Perspectives on Science and Technology Advances to Enable FIRO

Presented by:

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FIRO Workshop SIO

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Talk Overview

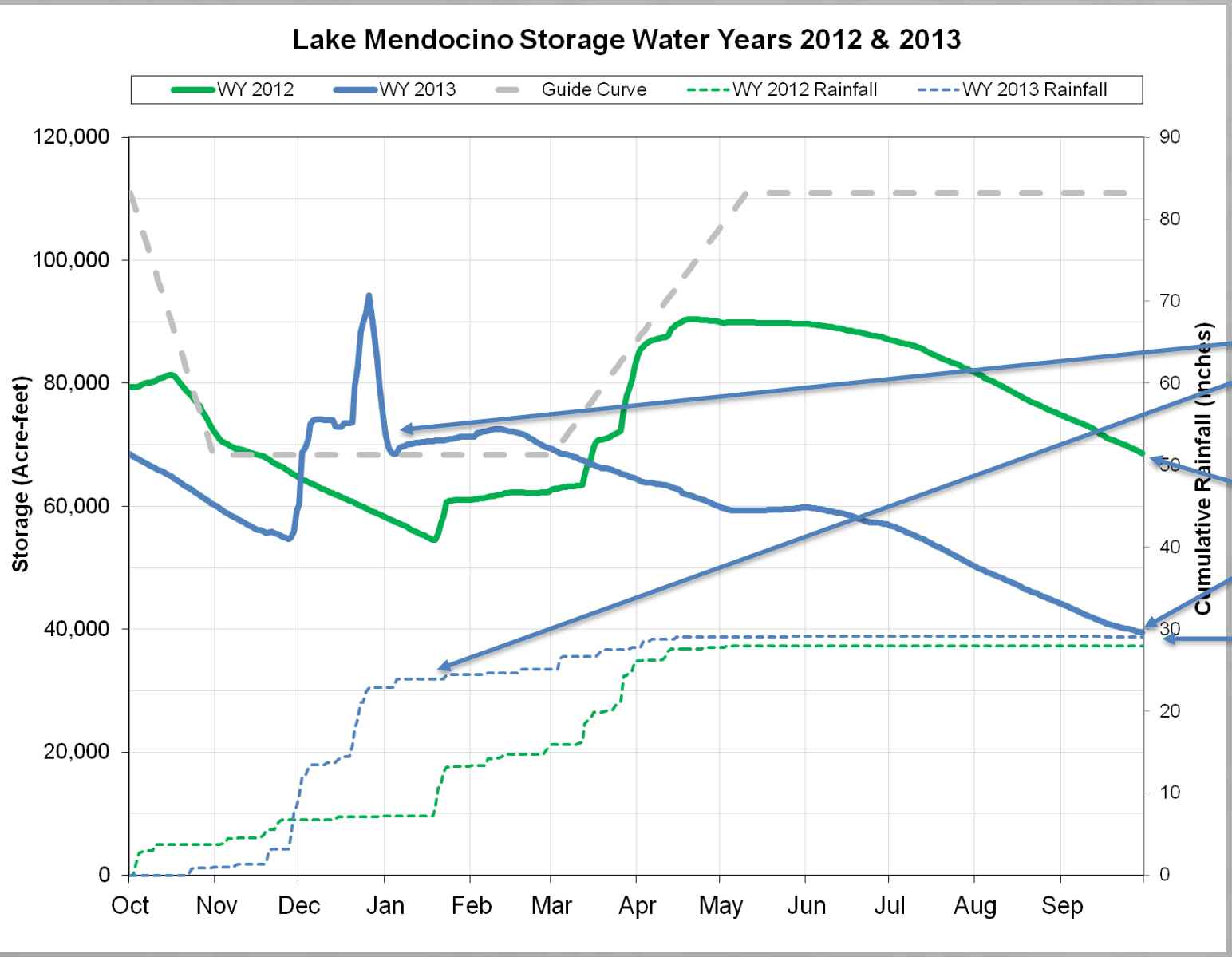
- FIRO to Date
- Observations and Forecasts
- A To-Do List of Sorts

California's topography affects our weather and climate

- *Russian River and Lake Mendocino Project impacted by relicensing of Potter Valley Project diversions from Eel River to Russian River*

