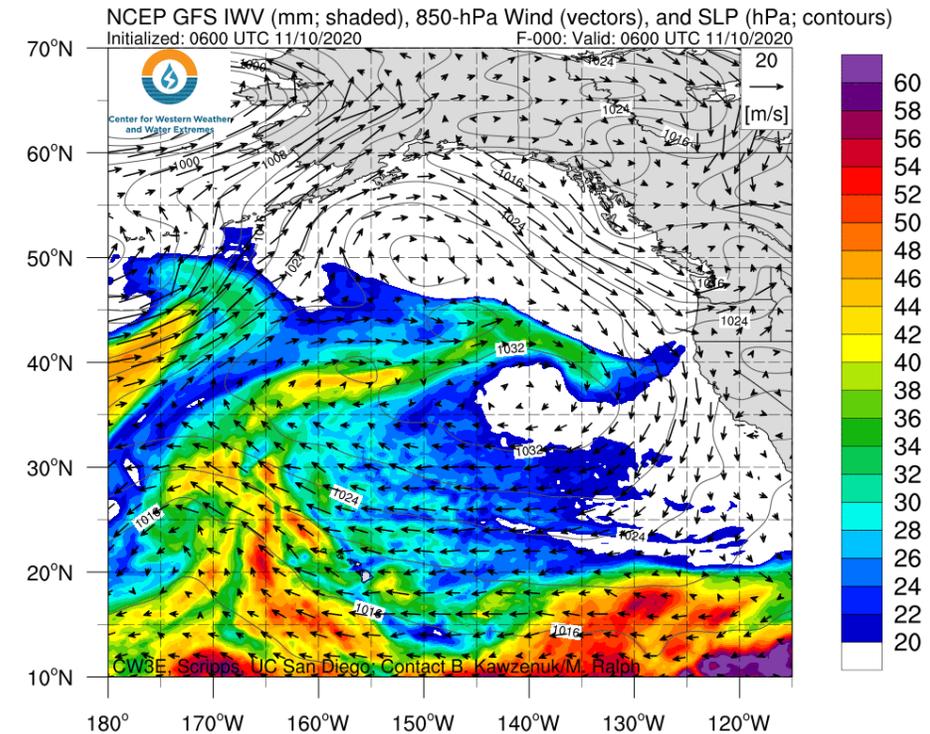
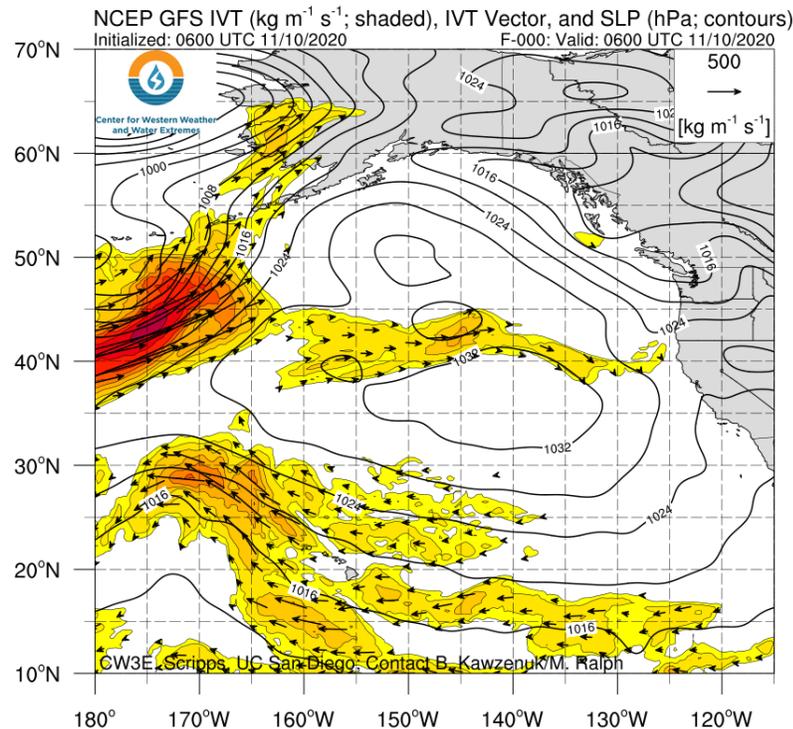


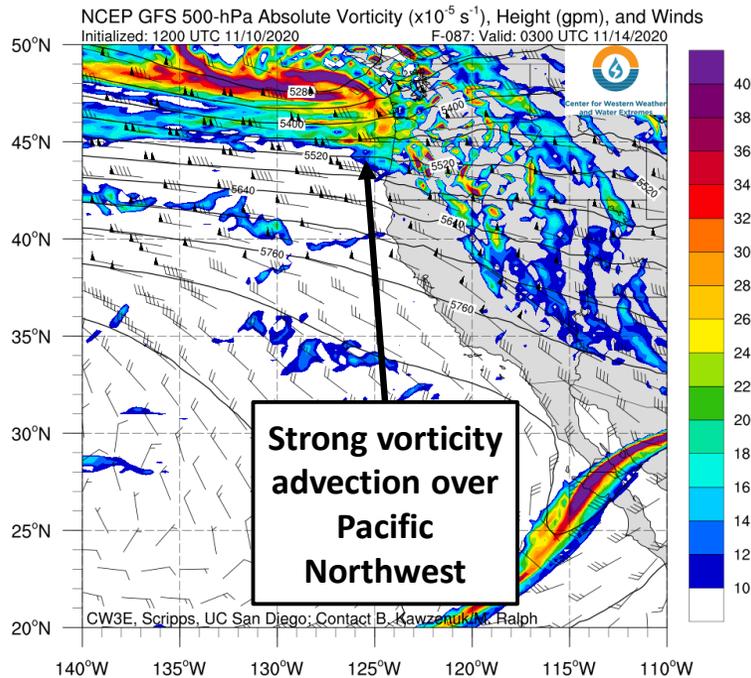
## An active pattern is forecast to bring multiple landfalling atmospheric rivers to the Pacific Northwest and Northern California

- The first AR is forecast to make landfall on 13 November, though there is currently large ensemble uncertainty in onset and overall duration of AR conditions
- The second AR is forecast to make landfall over the Pacific Northwest on 15 November but is also associated with large ensemble and model-to-model uncertainty
- The GFS control member is currently suggesting that first AR could bring AR 2 conditions to Northern CA and Southern OR while the second AR could bring AR 4 conditions to Southern OR
- The NOAA Weather Prediction Center is currently forecasting >10 inches of precipitation over the high elevations of the Coastal, Olympic, and Cascade Mountain Ranges during the next 7 days.

