

CW3E Atmospheric River Outlook

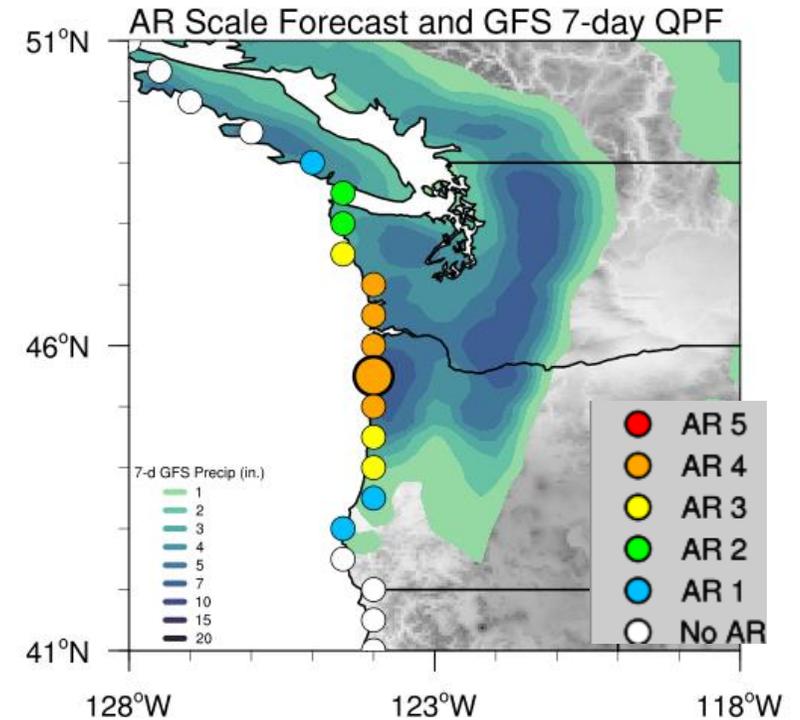
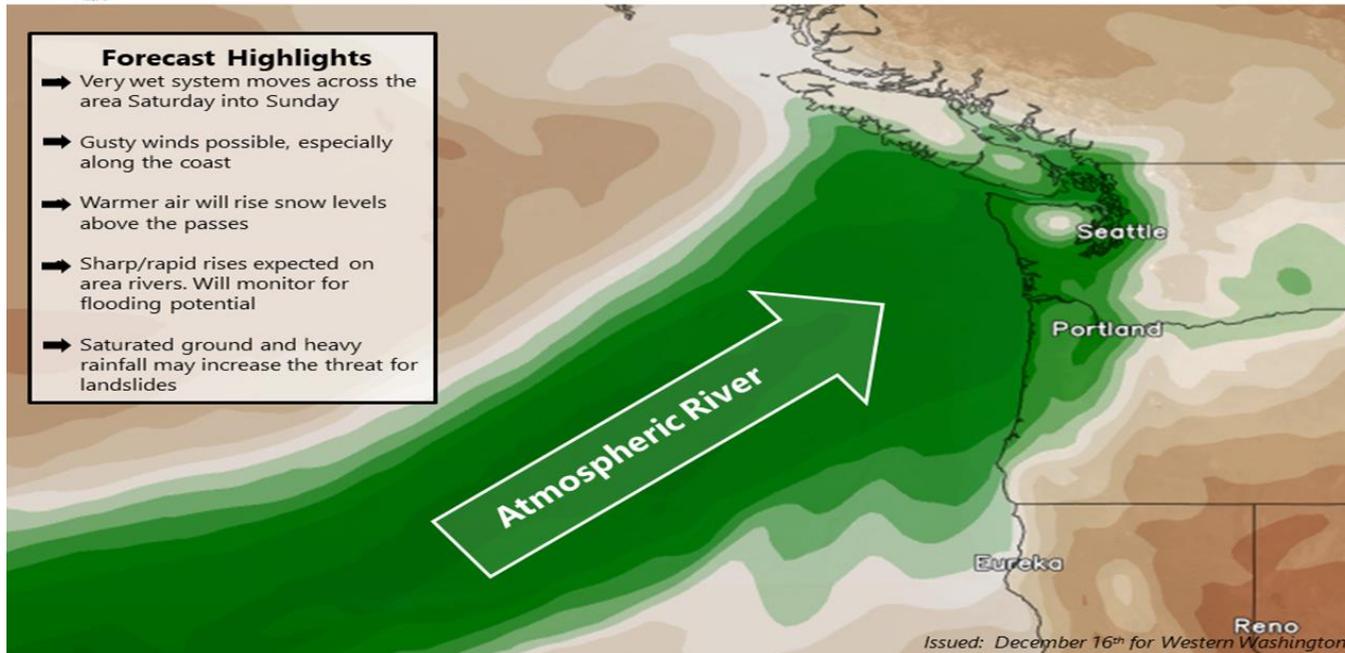
Multiple Atmospheric Rivers are Forecast to Make Landfall over Pacific Northwest this Weekend and into Next Week

- The first AR is forecast to bring AR 1 conditions to much of the Pacific Northwest (PNW) coast beginning on Friday
- The second AR is forecast to make landfall Saturday evening and could potentially last into Monday evening
- Due to the potential development of a mesoscale frontal wave (MFW) and secondary cyclone, current forecast uncertainty in overall AR condition duration and magnitude is high
- The Weather Prediction Center is currently forecasting as much as 15 inches of precipitation in some locations of the PNW while the Northwest River Forecast Center is predicting 3 river gauges to rise above moderate flood stage



