

# CW3E Atmospheric River Outlook

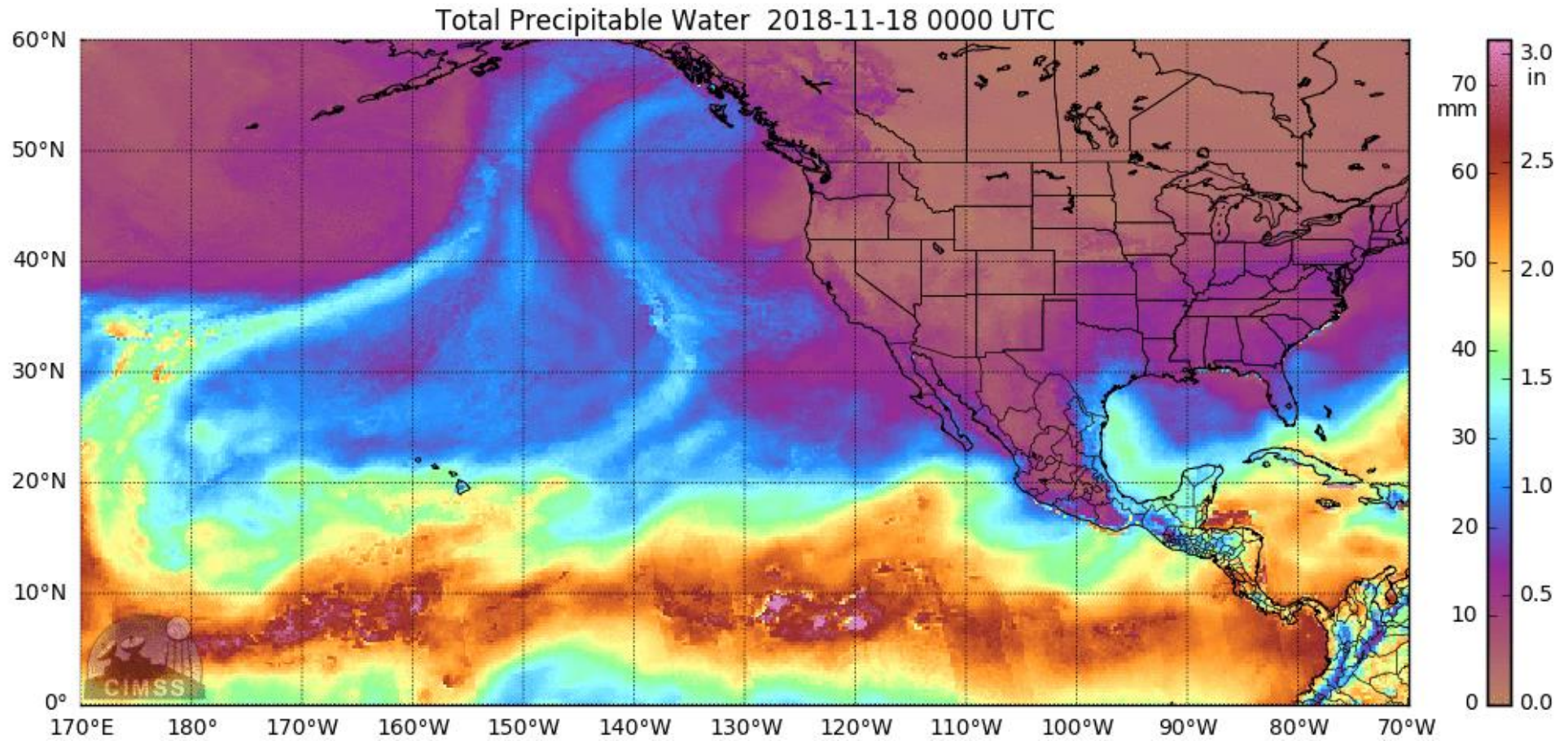
For California DWR's AR Program



Center for Western Weather and Water Extremes  
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## Update on the ARs Currently Impacting and Forecast to Impact the U.S. West Coast

- Precip. has begun in association with AR 1, where as much as 0.5 to 2 in. has fallen over North-Coastal CA
- AR 2 is forecast to bring strong AR conditions (IVT 750–1000  $\text{kg m}^{-1} \text{s}^{-1}$ ) to Southern OR and moderate AR conditions to CA tomorrow
- The National Weather Service has issued numerous Flash Flood watches across Northern CA and Southern OR
- Forecast Confidence for another period of AR activity from 26 to 28 November has increased



# AR Outlook: 21 November 2018

For California DWR's AR Program



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CNRFC 24-hour QPE  
Ending: 9:30 AM PST 21 Nov.

