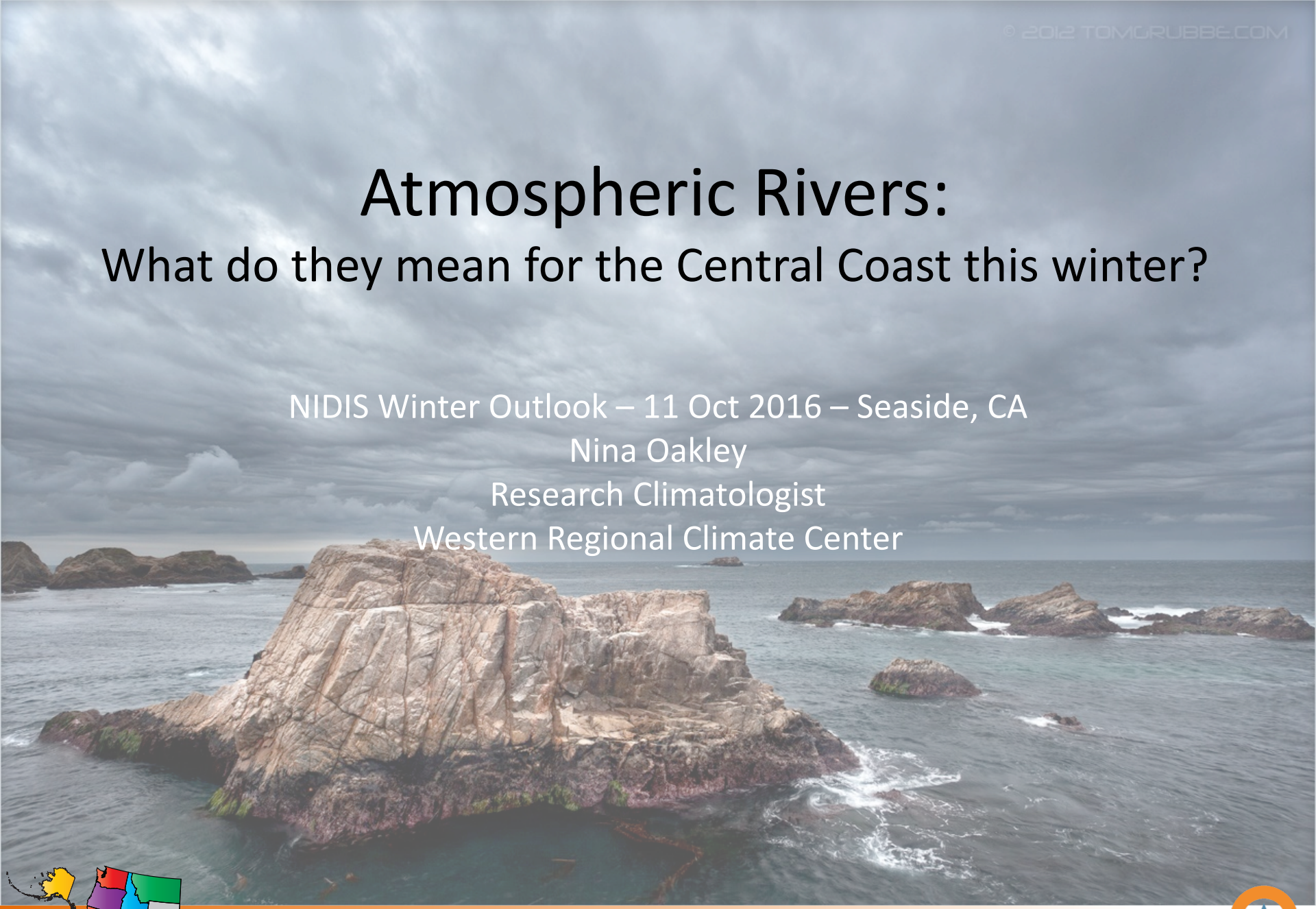


Atmospheric Rivers:

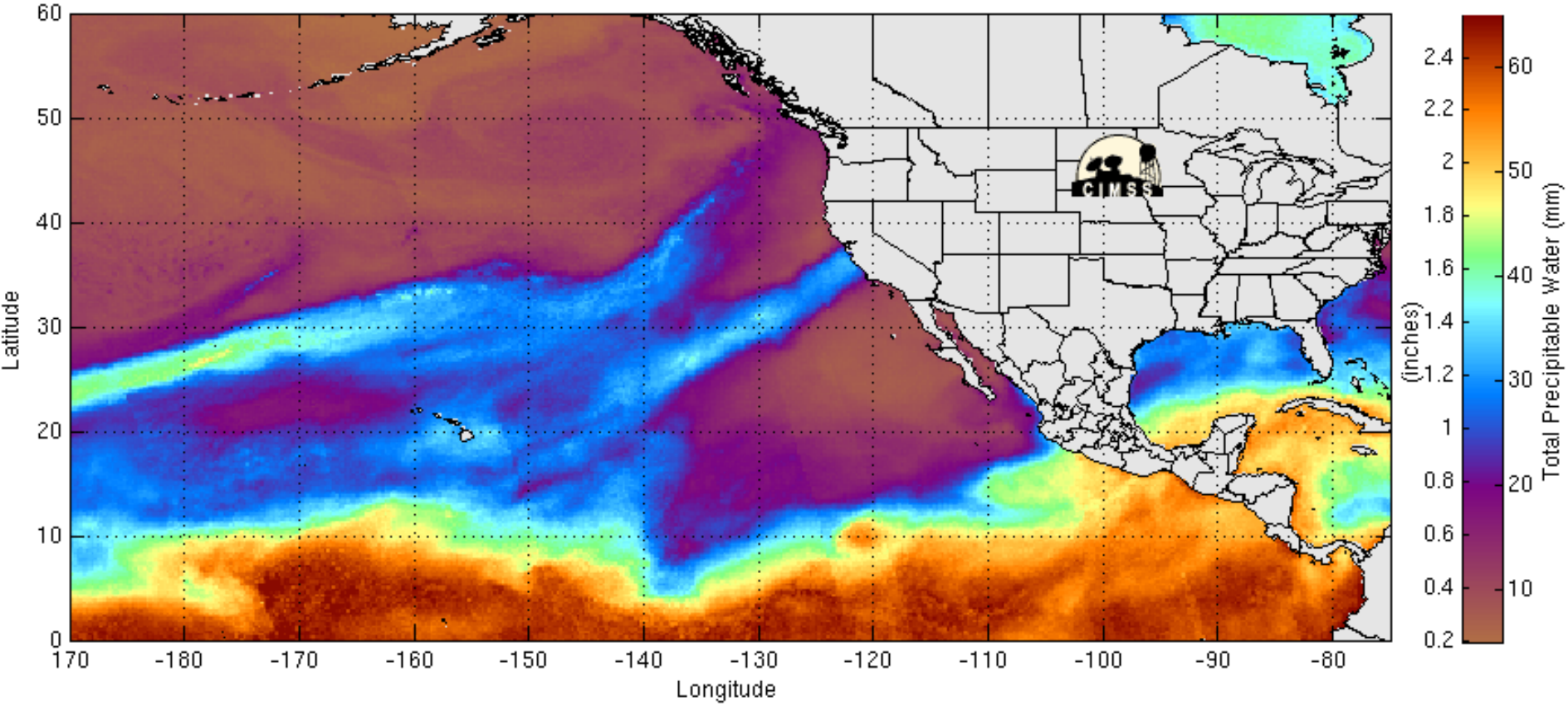
What do they mean for the Central Coast this winter?

NIDIS Winter Outlook – 11 Oct 2016 – Seaside, CA

Nina Oakley
Research Climatologist
Western Regional Climate Center

What Is an Atmospheric River?