Change can come in a variety of ways

A Tale of Two Water Years – Timing Matters



No significant precipitation after this event

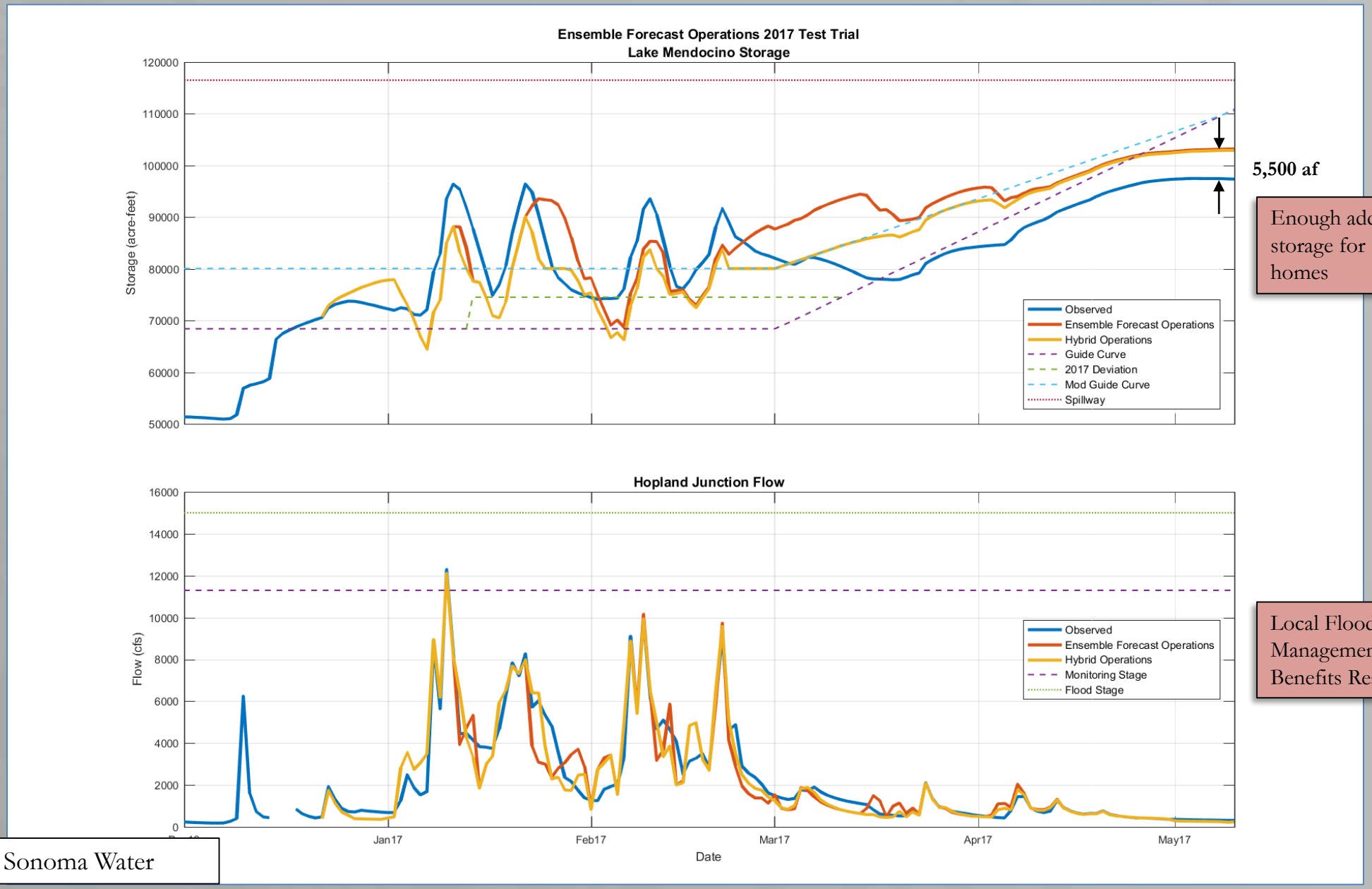
End of Year Storage Very Different

Seasonal Precipitation Similar

FIRO Steering Committee – Collaborations are Key!

Coalition of federal, state, & regional agencies and academia, comprised of scientists, engineers & water managers