Wet Weekend on the Way

Saturday December 19 – Sunday December 20, 2020



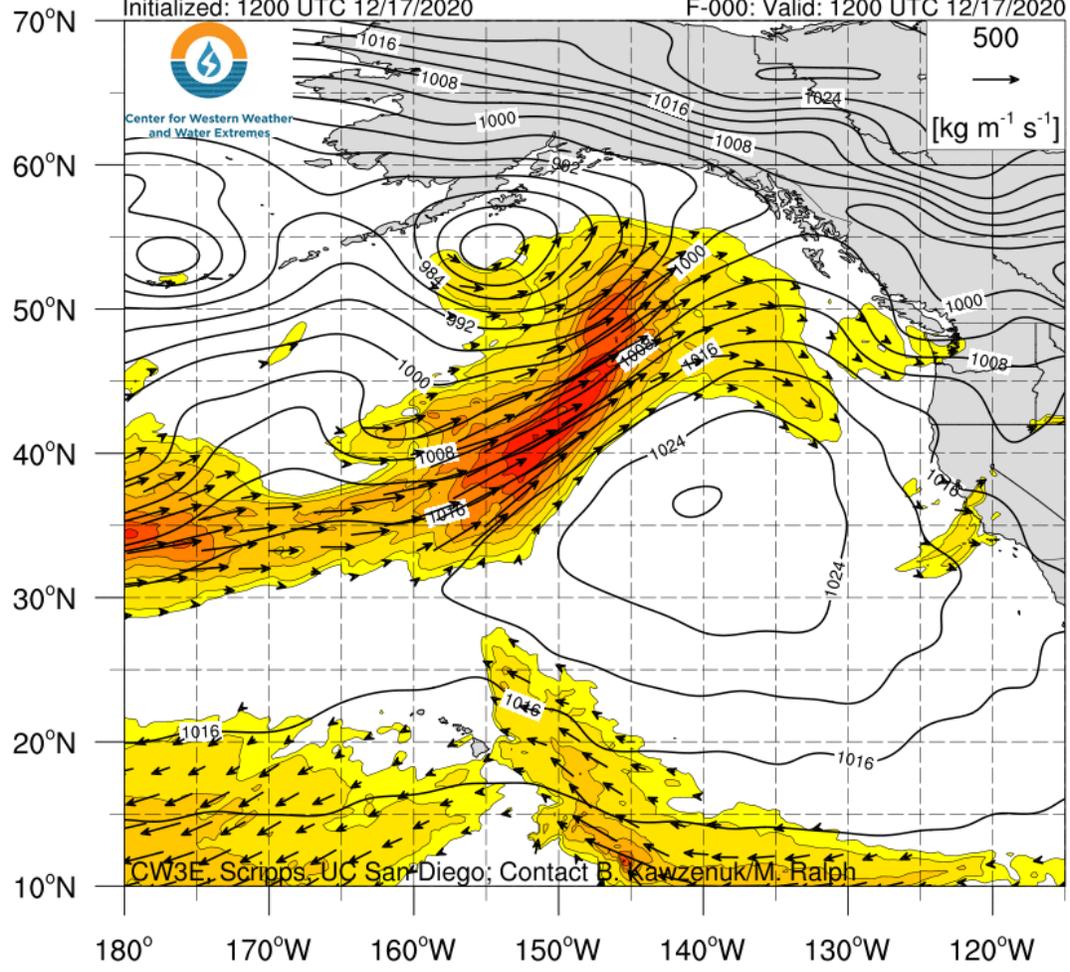
CW3E

Center for Western Weather
and Water Extremes

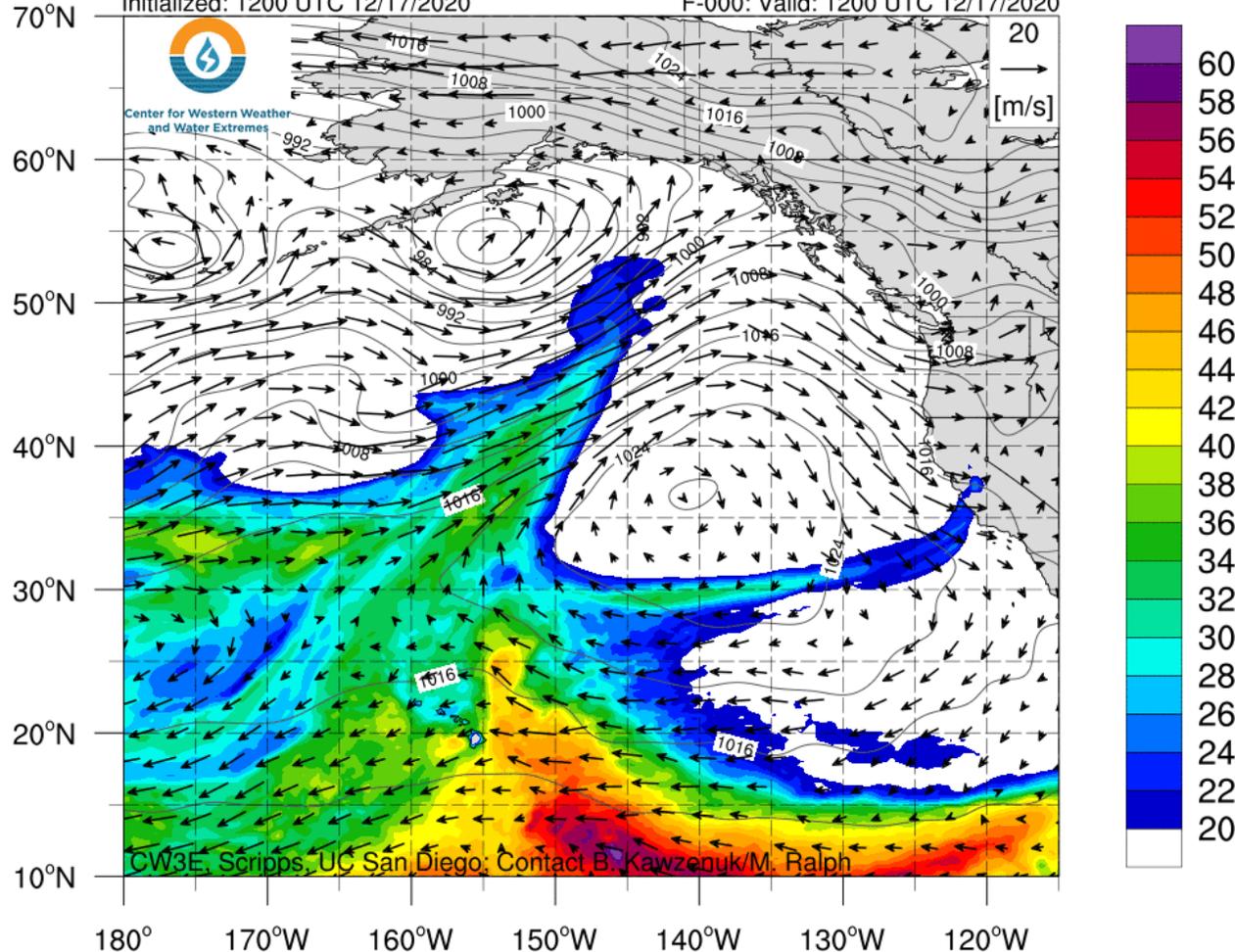
Atmospheric River Outlook: 17 December 2020

For California DWR's AR Program

NCEP GFS IVT ($\text{kg m}^{-1} \text{s}^{-1}$; shaded), IVT Vector, and SLP (hPa; contours)
Initialized: 1200 UTC 12/17/2020 F-000: Valid: 1200 UTC 12/17/2020



