

# CW3E Atmospheric River Outlook

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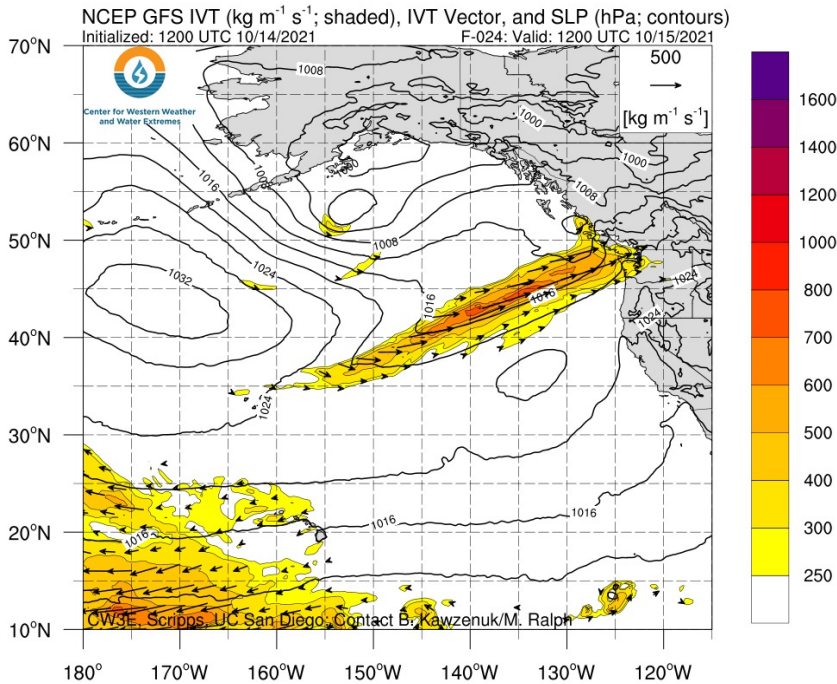
## Prolonged Period of Active Weather Expected in the Pacific Northwest

- An atmospheric river (AR) will make landfall across Washington early Friday morning
- AR 3 conditions (based on the Ralph et al. 2019 AR Scale) are forecasted in coastal Washington
- Limited moisture and weak storm dynamics are expected to constrain precipitation totals outside of the Olympic Peninsula and North Cascades
- After a brief lull, a period of very active weather is forecasted to impact to the U.S. West Coast, with a series of landfalling ARs becoming increasingly likely during 20–24 October
- The highest forecast confidence in landfalling AR activity during this period is in Northern California, Oregon, and Washington, but there is considerable uncertainty in the evolution of these ARs and their associated low-pressure systems