Innovation Needs Realized



Enough additional storage for ~20,000 homes

Local Flood Management Benefits Realized

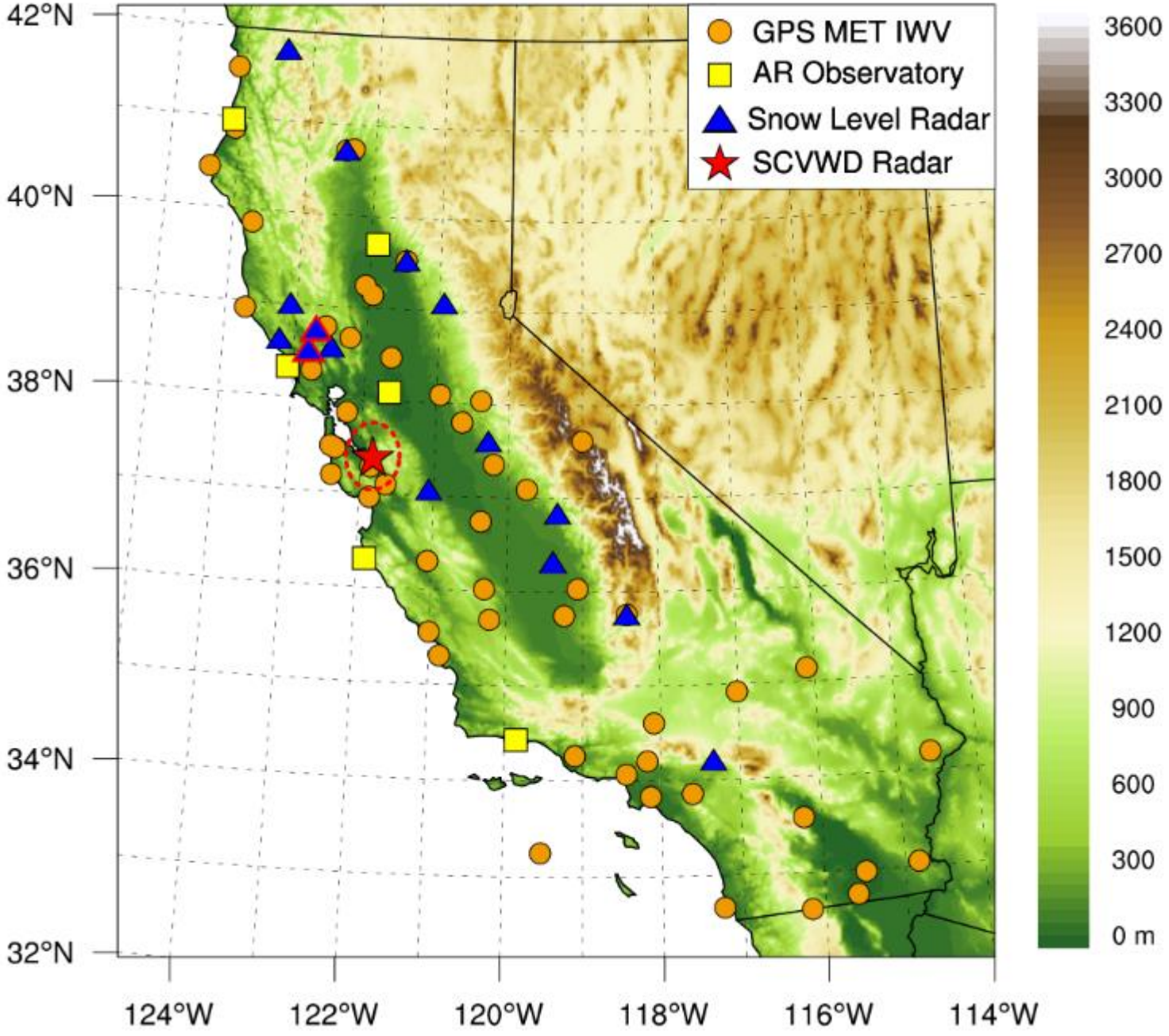
Slide courtesy Sonoma Water

FIRO Lessons Learned

- FIRO provides an effective means of increasing the efficiency and resiliency of existing water resources projects

- Collaboration between researchers, operators and regulators focused collectively on improving water management strategies is key

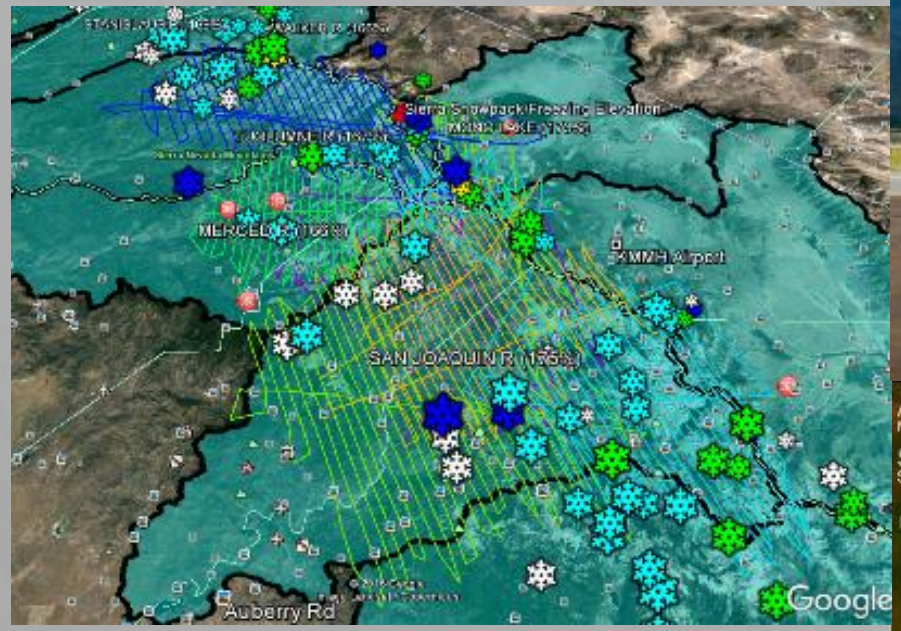
- Collaborative research shows significant promise for making advances in observations and forecasts and their use which will lead to more opportunities for developing adaptive strategies to changing conditions impacting water management