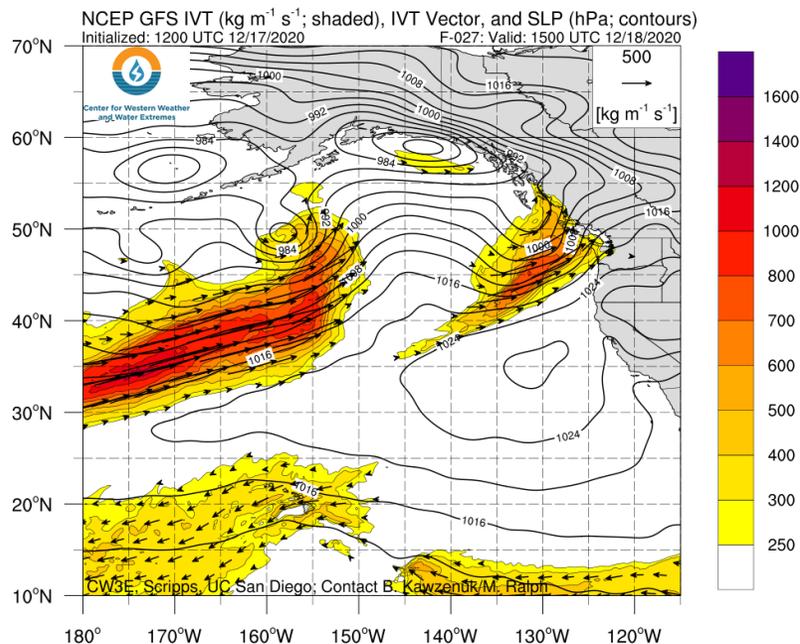
NCEP GFS IWV (mm; shaded), 850-hPa Wind (vectors), and SLP (hPa; contours)
Initialized: 1200 UTC 12/17/2020 F-000: Valid: 1200 UTC 12/17/2020



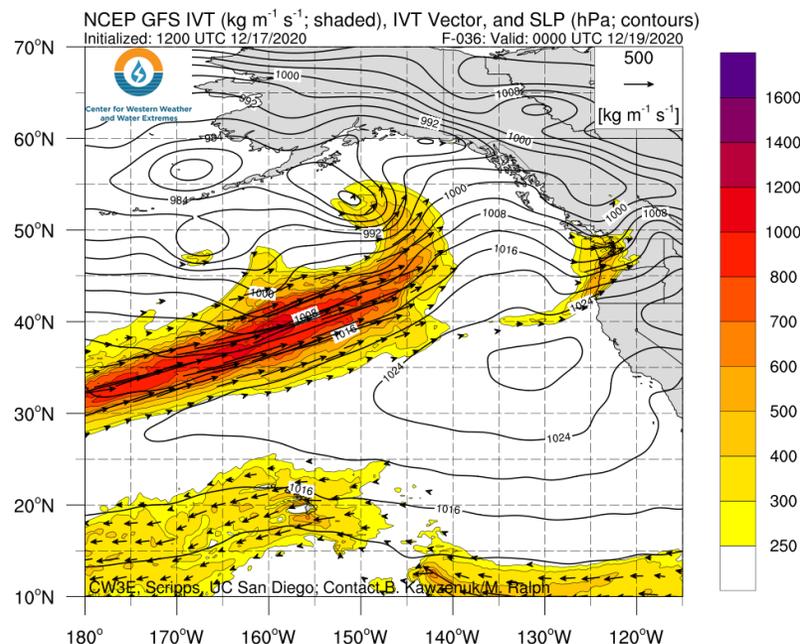
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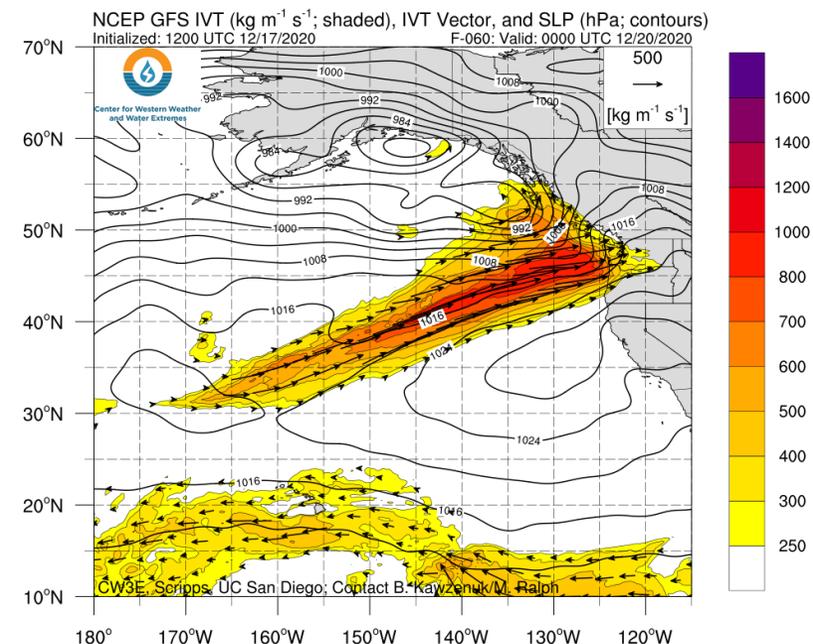
A) Valid: 1500 UTC 18 Dec (F-27)



B) Valid: 0000 UTC 19 Dec (F-36)