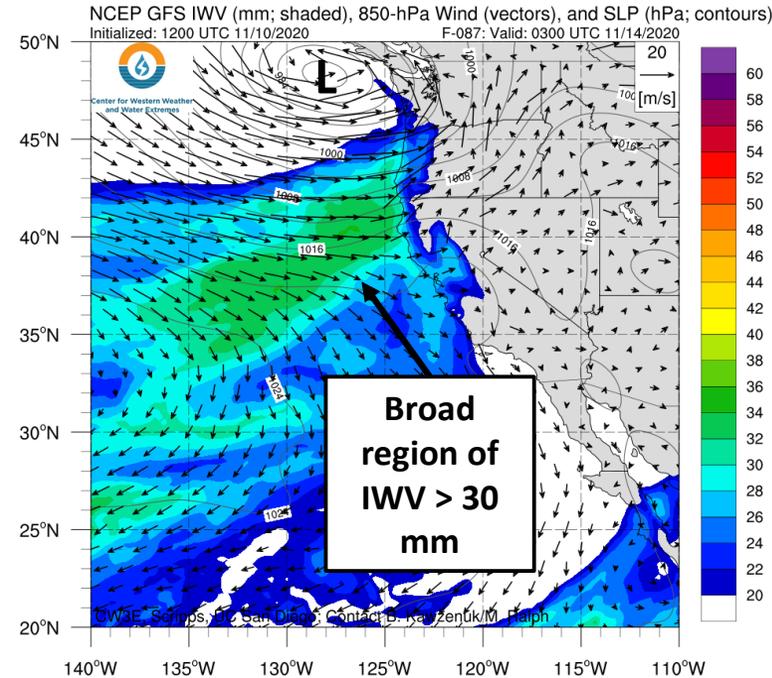


## GFS Forecasts: Valid 0300 UTC 14 Nov (F-87)

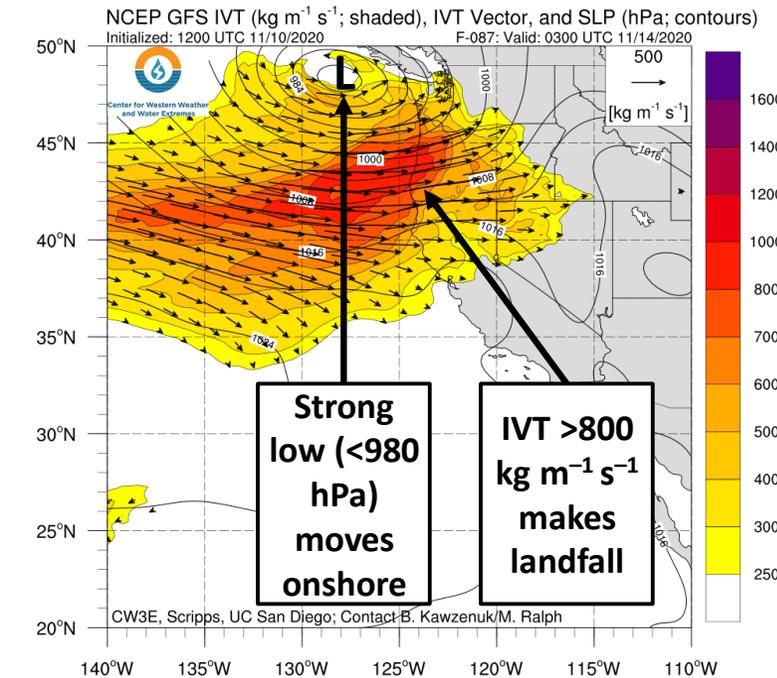
### 500-hPa Vorticity, Height, and Wind



### IWV, 850-hPa Wind, and SLP



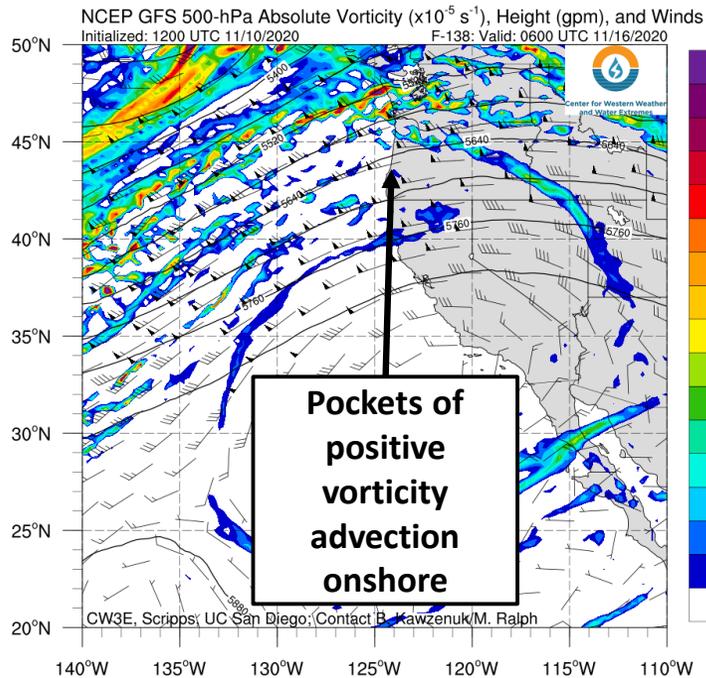
### IVT, IVT Vector, and SLP



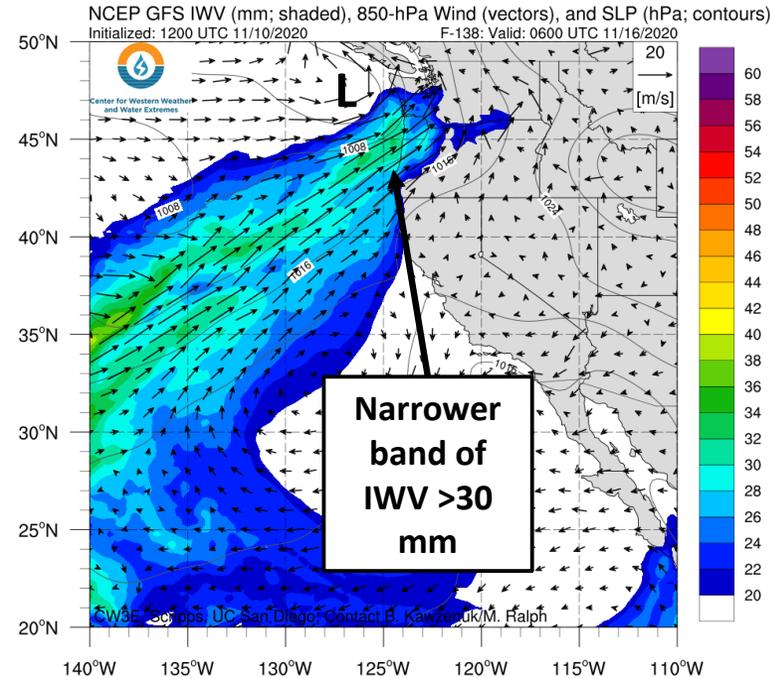
- A region of strong vorticity advection and a strengthening low-pressure system is forecast to move onshore over the Pacific Northwest at ~3 UTC on 14 November
- The strong AR to the south of the parent low is forecast to bring IVT magnitudes  $> 800 \text{ kg m}^{-1} \text{ s}^{-1}$  to Oregon and Northern California
- The AR is forecast to be driven by strong winds and high moisture content with a broad region of IWV values  $> 30 \text{ mm}$  over the Eastern Pacific