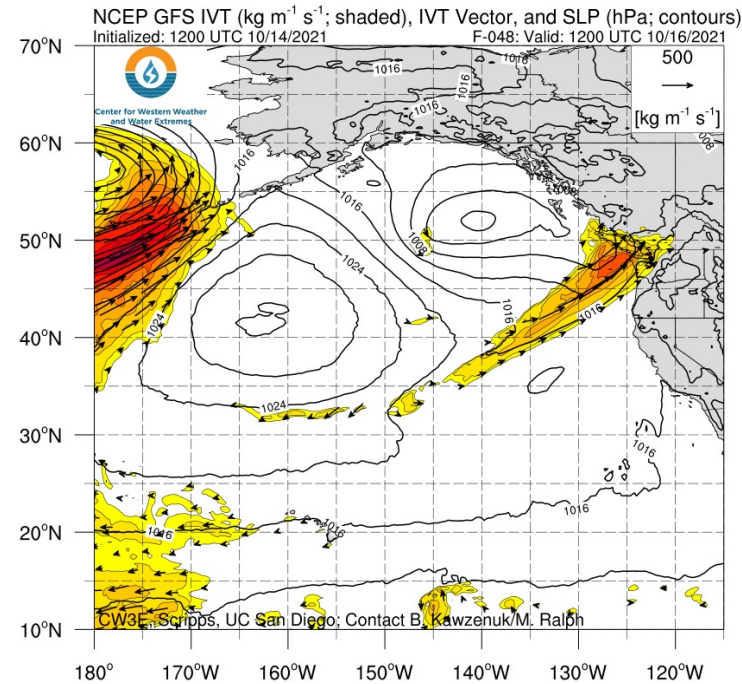
# AR Outlook: 14 Oct 2021

## GEFS IVT & IWV Forecasts

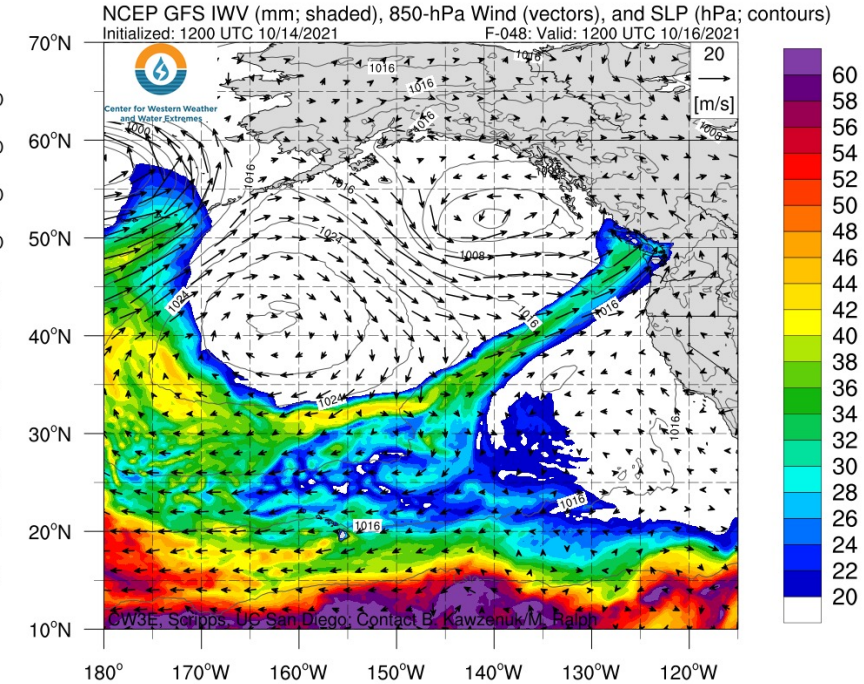
(A) Valid: 5 AM PT 15 Oct (F-24)



(B) Valid: 5 AM PT 16 Oct (F-48)



(C) Valid: 5 AM PT 16 Oct (F-48)

