



Center for Western Weather
and Water Extremes

SCRIPPS INSTITUTION OF OCEANOGRAPHY
AT UC SAN DIEGO

Leveraging Atmospheric River Forecasts in Water Management

F. Martin (Marty) Ralph, Ph.D.

Founding Director, Center for Western Weather and Water Extremes

UC San Diego/Scripps Institution of Oceanography



UC San Diego



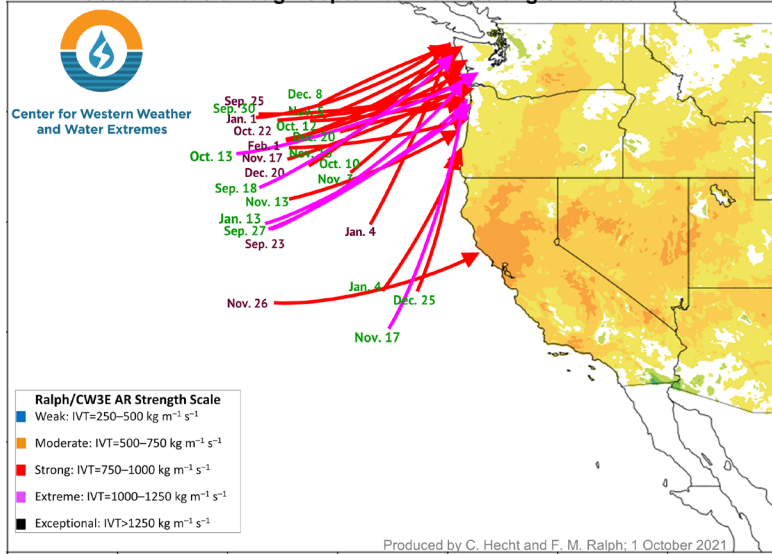
SCRIPPS INSTITUTION OF
OCEANOGRAPHY

ACWA
Indian Wells, CA
December 4, 2024

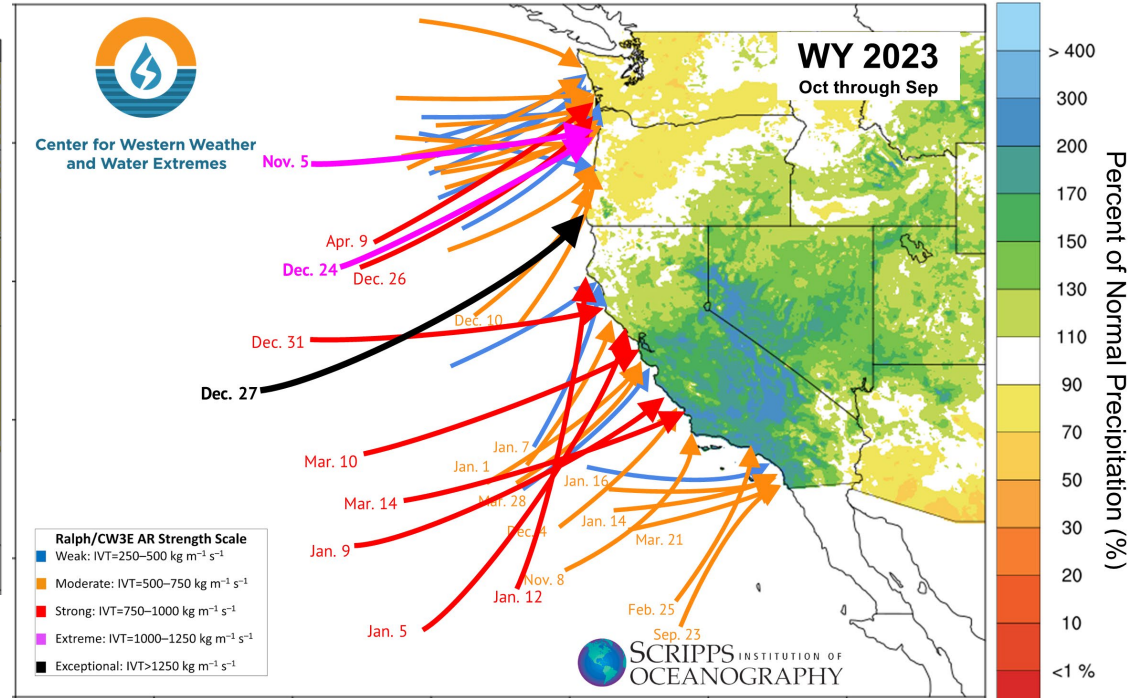
ATMOSPHERIC RIVERS (ARs): DROUGHT AND WET EXTREMES

