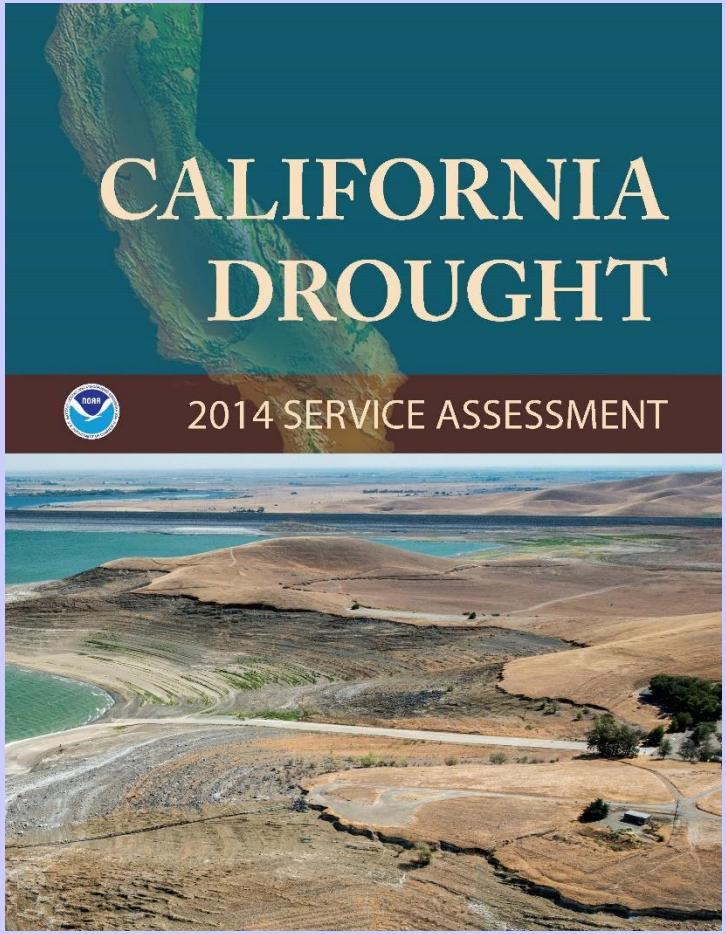
CDWR Efforts on S2S Forecasting Improvement

Jeanine Jones, California Department of Water Resources

Can S2S Precipitation Forecasting be Improved?