## GFS Forecasts: Valid 0600 UTC 16 Nov (F-138)

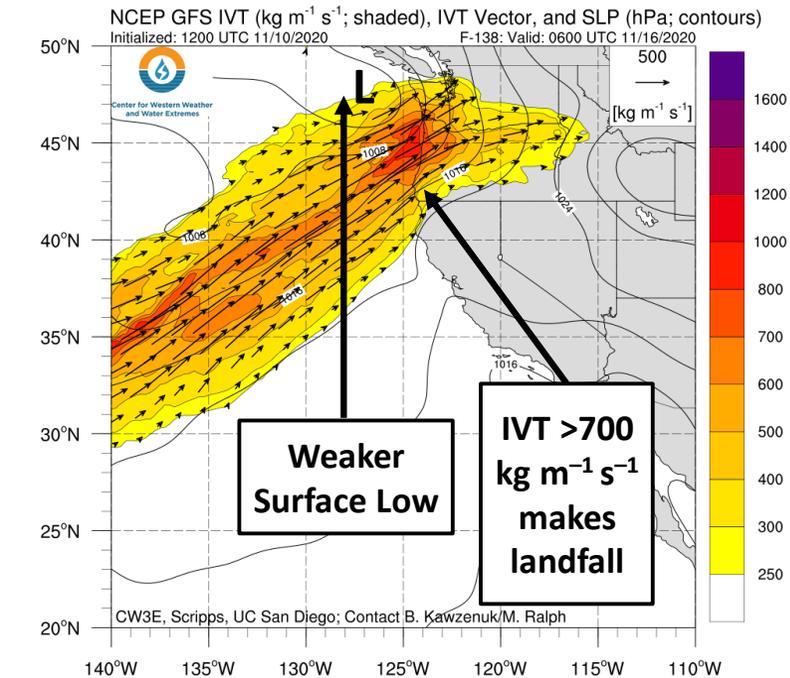
### 500-hPa Vorticity, Height, and Wind



### IWV, 850-hPa Wind, and SLP



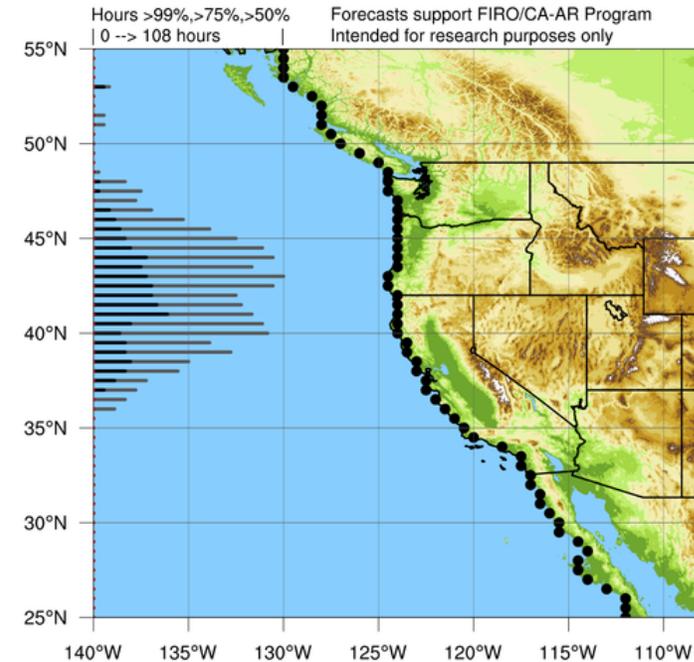
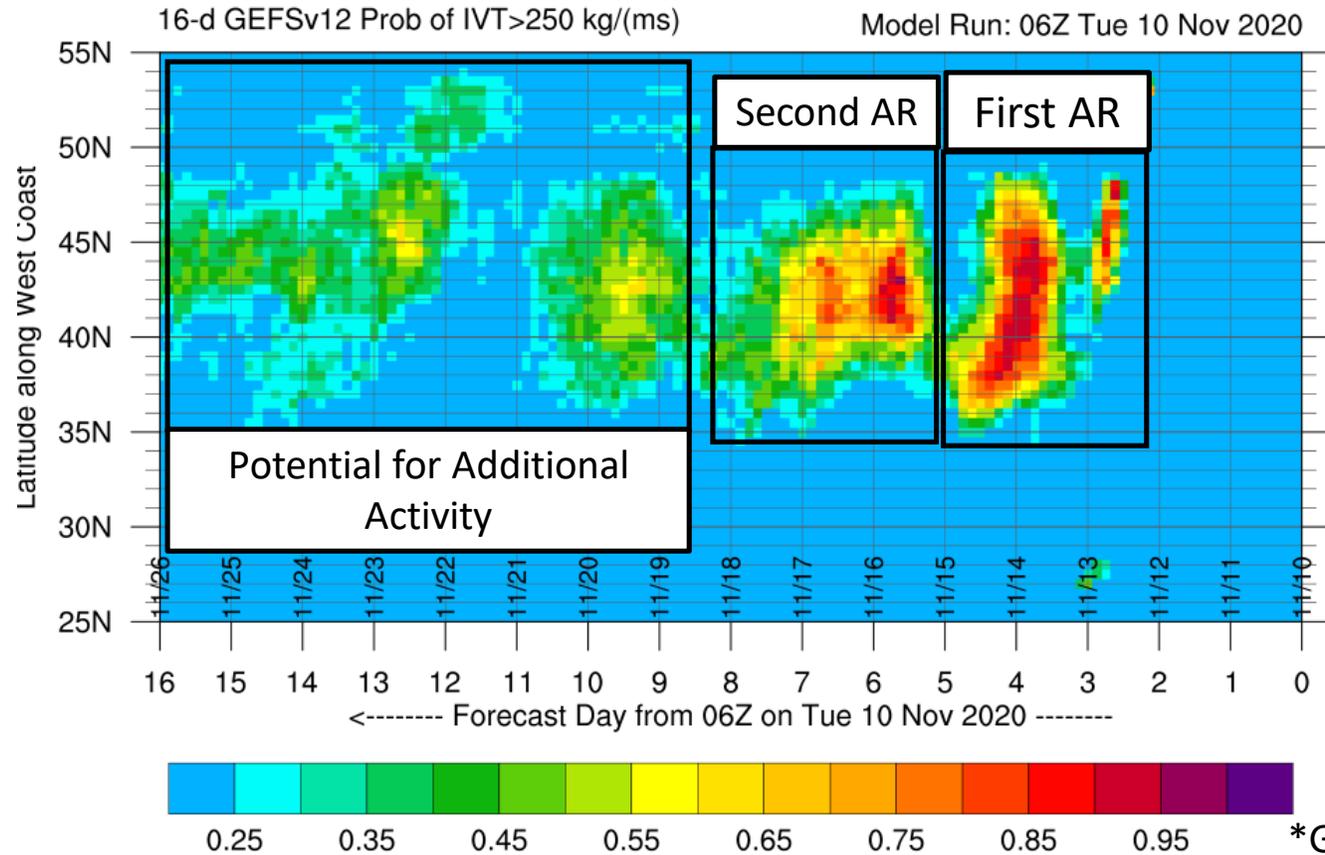
### IVT, IVT Vector, and SLP



- The second landfalling AR is forecast to be associated with a broader scale 500-hPa trough and pockets of positive vorticity advection