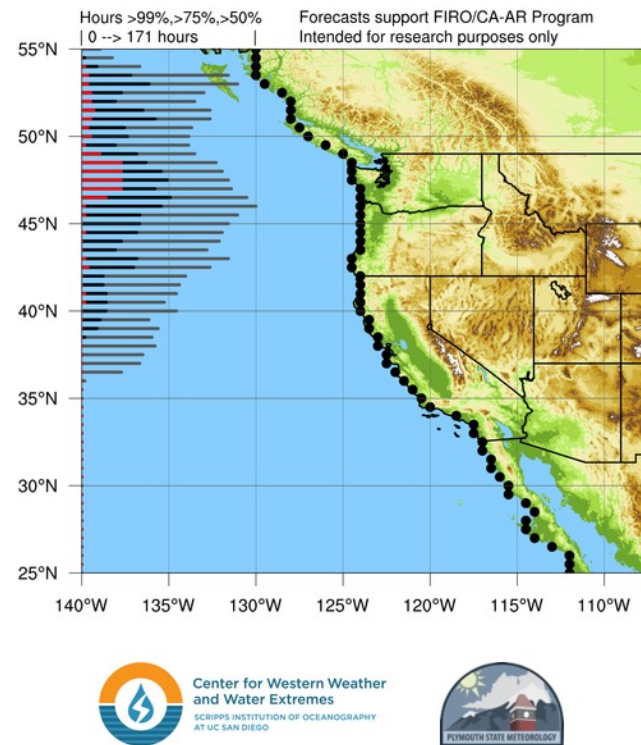
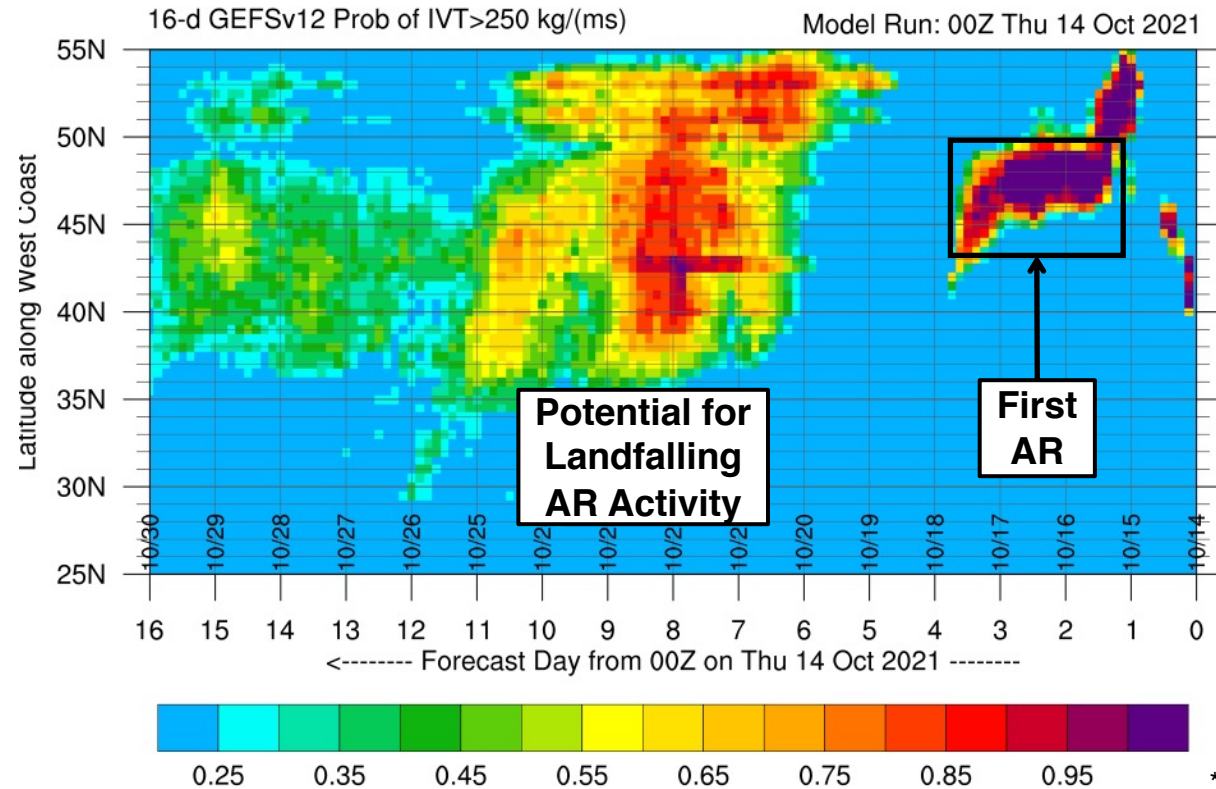


- The 12Z 14 Oct deterministic GFS forecast shows a narrow AR making landfall in Washington early Friday morning (Figure A)
- The core of the AR is forecasted to approach the Olympic Peninsula Saturday morning, with IVT values  $> 700 \text{ kg m}^{-1} \text{ s}^{-1}$  and IWV values  $> 30 \text{ mm}$  (Figures B and C)
- Despite the well-defined spatial characteristics of this AR, the lack of a tropical moisture connection and weak synoptic-scale forcing for ascent will limit precipitation amounts outside of the Olympic Peninsula and North Cascades (Figure C)

