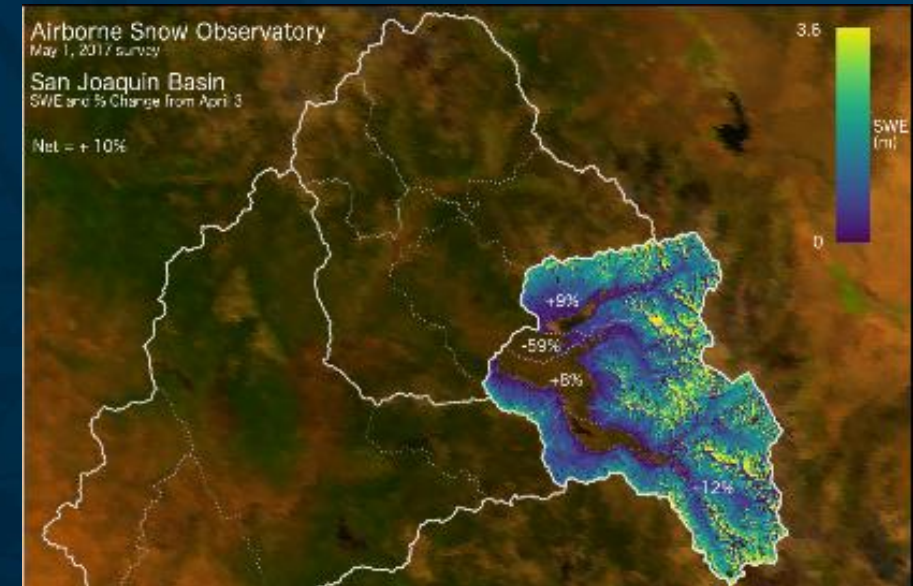




Advanced Observing Systems and S2S Forecasting – California Investments



Dr. Michael Anderson, CA State Climatologist

WSWC S2S Workshop

May 14, 2018

Talk Overview

- Motivation
- History of the Past Decade
- Current and Future Investments

Motivation

- Atmospheric Rivers are a key component to California's water supply and flood risk. The character, size, number, and timing of atmospheric rivers play a key role in seasonal hydrologic outcomes for California including the size and distribution of the snowpack.
- Improved observations and forecasting are key elements for enabling more options for integrated water management in California.
- As the world warms, capabilities in observations and forecasts must adapt for water management to keep up with changing conditions.

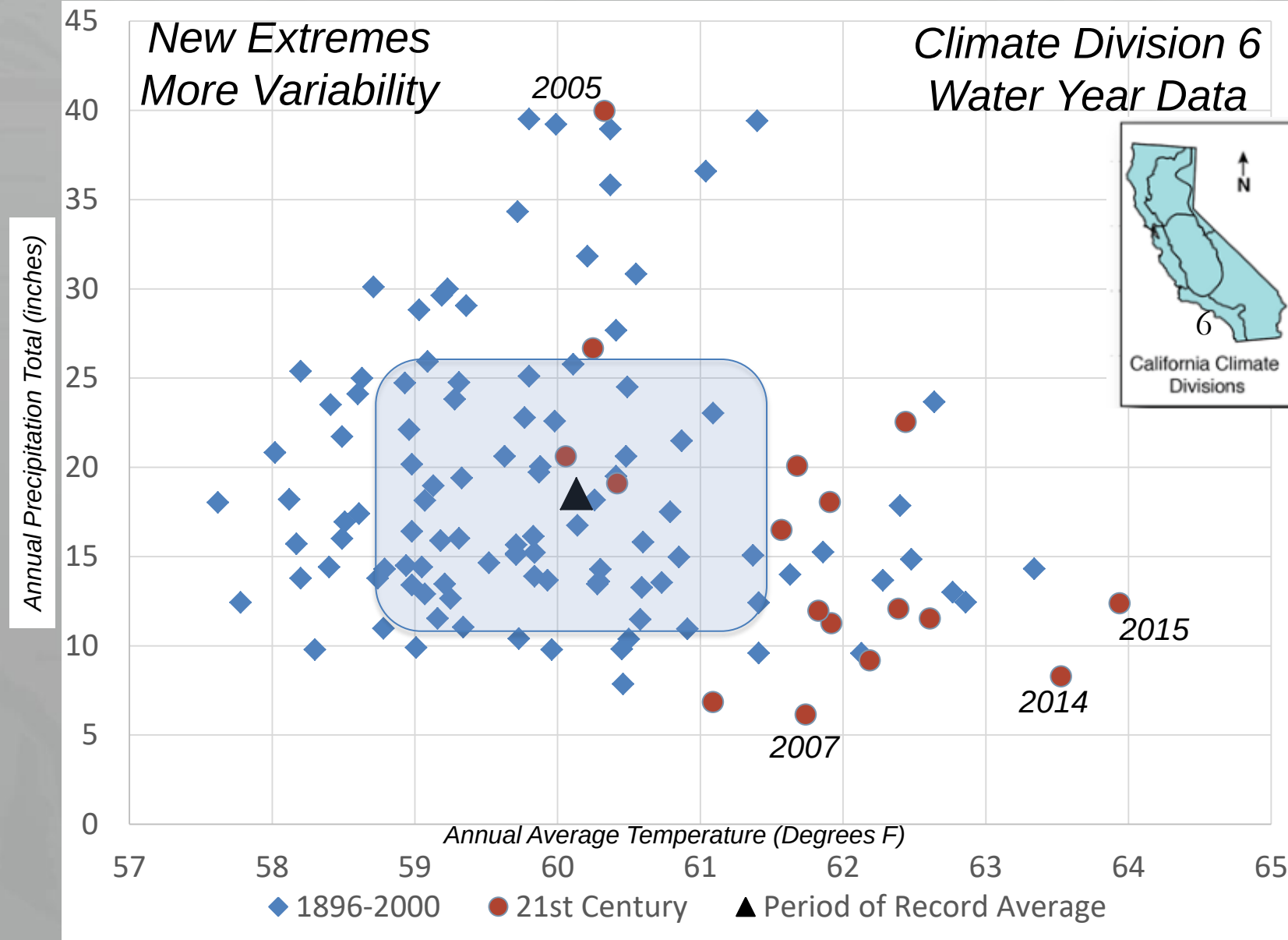


California's topography affects our weather and climate.

Observations play a critical role in and resource management. Complex terrain can be challenging to observations on many fronts.

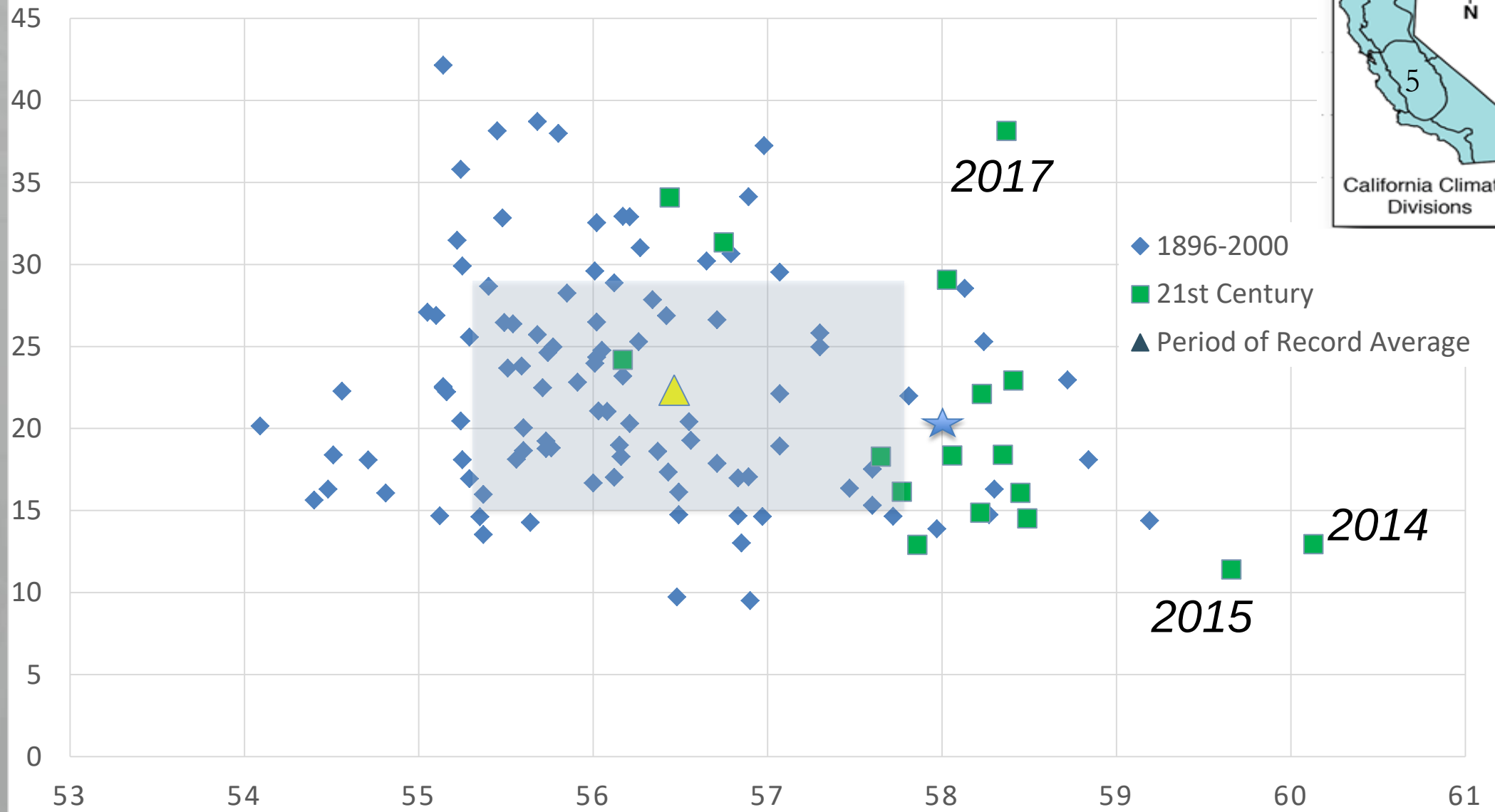
Time is a key element to water management – more time offers more alternatives to be employed. Forecasts can play a role.