- The parent low-pressure system is forecast to be weaker ( $\sim 1004$  hPa) and dissipating as it moves onshore at  $\sim 6$  UTC 16 November
- The core of the AR is forecast to bring IVT magnitudes  $>700 \text{ kg m}^{-1} \text{ s}^{-1}$  to the Pacific Northwest with a narrower band of IWV  $> 30$  mm



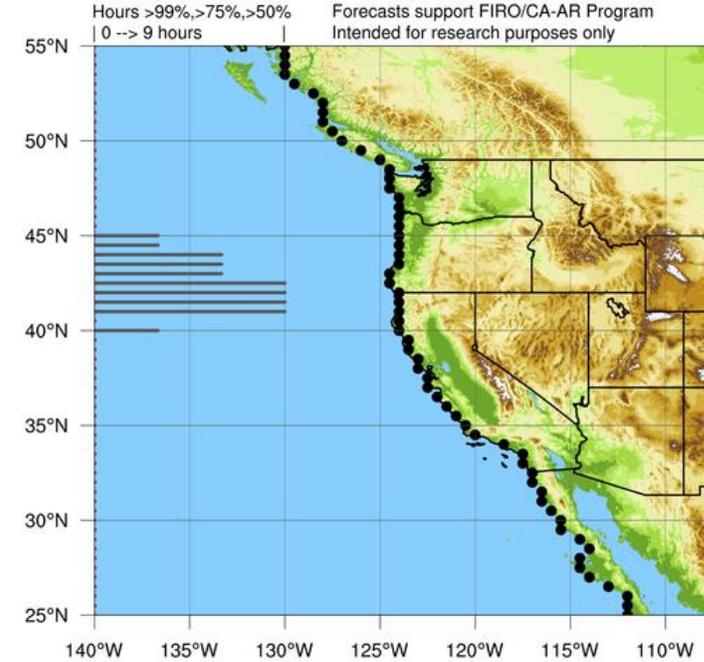
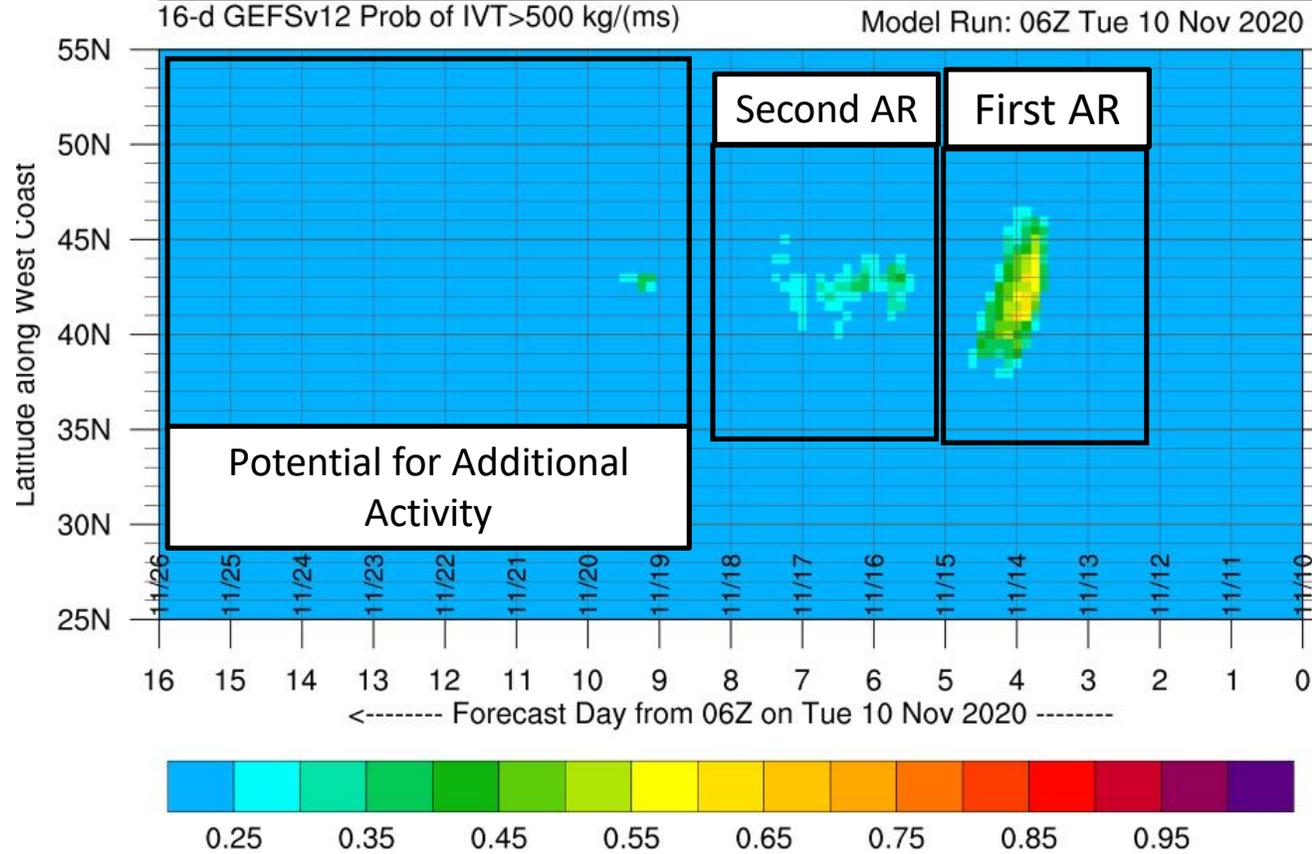
## Probability of AR Conditions: Coastal Transect



