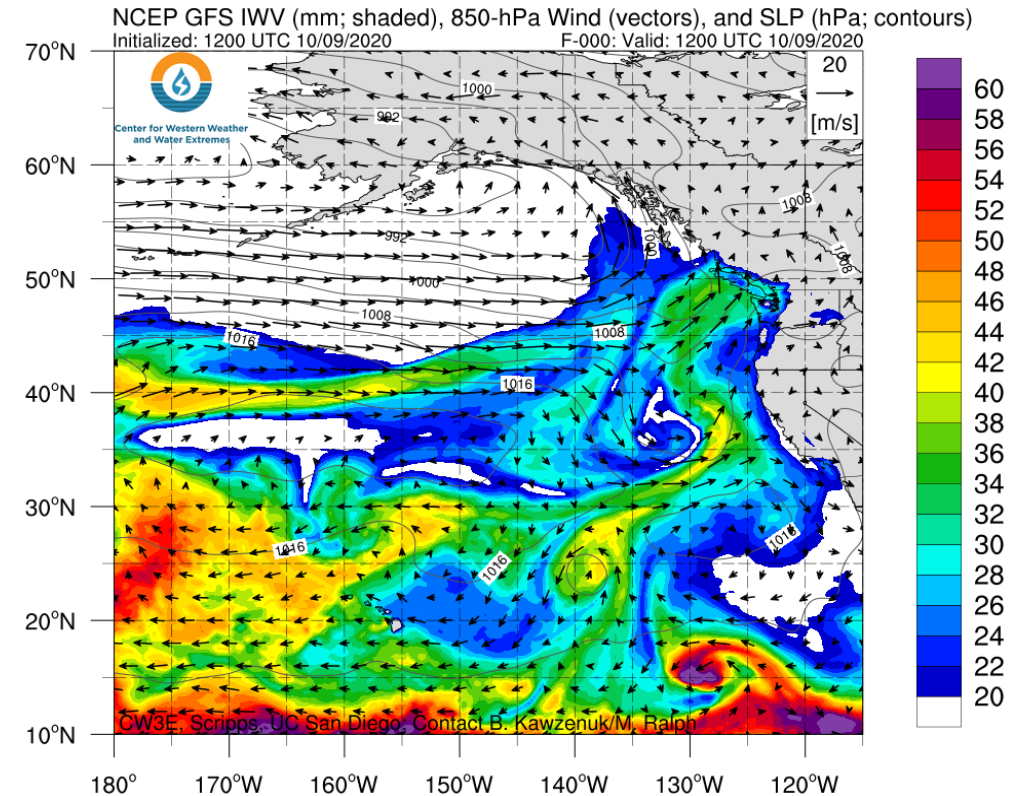
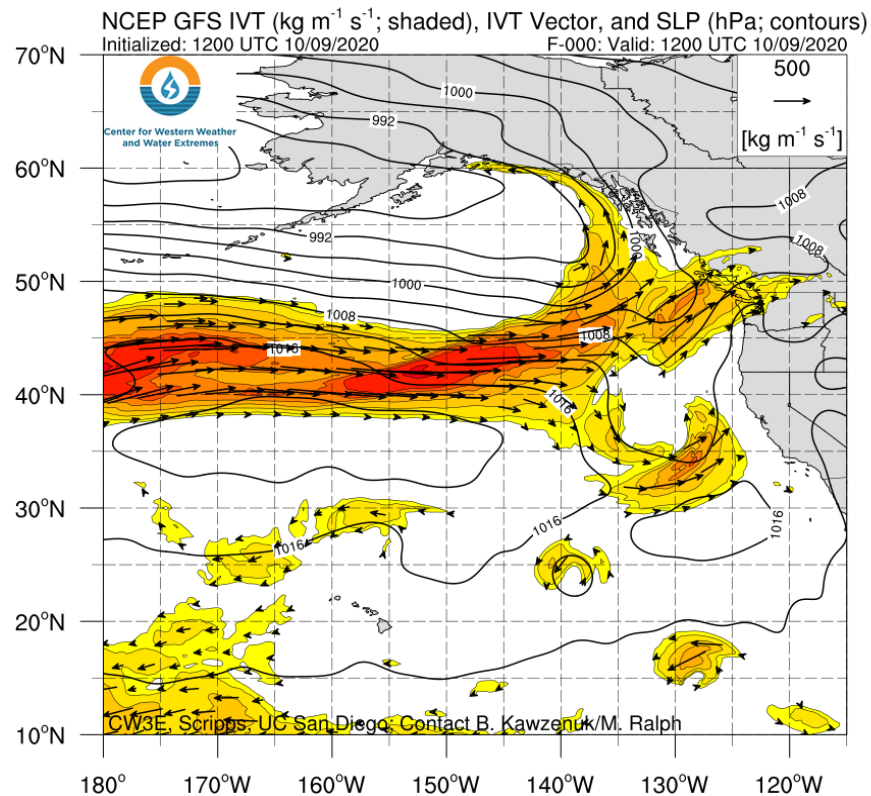