A warming world challenges current forecasting practices



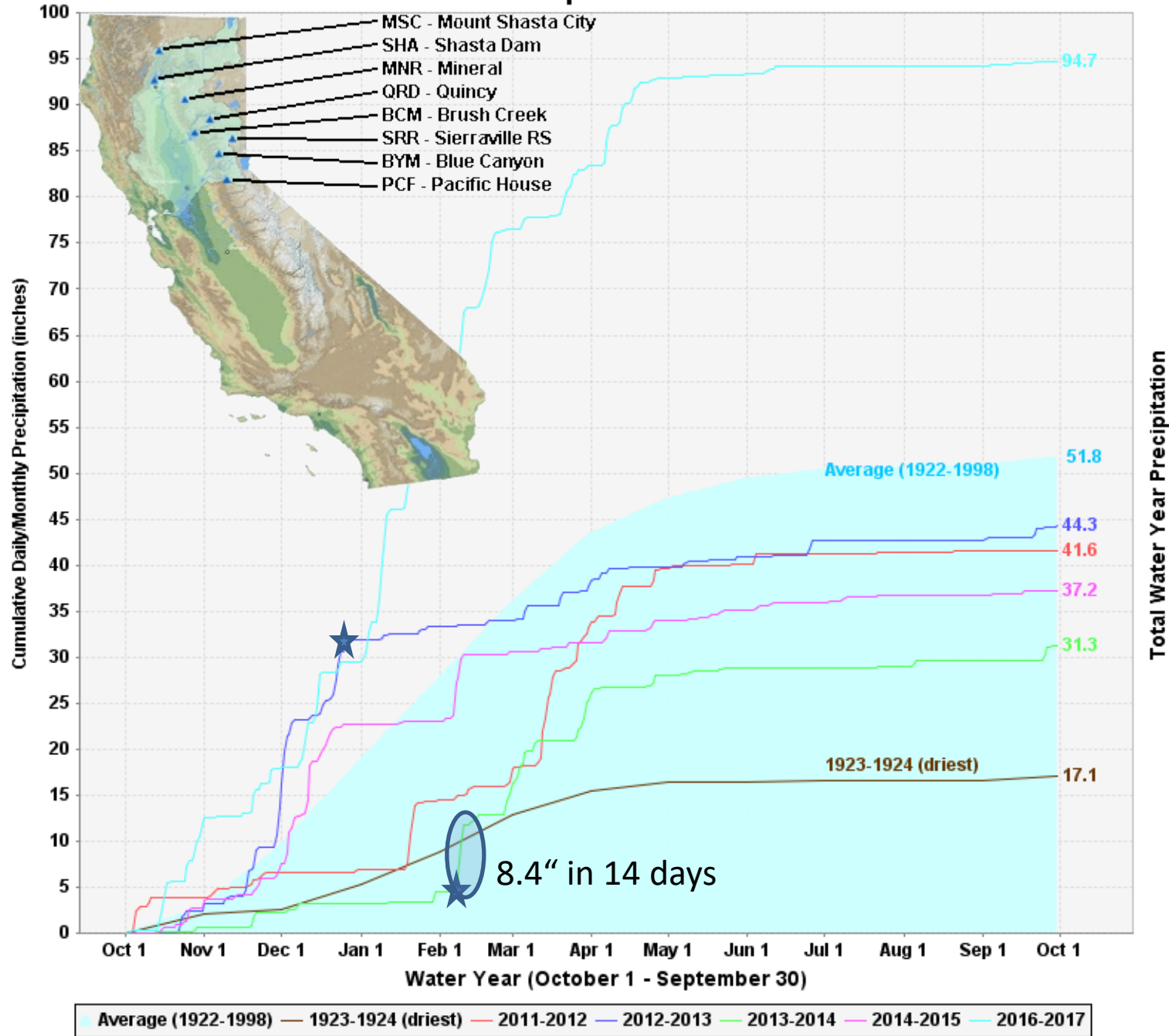
Source: NOAA Climate Division 6 Water Year Data

CLIMATE DIVISION 5 WATER YEAR DATA



Annual Average Temperature (°F)

Northern Sierra Precipitation: 8-Station Index



Variability at multiple scales

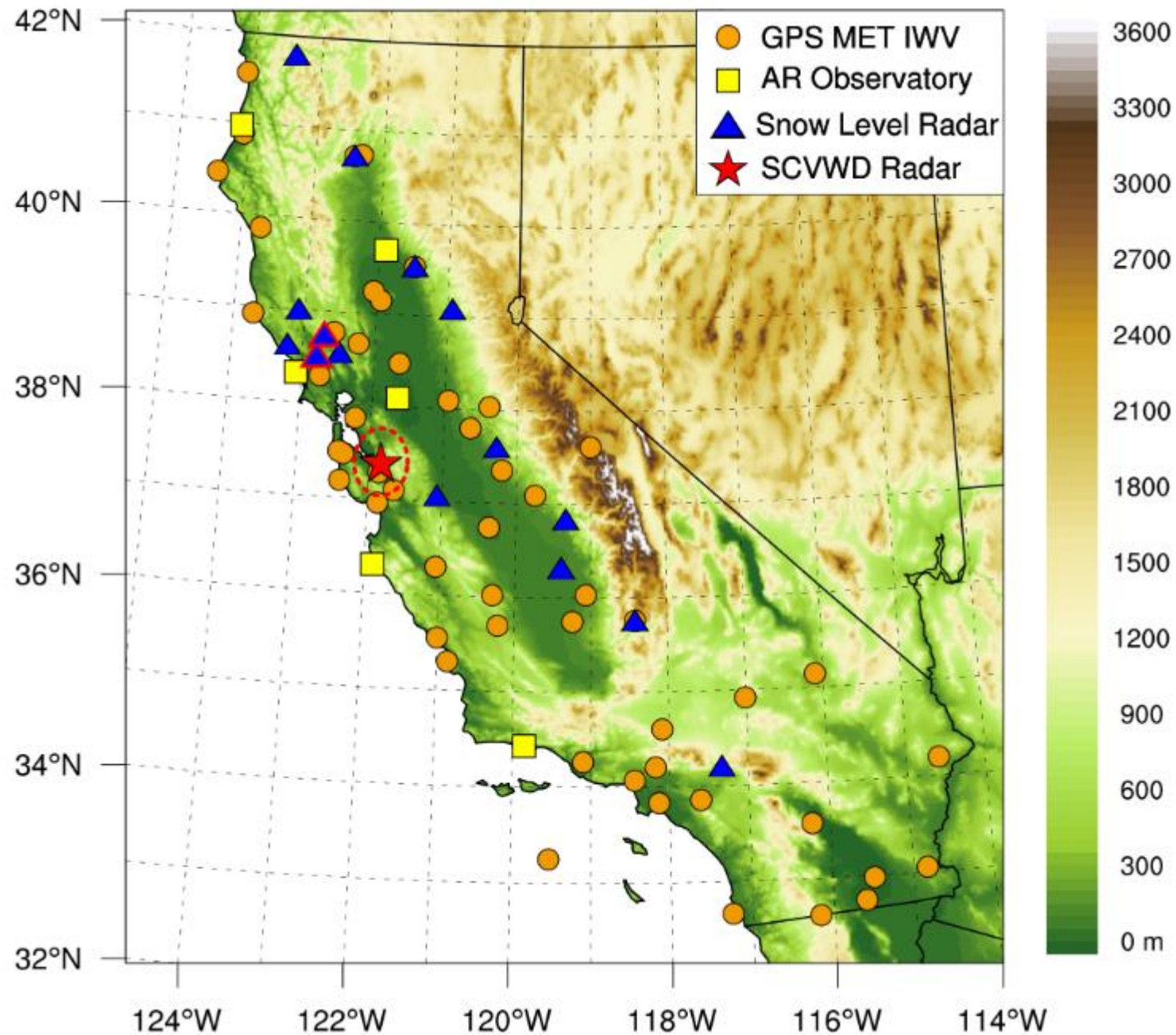
★ 16.8"
404 Days

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Opportunity Knocks 2005 to Present