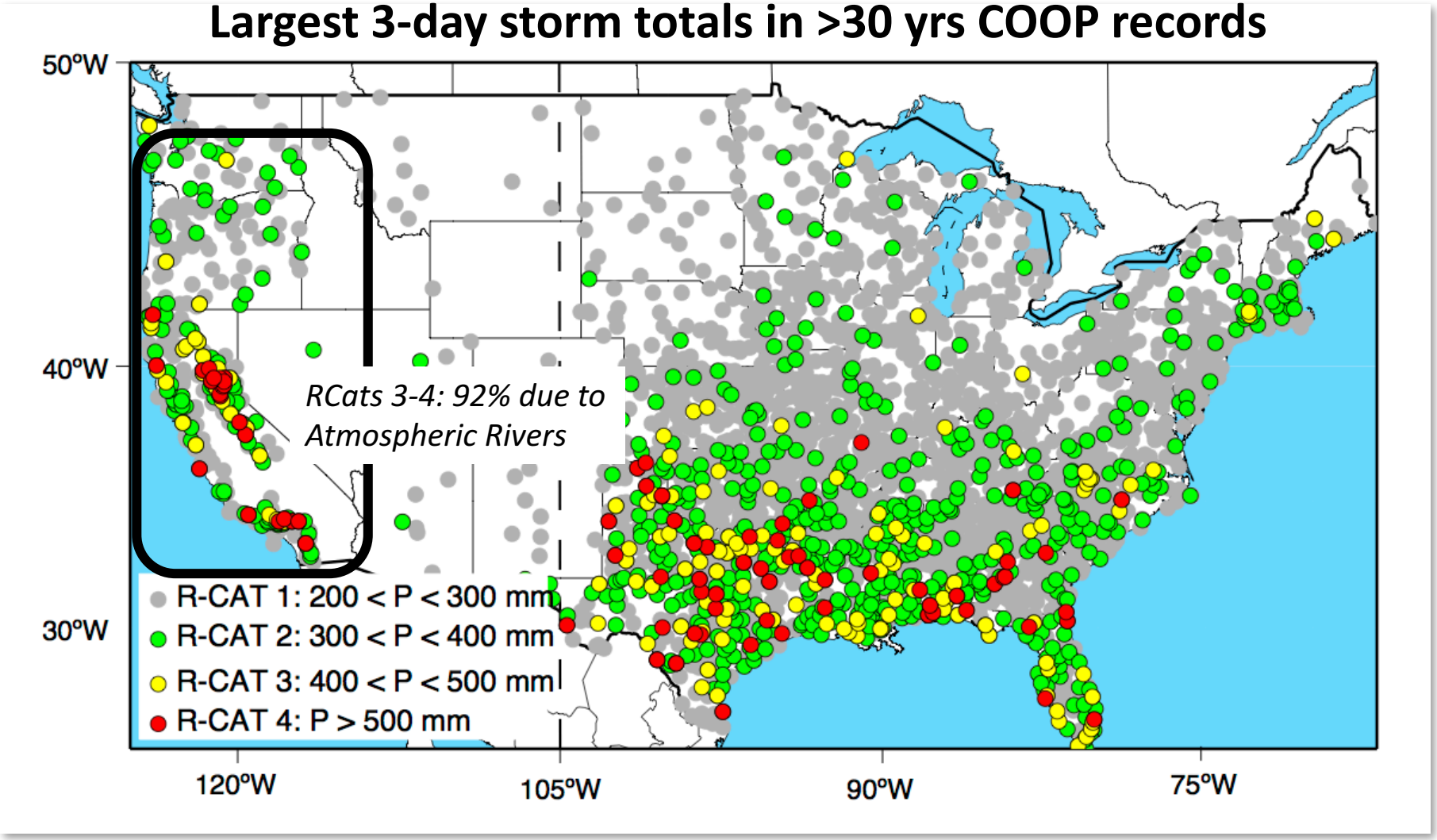
Precipitable Water: March 4-7 2016



Atmospheric river making landfall on Central CA coast

Source: tropic.ssec.wisc.edu/real-time/mimic-tpw/epac/main.html

How big are these storms?