## Update on Atmospheric Rivers Forecast to Impact the Northwestern US

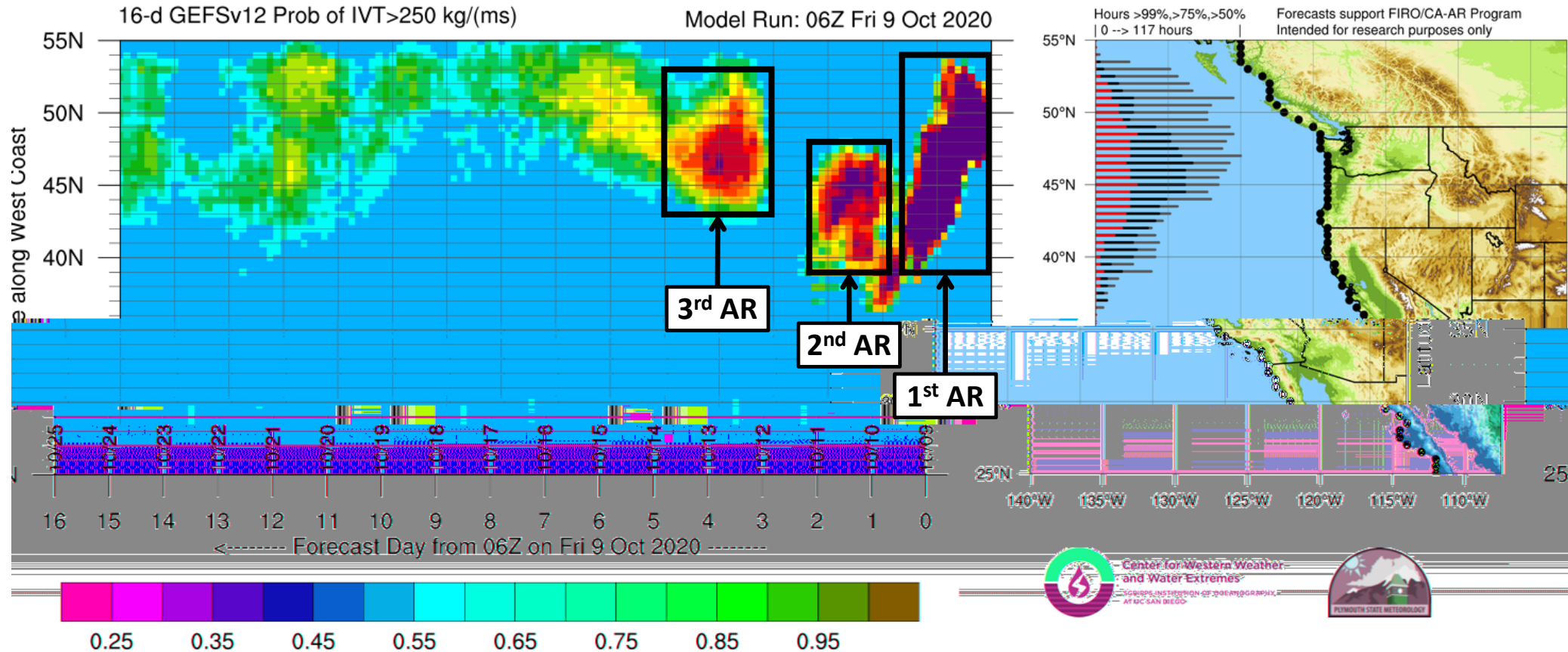
- Multiple landfalling ARs are forecast to bring significant precipitation to the northwestern US during the next 7 days
- Current forecasts suggest that AR 3/AR 4 conditions (based on the Ralph et al. 2019 AR Scale) are possible over coastal Oregon and Washington in association with the first and third ARs
- Inland penetration of these ARs may also produce AR 2/AR 3 conditions over portions of interior Oregon and Washington
- 7-day total precipitation is forecast to exceed 7 inches over the Olympic Mountains and North Cascades, with more than 3 inches of precipitation possible over the Northern Rockies