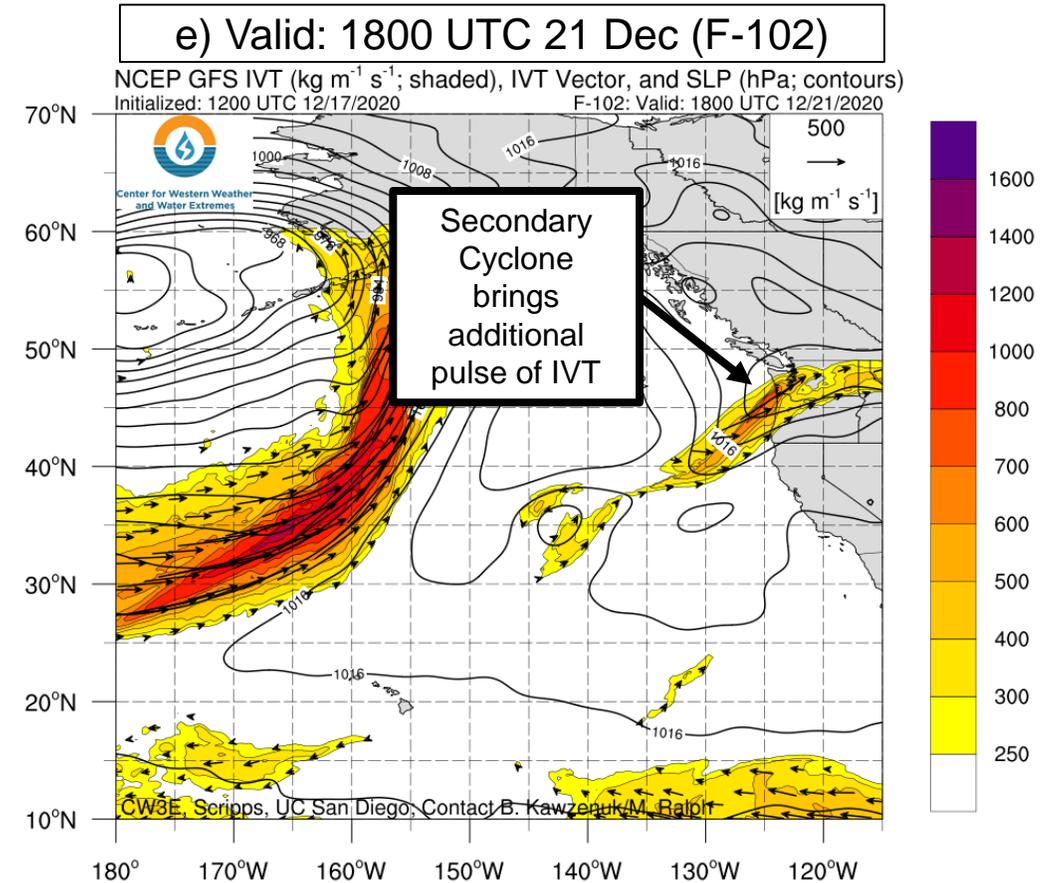
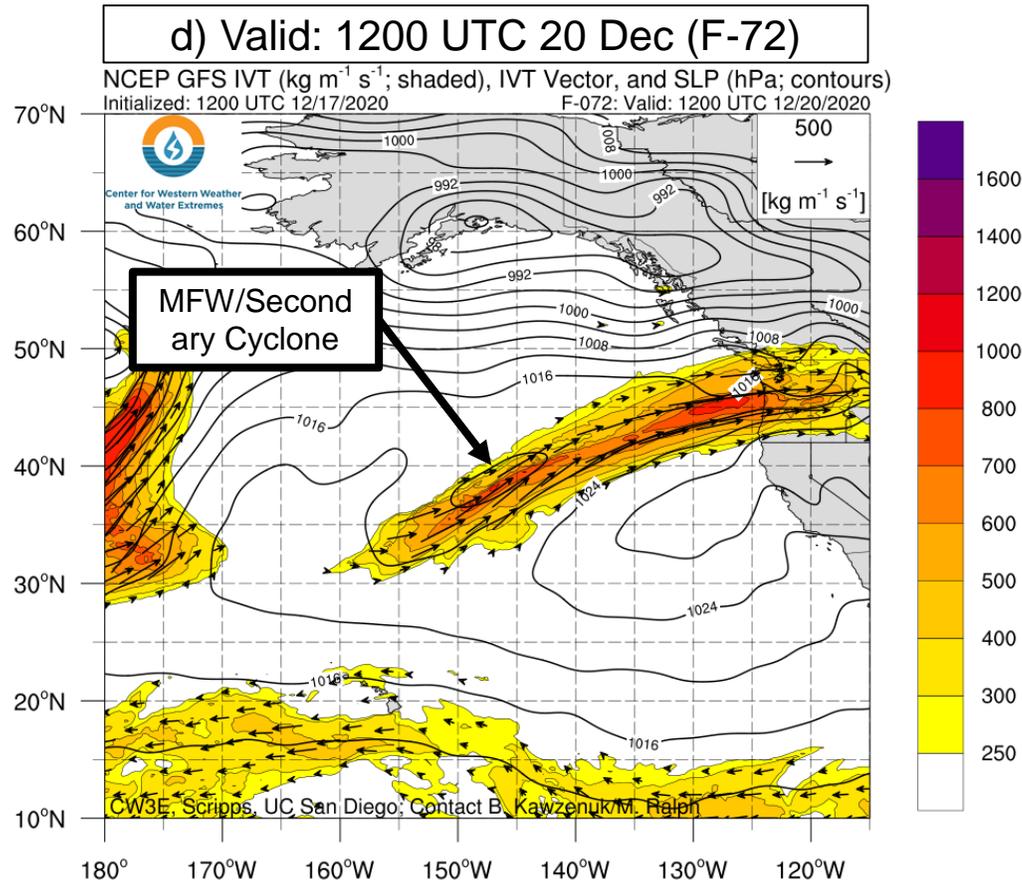
C) Valid: 0000 UTC 20 Dec (F-60)



- The first AR is forecast to make landfall over Vancouver Island and the Pacific Northwest at ~15 UTC (7 AM PT) on 18 Dec. as the Second AR is strengthening over the central north Pacific

- The first AR is then forecast to weaken and propagate down the coast over Washington and Oregon, bringing weak AR conditions ($\text{IVT} < 500 \text{ kg m}^{-1} \text{s}^{-1}$) to much of the region