Ralph and Dettinger, BAMS, 2012

ARs moderate CA precipitation

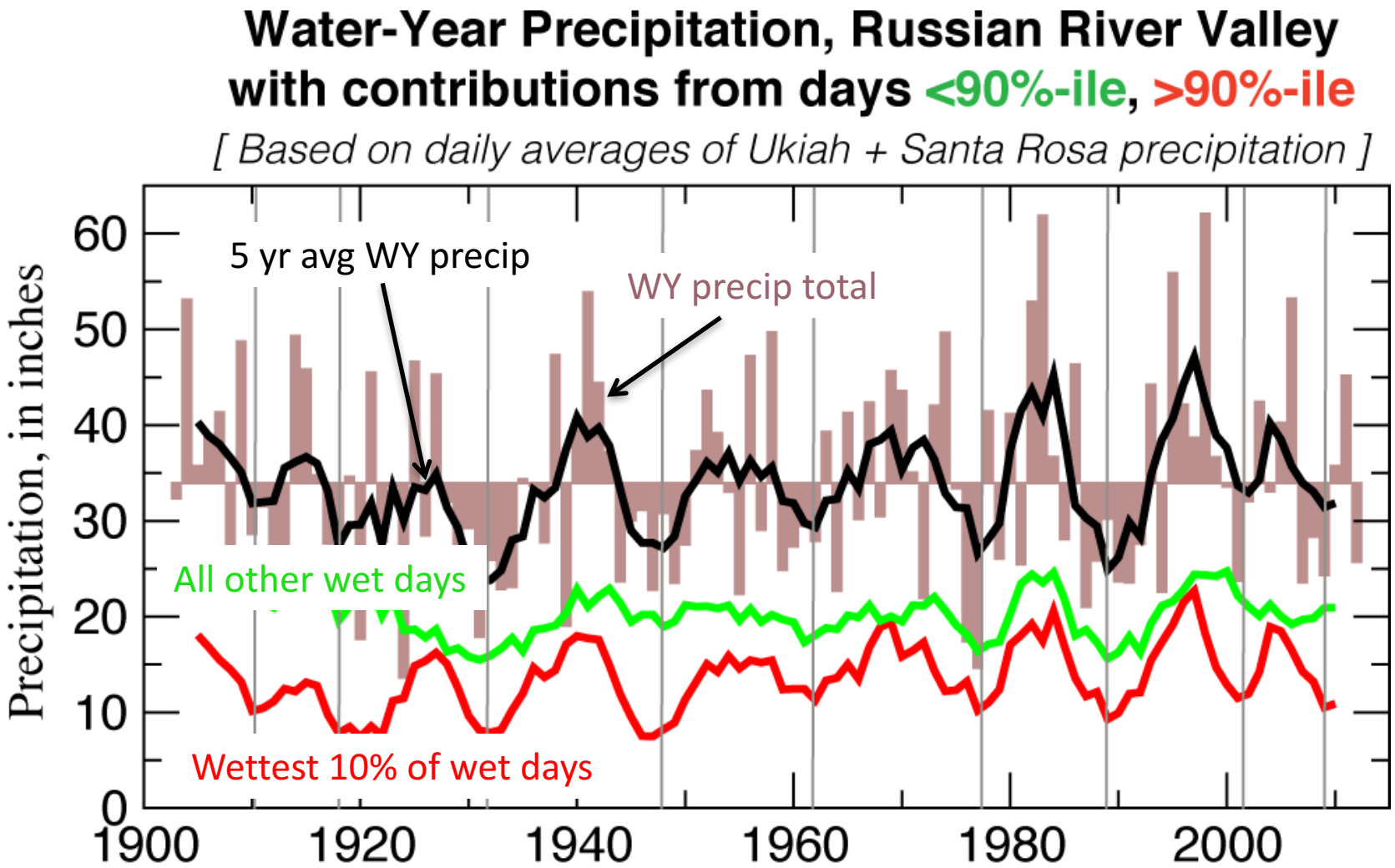
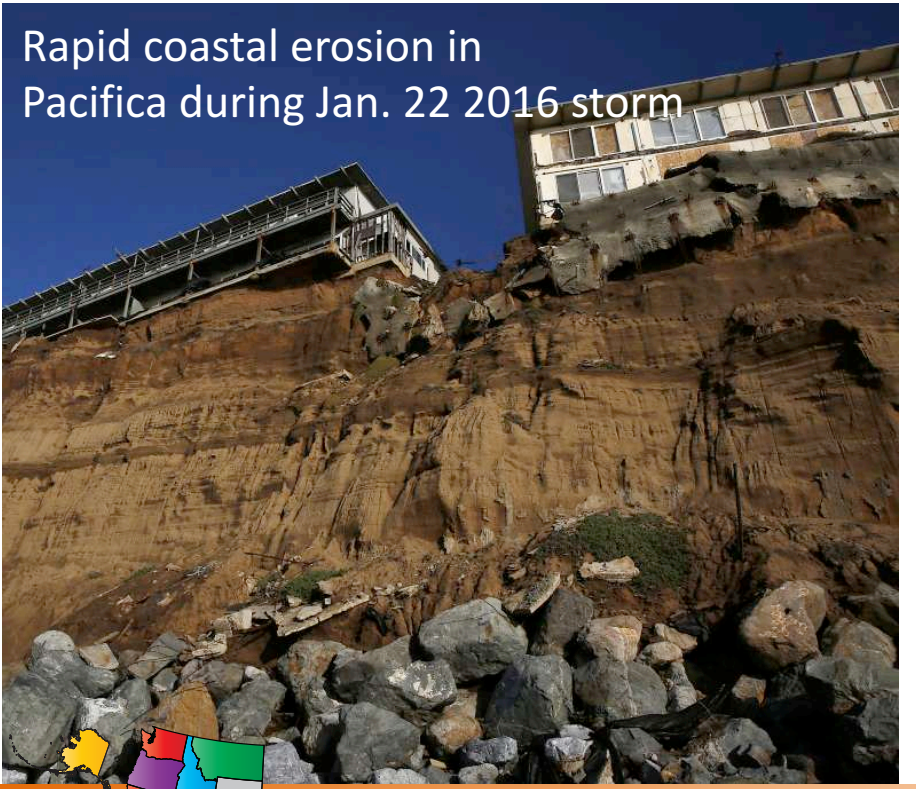
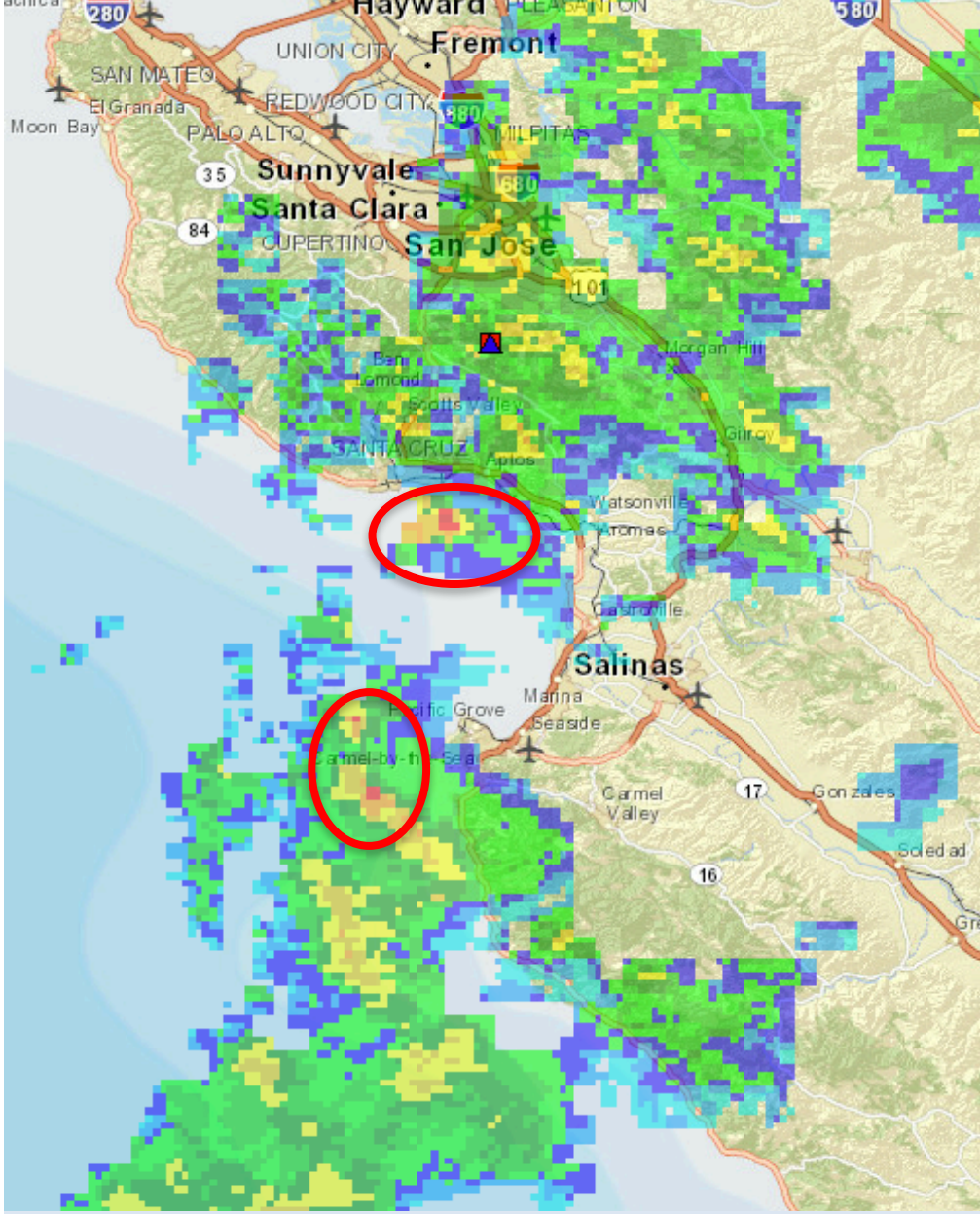