CA's Most Recent Drought

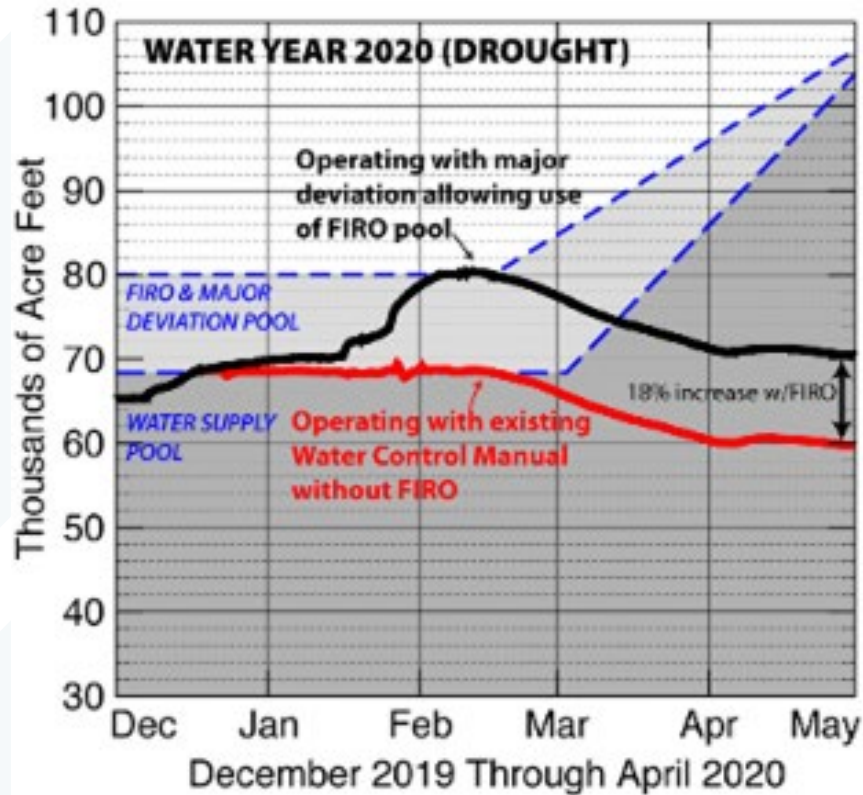
October 2019 through September 2021 Strong or Greater ARs