# AR Outlook: 9 Oct 2020

For California DWR's AR Program

## Probability of AR Conditions: Coastal Transect



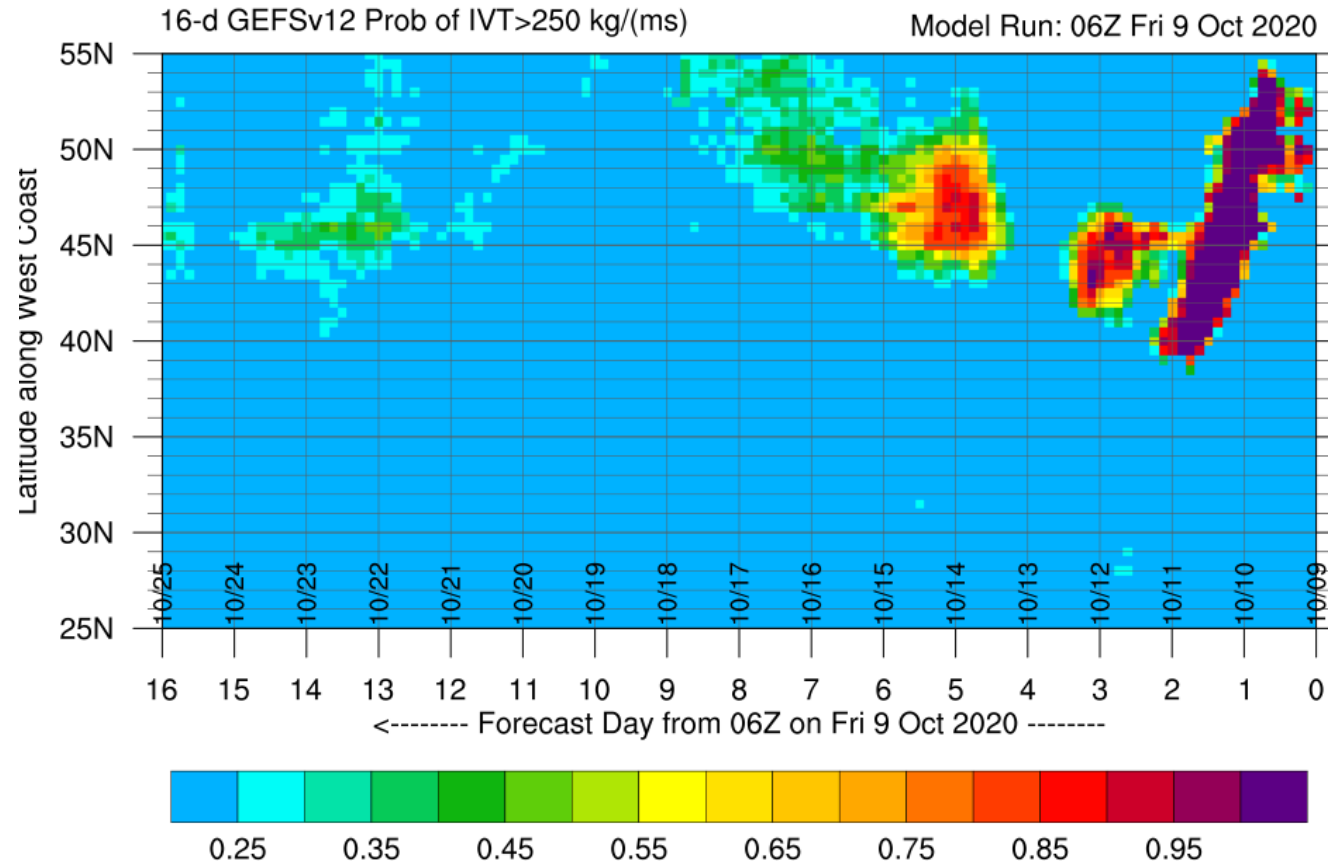
\*GEFS = NCEP Global Ensemble Forecast System (United States)