Image Courtesy of Mike Dettinger, USGS/CW3E

Atmospheric Rivers and Erosion, Landslides, Debris Flows

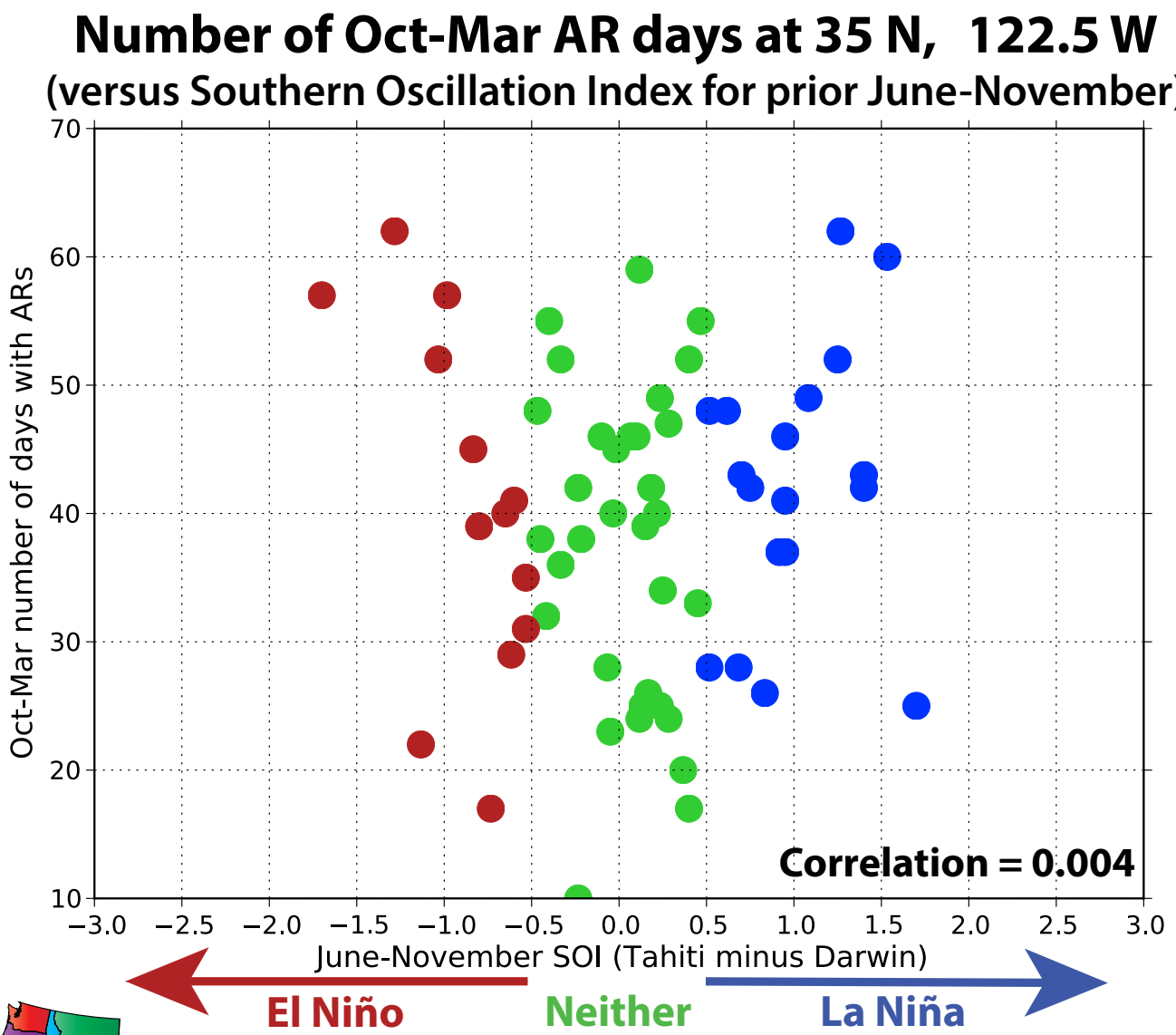
Areas of high intensity rainfall within storm can be destructive, hard to forecast!