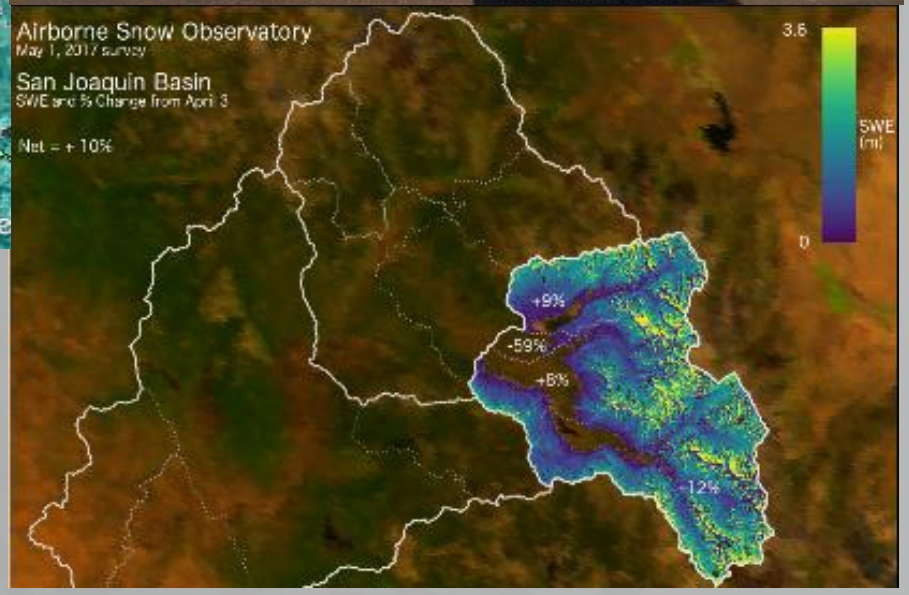


California's Advanced Observing System for Atmospheric Rivers

Starting in 2008 DWR collaborated with NOAA ESRL and Scripps Institution of Oceanography to develop AR Observing System