- ~75–95% of GEFS ensemble members are suggesting a 12–18-hour period of AR conditions associated with the first landfalling AR
- There is currently lower ensemble agreement (25–65%) around the onset and end of AR conditions, suggesting uncertainty in the overall duration of this event
- The GEFS is currently suggesting the possibility of a prolonged period of continuous AR conditions between 11/15 and 11/17, but there is low ensemble agreement in the timing and overall duration of the event
- The landfall tool is also suggesting the potential for additional AR activity through the rest of the 16-day period, but ensemble agreement decreases as lead-time increases



## Probability of Moderate AR Conditions: Coastal Transect

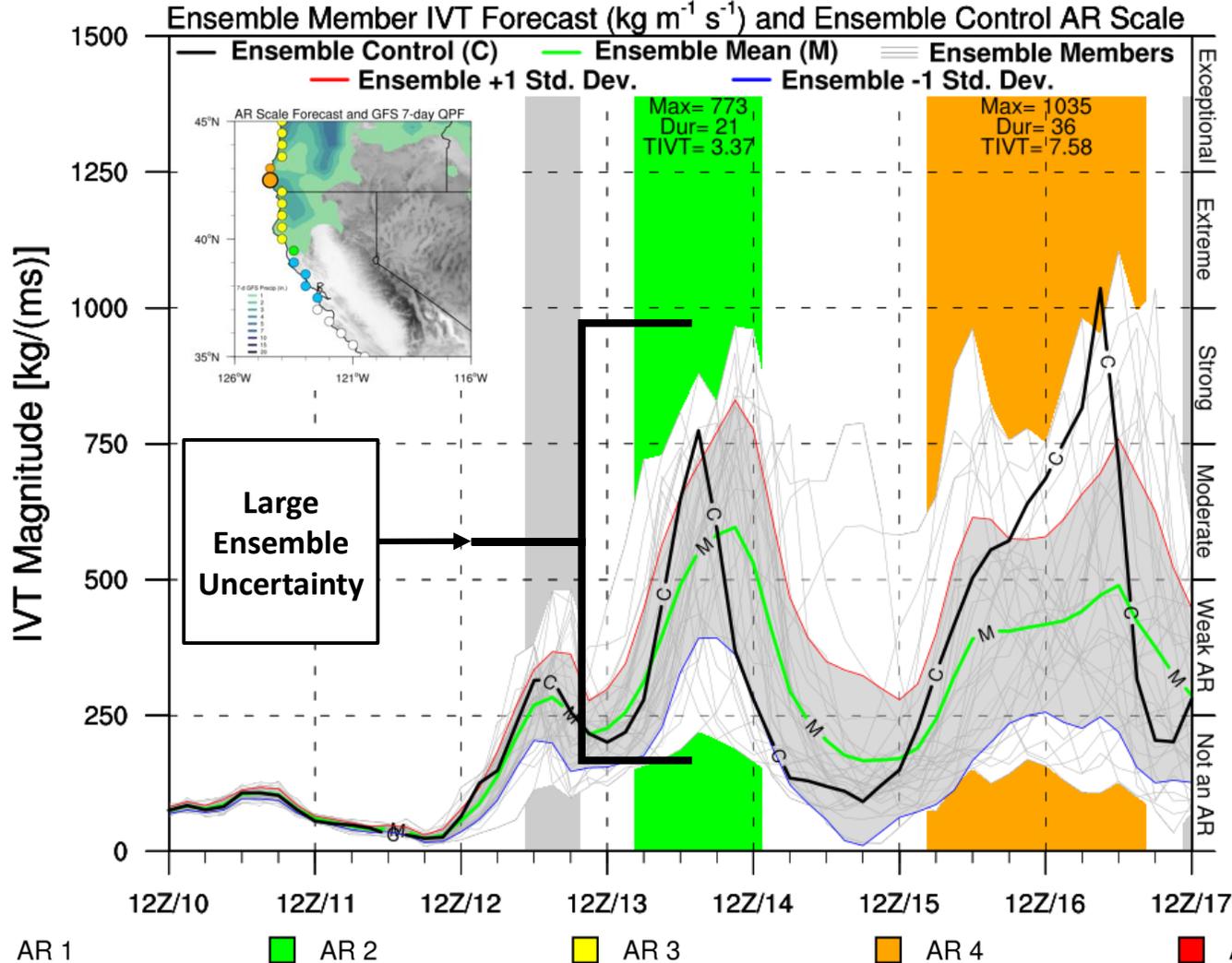


\*GEFS = NCEP Global Ensemble Forecast System (United States)