- GEFS AR landfall tool shows three distinct periods with high confidence (> 90% probability) in AR conditions ( $IVT \geq 250 \text{ kg m}^{-1} \text{ s}^{-1}$ ) along the U.S. West Coast during the next 7 days
- There is potential for a prolonged period ( $\geq 48$  hours) of continuous AR conditions over coastal Oregon and Washington in association with the third landfalling AR

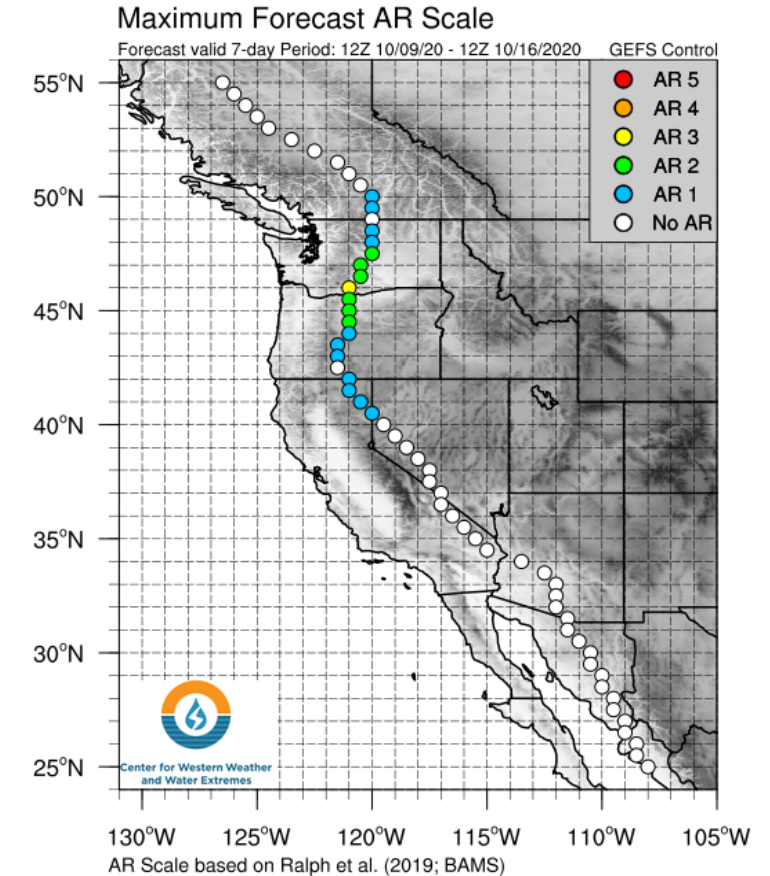
# AR Outlook: 9 Oct 2020

For California DWR's AR Program