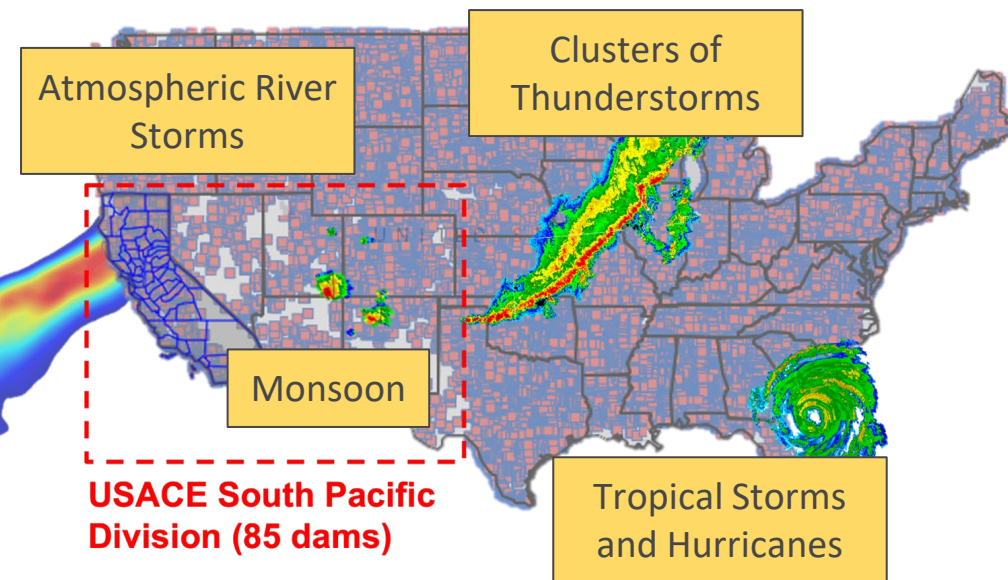
Record Setting Wet Year



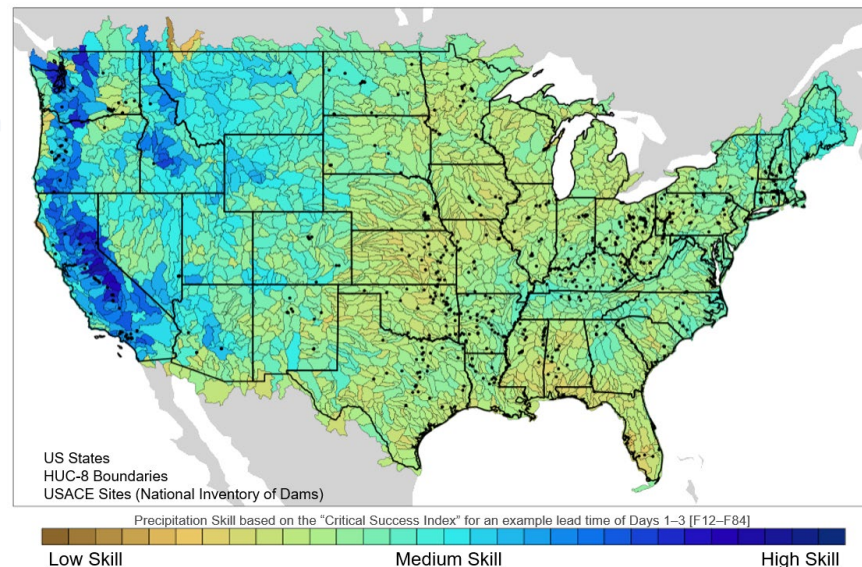
FIRO is demonstrating use of AR Forecasts to support reservoir operations



FIRO - National Expansion Pathfinder



National Precipitation Forecast Skill | **Top-5%** | Days 1–3



USACE Phase III – National expansion pathfinder (FY23 – FY28)

- National forecast skill assessment and improvement
- Support planned Water Control Manual updates
- Expand effort at more complex sites (system of dams)
- Apply screening process nationally (~ 700 dams)

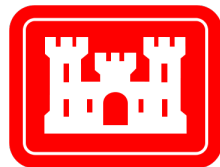
Research And Operations Partnerships (RAOP)

AR Program



FIRO, AR Recon,
Model, AR Scale

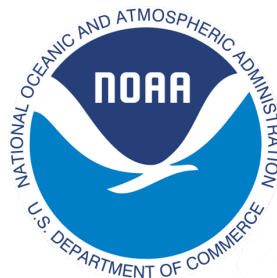
FIRO



USACE
ERDC
ENGINEER RESEARCH & DEVELOPMENT CENTER



Innovation-focused

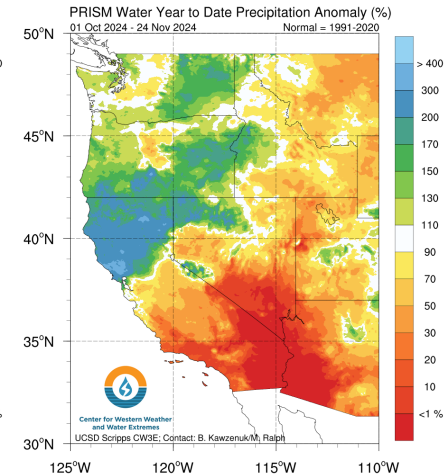
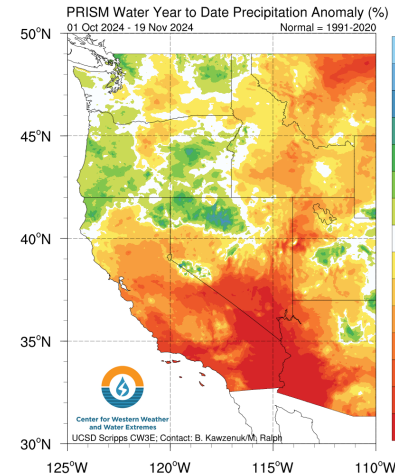
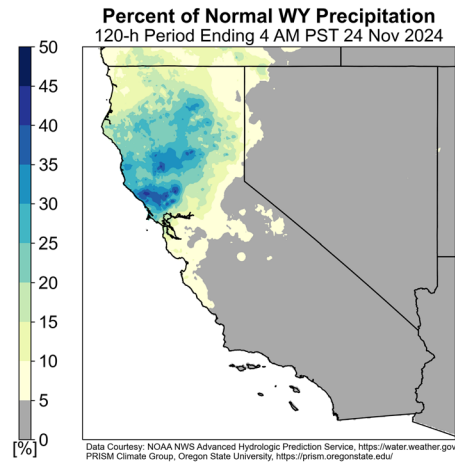
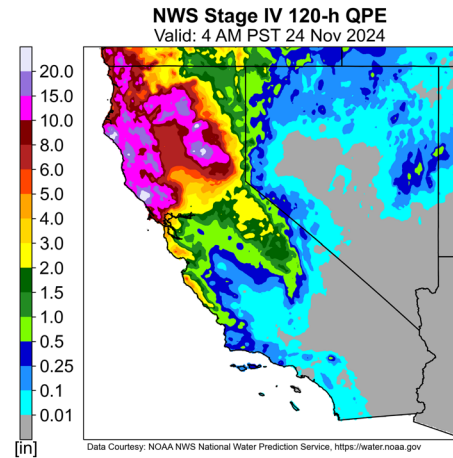