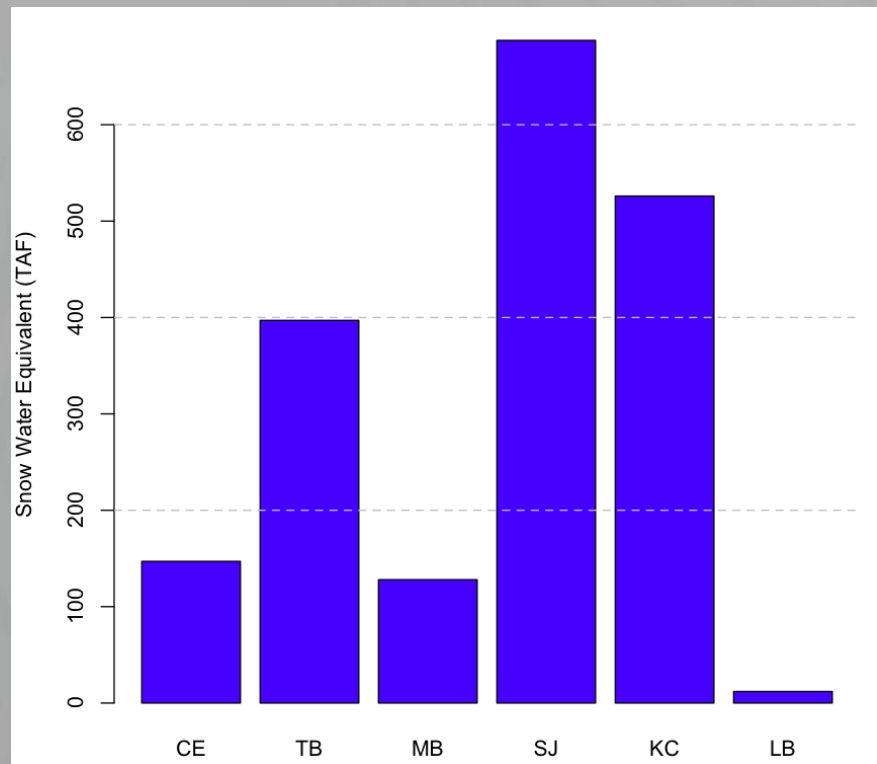
- HMT, EFREP and FloodSafe Investments
- ARRA Funding, 2007-2009 Drought, and NASA-JPL Collaboration
- CW3E Formation, the 2012-2016 Drought, and Collaboration Expansion with ASO, WWAO, and FIRO
- AQPI, The Events of WY 2017 & WY2018



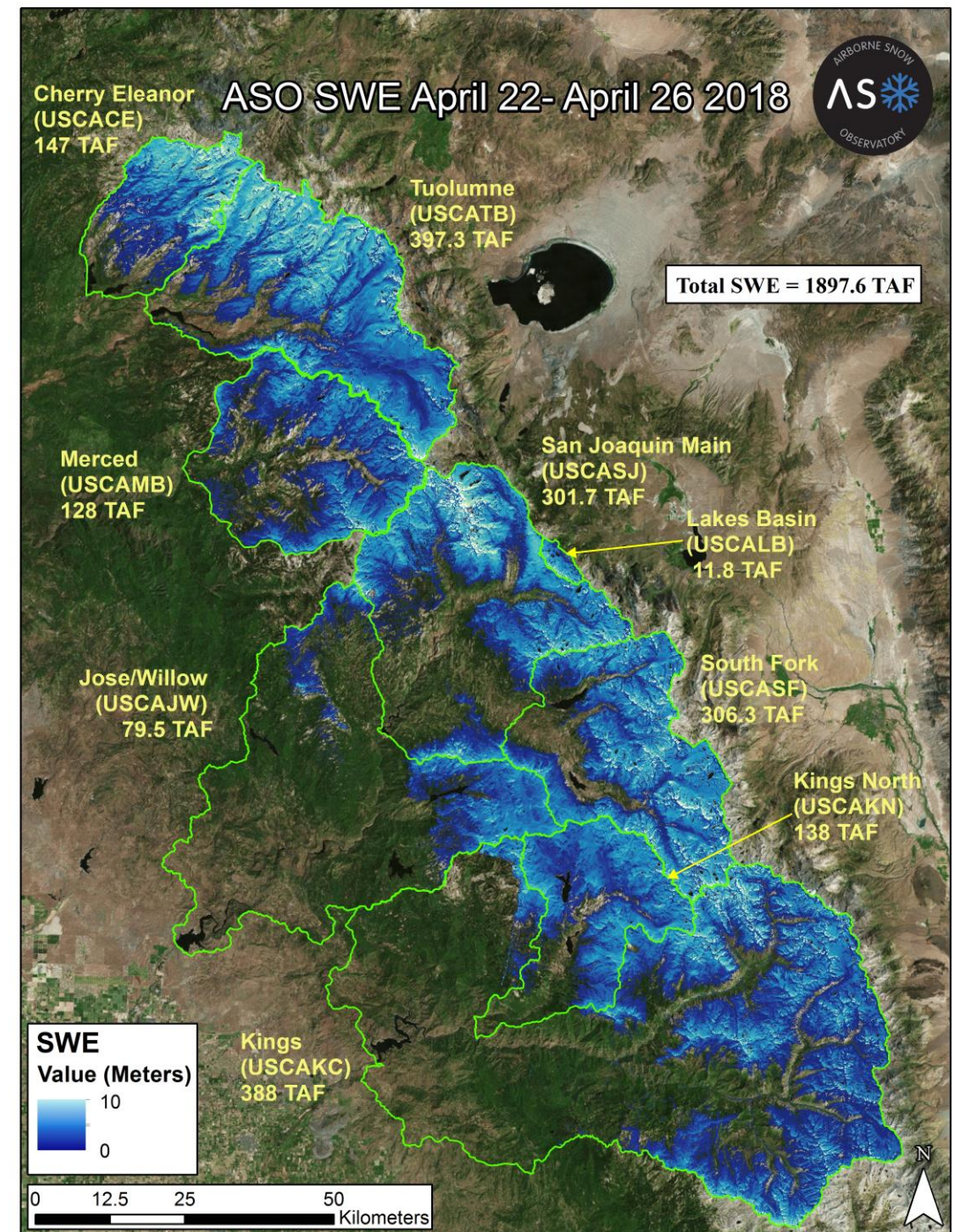
California's Advanced Observing System for Atmospheric Rivers