Radar: 4:10 pm PST January 22 2016

ARs and ENSO

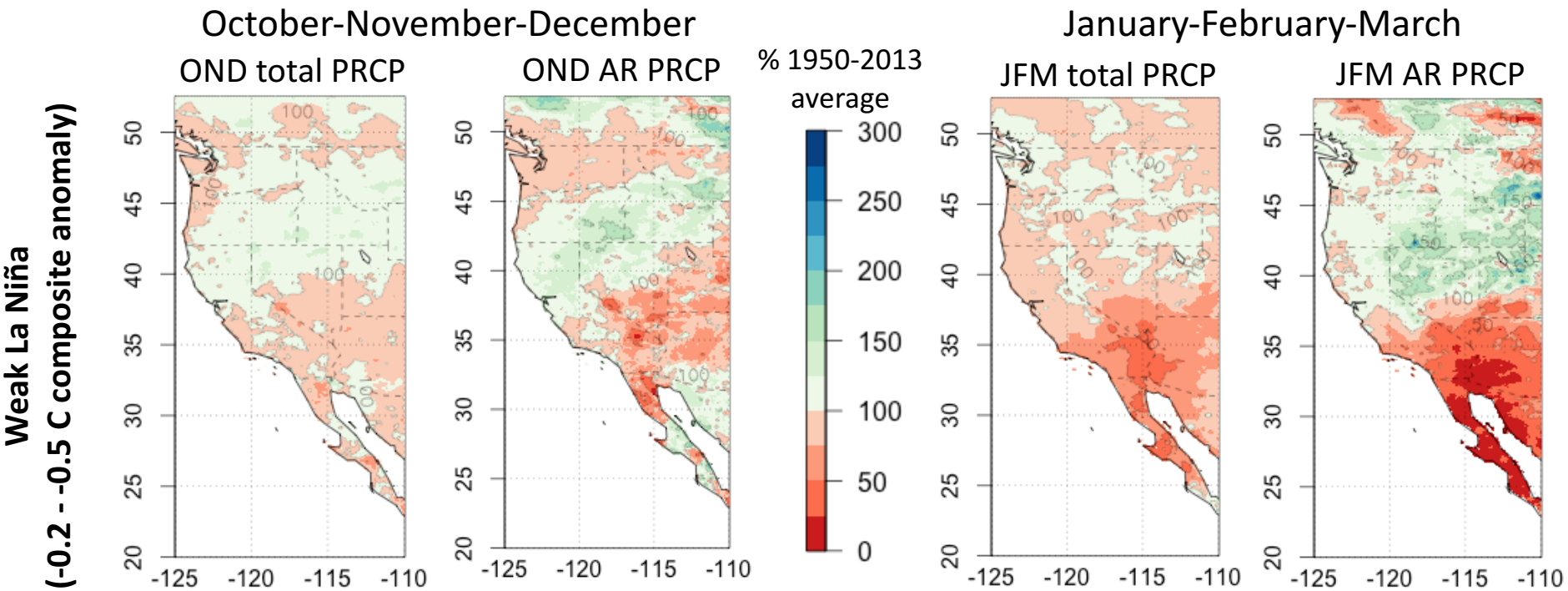


Period Shown:
1948/1949-2011/2012

Based on AR data from Rutz et al. 2014

ARs and ENSO: Weak La Niña

Weak La Niña: 1957, 1963, 1968, 1984, 1986, 1997, 2002, 2006, 2009, 2014



75-125% average precipitation

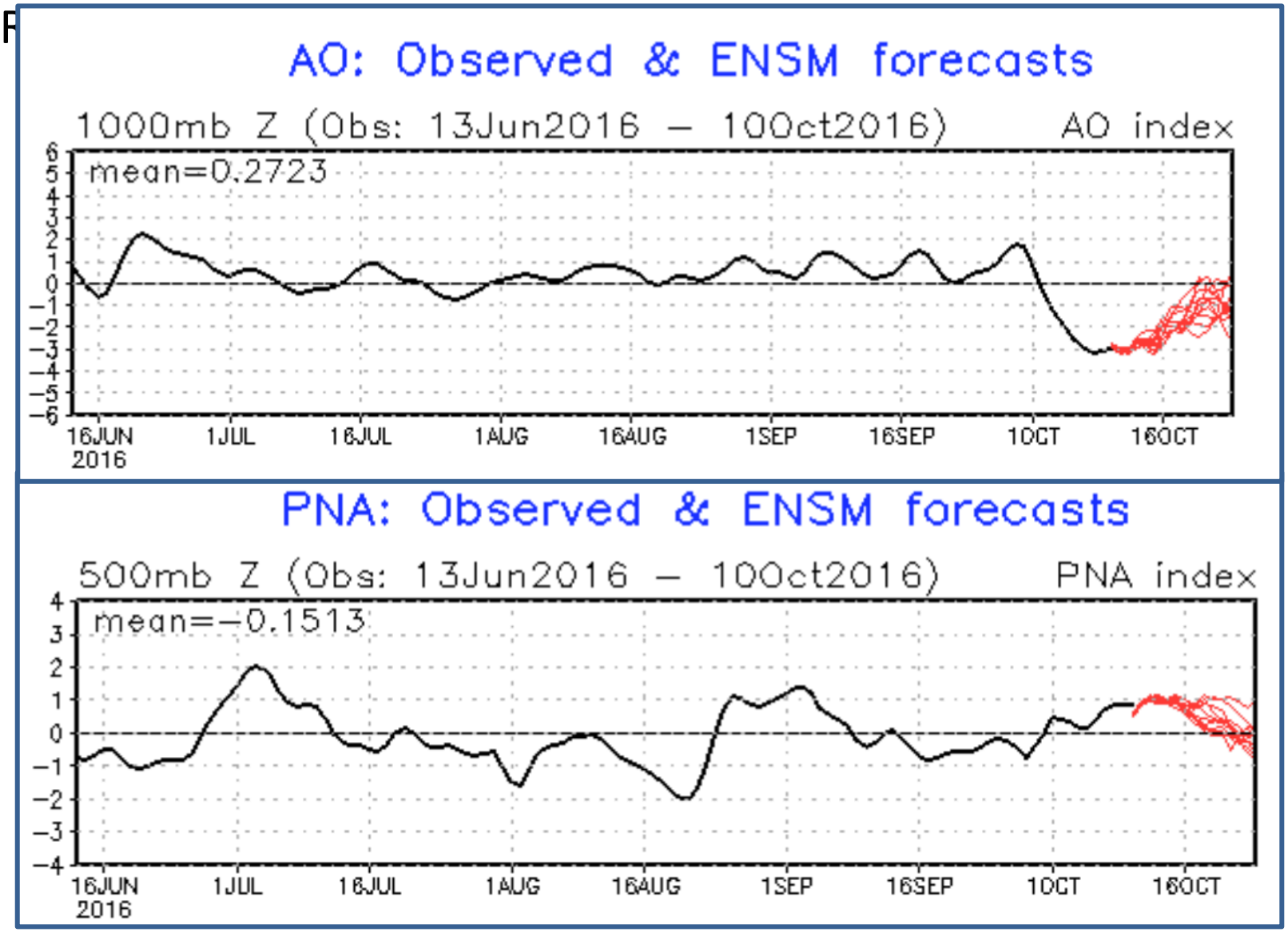
75-150% average AR precipitation

50-100% average precipitation

25-125% average AR precipitation

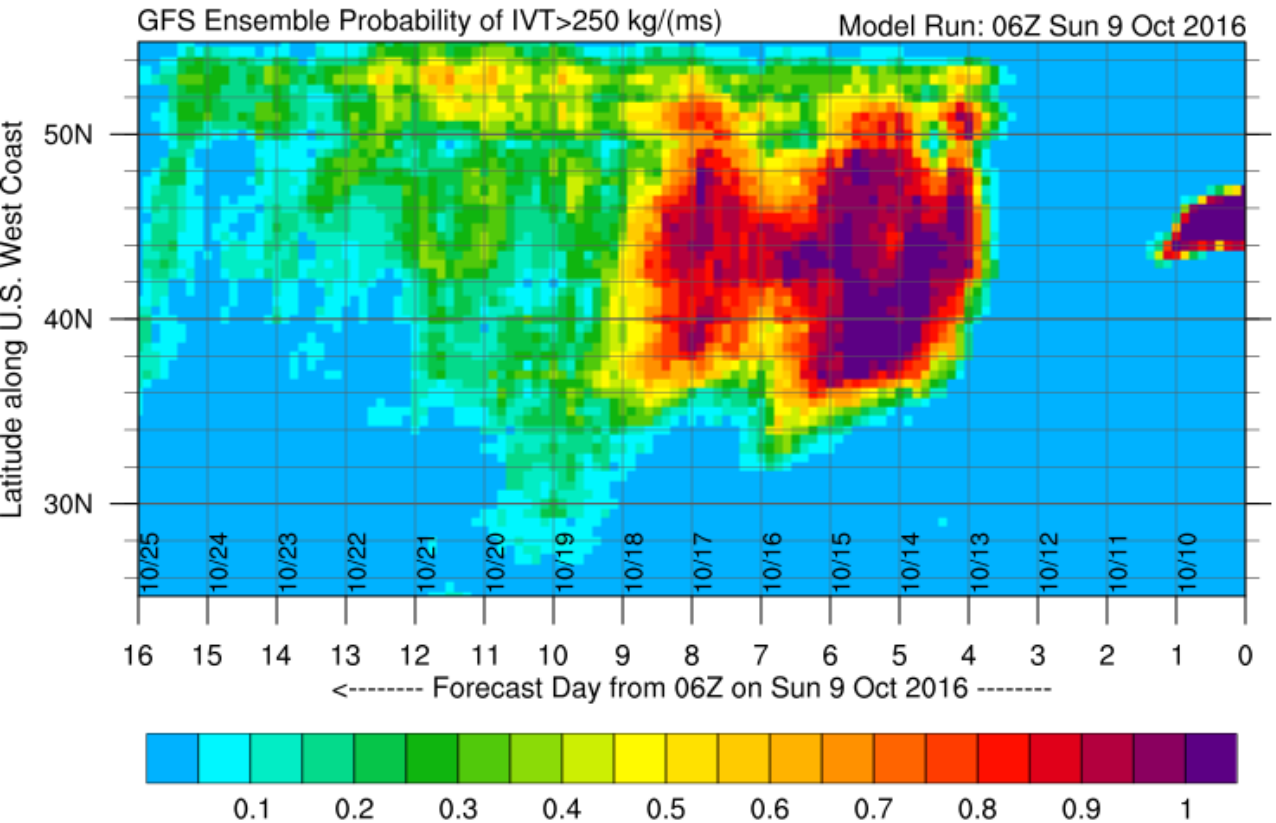
Images courtesy Tamara Shulgina and Alexander Gershnov, CW3E/SIO

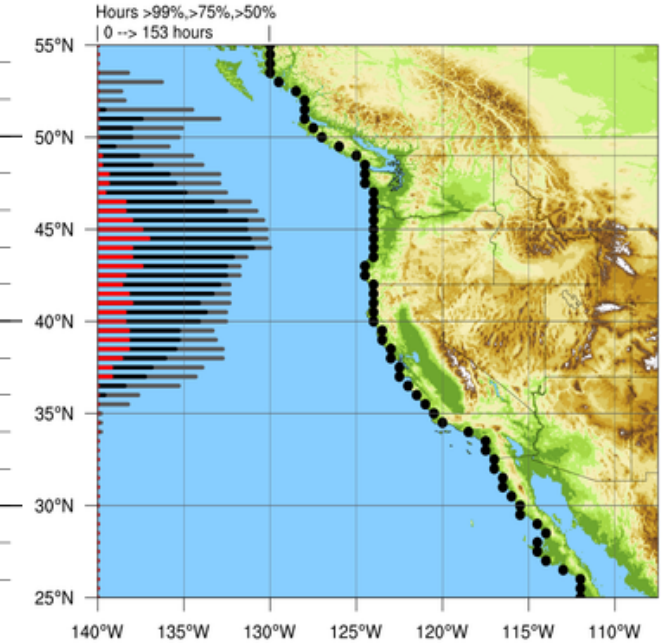
AR (PNA)