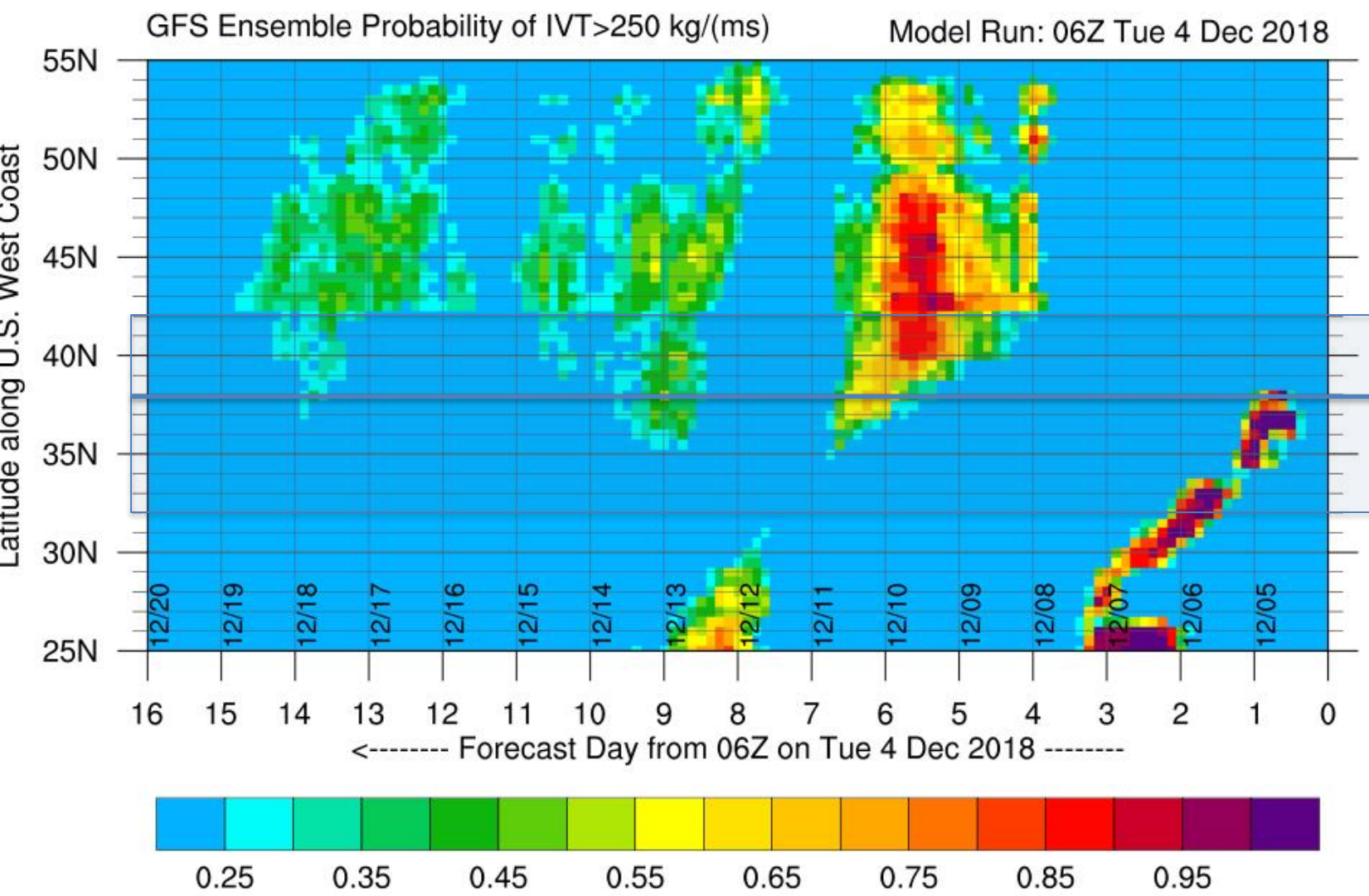
ASO – High Elevation Snow Observations

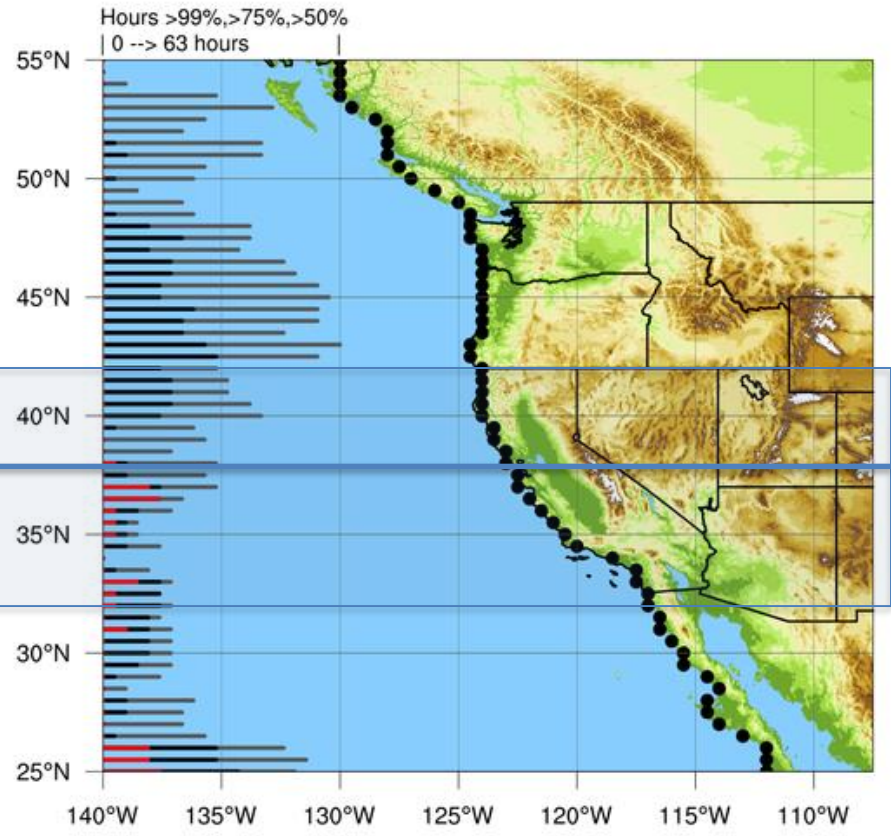




For more information see:
https://aso.jpl.nasa.gov/

AR Outlook Tool from CW3E





Center for Western Weather and Water Extremes
SCRIPPS INSTITUTION OF OCEANOGRAPHY AT UC SAN DIEGO