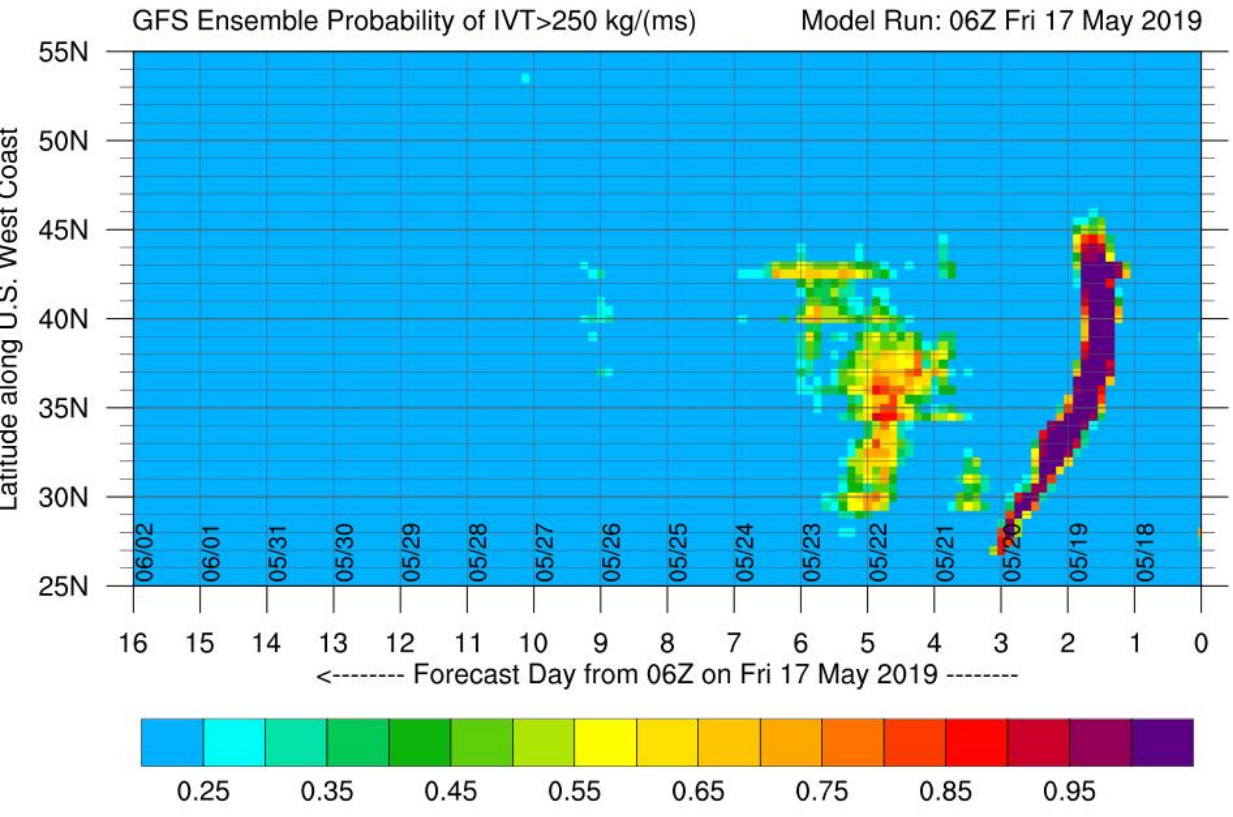
- 2018 marked 10th anniversary of DWR Winter Outlook Workshops with research community, originally begun due to 2007-09 drought
- Seeing progress, or at least a direction, building upon DWR's investment in observing systems
- Two recent National Academies of Science reports
- Weather Research & Forecasting Innovation Act of 2017 (reauthorized in 2019) direction to NOAA

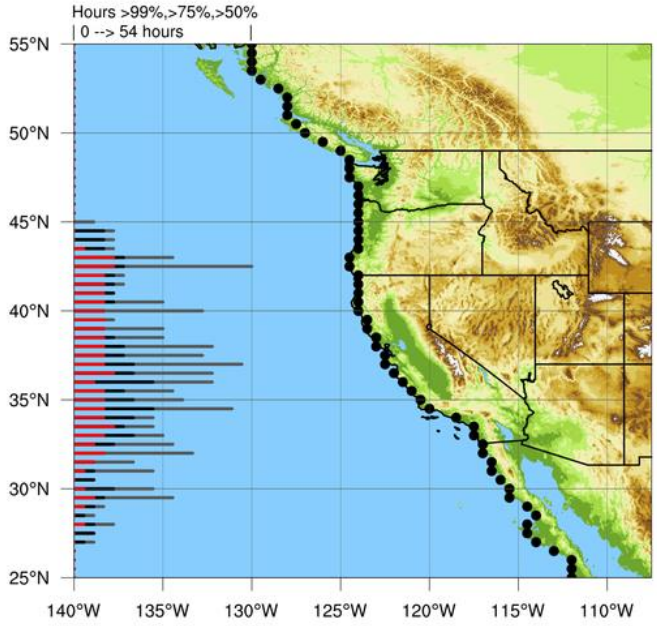
Ideally, a Seamless Suite of Forecasts from Flood to Drought….



Making Progress in Forecasts from Hours to Months

- Decade+ partnership with NOAA on Hydrometeorology Testbed program, for experimental observations & research on extreme precipitation (atmospheric river storms)
- Enabling forecast-informed reservoir operations pilot studies with Scripps (weather timescale)
- Potential to leverage this research investment to help with S2S forecasting