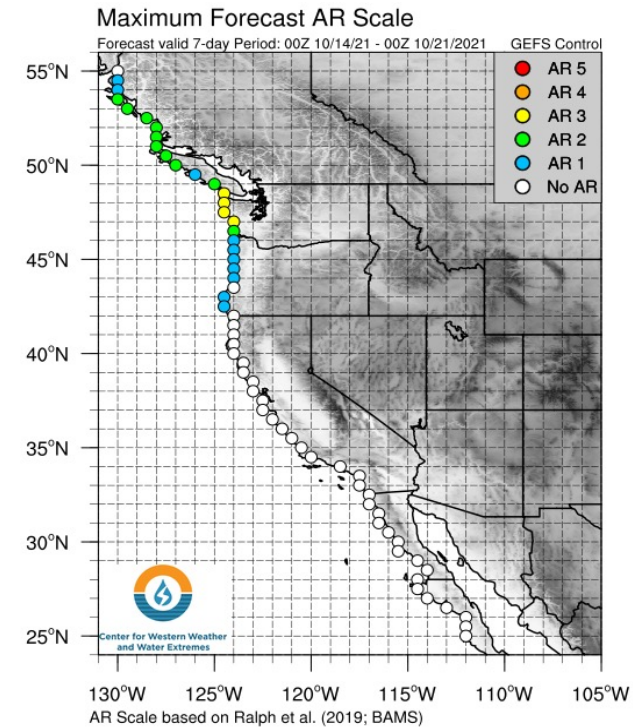


# AR Outlook: 14 Oct 2021

## Probability of AR Conditions Along Coast



## AR Scale



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

- The 00Z GEFS is showing very high confidence (> 95% probability) in a period of AR conditions (IVT > 250 kg m<sup>-1</sup> s<sup>-1</sup>) over coastal Washington in association with the first AR
- An AR 3 (based on the Ralph et al. 2019 AR Scale) is currently forecasted in coastal Washington, where AR conditions may persist for more than 48 hours
- There is increasing forecast confidence (now > 60% probability) in the possibility of additional landfalling AR activity across Northern California, Oregon, and Washington during Days 6–10 (20–24 Oct)