As of 12:45 PM PST 21 Nov., 0.75–2 inches of precipitation has fallen over portions of North-Coastal California and the San Francisco Bay Area (Note: this data is not QC'd)

There is widespread precipitation currently falling across a larger portion of the US West Coast

For the latest precipitation estimates from the NWS CNRFC visit [cnrfc.noaa.gov](http://cnrfc.noaa.gov)

Current radar loops are available at [www.weather.gov/Radar](http://www.weather.gov/Radar)



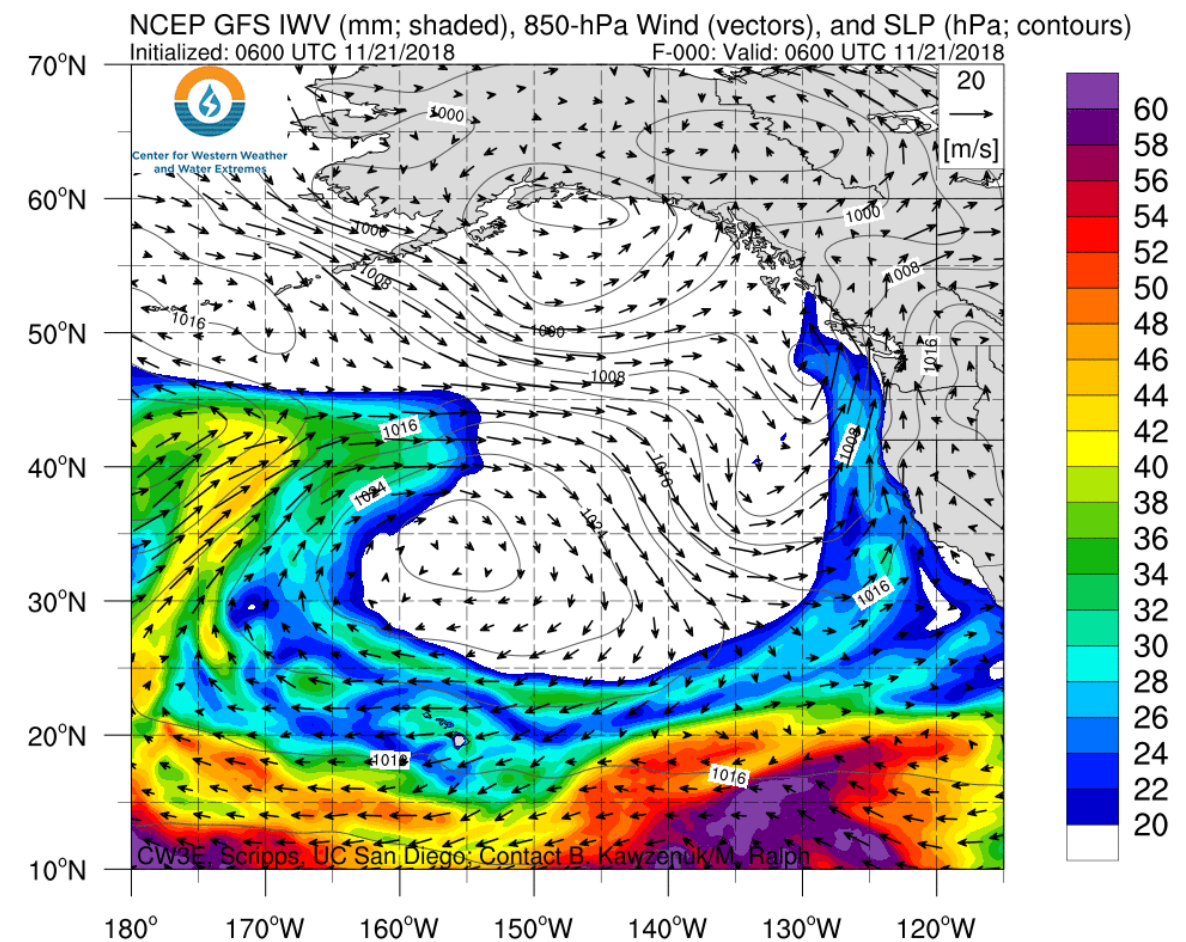
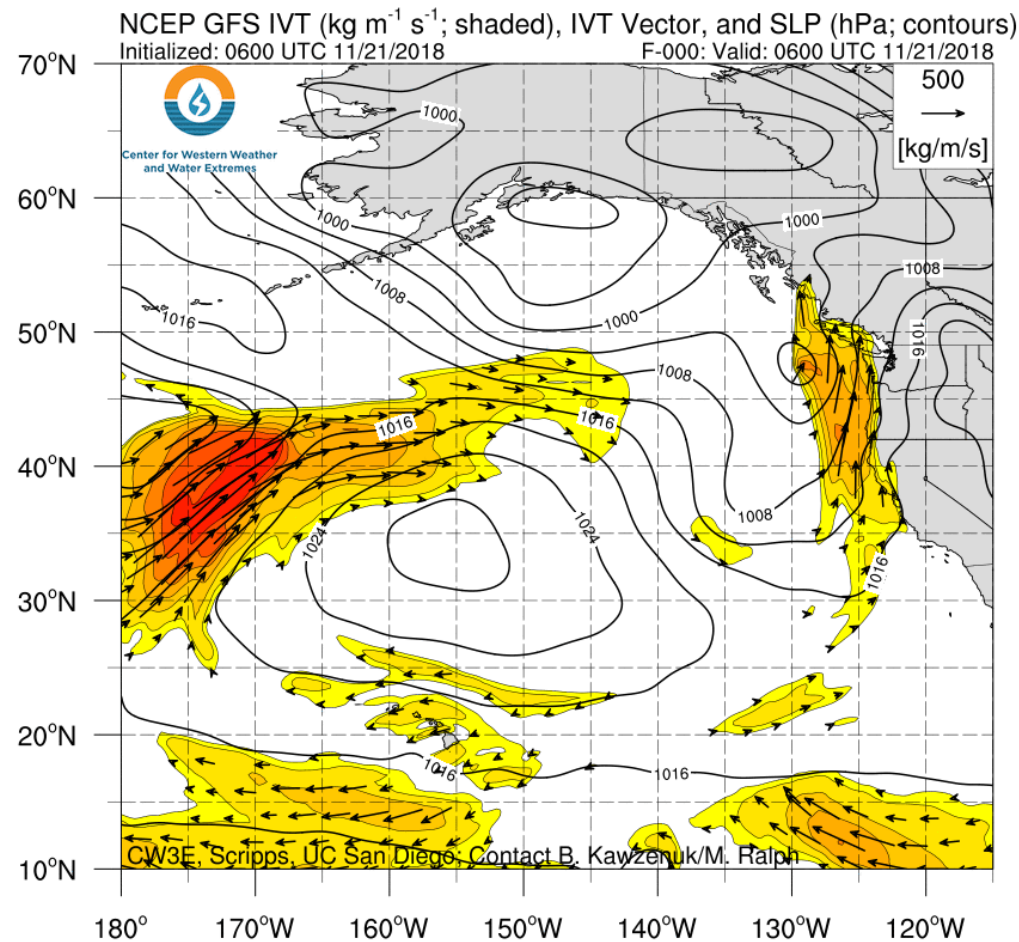
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- The current AR (AR 1) is forecast to end over Southern California (likely low impact) at ~12Z (4 AM PST) on 22 November
- AR 2 is forecast to make landfall over Coastal Oregon at ~15Z (7 AM PST) 22 November
- AR conditions associated with AR 2 are forecast to end at ~6 UTC 24 November (11 PM PST 23 November) over Central CA
- Additional ARs are forecast to make landfall in the extended forecast (5 days+) but uncertainty is currently high