Guan et al. 2013, Water Resources Research

Forecasting ARs





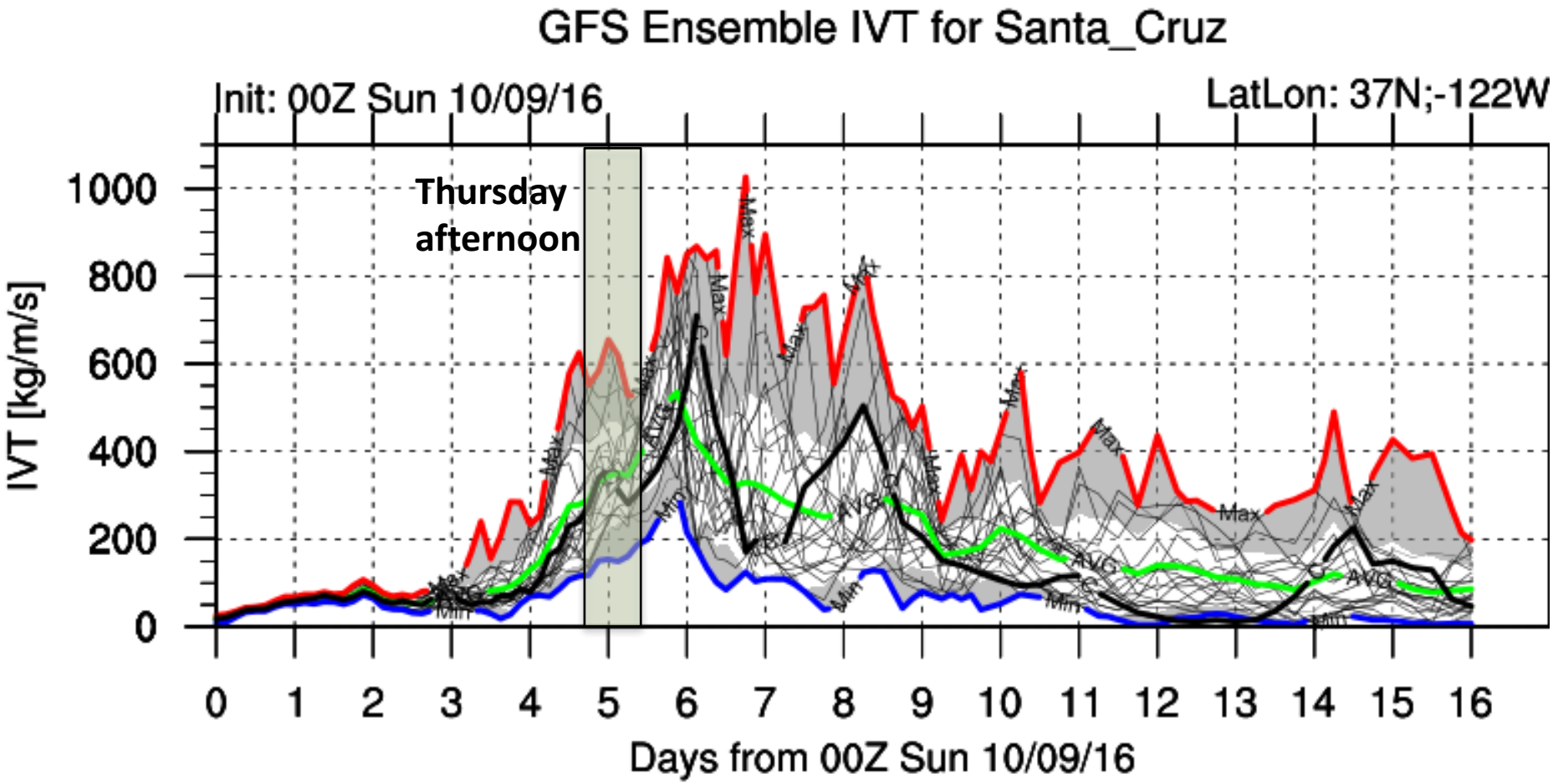
Center for Western Weather and Water Extremes
SCRIPPS INSTITUTION OF OCEANOGRAPHY AT UC SAN DIEGO

PLYMOUTH STATE METEOROLOGY

http://woodland.ucsd.edu/?page_id=491

"probability IVT > 250 kg m^{-1} s^{-1}"

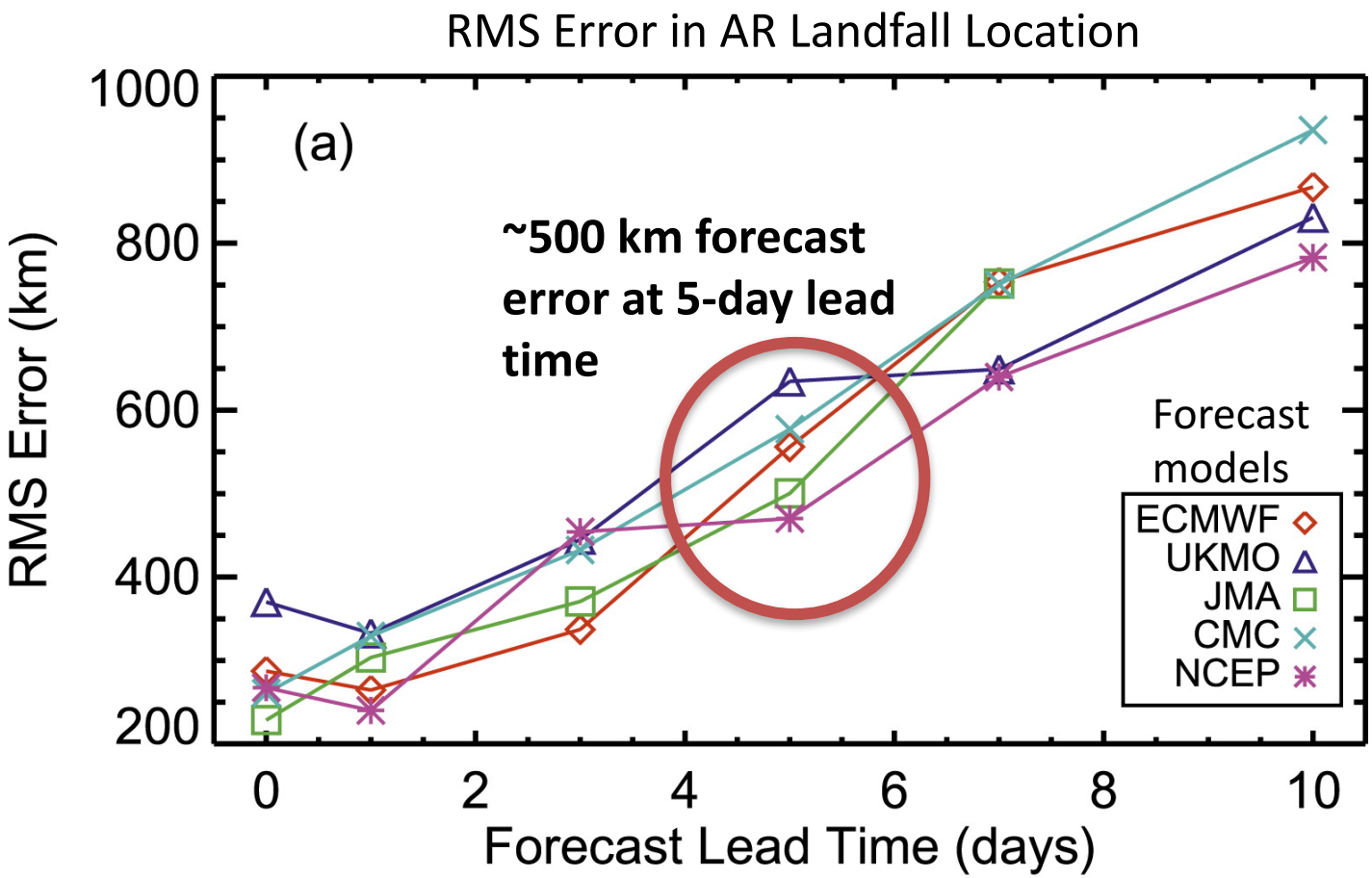
Forecasting ARs



http://woodland.ucsd.edu/?page_id=491

"GFS Ensemble"