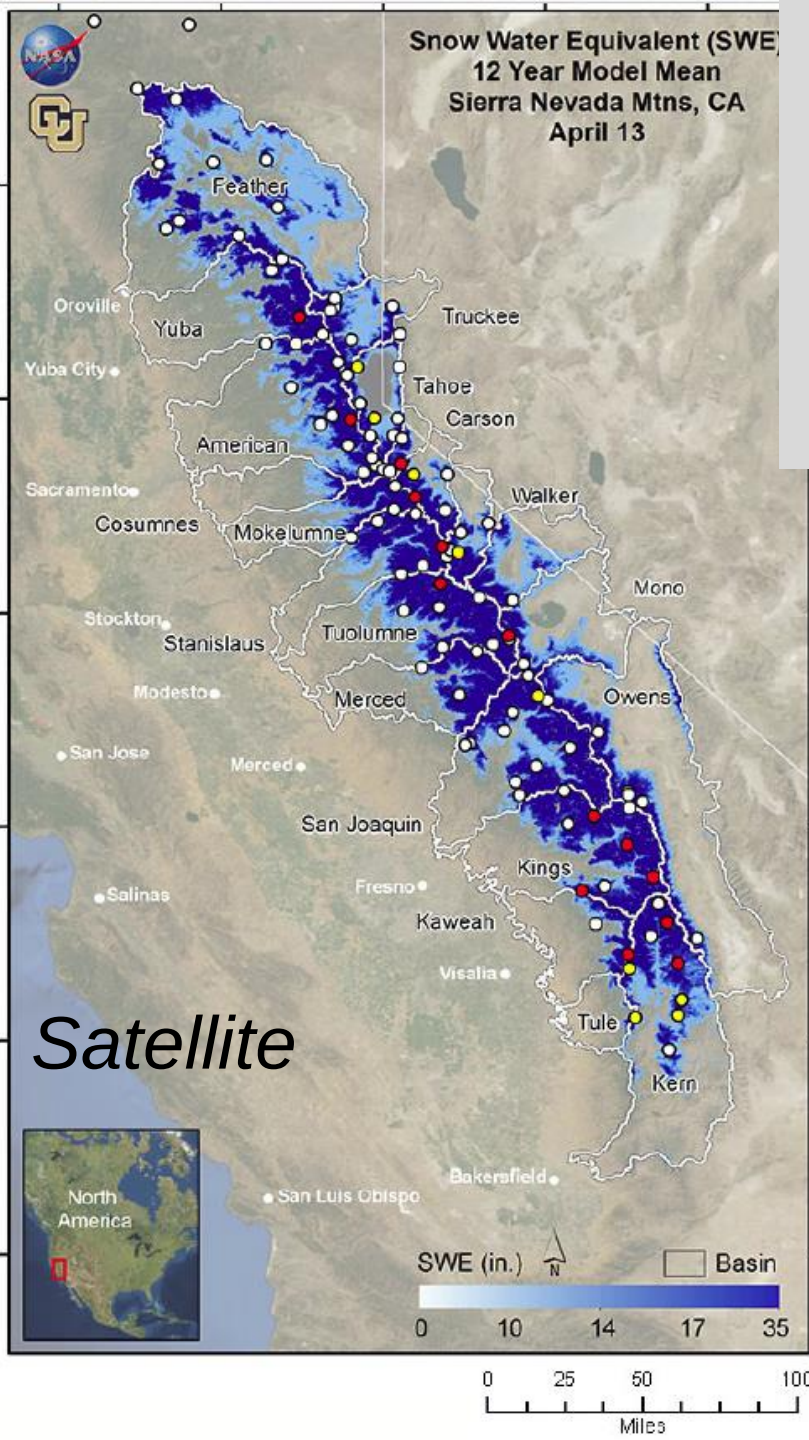


ASO April 2018 Surveys

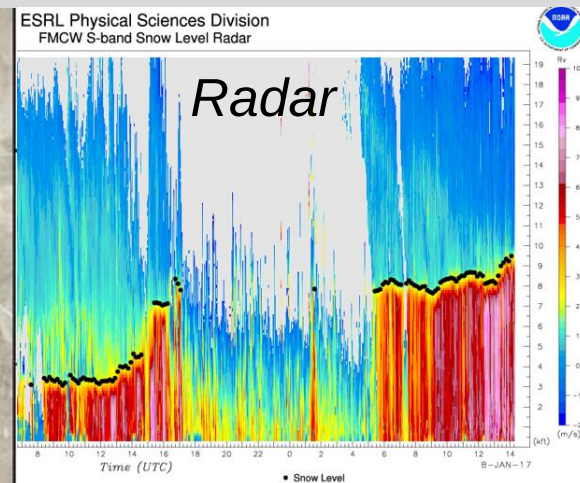


Slide from Dr. Thomas Painter, JPL



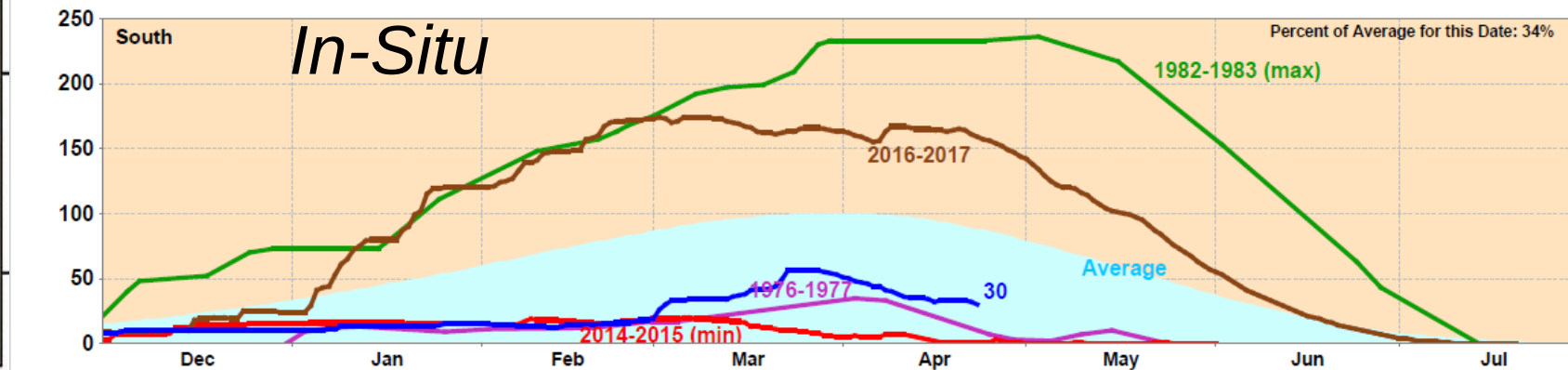
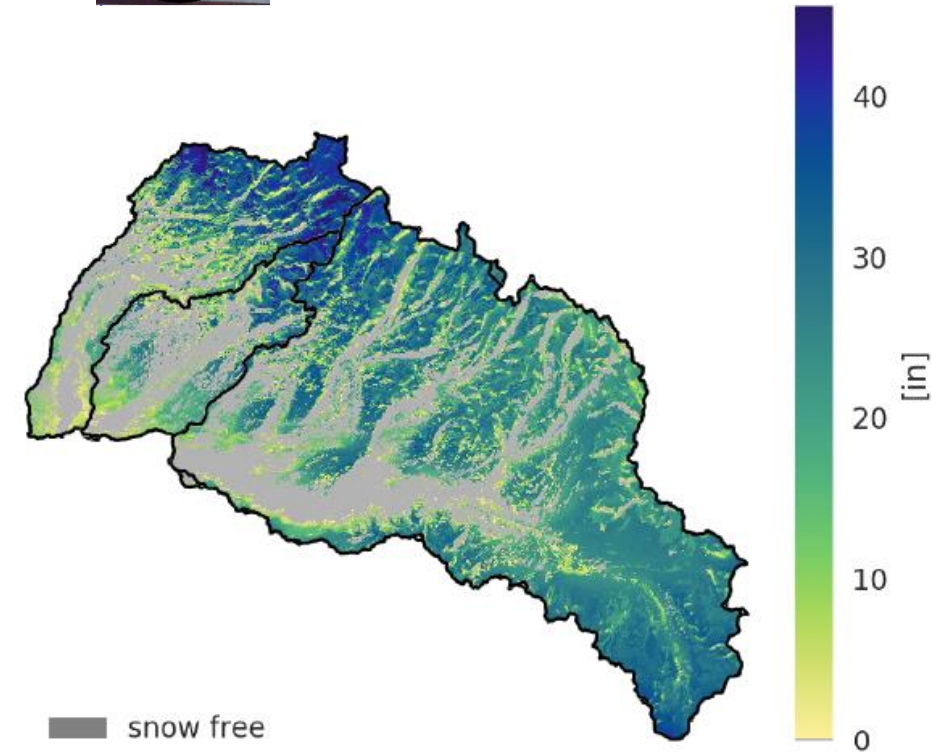