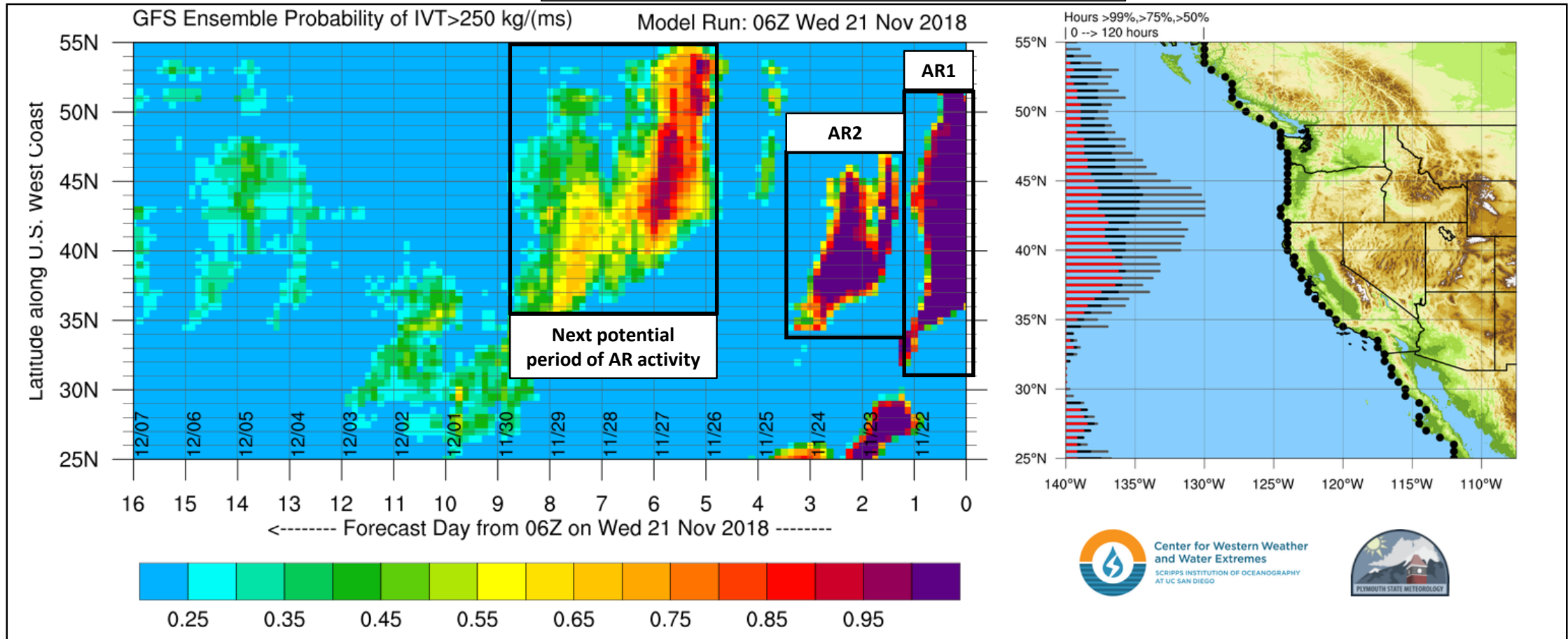
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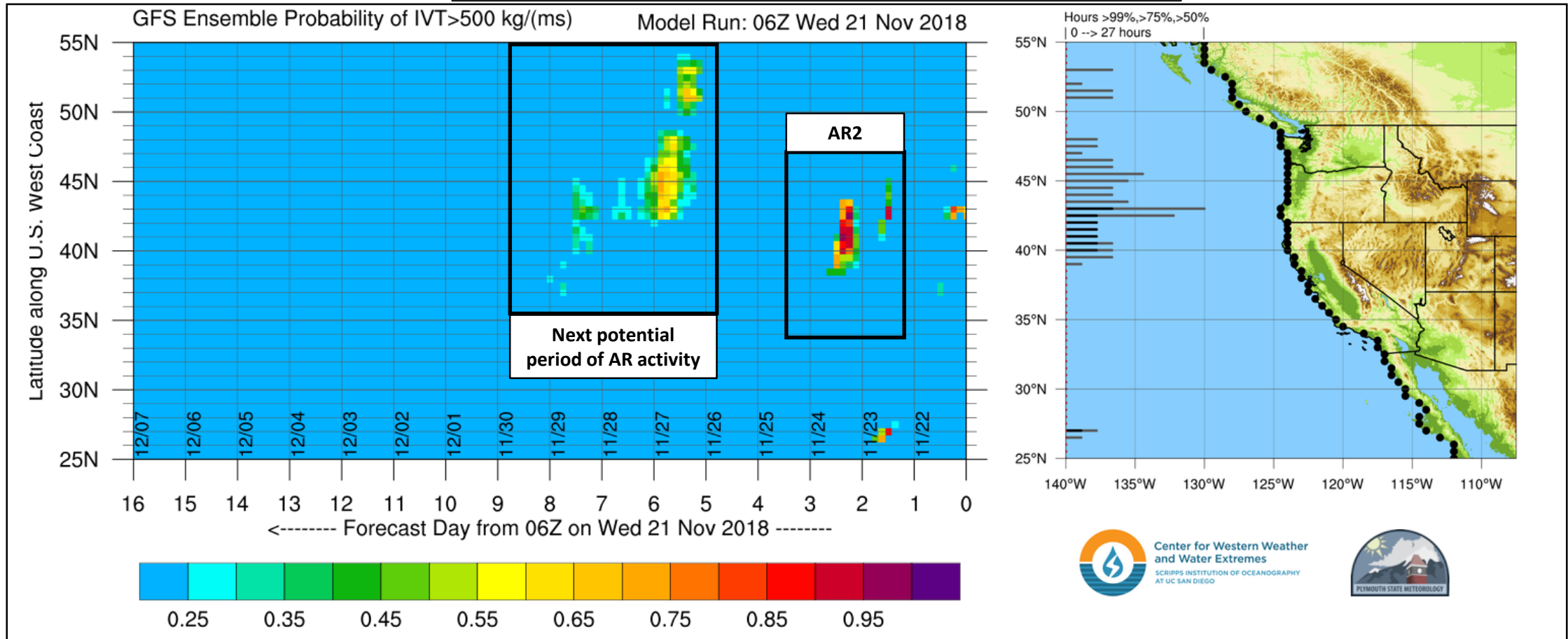
## Probability of AR Conditions Along Coast