- The GEFS is currently forecasting >45% ensemble probability of moderate AR conditions (IVT > 500 kg m<sup>-1</sup> s<sup>-1</sup>) for ~12 hours over South-Coastal Oregon and North-Coastal California in association with the first AR between days 3 and 5 (11/13 to 11/15)
- The GEFS is also highlighting the potential for moderate AR conditions in association with the second AR, but ensemble probabilities are currently much lower (<35%)

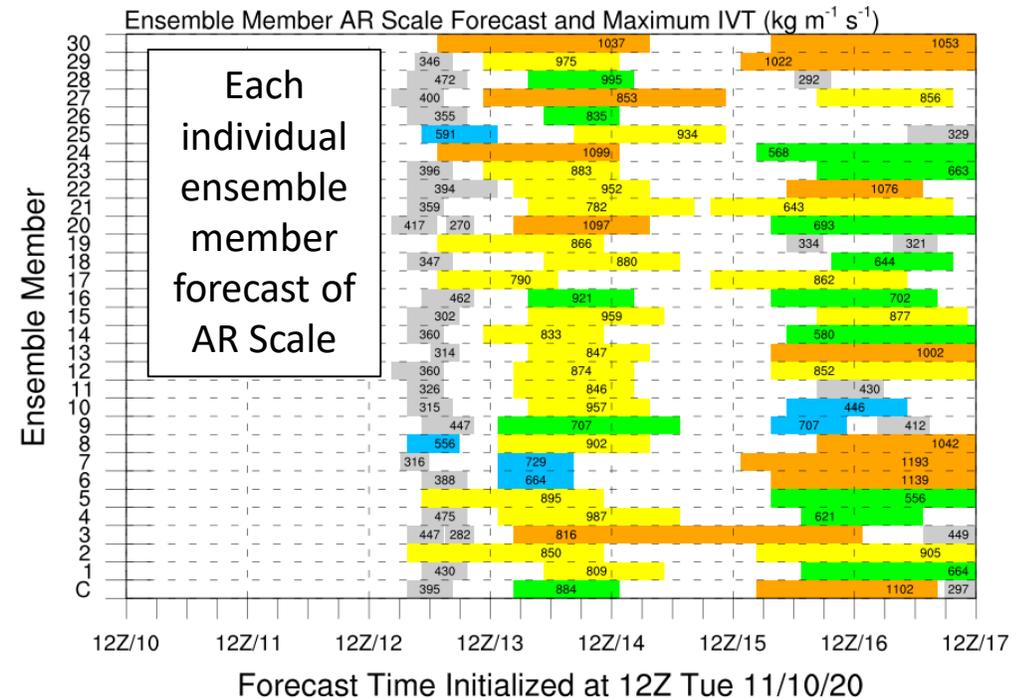
## GEFS AR Scale & IVT Forecasts

GFS Ensemble Initialized: 12Z Tue 11/10/20



Categorical AR Strength by Ralph/CW3E

- The 12Z GEFS control member is currently forecasting AR2 conditions associated with the first AR and AR 4 conditions associated with the second AR over Southern Oregon
- Due to large ensemble uncertainty in the overall duration and magnitude of both ARs, the GEFS is forecasting a numerous potential AR Scale outcomes ranging from AR 1 to AR 4 within the first AR and no AR to AR 4 within the second AR