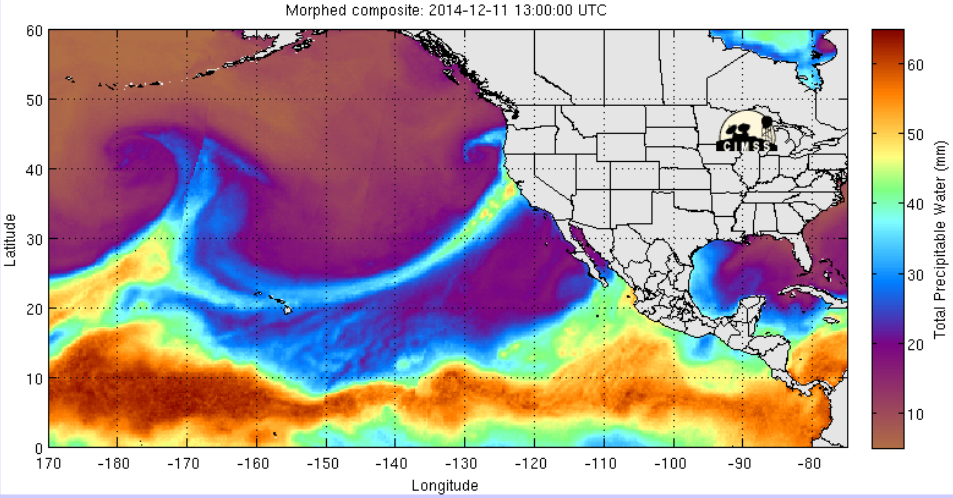




Center for Western Weather and Water Extremes
SCRIPPS INSTITUTION OF OCEANOGRAPHY AT UC SAN DIEGO