# AR Outlook: 14 Oct 2021

## GEFS AR Scale and IVT Forecasts

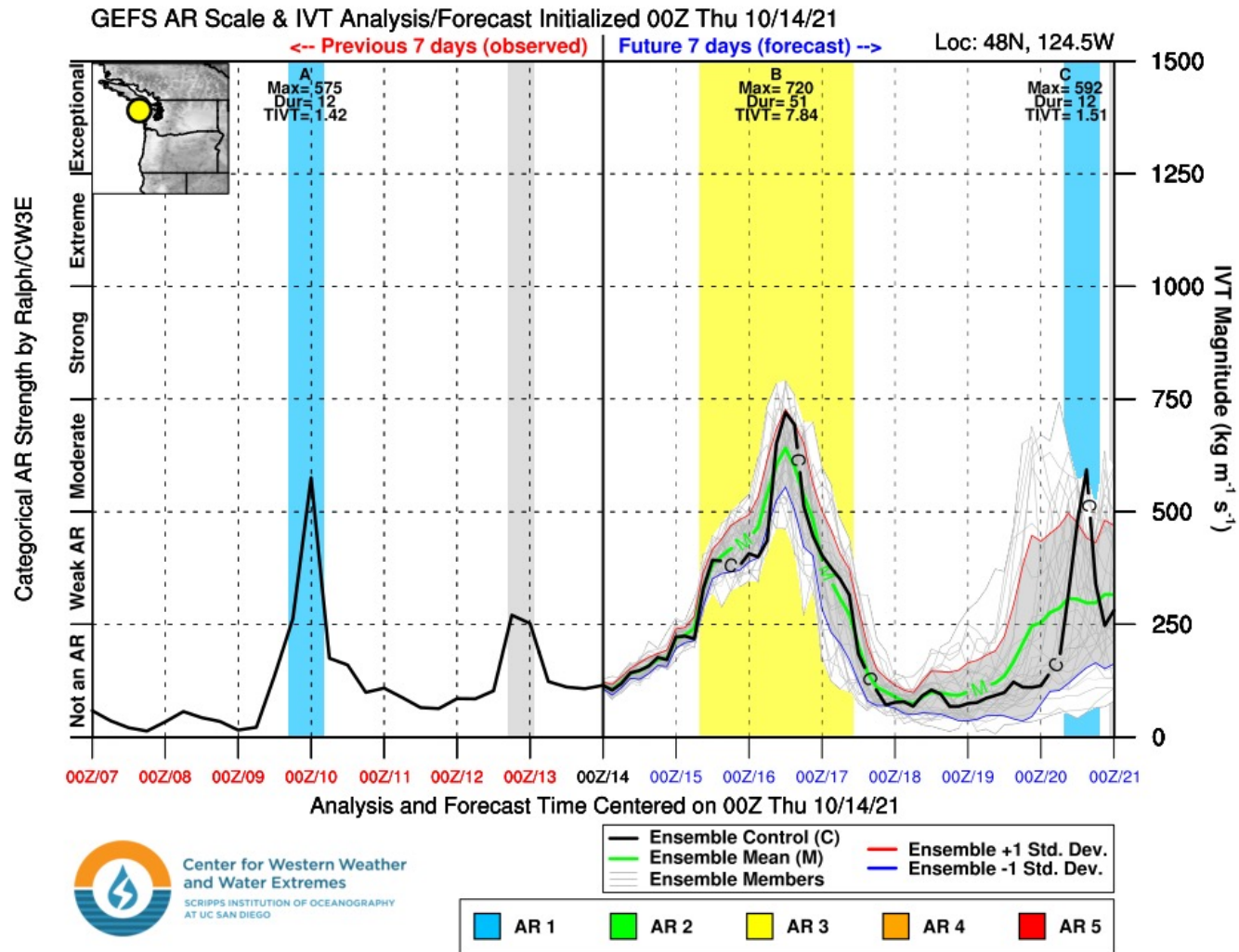


Image created: 05 UTC 10/14/2021

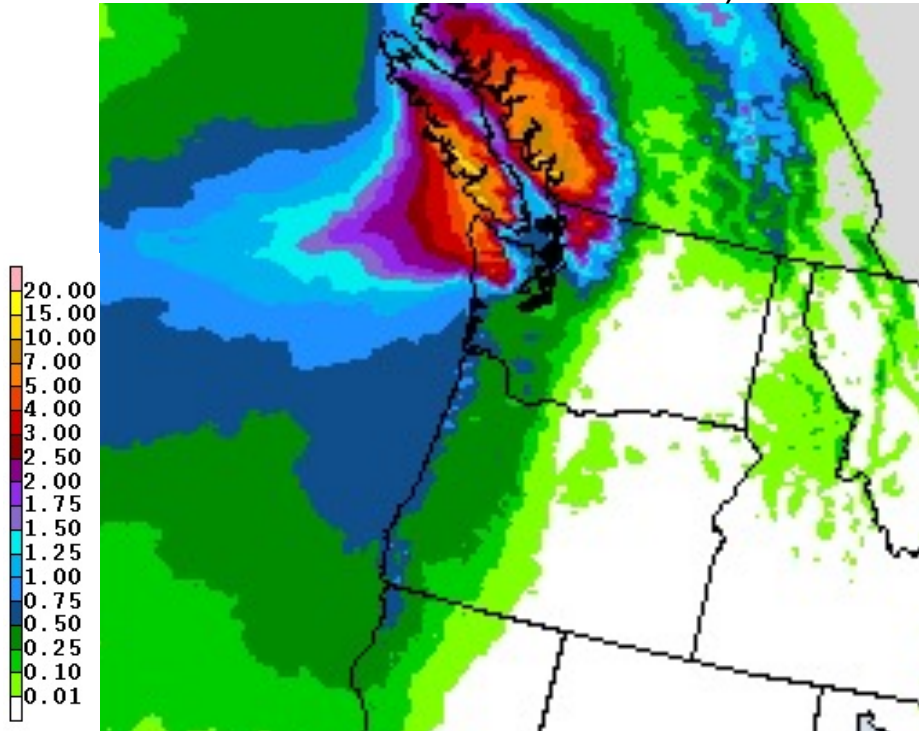
More information: <http://cw3e.ucsd.edu> AR Scale based on Ralph et al. (2019; BAMS), contact M. Ralph

- Both the 00Z GEFS control run and the GEFS ensemble mean are forecasting an AR 3 at 48°N, 124.5°W (near Quillayute, WA) based on the Ralph et al. 2019 AR Scale
- The 00Z GEFS control run is forecasting a maximum IVT of 720 kg m<sup>-1</sup> s<sup>-1</sup> and an AR duration of 51 hours at this location
- There is still some uncertainty in the forecasted duration of AR conditions and maximum IVT magnitude