PLYMOUTH STATE METEOROLOGY

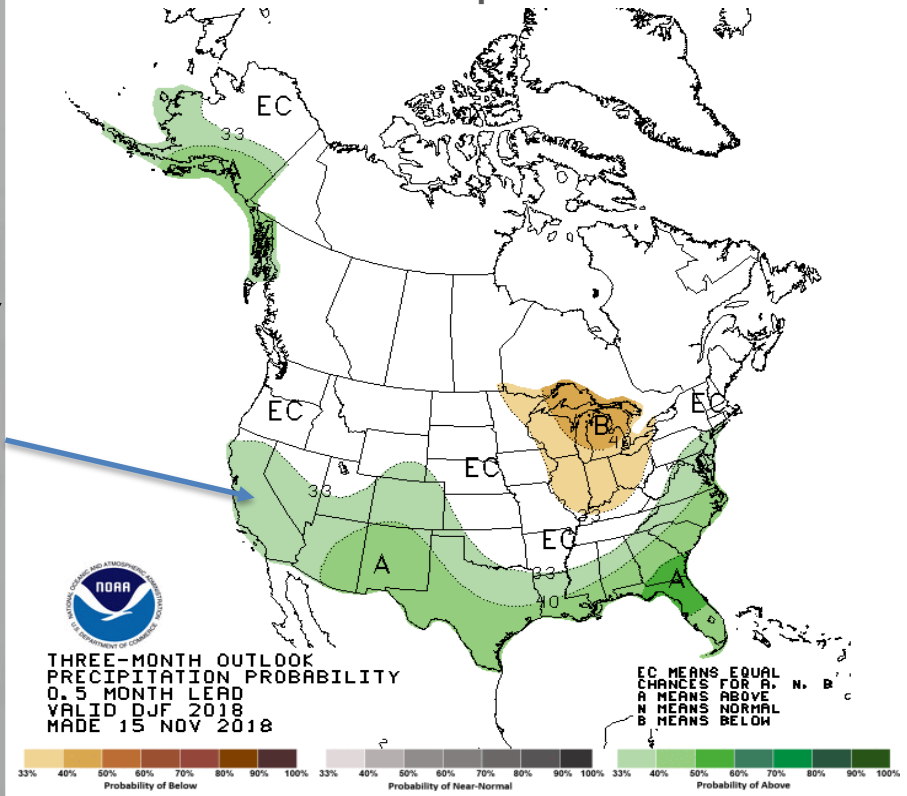
U. S. Seasonal Outlooks

December 2018 - February 2019

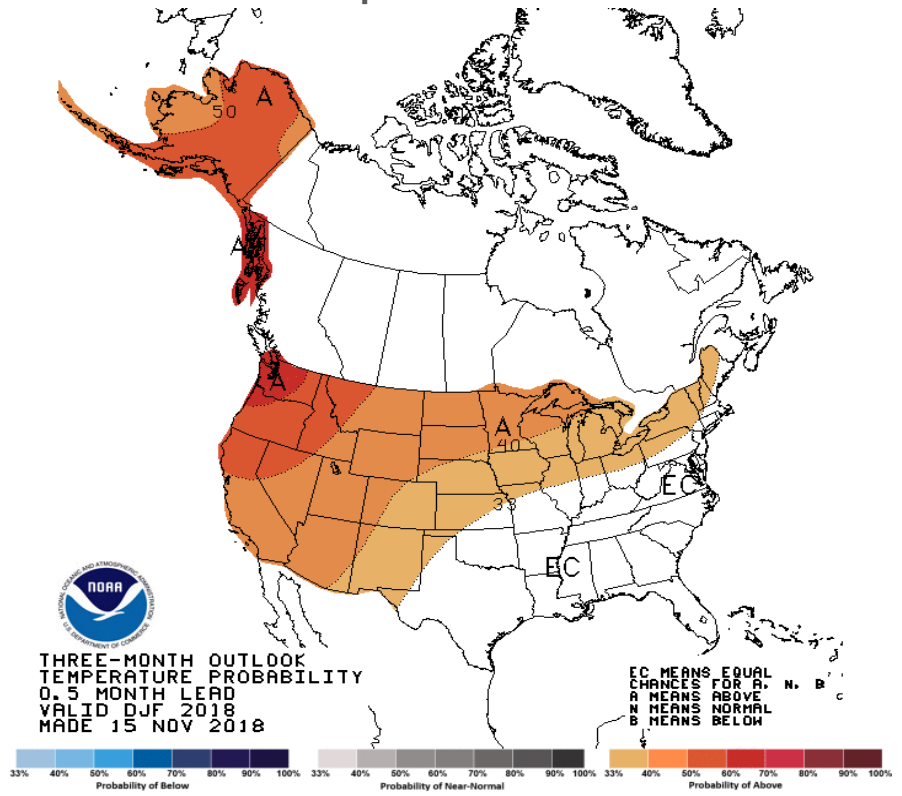
The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, ENSO.