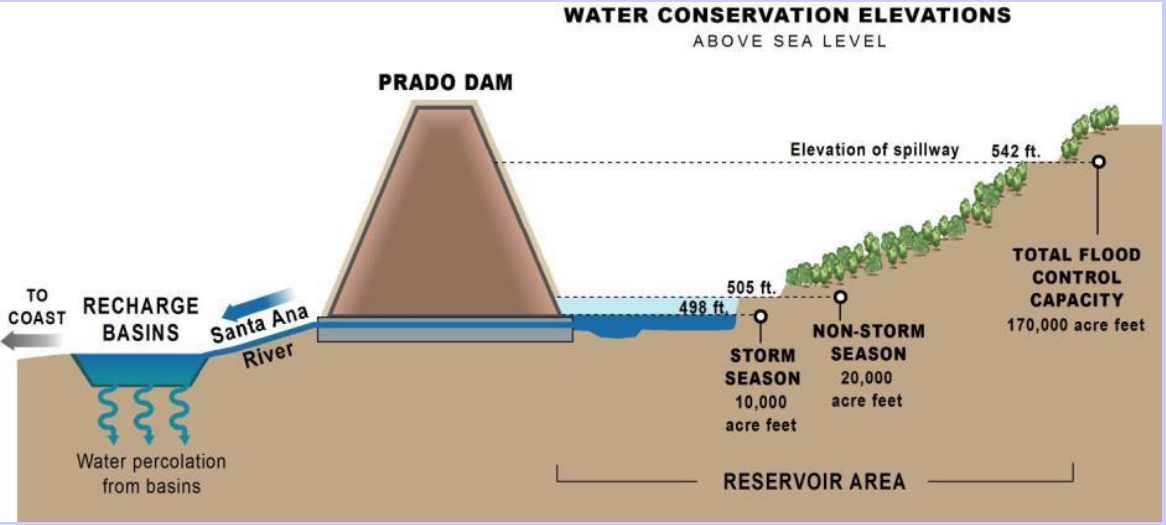
PLYMOUTH STATE METEOROLOGY

Forecast-Informed Reservoir Operations Pilot Projects

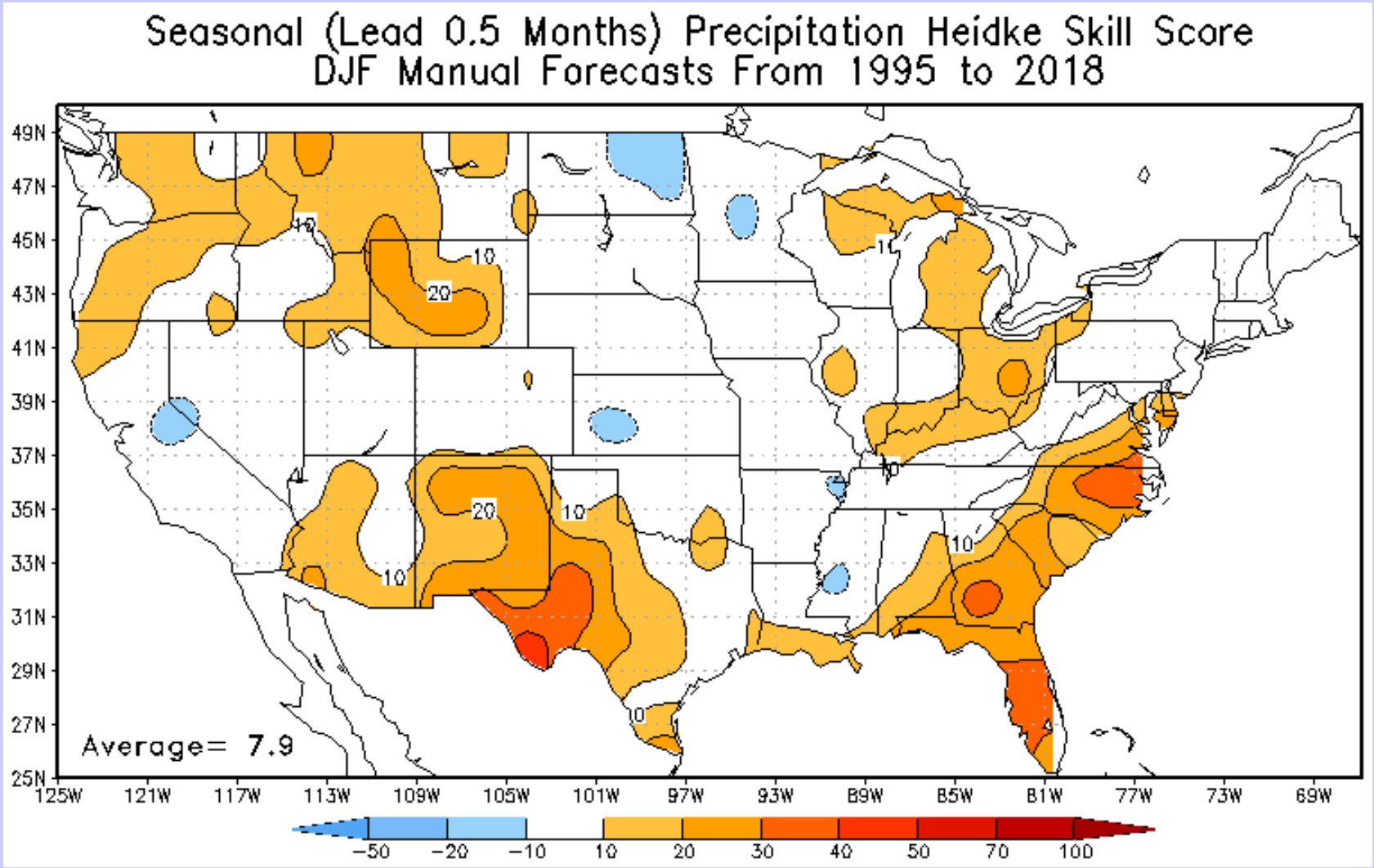


YUBA WATER AGENCY

DEPARTMENT OF WATER RESOURCES • STATE OF CALIFORNIA •

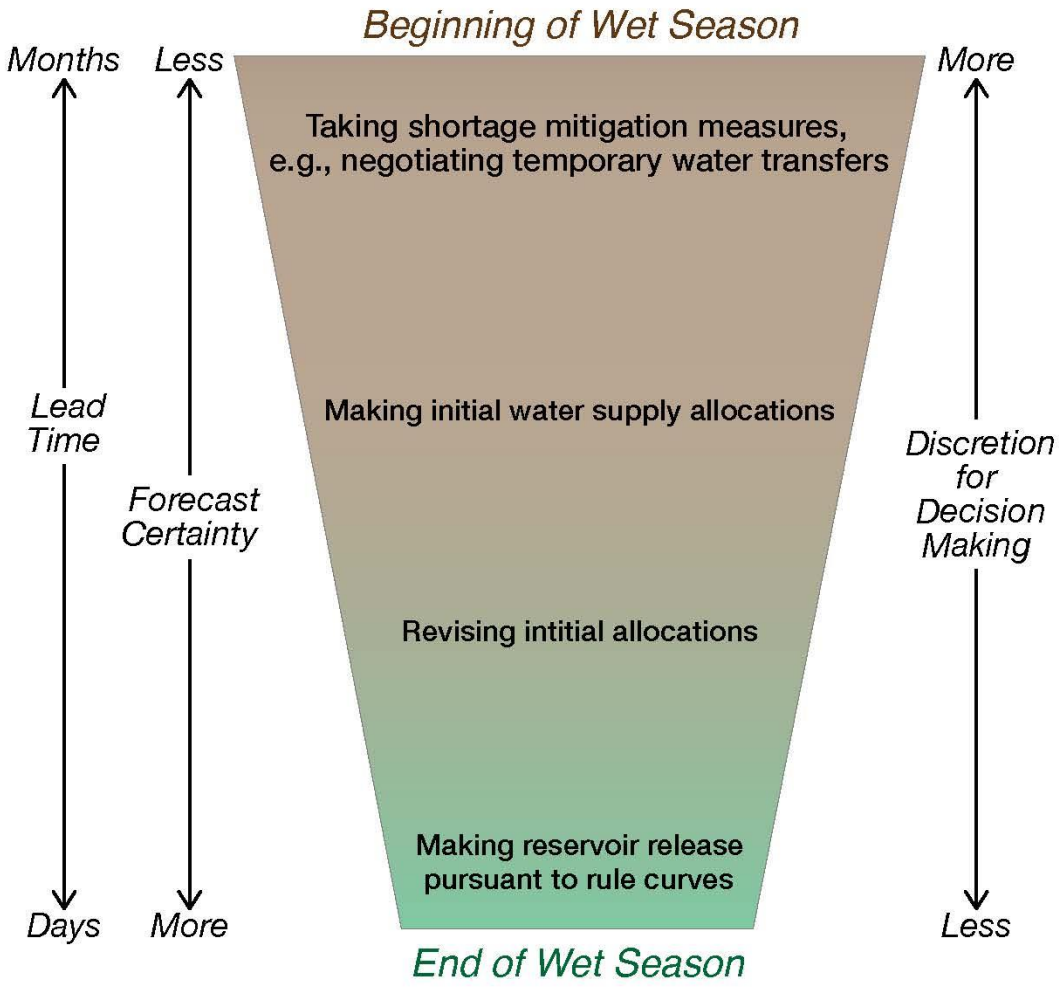