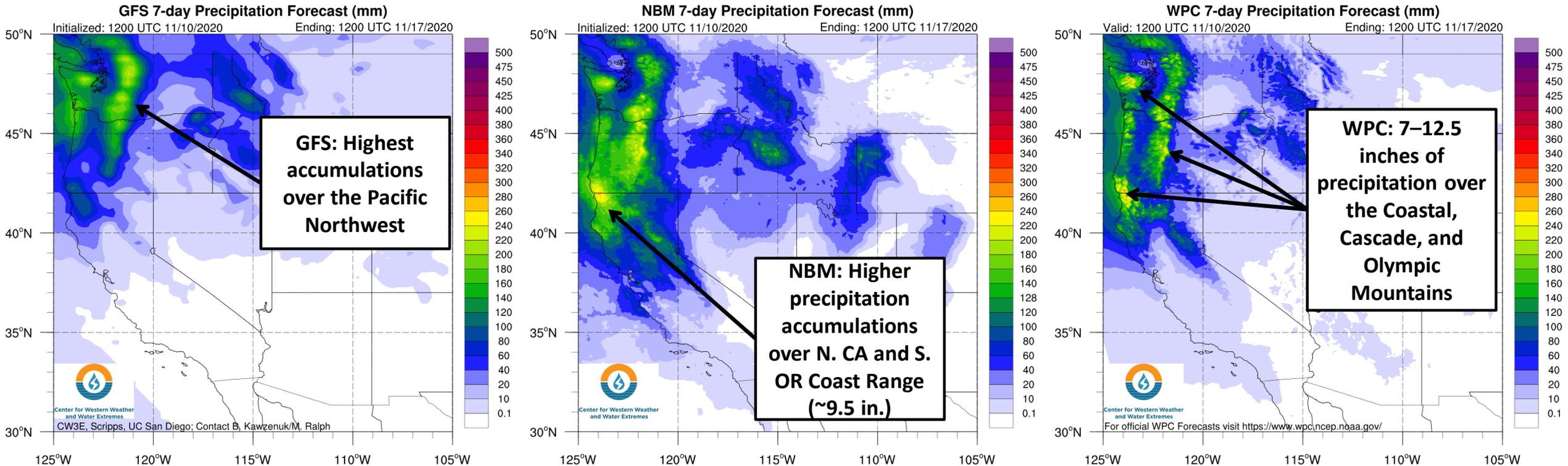
# AR Outlook: 10 Nov 2020

For California  
DWR's AR Program



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

## Model 7-day QPF: Valid 1200 UTC 10-17 November



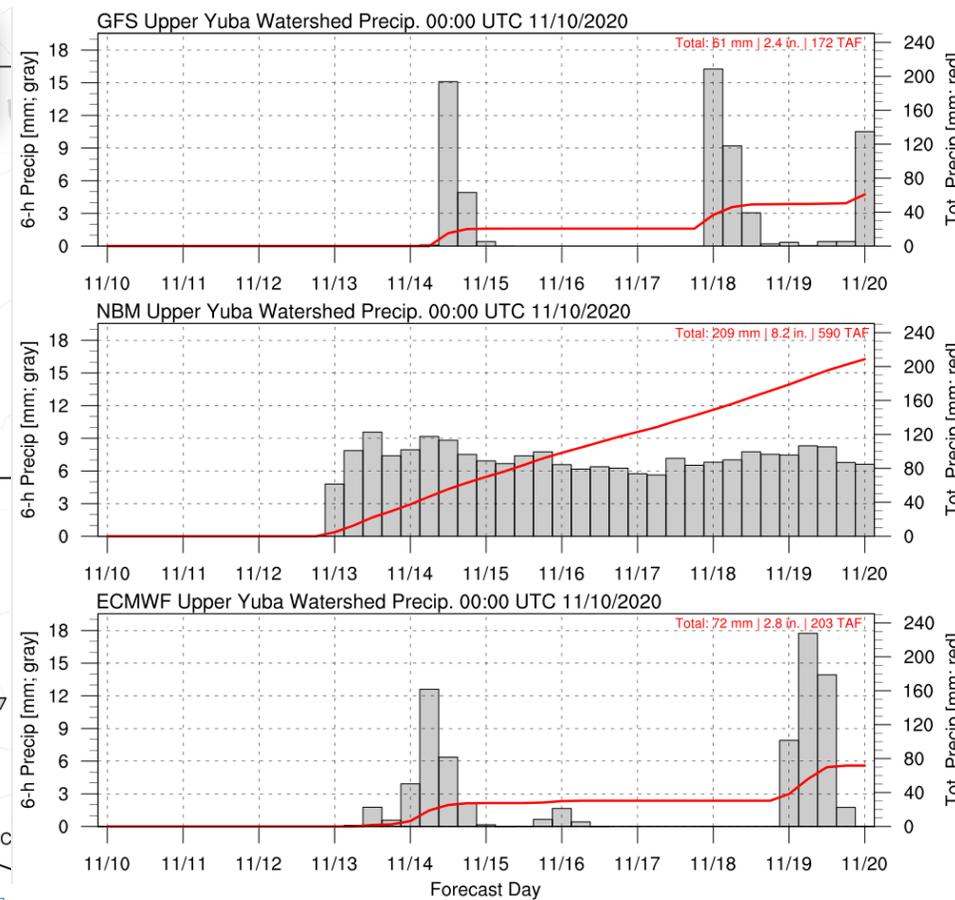
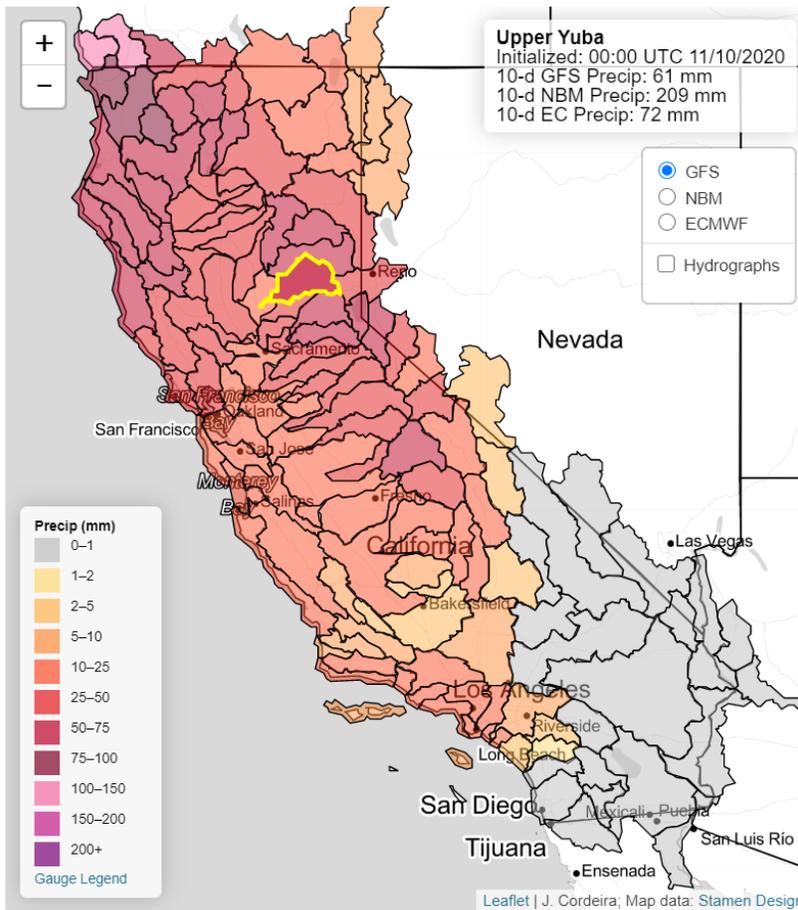
\*GFS = NCEP Global Forecast System (United States)

\*NBM = National Blend of Models (Blend of NWS and non-NWS models)

\*WP = NOAA Weather Prediction Center ([www.wpc.ncep.noaa.gov](http://www.wpc.ncep.noaa.gov))

- There is currently disagreement between the NBM and GFS in the location of the highest precip. accumulations during the next 7 days.
- The GFS is currently suggesting precipitation accumulations of >7 inches over the Washington Cascades while the NBM is predicting >9 inches over the Northern CA and Southern Oregon Coast Ranges
- The WPC is currently predicting 7–12.5 inches of precipitation over the higher elevations over the Coastal, Olympic, and Cascade Mountains