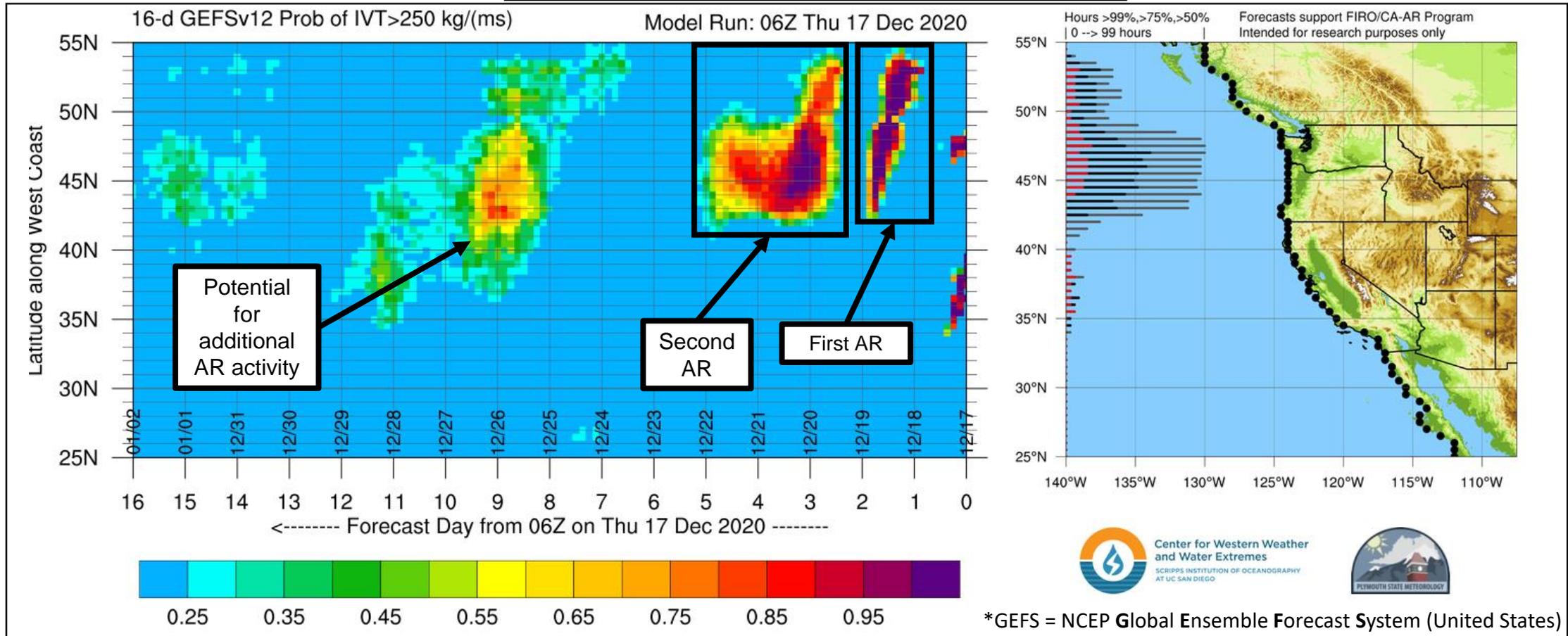
- The second AR is forecast to make landfall over Washington at ~00 UTC 20 Dec (4 PM 19 Dec), bringing moderate to strong AR conditions to the Coast



- As the main portion of the second AR is impacting the PNW, a mesoscale frontal wave develops into a secondary cyclone over the southwestern portion of the AR corridor at ~12 UTC 20 Dec (4 AM PT)

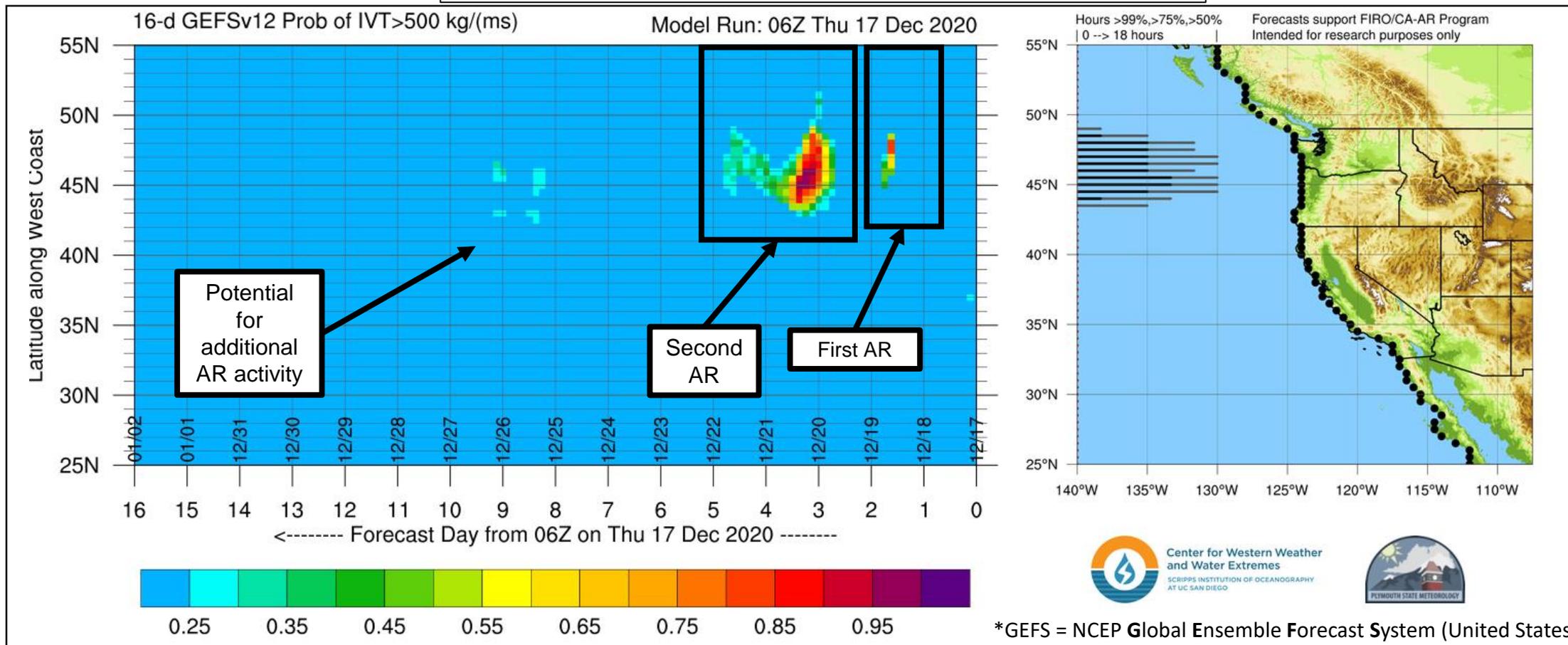
- This secondary cyclone is then forecast to propagate northeastward towards the PNW, moving onshore at ~18 UTC 21 Dec (10 AM), prolonging AR conditions and resulting in an additional pulse of high IVT magnitudes

Probability of AR Conditions Along Coast



- The GEFS is currently forecasting a high probability of AR conditions ($IVT > 250 \text{ kg m}^{-1} \text{ s}^{-1}$) associated with the first AR forecast to make landfall on 18 Dec. and last ~12 hours over coastal locations from British Columbia to far Northern California
- The ensemble probability of AR conditions associated with the second AR is lower compared to the first AR, especially during the later portions of the event, due to the uncertainty surrounding the development of the mesoscale frontal wave