## Precipitation Impacts

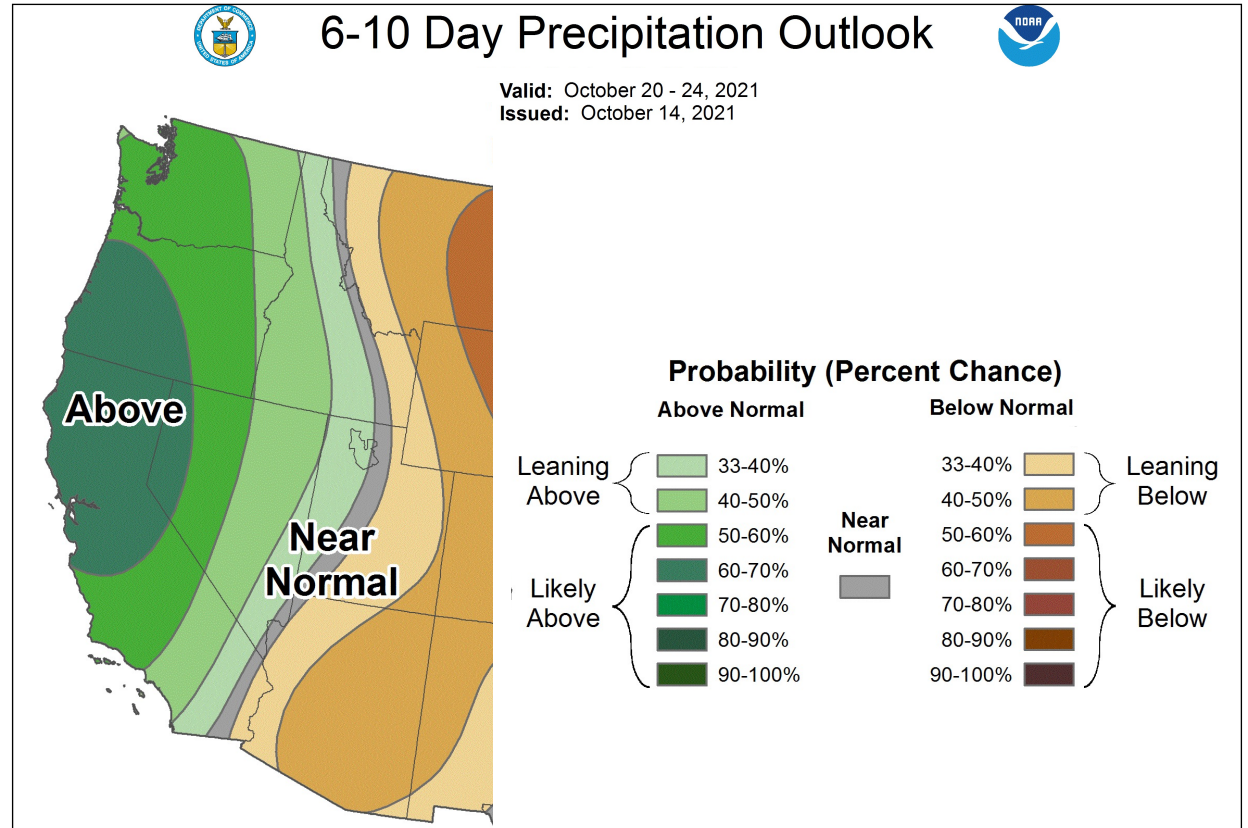
WPC 3-day QPF  
Valid 5 PM PT 14–17 Oct)