37% W
34% N
29% D

Precipitation



Temperature

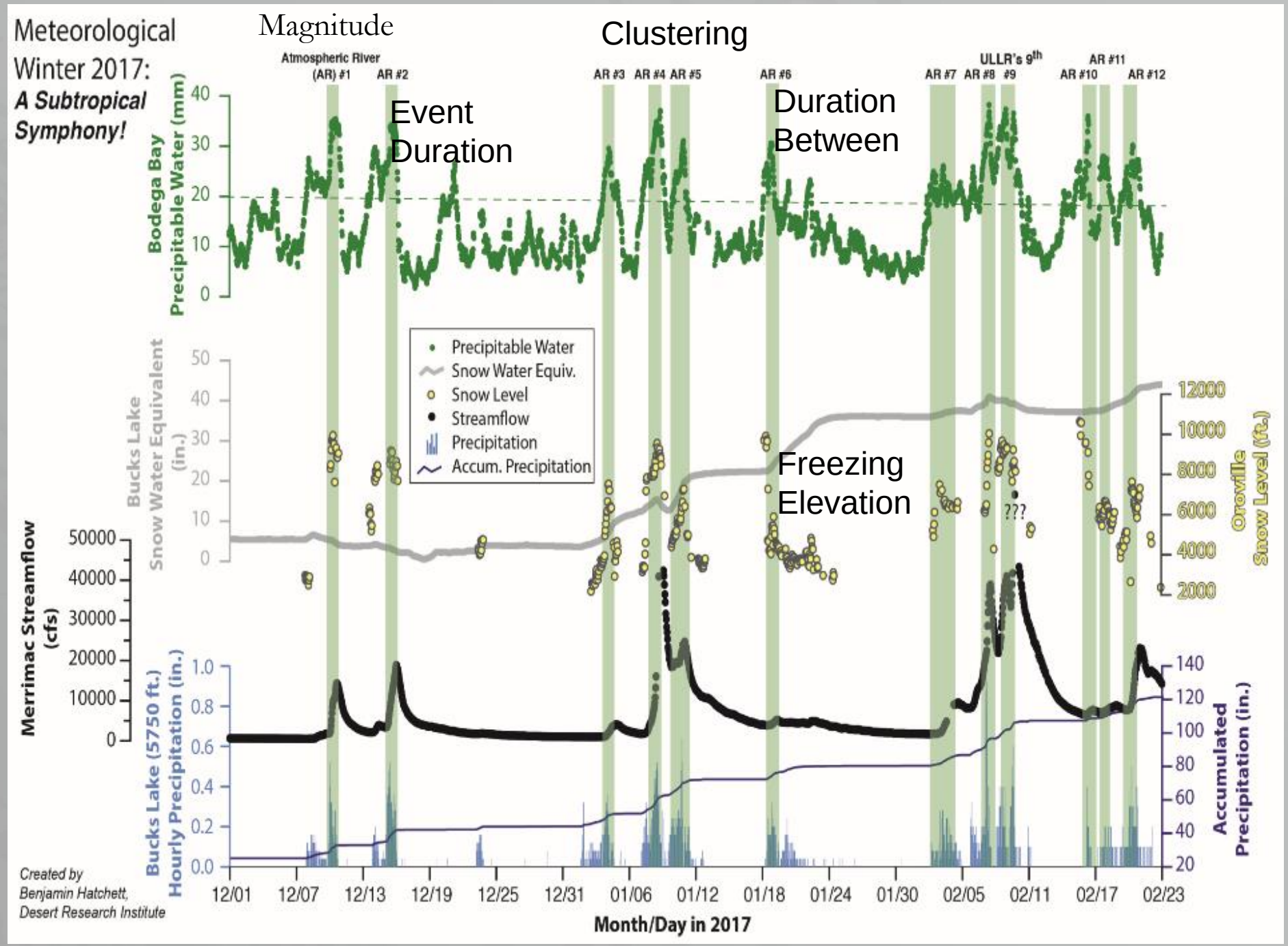


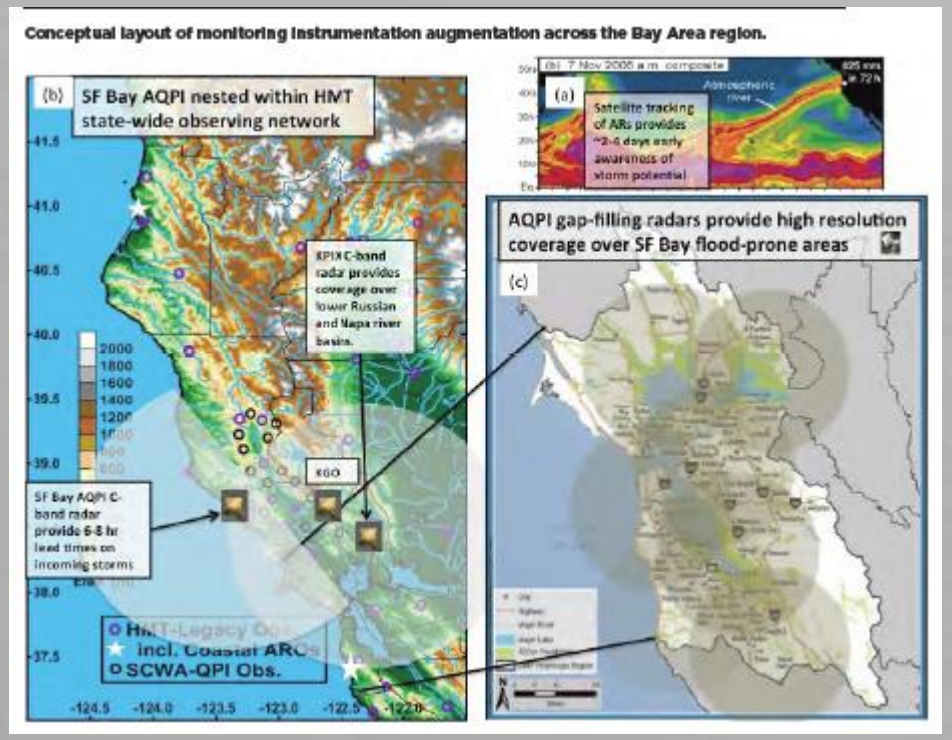
From NWS CPC ENSO Diagnostic Discussion 12/3/18

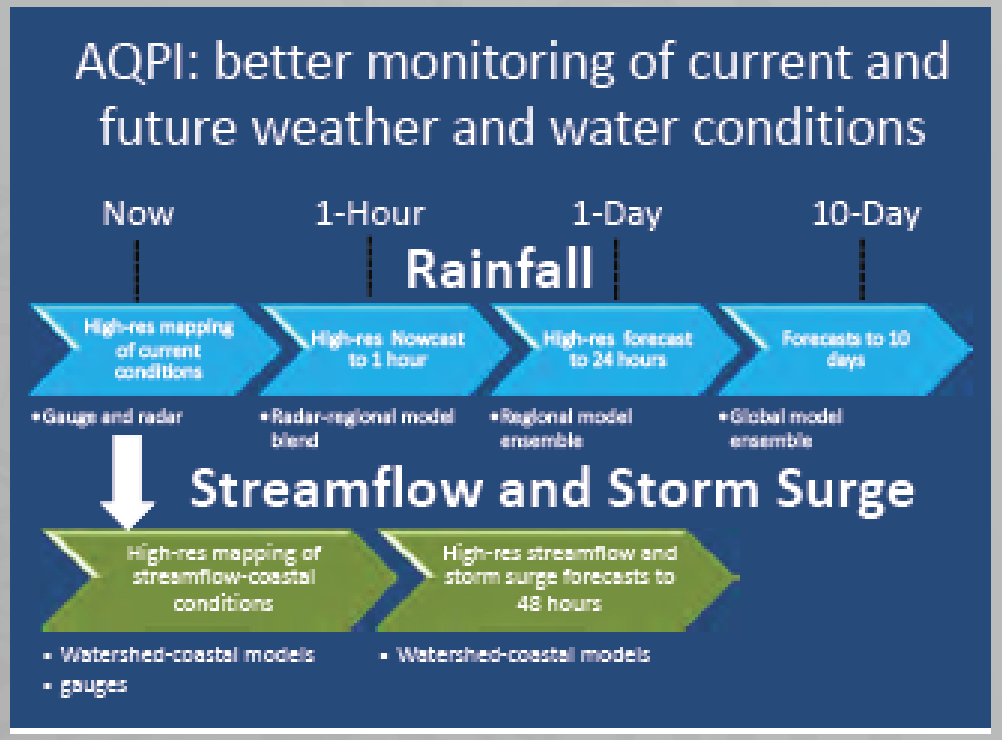
How much can we anticipate?