NOAA NWS Climate Prediction Center Skill Scores



NOAA CPC figure

Seasonal Water Management Funnel

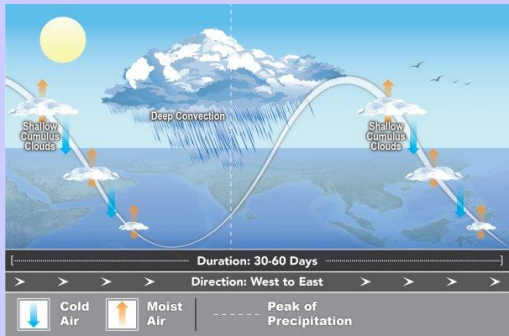


Opportunities for Innovation

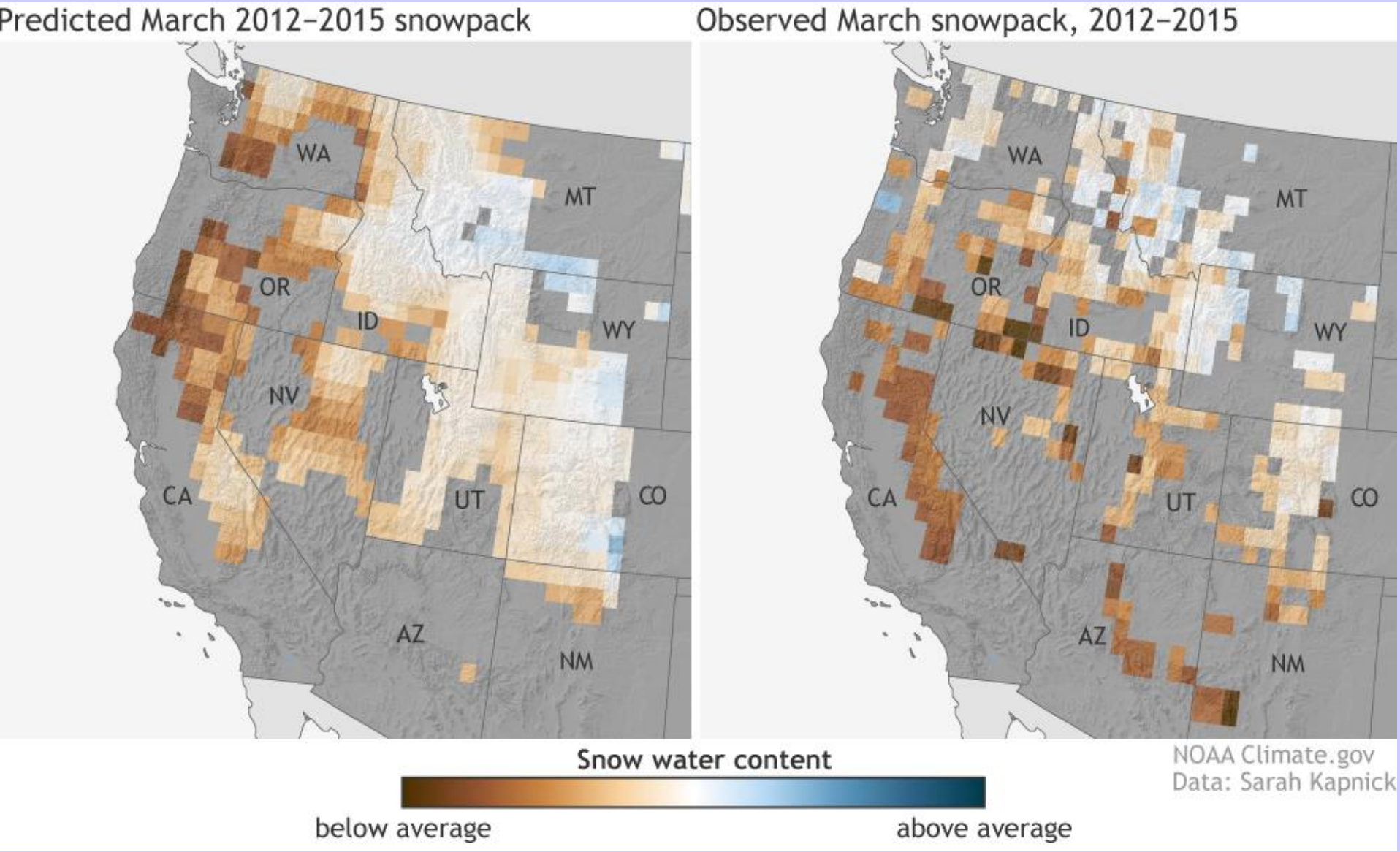
- Taking advantage of DWR investment in observing system
- Attempting experimental forecasts of sub-seasonal atmospheric rivers, sub-seasonal to seasonal atmospheric ridging
- Exploring potential for seasonal snowpack forecasting
- Experimenting with machine learning/artificial intelligence improvements to weather models