Probability of Moderate AR Conditions Along Coast

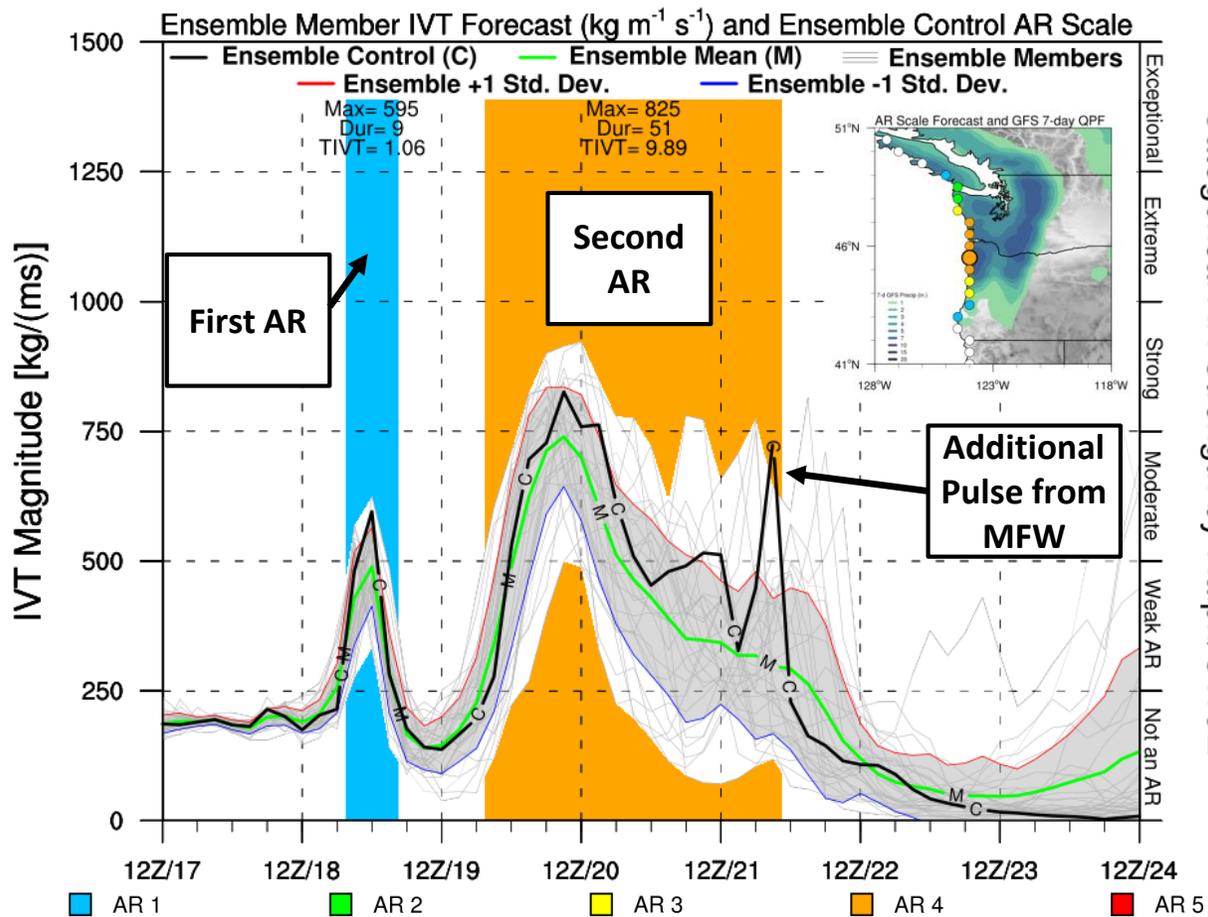


- There is currently a high probability (>75% of ensembles) of moderate AR conditions ($IVT > 500 \text{ kg m}^{-1} \text{ s}^{-1}$) over Washington and Oregon in association with the second AR
- The probability of moderate or greater AR conditions decreases on 21 December due to the large ensemble uncertainty pertaining to the development, strength, and location of the mesoscale frontal wave and secondary cyclone

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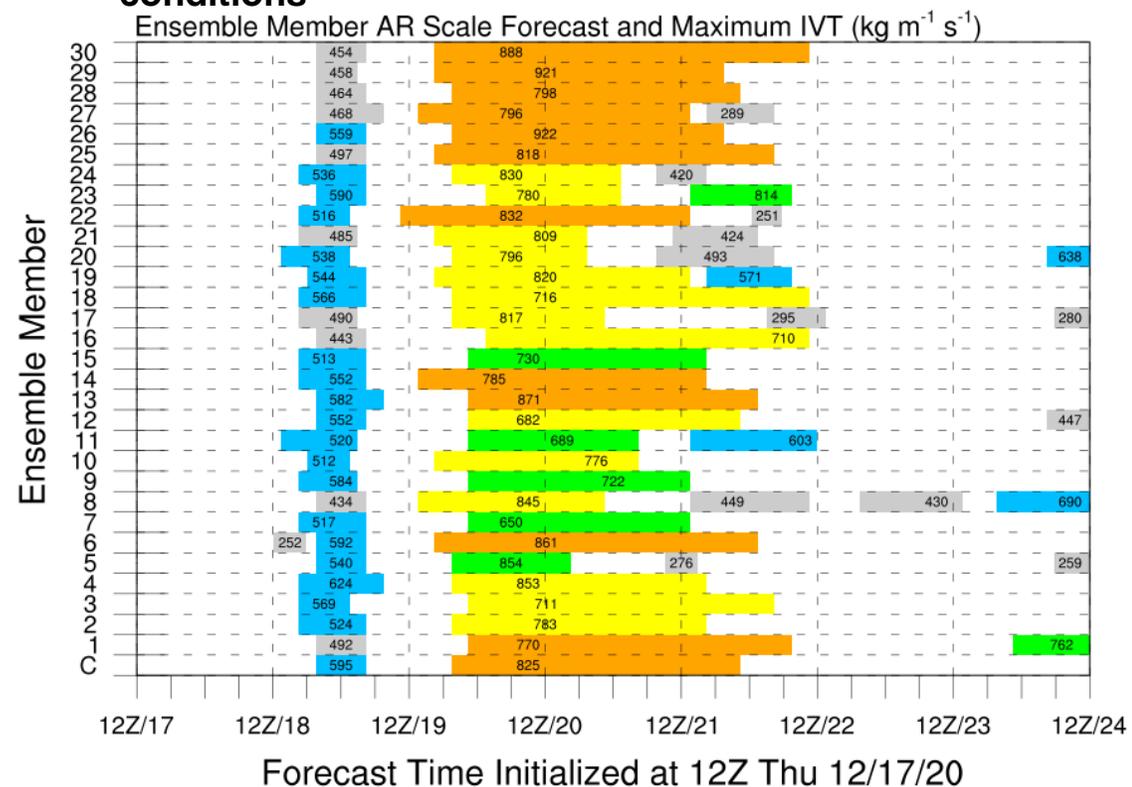
GFS Ensemble Initialized: 12Z Thu 12/17/20