AR Recon

Research
developed and
tested alongside
Operations drives
TRANSFORMATIVE
Change

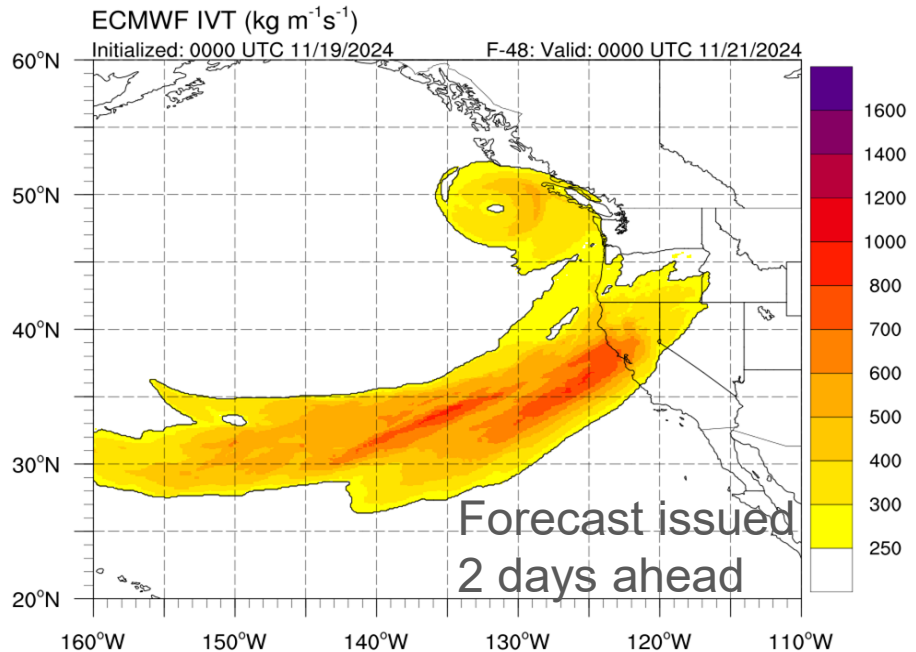
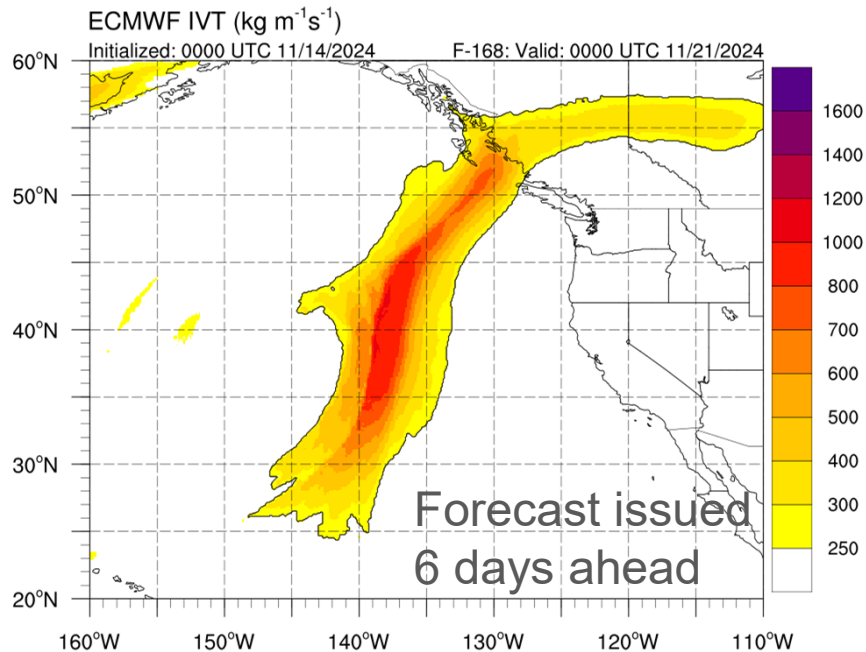
CW3E Event Summary: 19-23 Nov 2024