DWR-NOAA 5-Year Contract

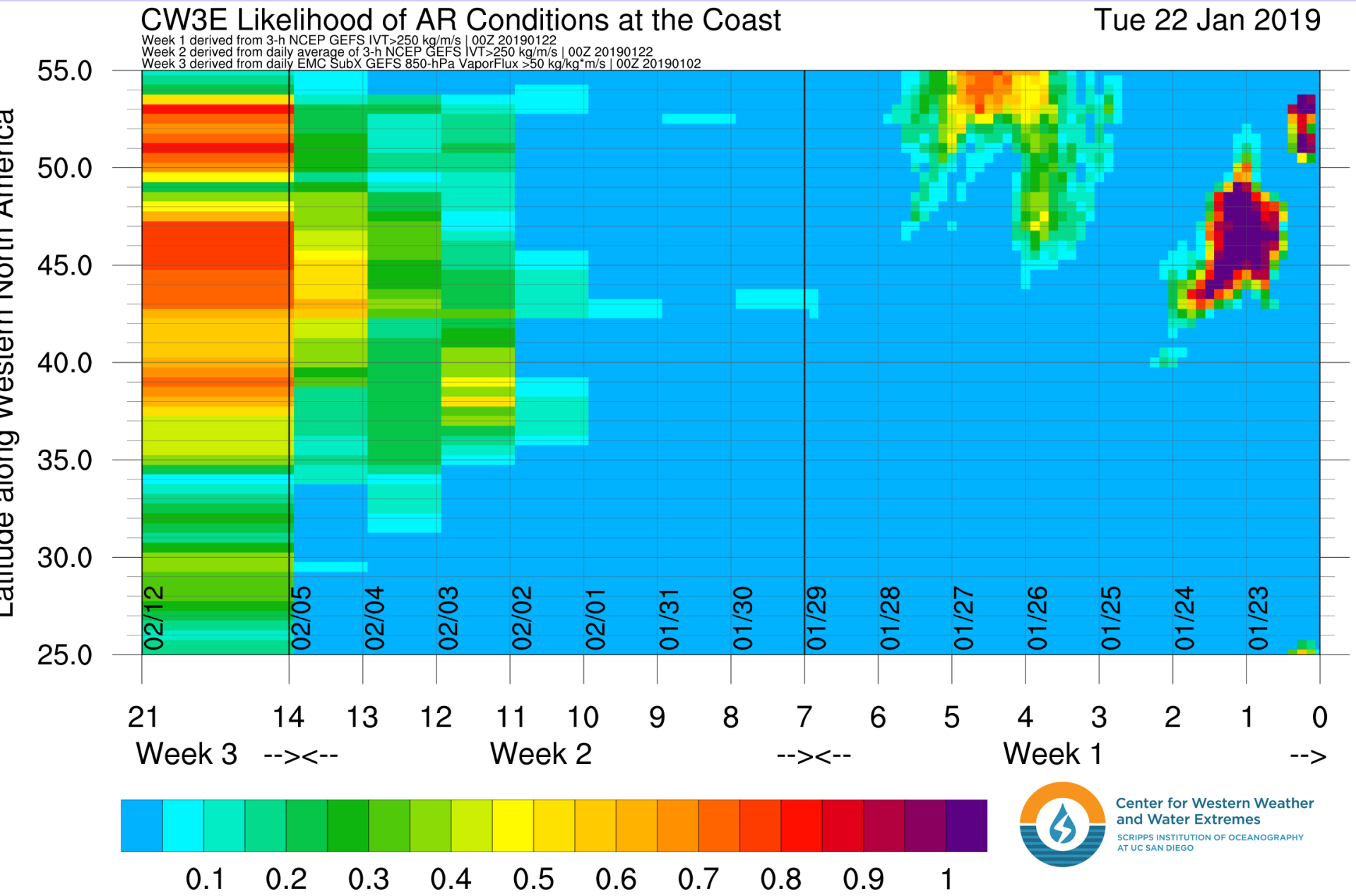
- Executed in December 2018, $750k/year for five years
- Near-term to longer-term projects, ranging from statistical post-processing of current weather model runs, to model data assimilation, to improving model representation of tropical convection