- AR 1 is likely to last until ~00Z on 22 Nov. over most of the West Coast, with AR conditions lasting until ~6Z+ over Southern California
- AR 2 is likely to begin ~18Z on 22 Nov. and last till ~6Z on 24 November over portions of Northern and Central California
- ~85–100 % of ensemble members suggest more AR activity between 26 and 29 Nov. for the Pacific Northwest and NorCal



## Probability of Moderate AR Conditions Along Coast



- The likelihood of moderate AR conditions (IVT 500–750 kg m<sup>-1</sup> s<sup>-1</sup>) between 39°N and 44°N (small area) for ~12 hours (short lived) in association with AR 2 between 6Z (10 PM PST on 22<sup>nd</sup>) and 18Z (10 AM PST) on the 23 Nov. has increased since yesterday's outlook

- The GEFS is also suggesting the ARs between 26 and 29 November could bring moderate strength AR conditions to the Pacific Northwest

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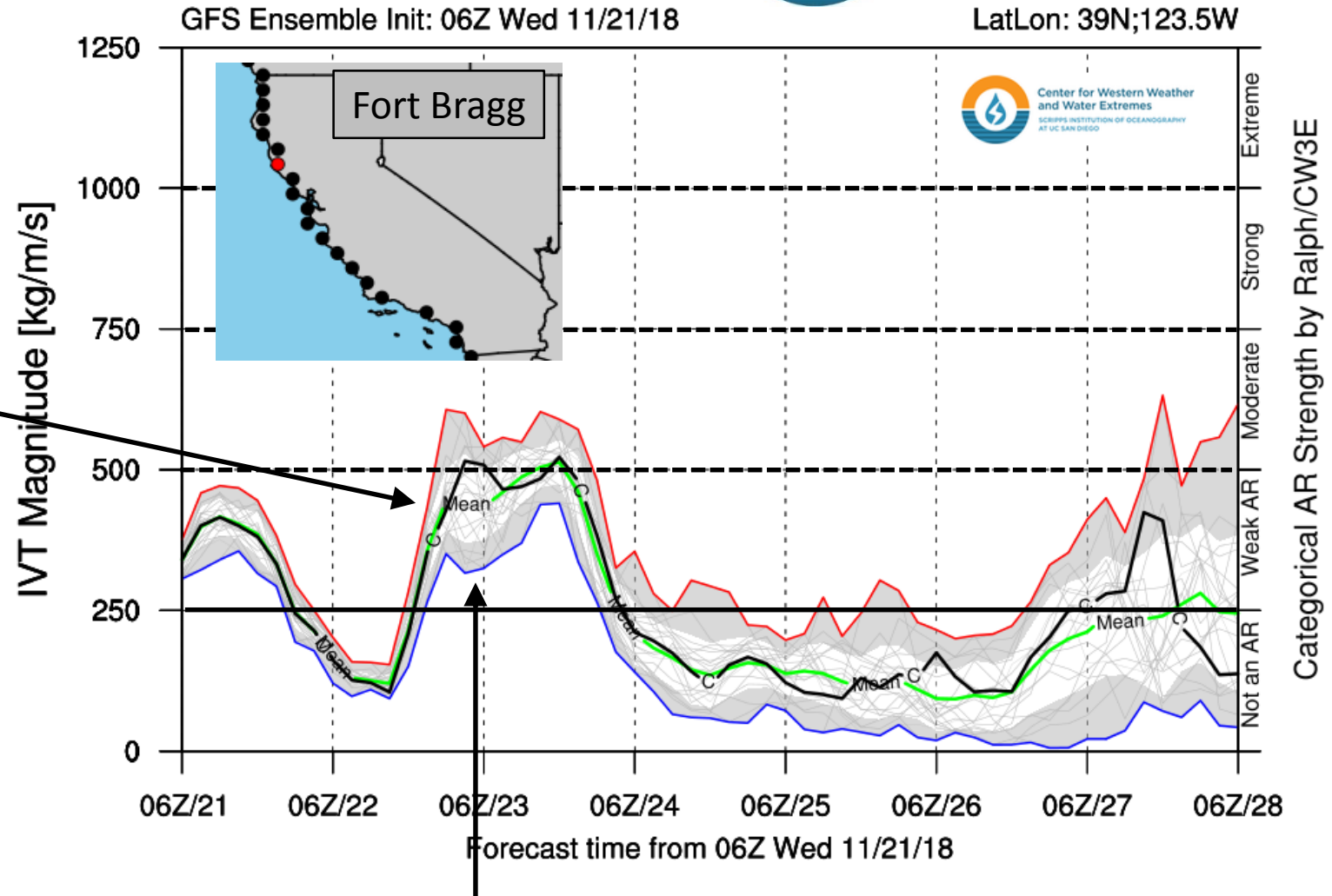
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The Second AR is currently forecast to bring two pulses (due to development of a frontal wave) of moderate AR conditions to North Coastal CA, with AR conditions beginning ~18Z (10 AM PST) 22 November

## Forecast Magnitude of AR 2 (23 November)

- Maximum predicted IVT  $\sim 700 \text{ kg m}^{-1} \text{ s}^{-1}$
- Mean IVT  $\sim 525 \text{ kg m}^{-1} \text{ s}^{-1}$
- Minimum IVT  $\sim 400 \text{ kg m}^{-1} \text{ s}^{-1}$

AR conditions are currently forecast to last ~30 hours +/- 6 hours over North-Coastal California



- Due to the uncertainty in the forecast development of a mesoscale frontal wave, there is large disagreement in the magnitude of AR conditions over North-Coastal CA within the next AR

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Southern Oregon is forecast to experience multiple pulses of AR conditions: one of moderate strength and another of potentially “strong” strength, in association with the landfall of AR 2 and the attendant mesoscale frontal wave