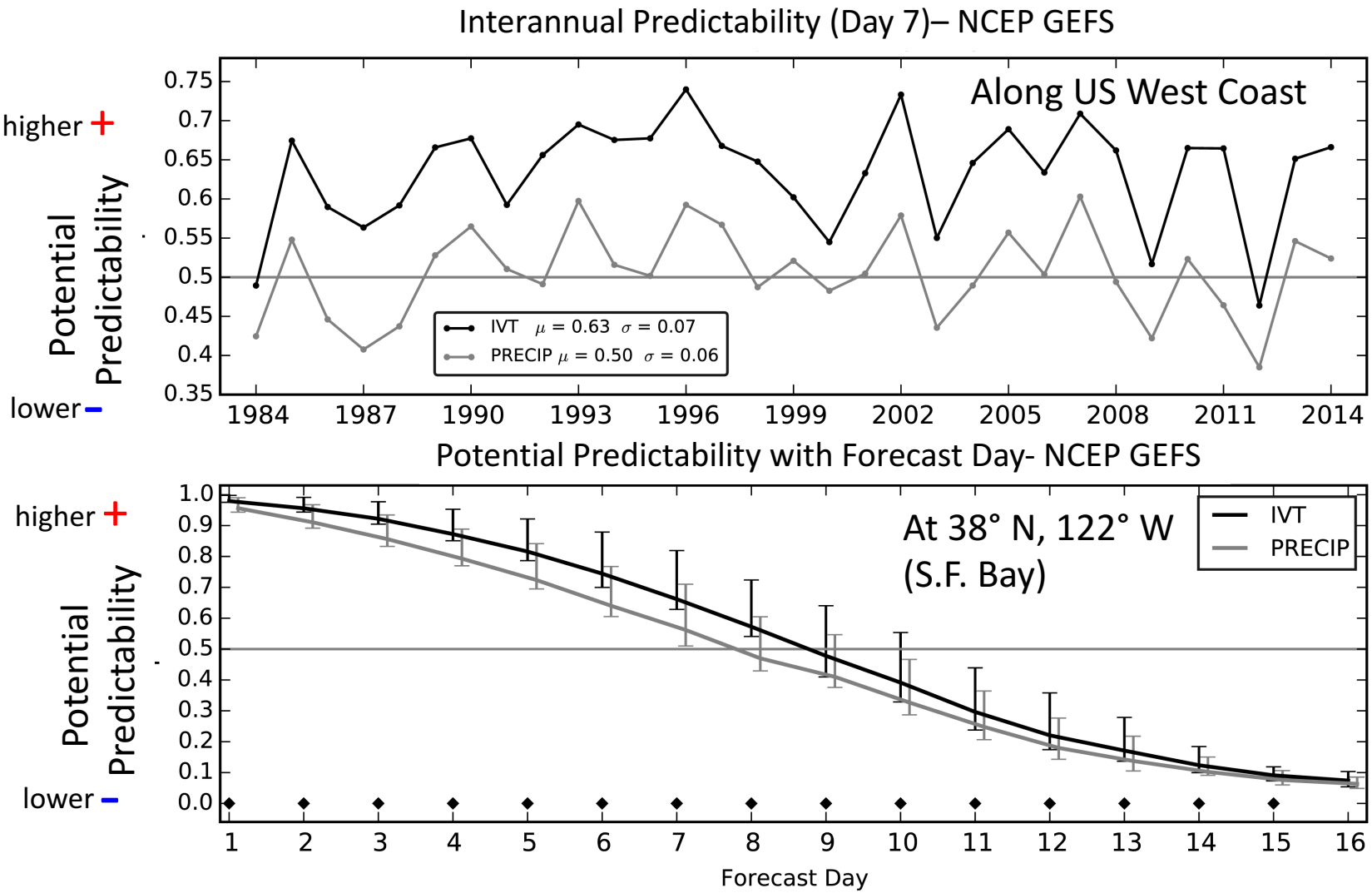
AR Forecast Challenge: Landfall Position



*Based on West Coast ARs for 3 cool seasons 2008/09-2010/11

Wick et al. 2013, Weather and Forecasting

AR Forecast Potential: Integrated Water Vapor Transport (IVT)