Categorical AR Strength by Ralph/CW3E

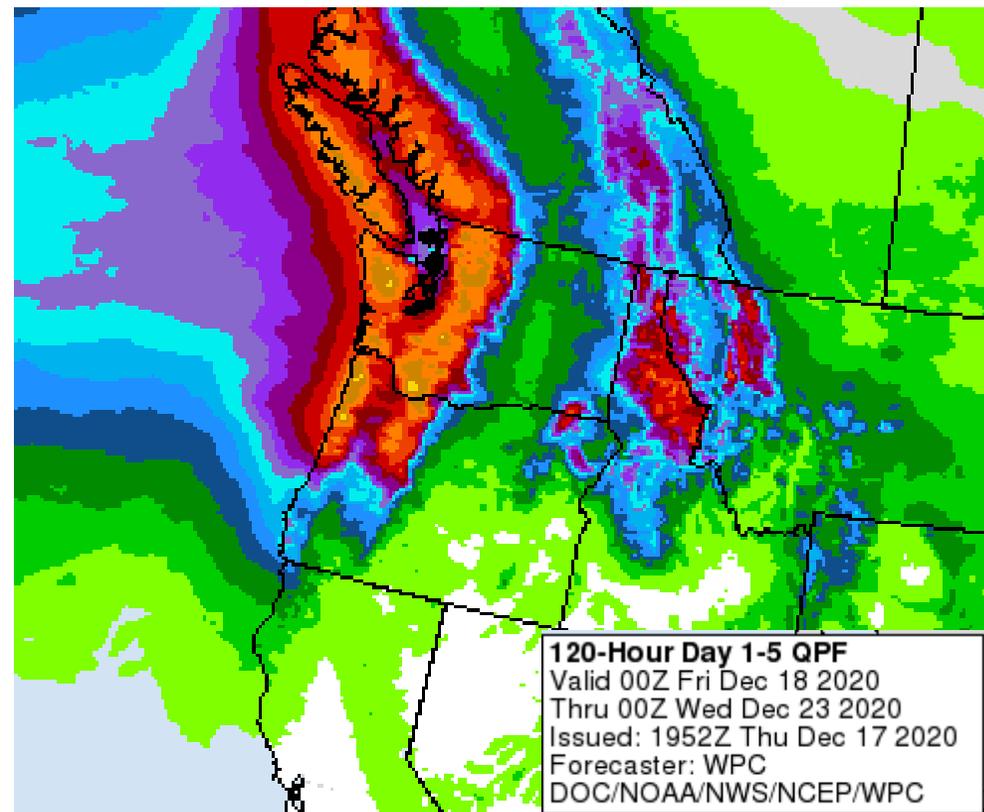
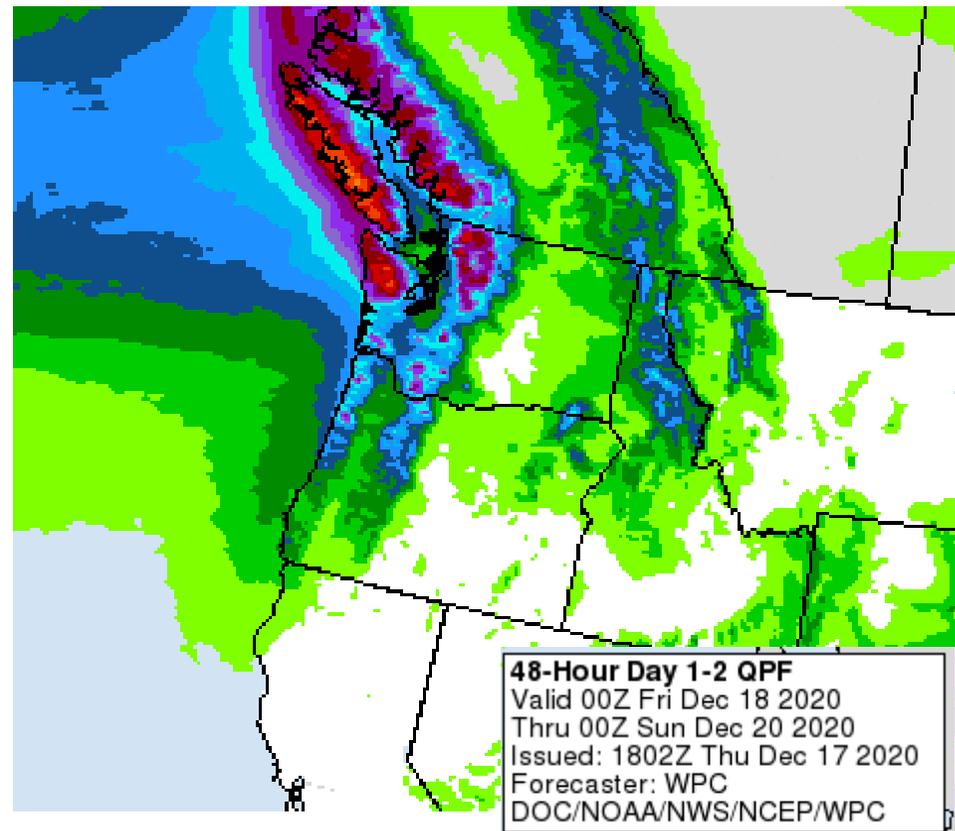
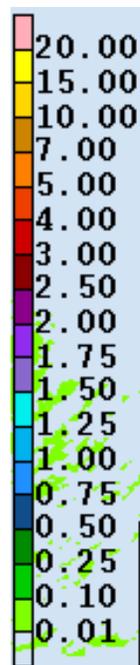
- The first AR is forecast to bring AR 1 conditions to OR, with a max. IVT magnitude of $595 \text{ kg m}^{-1} \text{ s}^{-1}$ and a duration of 9 hrs.
- The second AR is forecast to bring AR 4 conditions, though there is large ensemble uncertainty in the overall duration and magnitude of the additional pulse of IVT due to the MFW

- 21 of 31 ensemble members (~70%) are forecasting AR 1 conditions associated with the first AR
- Uncertainty increases dramatically within the second AR due to the potential development of an MFW and the prolongation of AR conditions
- 5 ensemble members are predicting AR 2 conditions, 14 are predicting AR 3 conditions and 12 are predicting AR 4 conditions