Goal: Integrated Observing Systems for Integrated Water Management



SWE
2018-4-16

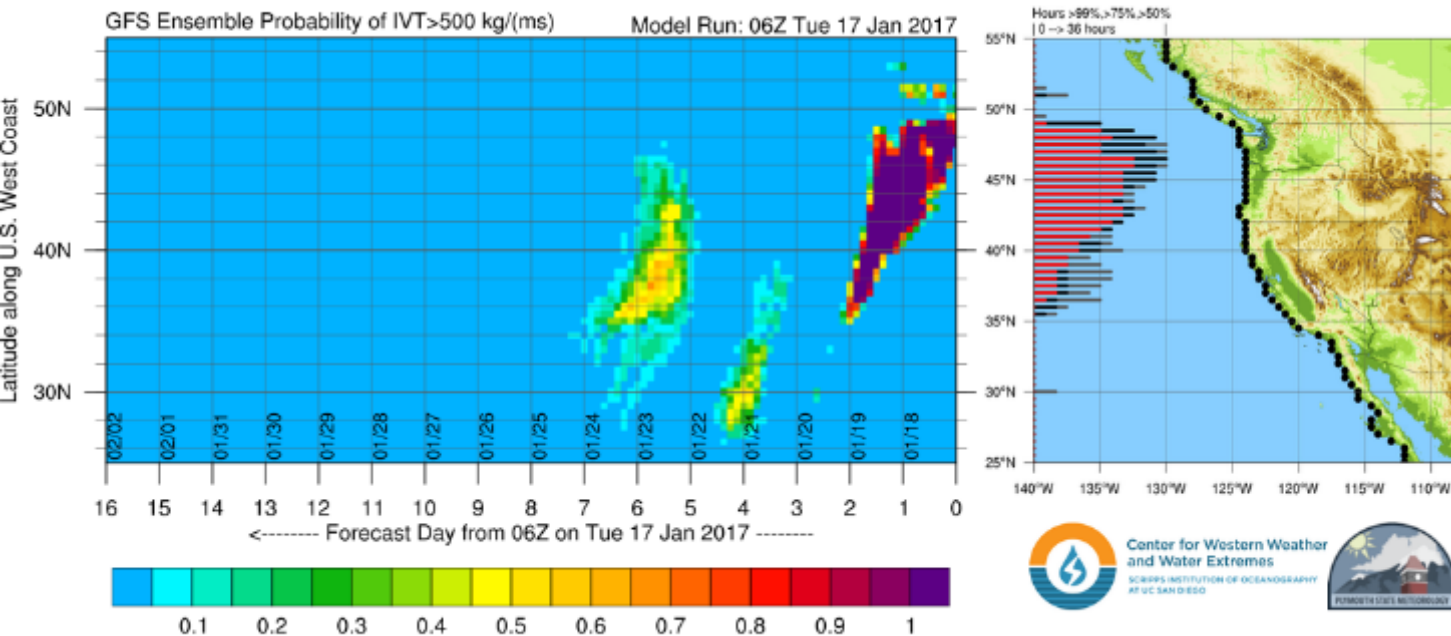
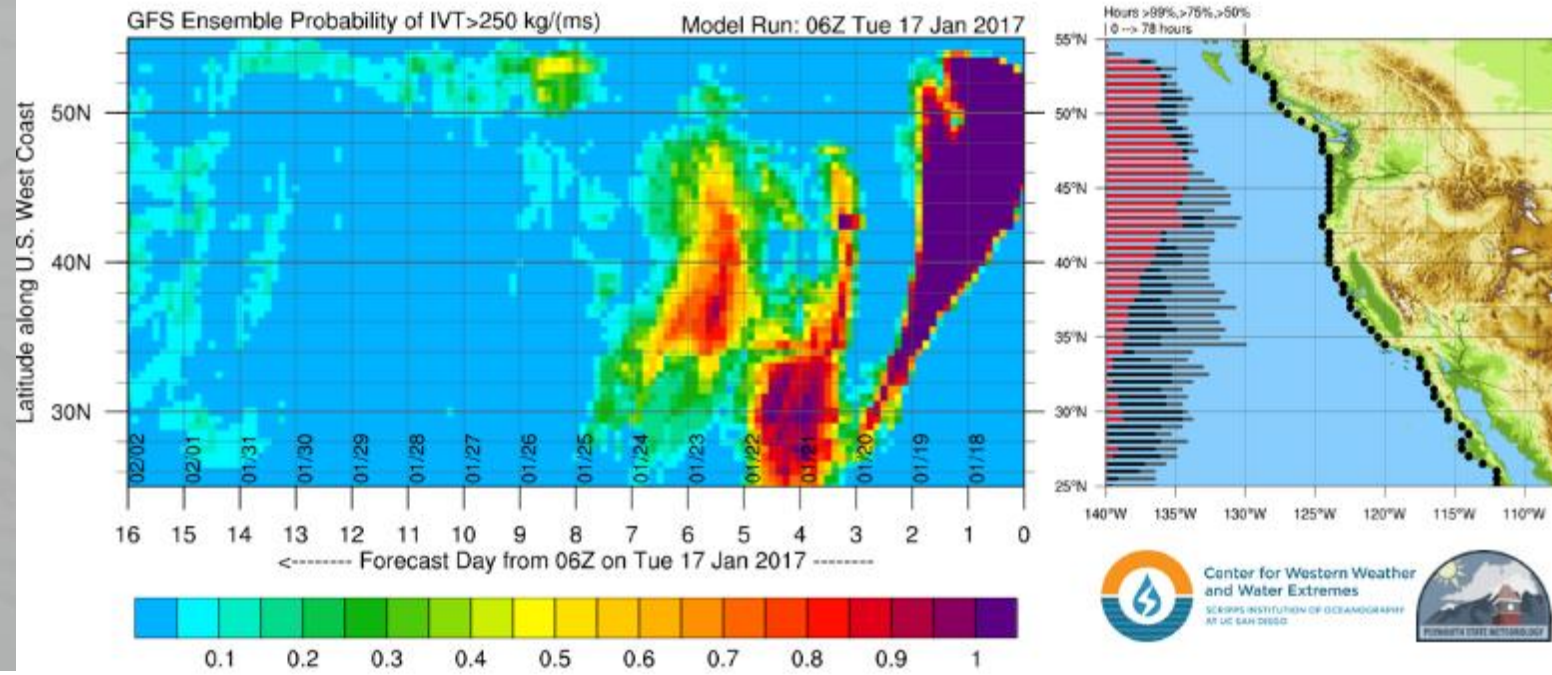
Airborne



Statewide Percent of April 1: 32%

Statewide Percent of Average for Date: 37%

Forecast Tools from the Center for Western Weather and Water Extremes (CW3E)