Source: NOAA/NWS WPC, <https://www.wpc.ncep.noaa.gov/>

## 6-10 Day Precipitation Outlook

Valid: October 20 - 24, 2021  
Issued: October 14, 2021

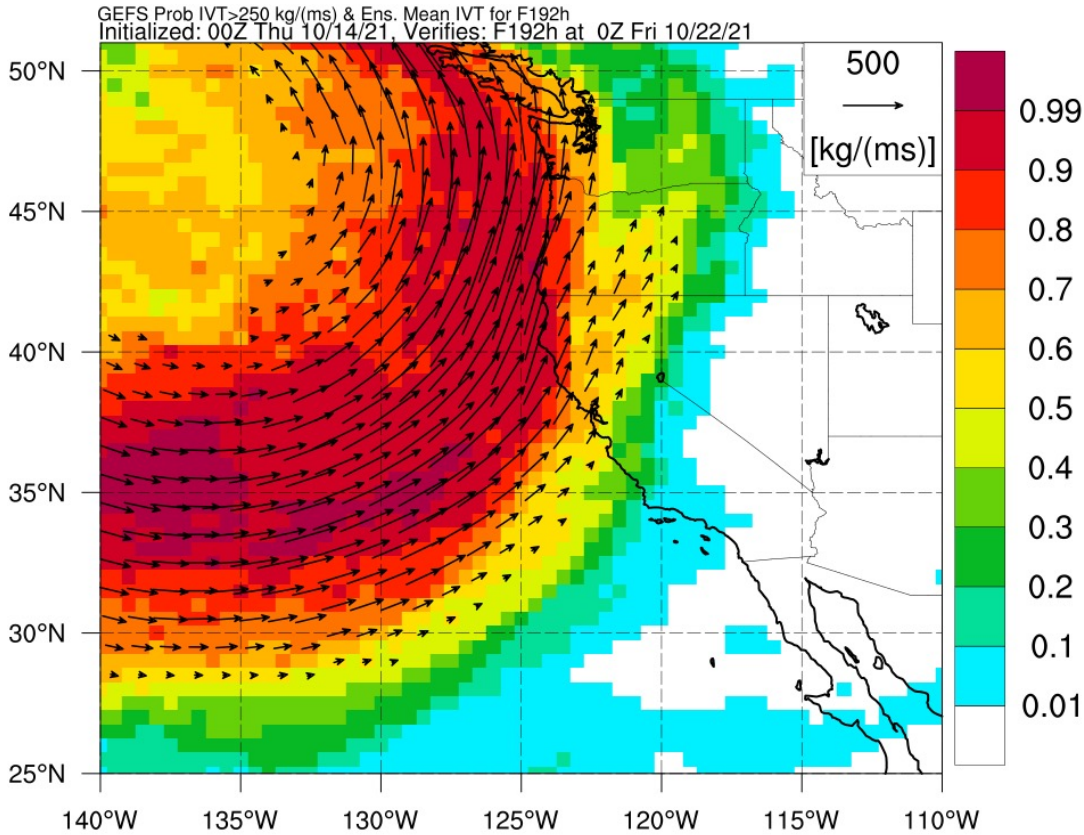


Source: NOAA/NWS CPC, <https://www.cpc.ncep.noaa.gov/>

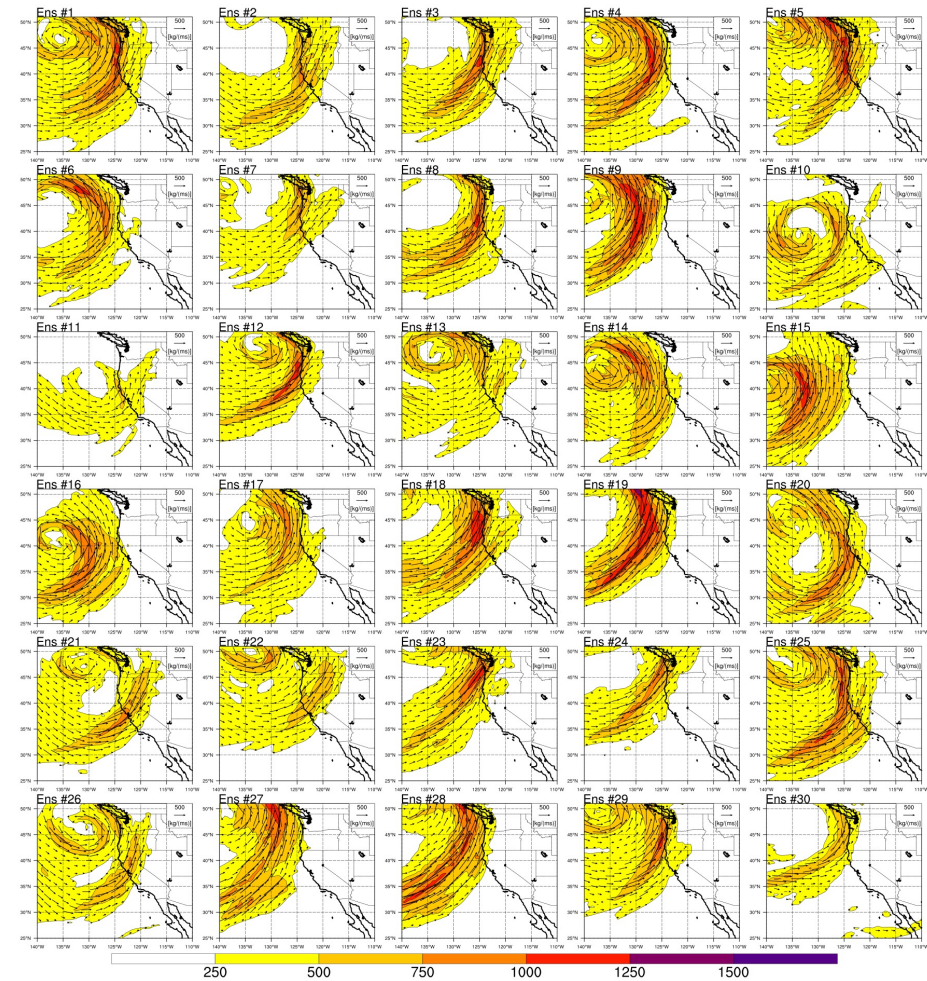
- The first AR is forecasted to bring about 2–5 inches of precipitation to the Olympic Peninsula and North Cascades, with lighter amounts forecasted elsewhere in western Washington, western Oregon, and far northwestern California
- Looking further ahead, the Climate Prediction Center is forecasting high confidence in a period of above-normal precipitation along the U.S. West Coast during 20–24 Oct