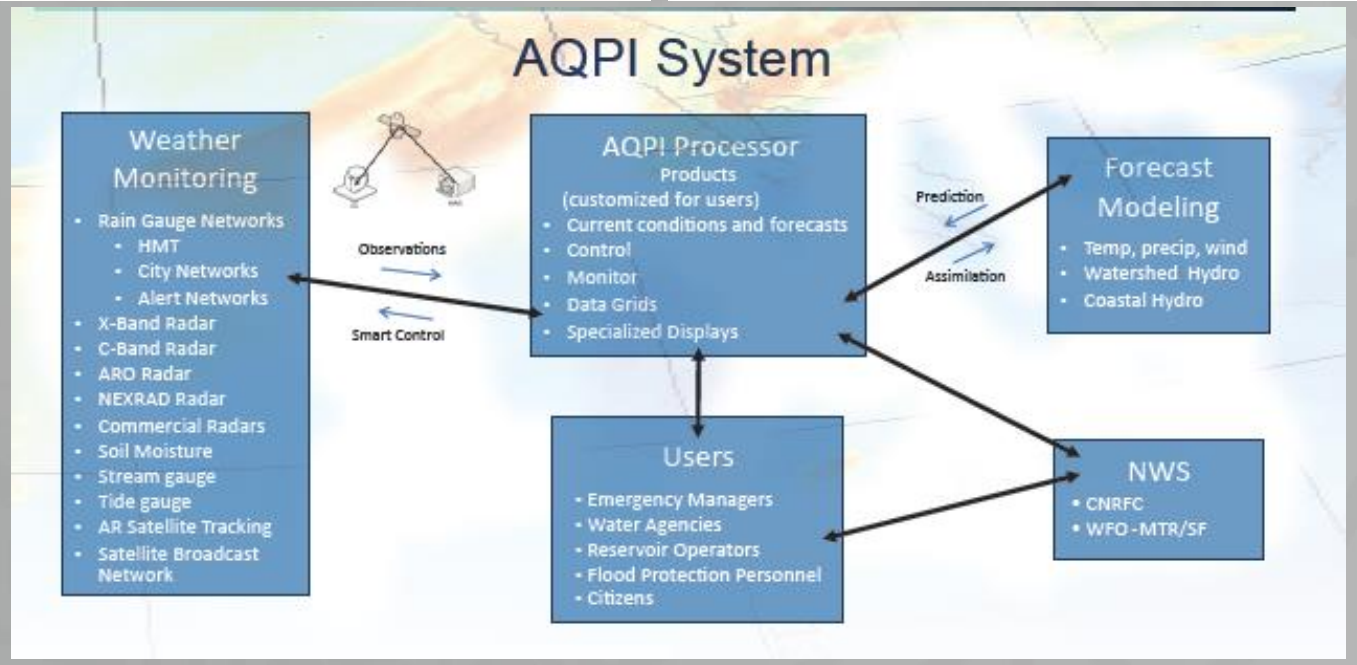
What metrics?

What matters most?




Conceptual layout of monitoring instrumentation augmentation across the Bay Area region.
(b) SF Bay AQPI nested within HMT state-wide observing network
(a) Satellite tracking of ARs provides ~2-6 days early awareness of storm potential
AQPI gap-filling radars provide high resolution coverage over SF Bay flood-prone areas
(c)
KPIX C-band radar provides coverage over lower Russian and Napa river basins.
SF Bay AQPI C-band radar provide 6-8 hr lead times on incoming storms
HMT-Legacy Obs
incl. Coastal ARO
SCWA-QPI Obs.


AQPI: better monitoring of current and future weather and water conditions
Now
1-Hour
1-Day
10-Day
Rainfall
High-res mapping of current conditions
High-res Nowcast to 1 hour
High-res forecast to 24 hours
Forecasts to 10 days
•Gauge and radar
•Radar-regional model blend
•Regional model ensemble
•Global model ensemble
Streamflow and Storm Surge
High-res mapping of streamflow-coastal conditions
High-res streamflow and storm surge forecasts to 48 hours
• Watershed-coastal models
• gauges
• Watershed-coastal models


AQPI System
Weather Monitoring
• Rain Gauge Networks
• HMT
• City Networks
• Alert Networks
• X-Band Radar
• C-Band Radar
• ARO Radar
• NEXRAD Radar
• Commercial Radars
• Soil Moisture
• Stream gauge
• Tide gauge
• AR Satellite Tracking
• Satellite Broadcast Network
Observations
Smart Control
AQPI Processor
Products
(customized for users)
• Current conditions and forecasts
• Control
• Monitor
• Data Grids
• Specialized Displays
Prediction
Assimilation
Forecast Modeling
• Temp, precip, wind
• Watershed Hydro
• Coastal Hydro
Users
• Emergency Managers
• Water Agencies
• Reservoir Operators
• Flood Protection Personnel
• Citizens
NWS
• CNRFC
• WFO-MTR/SF

A To Do List of Sorts

- *Develop an integrated observing system – combining in-situ, airborne, and satellite data for water management intel*
- *Evaluate new technologies to fold into Integrated Observing System with identified priority research with collaborative partners*
- *Develop forecasting across time scales from events to year-ahead outlooks to decadal change expectations geared to inform water management*
- *Identify key characteristics in atmosphere and watershed to track climate change impact drivers that can key timing and choice of adaptive strategy implementation*

Questions?

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