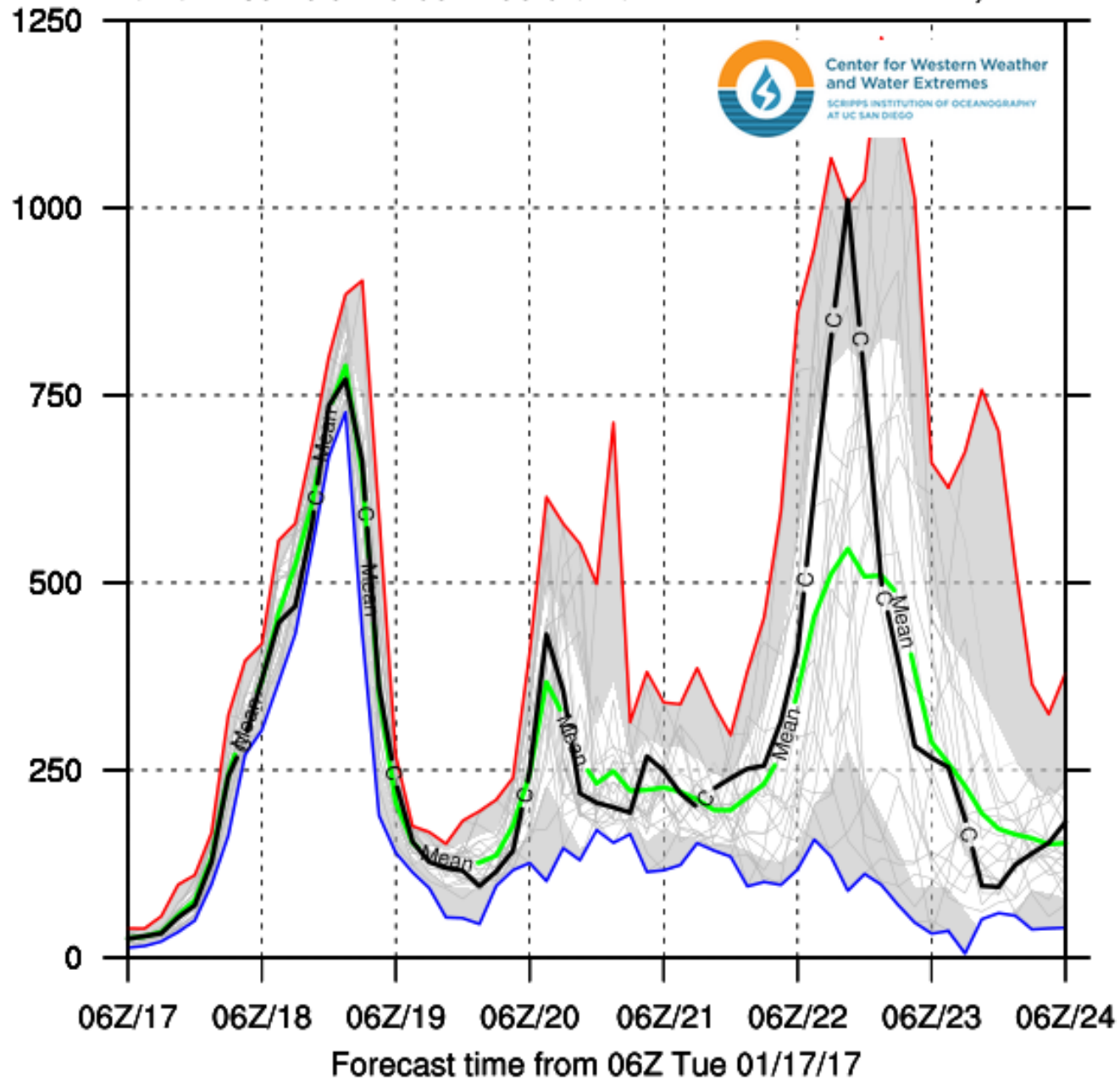


AR Outlook Tool

GFS Ensemble Init: 06Z Tue 01/17/17

LatLon: 39N;124W

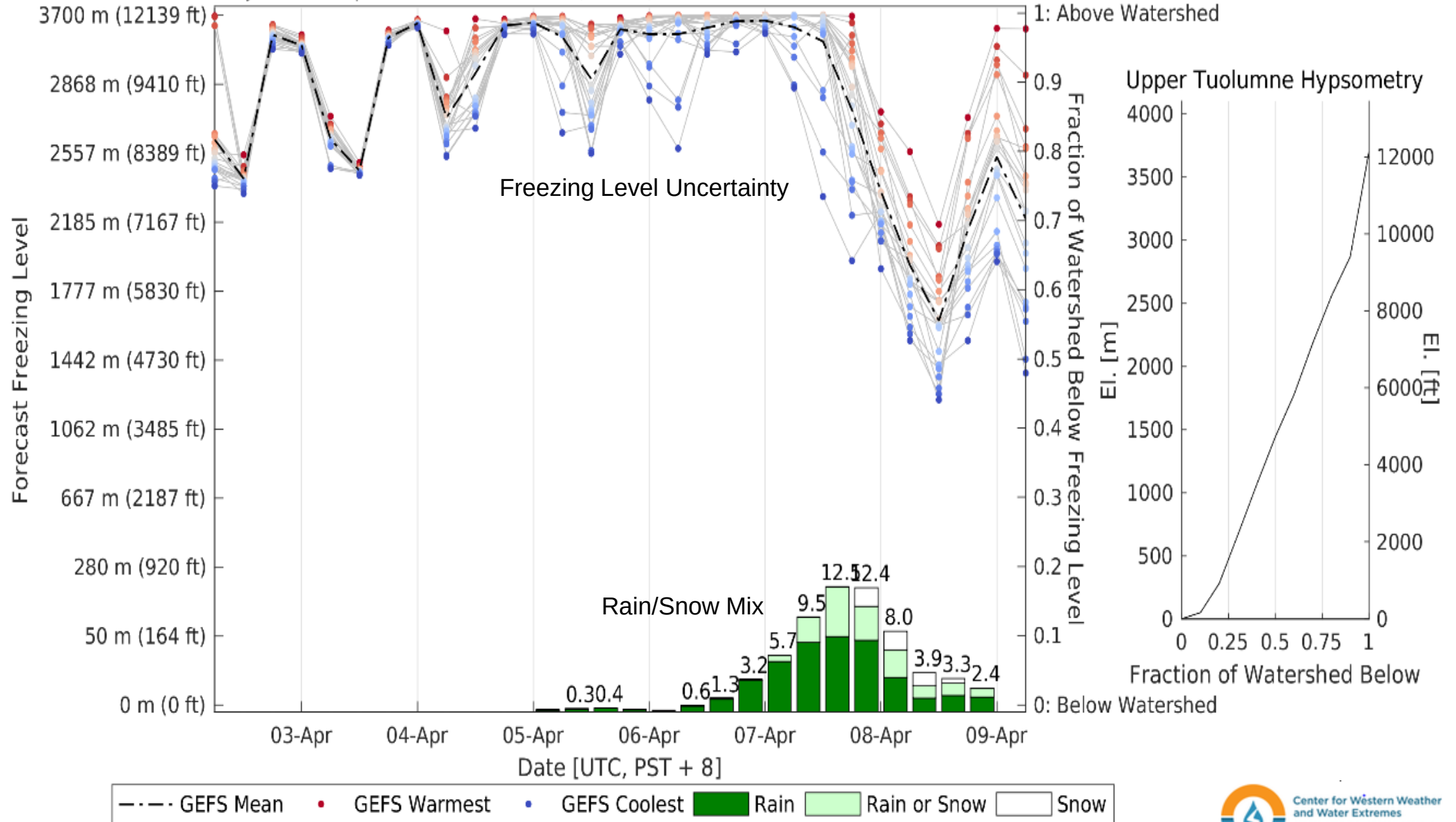
IVT Magnitude [kg/m/s]



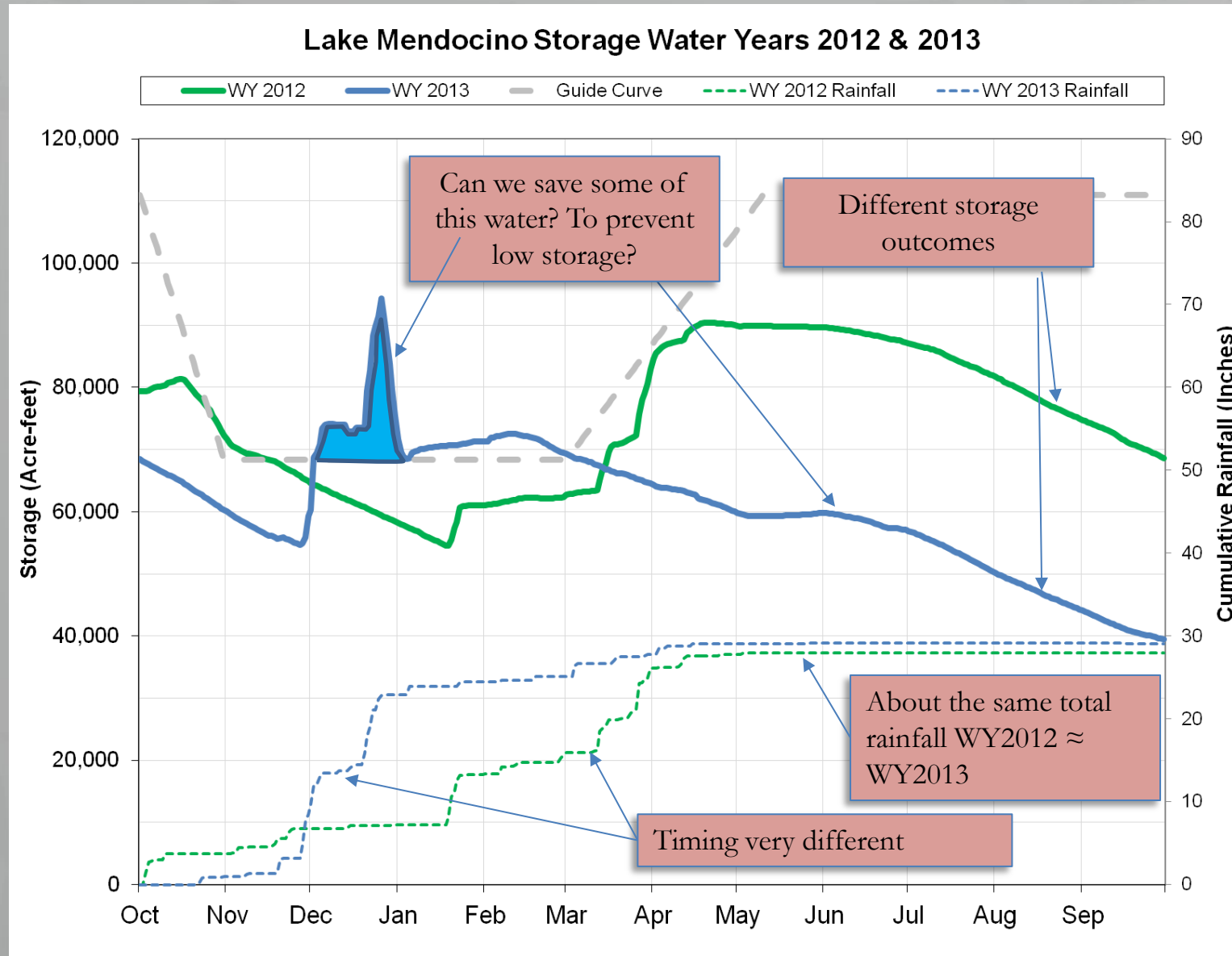
AR Strength Forecast and Uncertainty Tool