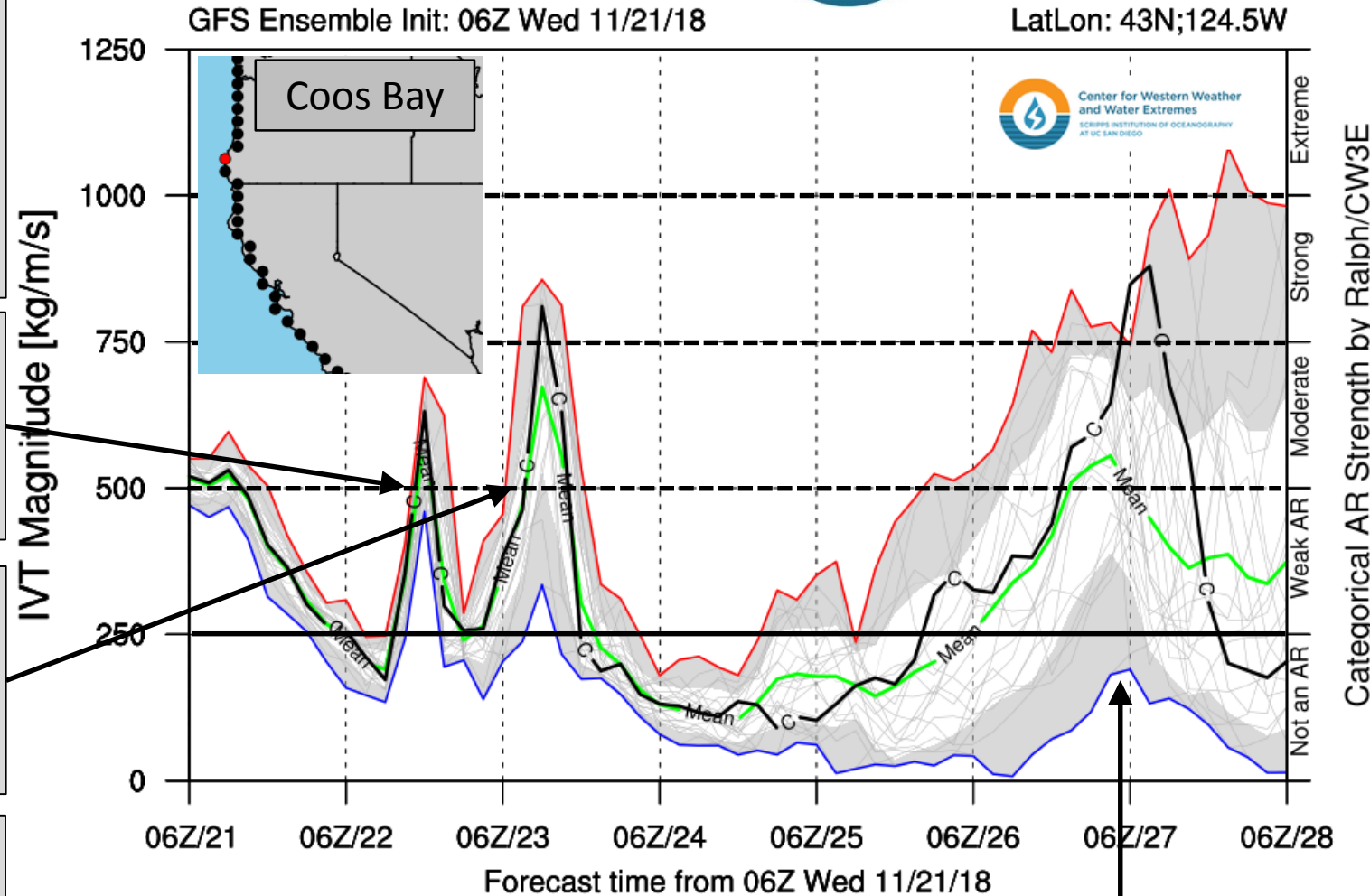
## Forecast Magnitude of Pulse 1:

- Maximum predicted IVT  $\sim 700 \text{ kg m}^{-1} \text{ s}^{-1}$
- Mean IVT  $\sim 600 \text{ kg m}^{-1} \text{ s}^{-1}$
- Minimum IVT  $\sim 450 \text{ kg m}^{-1} \text{ s}^{-1}$

## Forecast Magnitude of Pulse 2:

- Maximum predicted IVT  $\sim 850 \text{ kg m}^{-1} \text{ s}^{-1}$
- Mean IVT  $\sim 700 \text{ kg m}^{-1} \text{ s}^{-1}$
- Minimum IVT  $\sim 350 \text{ kg m}^{-1} \text{ s}^{-1}$

In total, AR conditions could last >24 hours but there is considerable disagreement in duration due to the uncertainty associated with the development of the mesoscale frontal wave



Potential for strong AR in extended forecast but there is currently a lot of disagreement between ensemble members