Observed Precipitation



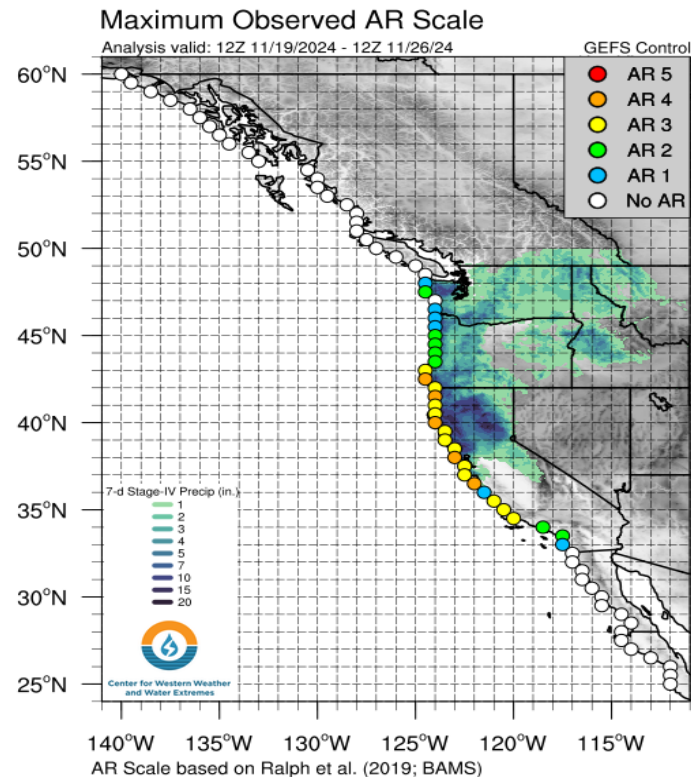
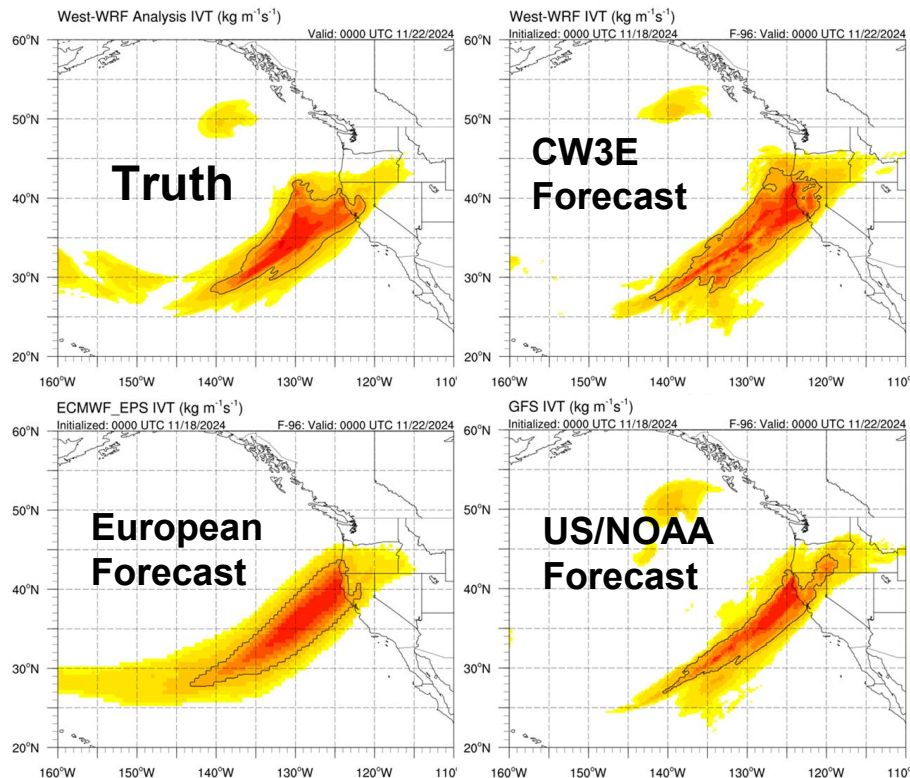
CW3E Event Summary: 19-23 Nov 2024

The forecasts for AR Landfall valid at November 21st changed dramatically



CW3E Event Summary: 19-23 Nov 2024

But by 4 days out, the forecasts had settled on NorCal as landfall point, and AR would



Lake Mendocino FIRO Concept