Upper Tuolumne Forecast Initialized 02-Apr 06Z

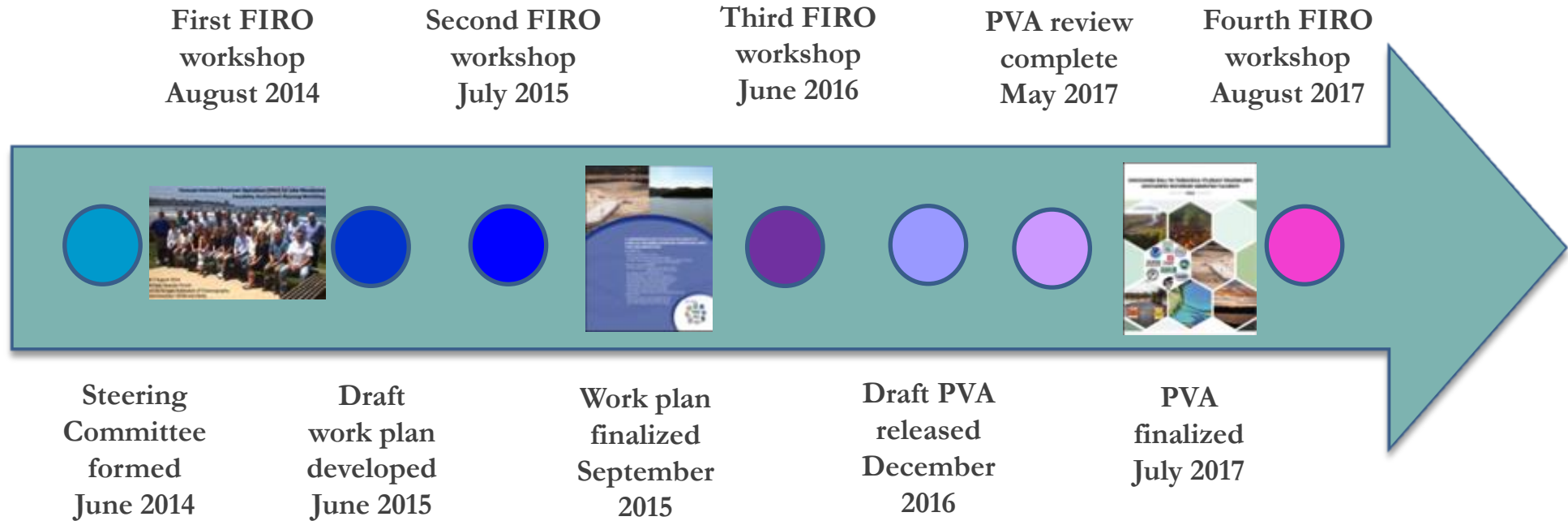
7-day WPC Precipitation Total: 64.1 mm (2.52 in) - 63% Rain, 28% Rain or Snow, 9% Snow



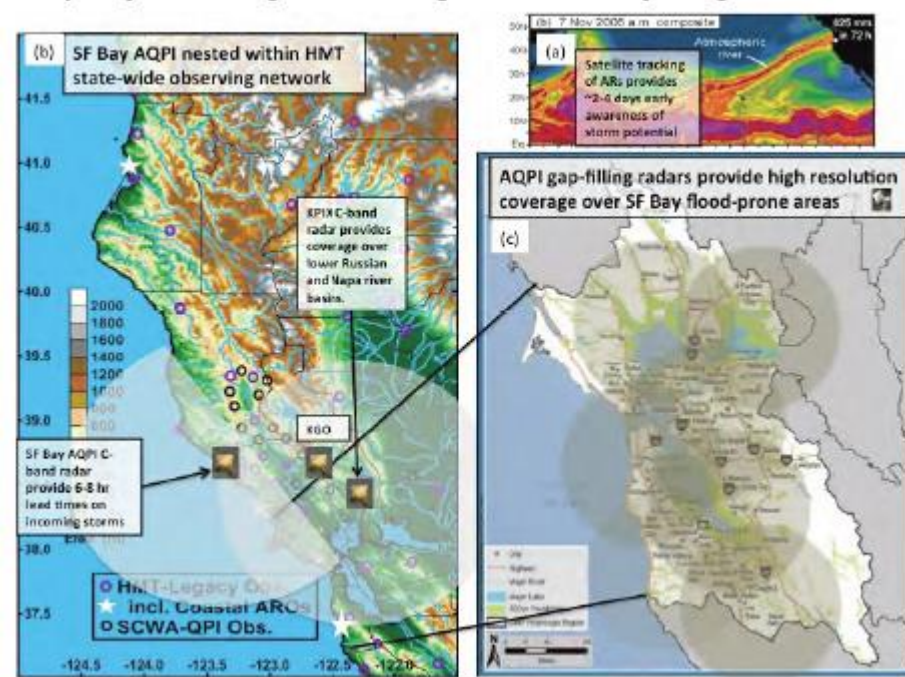
Lake Mendocino Guide Curve – A Tale of 2 Water Years



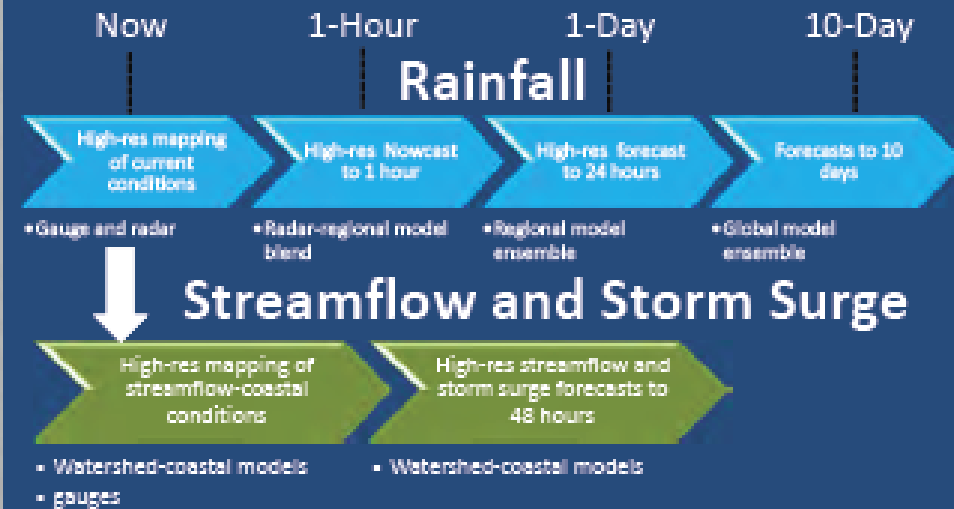
Lake Mendocino FIRO Timeline



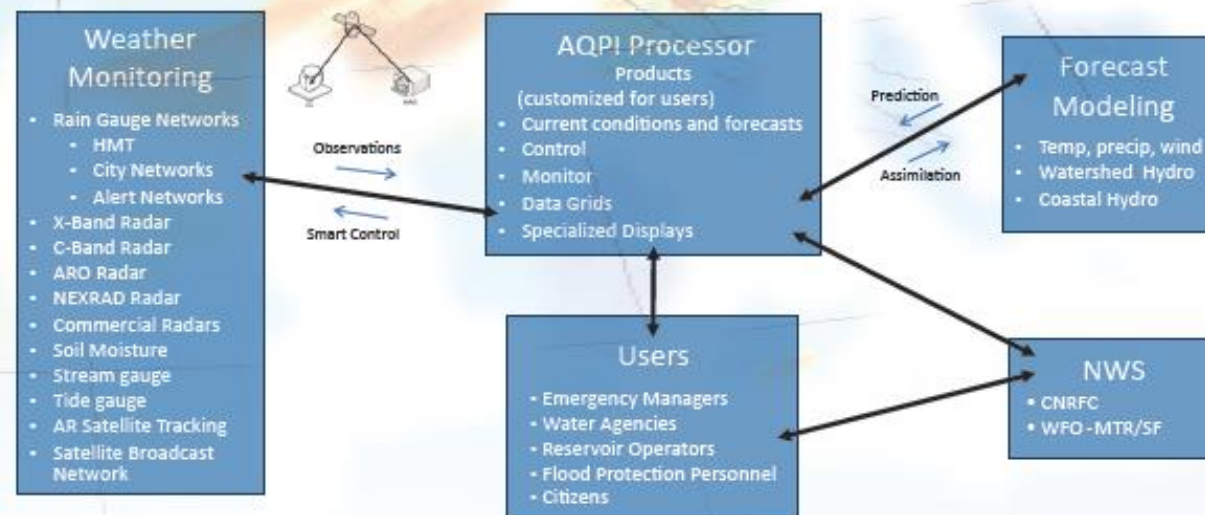
Conceptual layout of monitoring instrumentation augmentation across the Bay Area region.



