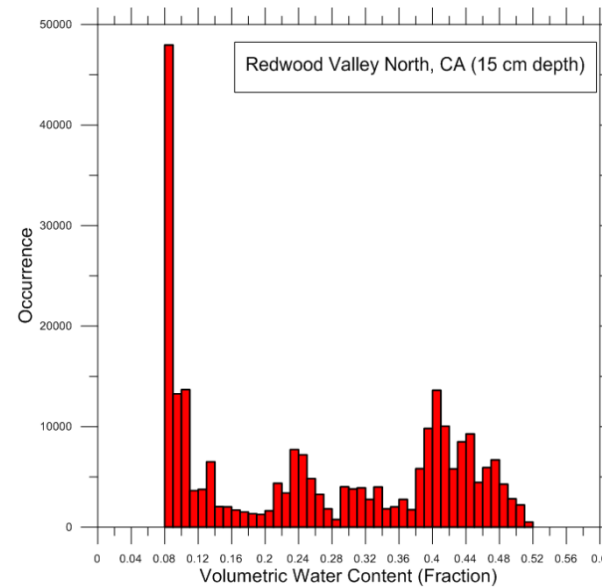
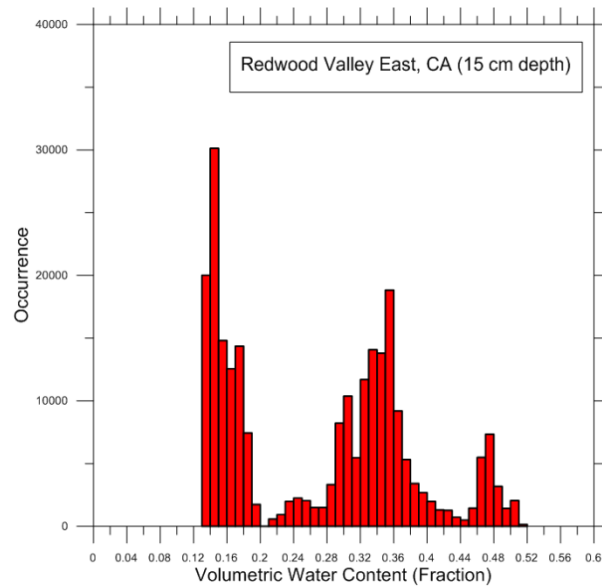


# Combined Observing Strategy

- Unified observing strategy (HMT protocol) allows us to address fast infiltration (minutes) to climatological time scales.
- Sample soil temperature and CSI 616 soil moisture probes 1 or 2 Hz, average to 1 or 2 minutes (same as meteorological variables).
- Standard USDA SCAN depths (5, 10, 20, 50, and 100 cm) plus HMT 15 cm legacy depth. Deepest probes depend on depth to first restrictive layer.
- Gravimetric re-calibration when soil electrical conductivity exceeds (1.0 dS/m) (WLS)
- Avoids the issues now facing the establishment of a National Soil Moisture Network

Note: Volumetric Water Content is reported as a fraction. So 0.15 VWC (fraction) is 15% VWC.





## Available Water Content (15 cm depth)

Site	Soil Dry*	Field Capacity	AWC
PTV	0.14	0.47	0.32
PVC	0.19	0.59	0.39
PVW	0.11	0.54	0.43
RVE	0.01	0.51	0.50
RVN	0.08	0.59	0.50
RVW	0.08	0.43	0.35

- Soil Dry are the driest values observed during the period of record. Meteorological processes can continue to extract water from the soil long after the oats have wilted.

## Summary and Next Steps

- Completed QC of PSD soil moisture observations for the period of record in Potter and Redwood Valley
- Completed the installation of additional soil probes at the DWR sponsored locations
- Available Water Capacity analysis completed for all PSD Russian River locations (includes field capacity and soil dry)
- Soil moisture simulations using the NWS National Water Model have been compared to the PSD observation for selected AR cases in the Russian River Basin
- Use the combined PSD/CW3E observations to help refine NWM and GSSHA a priori soil parameter choices. In typical hydrological model calibration all parameters “float” as we try to recover the observed hydrograph. By constraining the model soil parameters using the observations we may gain critical insight into the role ET and routing play on model performance.



# Thank You!