## 10-day Watershed Precipitation Forecasts



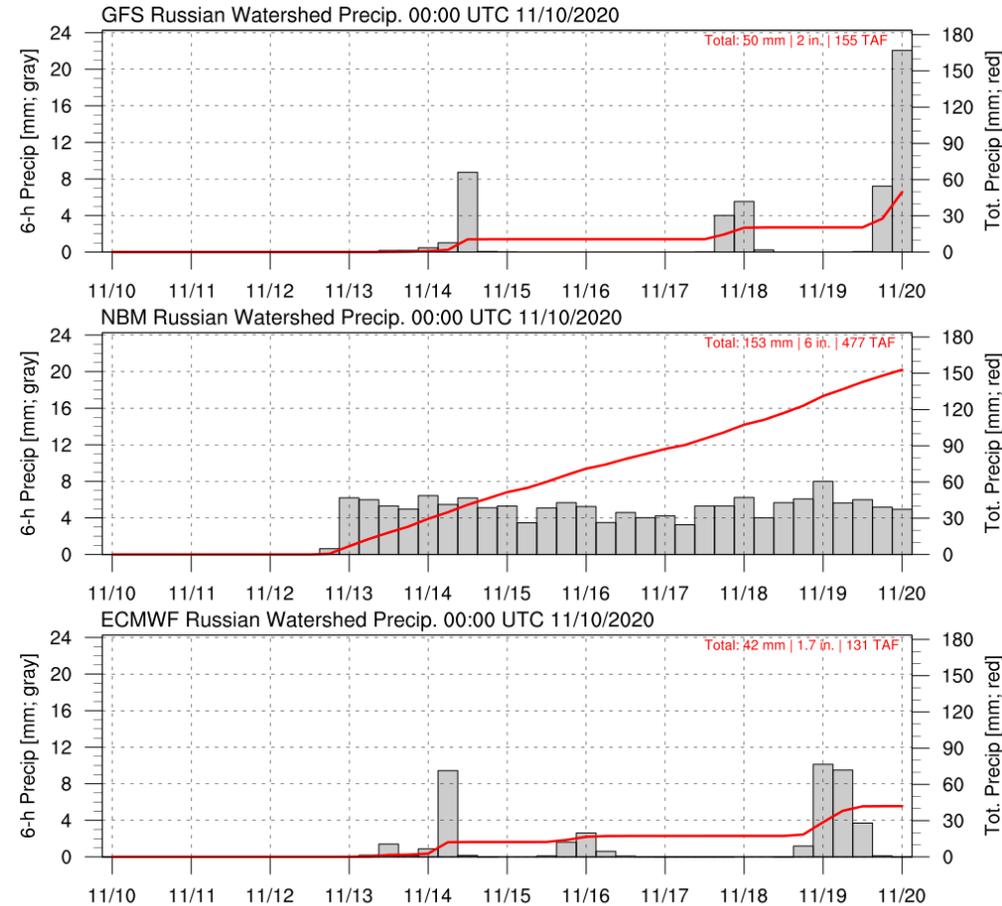
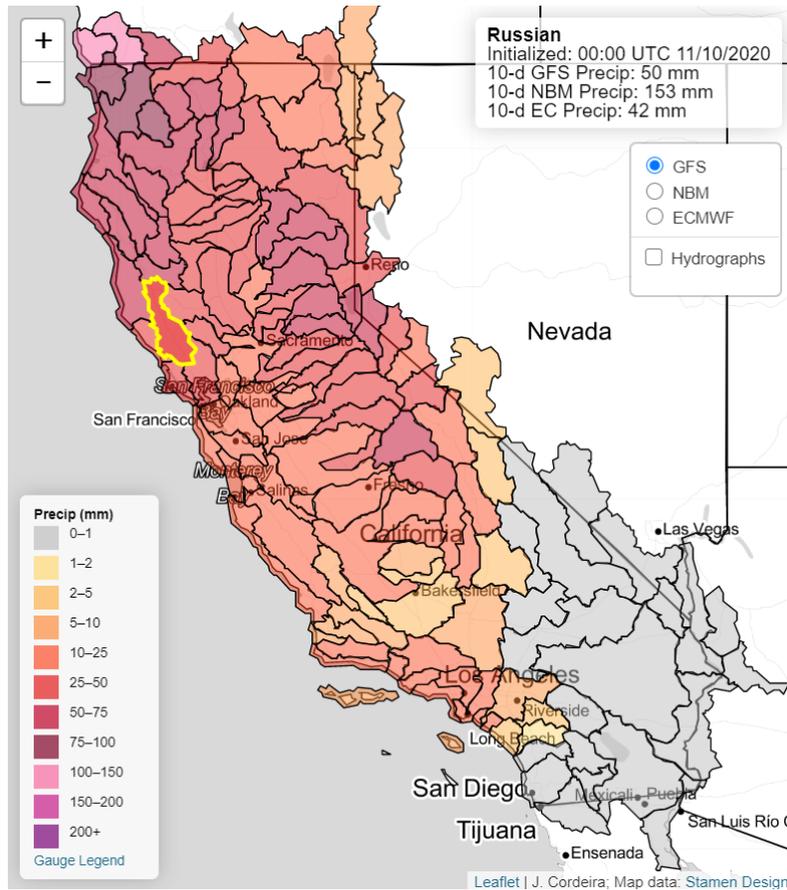
\*GFS = NCEP Global Forecast System (United States)

\*NBM = National Blend of Models (Blend of NWS and non-NWS models)

\*ECMWF = European Center for Medium-Range Weather Forecasts (Europe)

- The GFS and ECMWF forecast models are predicting 2.4 and 2.8 inches of watershed average precipitation over the Upper Yuba watershed in Northern California.
- The NBM is currently suggesting much higher precipitation accumulations of 8.2 inches of watershed average precipitation, equivalent to ~590,000 acre-feet over the watershed.

### 10-day Watershed Precipitation Forecasts



\*GFS = NCEP Global Forecast System (United States)

\*NBM = National Blend of Models (Blend of NWS and non-NWS models)

\*ECMWF = European Center for Medium-Range Weather Forecasts (Europe)

- The GFS and ECMWF are forecasting 2.0 and 1.7 inches of areal mean precipitation over the Russian River watershed during the next 10 days with heavier precipitation forecast for the second AR between 11/19 and 11/20
- Similar to the Upper Yuba watershed, the NBM is predicting significantly higher precipitation accumulations of 6 inches and persistent precipitation from 11/13 through 11/20