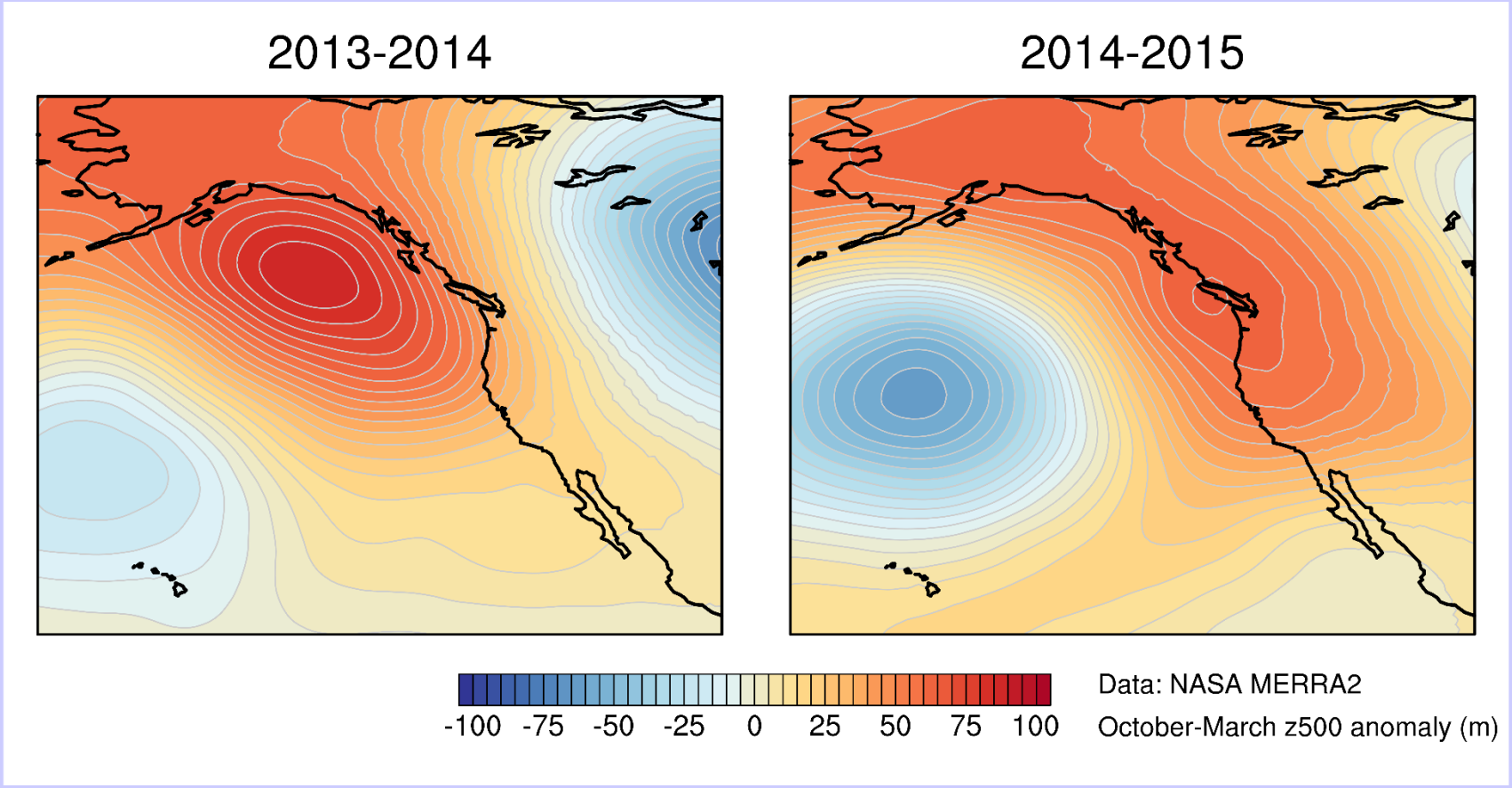
Could a Statistical Seasonal Model Match this NOAA Research Dynamical Model Prediction of Western Snowpack?



EXPERIMENTAL 3-Week Atmospheric River Forecast Prepared for DWR



Forecasting When it Won't Rain – Atmospheric Ridging



Peter Gibson, NASA JPL


"GODZILLA"
EL NIÑO
THE BLOB
MEGA-DROUGHT
WELCOME TO CALIFORNIA
©8/15
DUGINSKI

Working from the Climate Side

- Contracts with UCLA for experimental seasonal statistical model forecast, first for California then for Upper Colorado River Basin
- Preparing contract with UCI for analysis of climate diagnostics associated with wet season transitions (wet/dry, dry/wet case studies)

Where to Next?

- How to take advantage of machine learning/AI?
- Anything at all with the ocean???
- What are we missing at the climate time scale?
- Seasonal snowpack??
- Longer lead times!