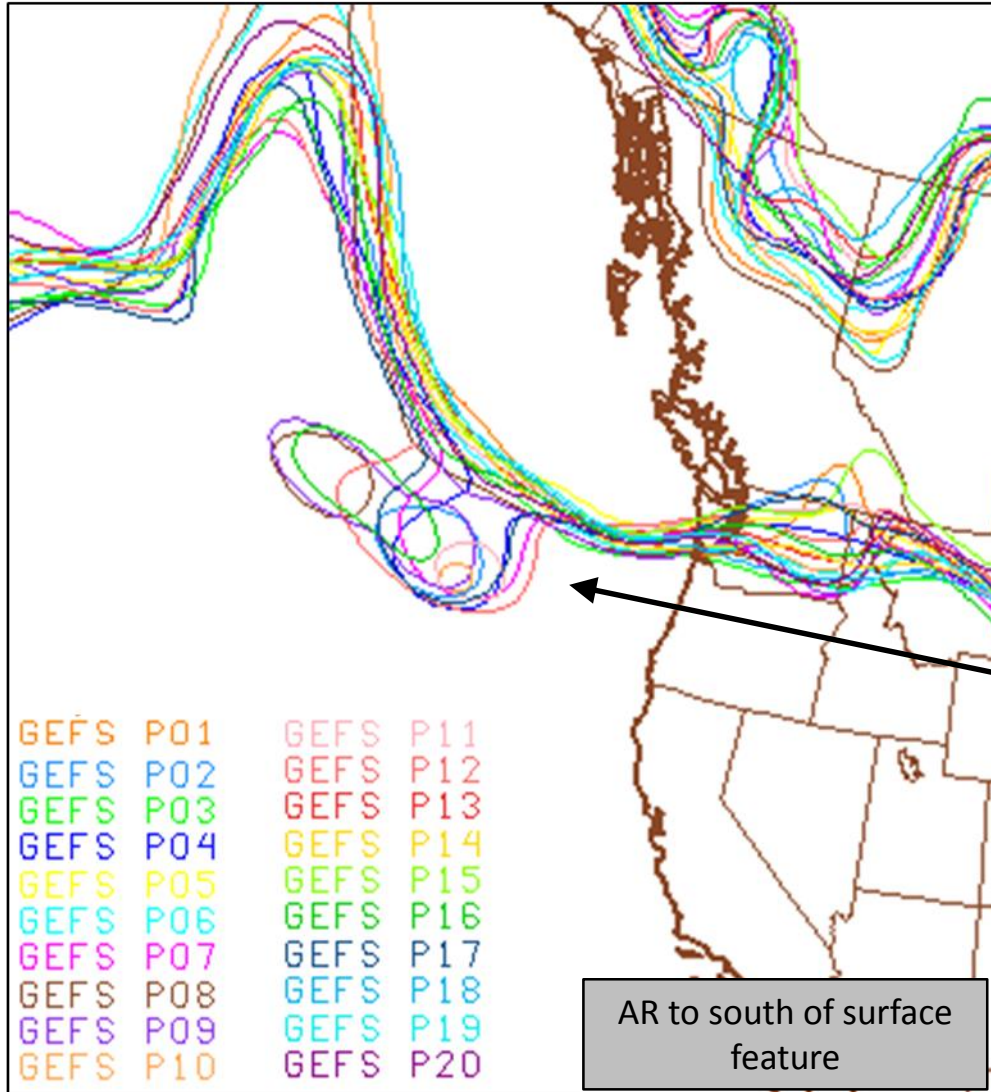
# AR Outlook: 21 November 2018

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11/21/18 12UTC 42HR FCST Valid 11/23/18 06UTC



The GFS Ensemble highlights the forecast uncertainty associated with the mesoscale frontal wave that is forecast to occur during AR 2