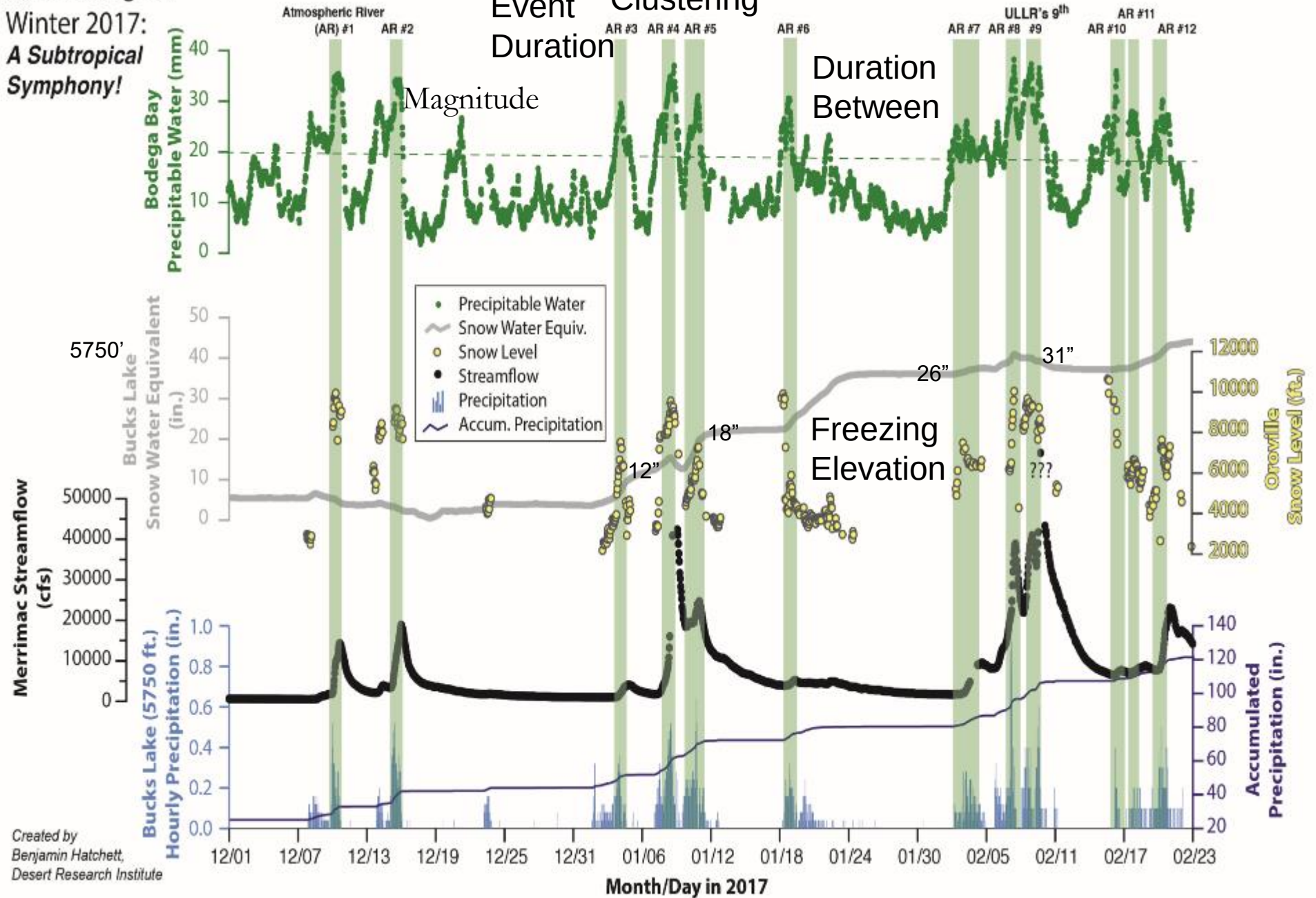
AQPI: better monitoring of current and future weather and water conditions

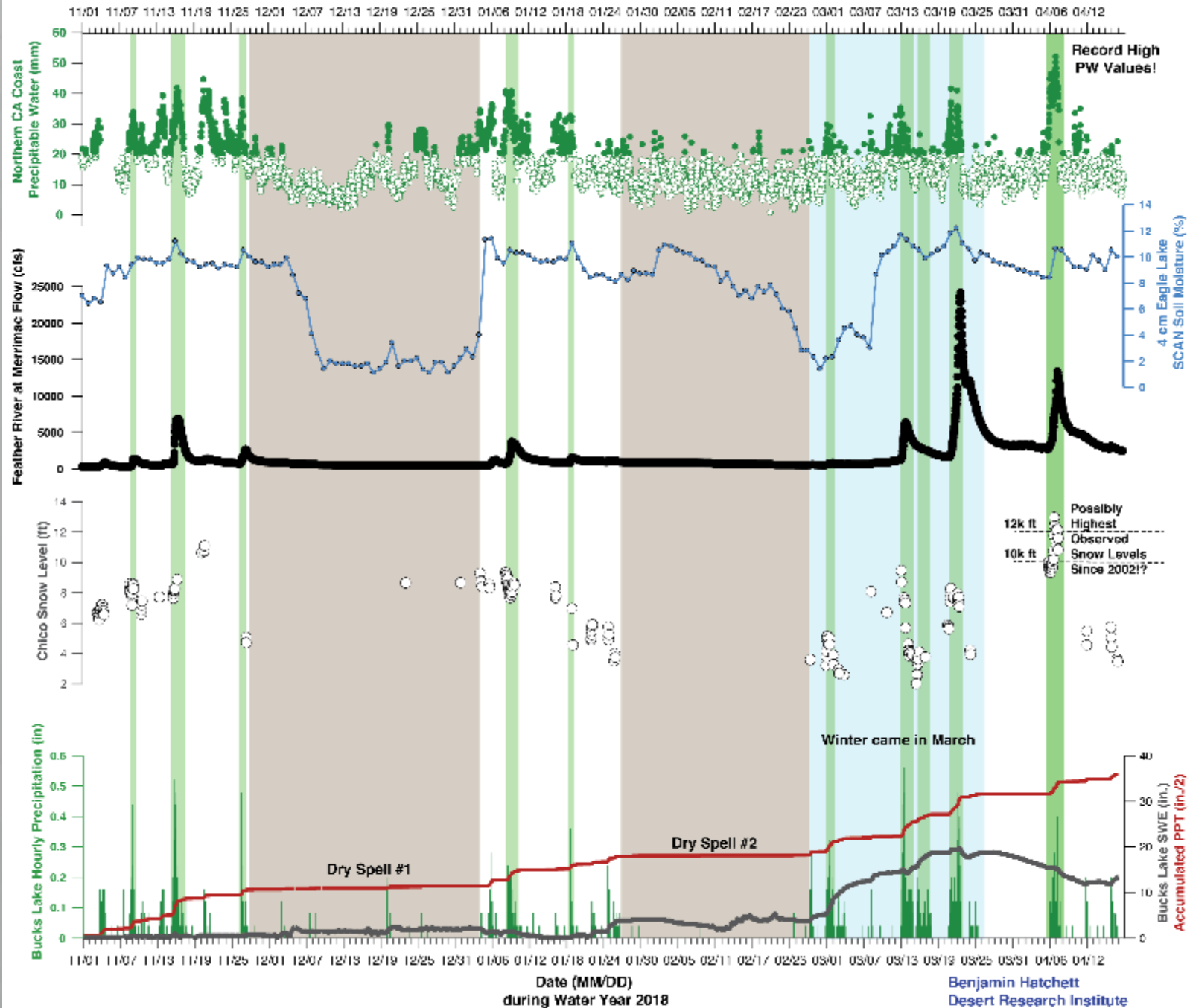


AQPI System



Meteorological
Winter 2017:
*A Subtropical
Symphony!*





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Federal State and Local Alignment

- DWR plays a key role in facilitating the transition of new science in observations and forecasting from research to operations for water management.
- Relationships with federal partners have been built over the past decade with the availability of resources on a project-by-project basis.
- Continued engagement with the science community is key to adapting to a warming world.

Next Steps

- Embarking on new partnership with Climate Prediction Center and furthering partnership with Earth Systems Research Lab
- FIRO comes to Southern California with Orange County Water District and Prado Dam
- Data Curation, Management, and Implementation
- The Next Great Collaboration and Finding Funding

An aerial photograph of a vast agricultural landscape. The foreground and middle ground are dominated by large, rectangular fields of varying shades of green and brown, indicating different crops or stages of cultivation. A large, dense flock of white birds, possibly geese or swans, is gathered in a central field, creating a stark contrast with the green. In the background, more fields stretch towards a distant horizon under a pale sky. A small cluster of buildings is visible in the upper right.

Questions?

Michael.L.Anderson@water.ca.gov