# AR Outlook: 14 Oct 2021

## GEFS IVT Probability > 250 kg m<sup>-1</sup> s<sup>-1</sup> Valid: 5 PM PT 21 Oct 2021 (F-192)



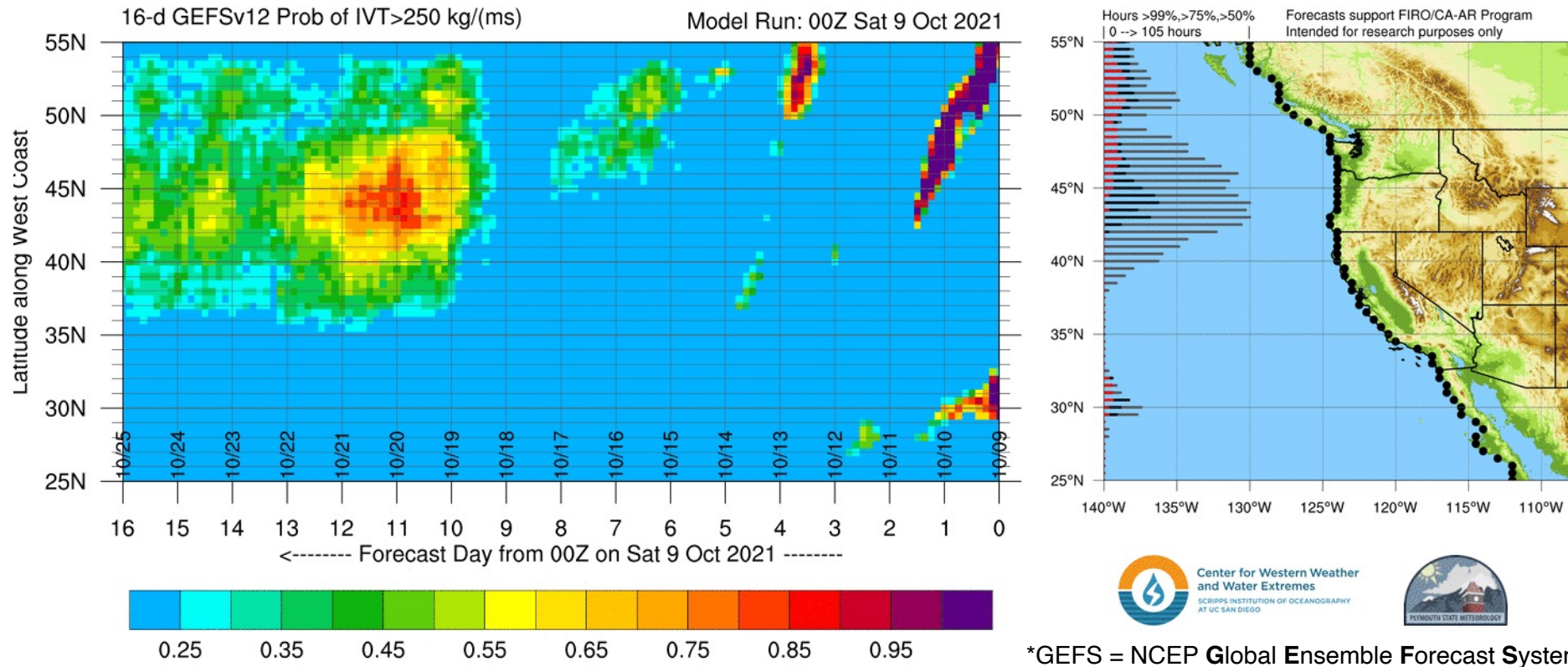
GEFS IVT [kg/(ms)] valid 02Z Fri 10/22/21 | F+192h



- Based on the 00Z GEFS, the highest probability of landfalling AR activity in Northern California is forecasted around 00Z 22 Oct (5 PM PT 21 Oct)
- More than 90% of the 30 GEFS members show a landfalling AR landfall over Northern California at this time, but there is considerable uncertainty in the position, timing, and magnitude of the AR



## Probability of AR Conditions Along Coast: dProg/dT



- GEFS was showing elevated probabilities (> 50%) of landfalling AR activity next week at least 5 days ago
- Since then, the probability of landfalling AR activity during 20–24 Oct has increased, particularly over Northern California
- In addition, the predicted onset of the landfalling AR activity is now later (20 Oct versus 18 Oct)