Several ensemble members don't highlight the presence of a frontal wave in the 1004 mb surface pressure contour while the ensemble members that do forecast a frontal wave, disagree on location and magnitude of the wave

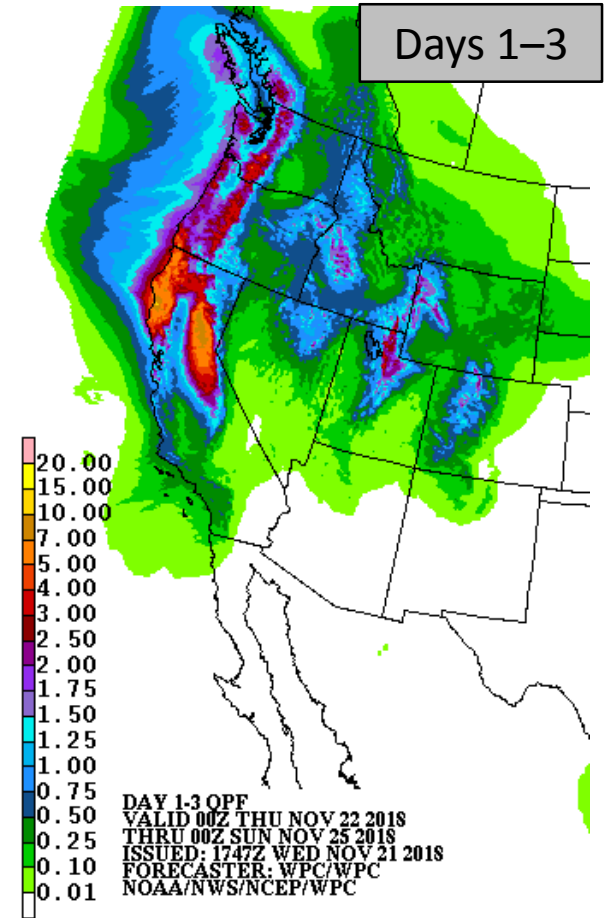
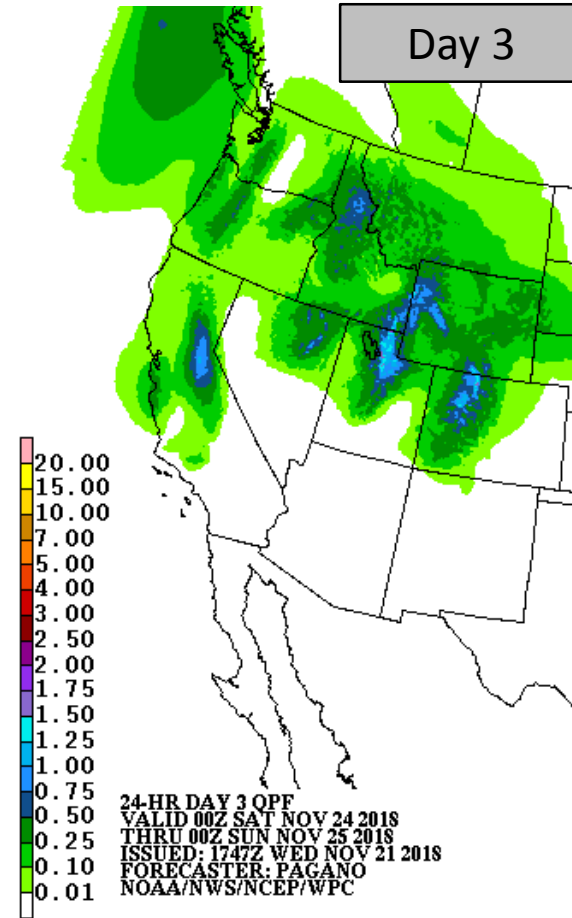
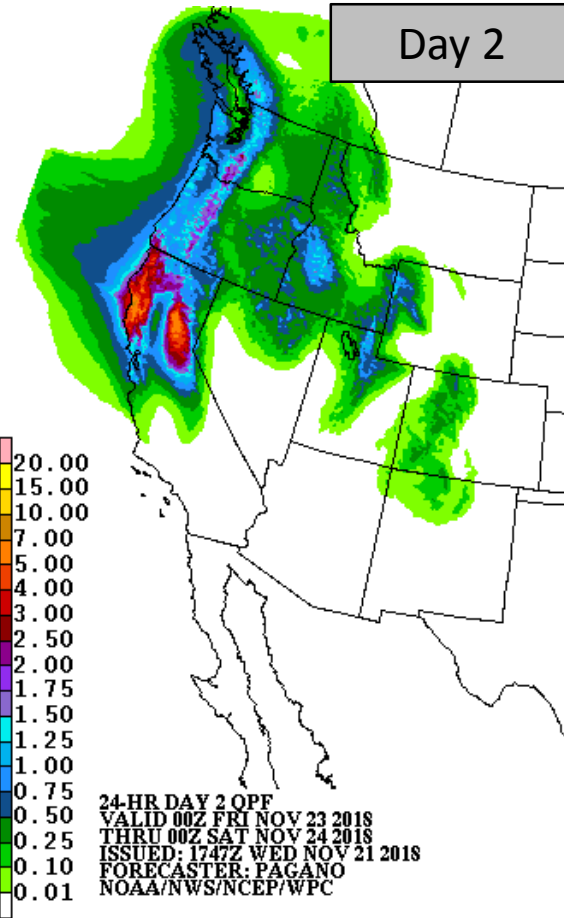
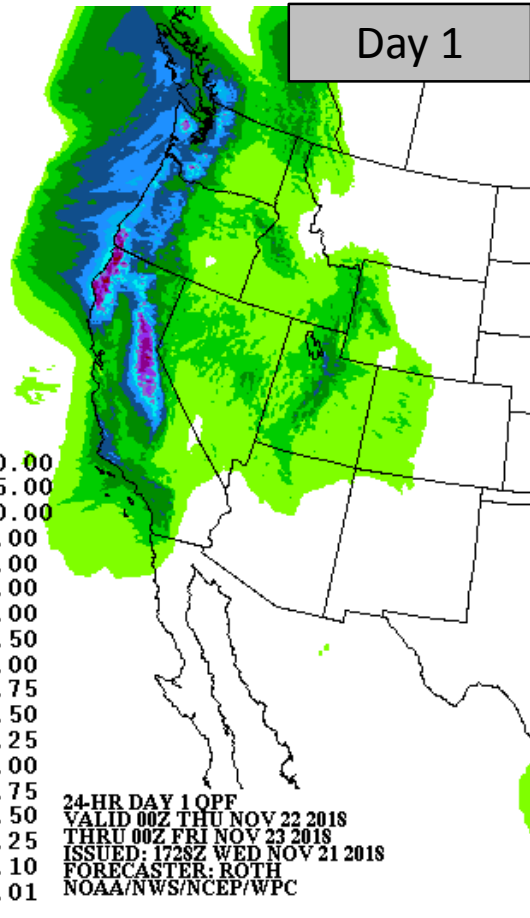