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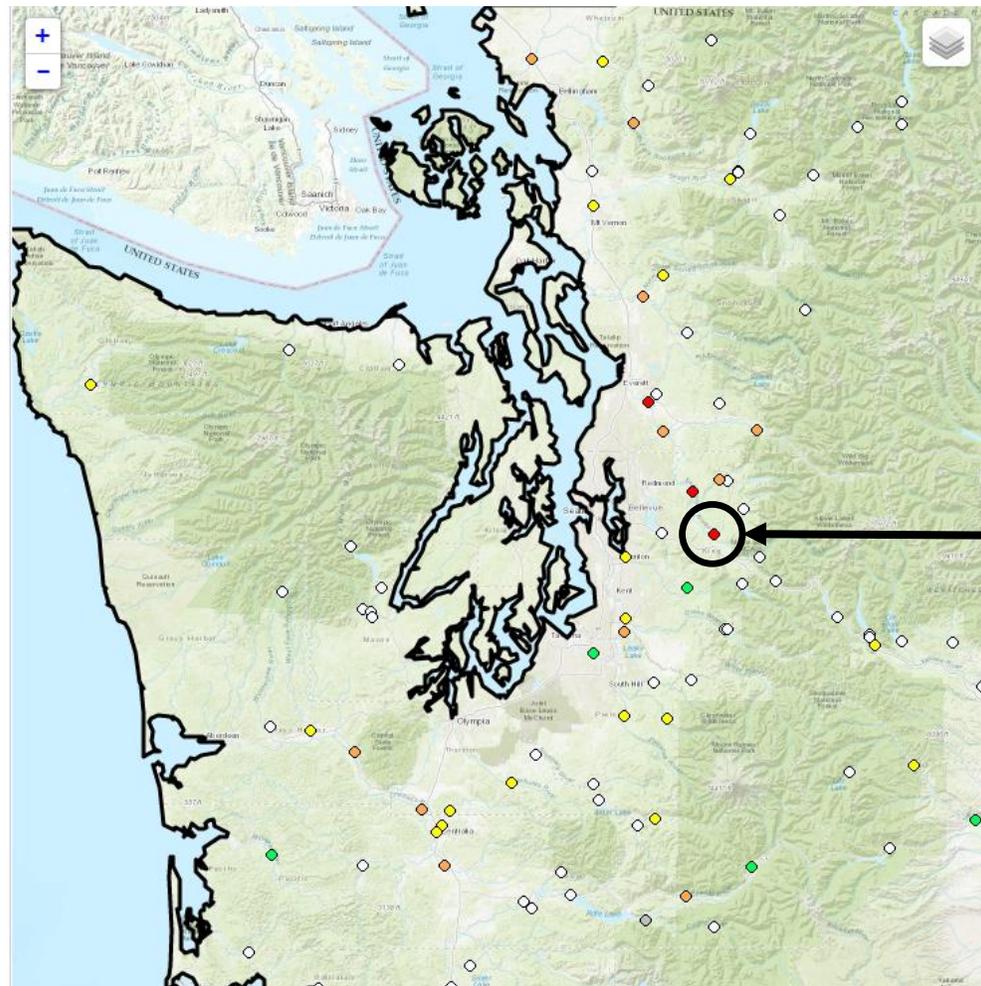


- The first AR is forecast by the Weather Prediction Center to bring as much as 5 inches of precipitation to the Olympic Peninsula, Northern Cascades and Vancouver Island between 18 and 20 December
- Other lower elevation locations are forecast to receive 0.5 to 1.5 inches

- The second AR could produce another 5–10 inches of precipitation over the Coast and Cascade Ranges bringing the highest 5-day accumulations to >15 inches
- The inland penetration of the AR could result in ~5–7 inches of precipitation over the Rocky Mountains of Northern Idaho and Western Montana

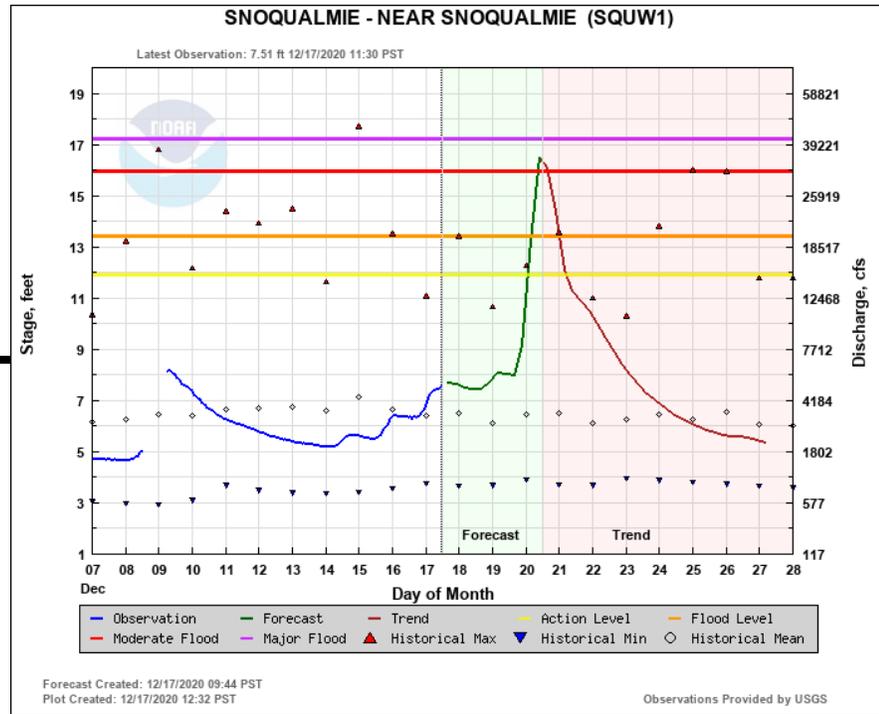
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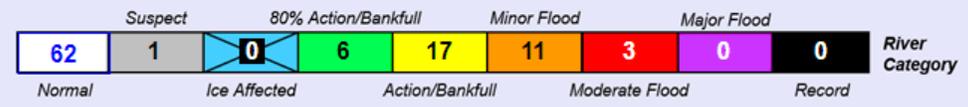


The Northwest River Forecast Center is currently forecasting 11 rivers or stream gauges to rise above minor flood stage and 3 to rise above moderate flood stage in Northwestern Washington

The Snoqualmie River near Snoqualmie, Washington is forecast to rise to ~16.5 feet, 0.5 feet above moderate flood stage and ~4 feet above action level



Source: nwrfc.noaa.gov



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