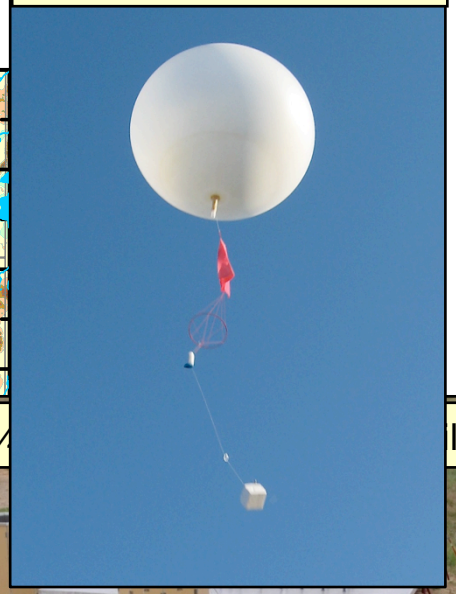
Lavers et al. 2016, GRL

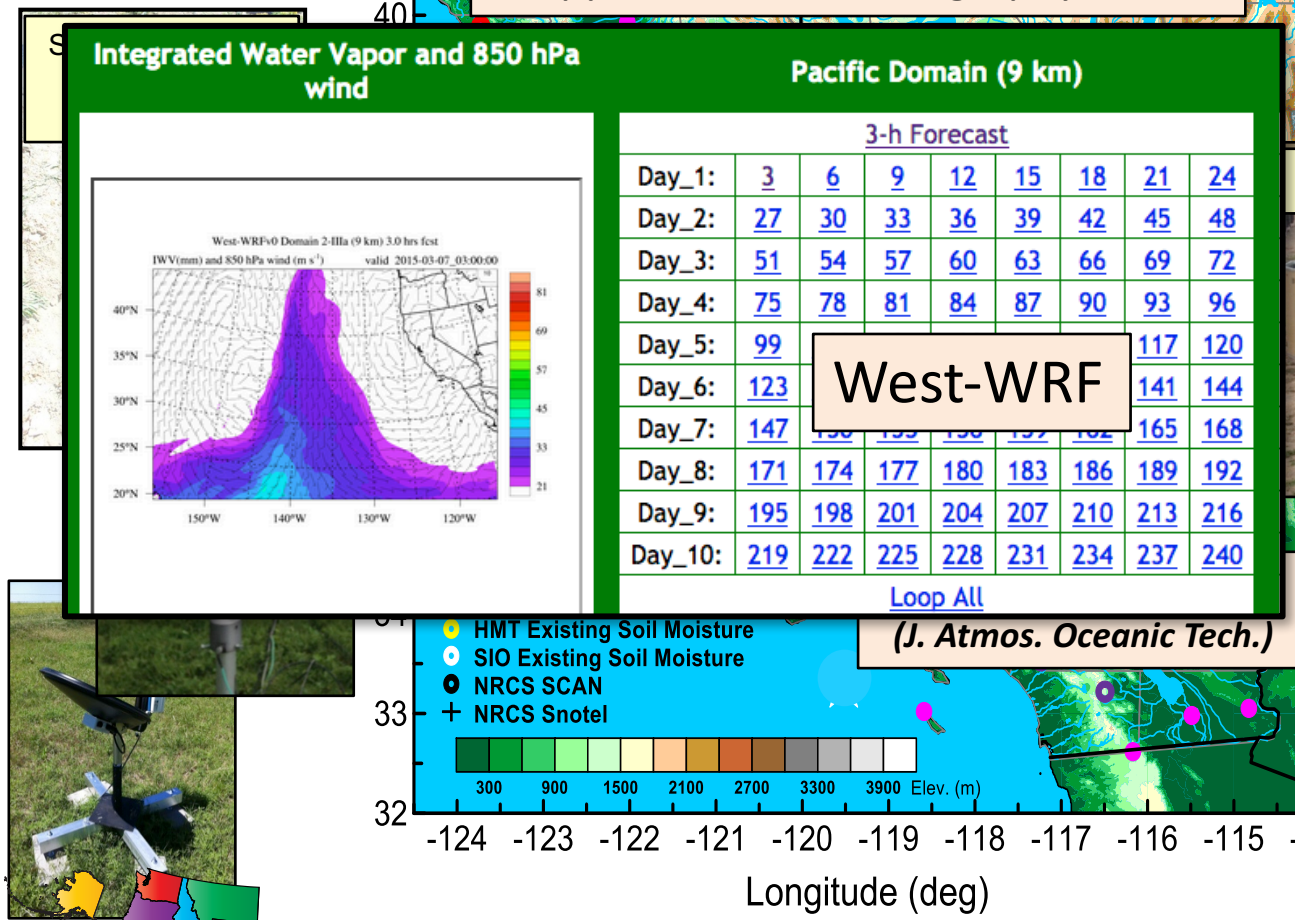
California Extreme Precipitation Network

GPS receiver for integrated water vapor

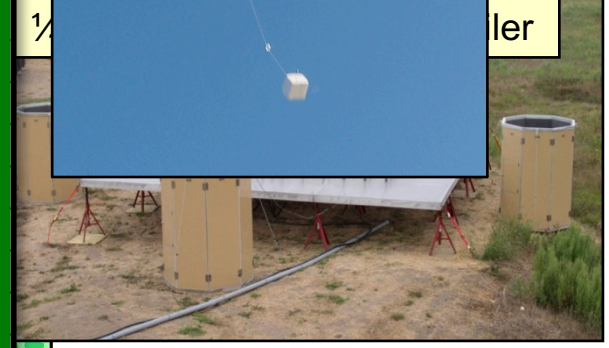
Part of collaborative project between CA Dept. Water Resources, NOAA, Scripps Inst. of Oceanography

Radiosonde launches





(J. Atmos. Oceanic Tech.)



FM-CW snow-level radar

Summary

Boulder blocks Hwy 1 in Big Sur
Source: CalTrans report

- ARs impact water resources and natural hazards in Central Coast
- Research on AR seasonal prediction in progress; ENSO relations tenuous
- AR forecasts good a few days out, challenges exist
  - Landfall position, timing, angle of incidence
  - Many forecasting tools available: cw3e.ucsd.edu
- AR field studies continue this winter at Bodega Bay

Thank you!

Contact:
Nina Oakley
nina.oakley@dri.edu
wrcc.dri.edu

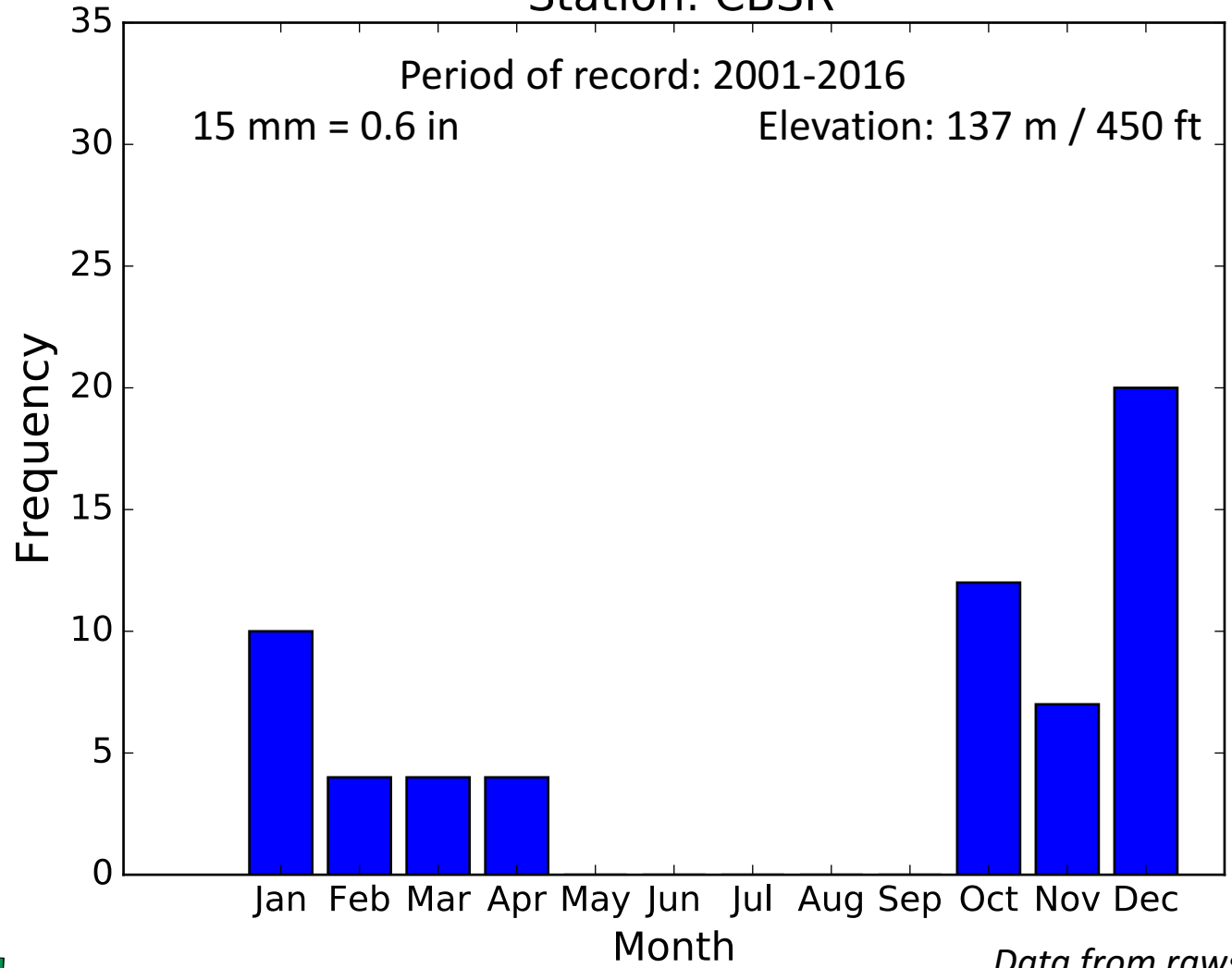
Connect with WRCC and CNAP!
@WRCCclimate
@CnapRisa

Flooding and debris flows in Big Sur, Feb 1987. *Source: CalTrans report*

Precipitation Intensity

Frequency of hourly values above 99th percentile by month

Station: CBSR



Data from raws.dri.edu