# AR Outlook: 21 November 2018

NOAA WPC QPF available at [wpc.ncep.noaa.gov](http://wpc.ncep.noaa.gov)



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The WPC is forecasting an additional 1–2 inches over North-Coastal CA and the northern Sierra for the next 24-hours

The landfall of the second AR on day 2 is forecast to produce an additional 1–5 inches of precipitation over portions of Northern CA

The end of the second AR is forecast by the WPC to produce as much as .75 inches of precip. over the north/central Sierra on day 3

In total, as much as 7 inches of precipitation (snow at high elevations) could fall over parts of northern CA during the next 1–3 days

# AR Outlook: 21 November 2018

For location-specific forecasts, watches, and warnings visit [weather.gov](http://weather.gov)



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**Due to the potential for higher precipitation rates, the National Weather Service has issued flash flood watches for several recently burned and actively burning areas across California**

...FLASH FLOOD WATCH REMAINS IN EFFECT FROM NOON PST TODAY THROUGH FRIDAY MORNING for the CAMP, CARR, DELTA, HIRZ, AND THE MENDOCINO COMPLEX WILDFIRE BURN AREAS...

The Flash Flood Watch continues for

- \* The Camp Fire wildfire in Butte County, the Carr, Delta and Hirz wildfires in Shasta County and the Mendocino Complex in Lake County burn areas in Northern California.

- \* From noon PST today through Friday morning

- \* Flash floods and debris flows will be a particular threat in the wildfire burn areas mentioned above. Heavy rainfall at times is possible over the burn areas.

- \* Those traveling or in the areas along Interstate 5 and Highway 299 in the western portion of Shasta County, and along portions of Highway 70 and the Skyway in Butte County should be alert for possible road problems due to flooding, rock, and debris flows.

- \* The storm will be accompanied by winds gusting up to 30 to 45 mph, especially Thursday afternoon and evening. These could potentially bring down fire damaged trees.