## Probability of AR Conditions: Inland Transect



## AR Scale: Inland Transect



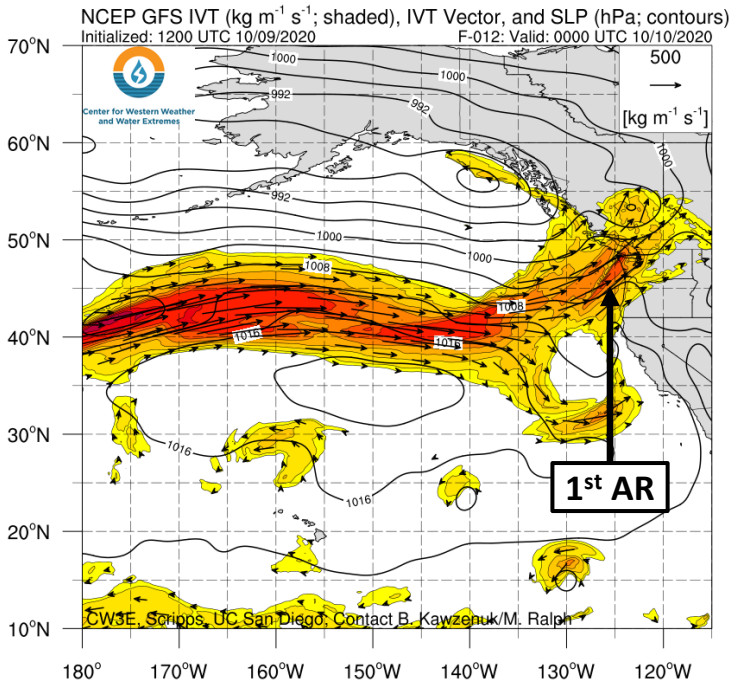
- GEFS AR landfall tool also suggests that these landfalling ARs will bring AR conditions to interior portions of the Pacific Northwest
- The 12Z GEFS control member is currently predicting AR 2/AR 3 conditions (based on the Ralph et al. 2019 AR Scale) across interior Oregon and Washington in association with the third AR

# AR Outlook: 9 Oct 2020

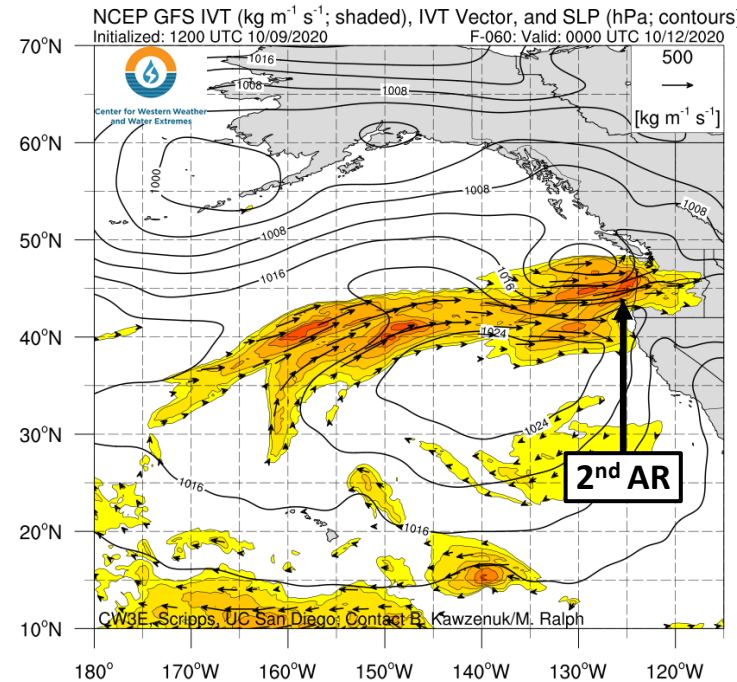
For California DWR's AR Program

## GFS IVT & SLP Forecasts

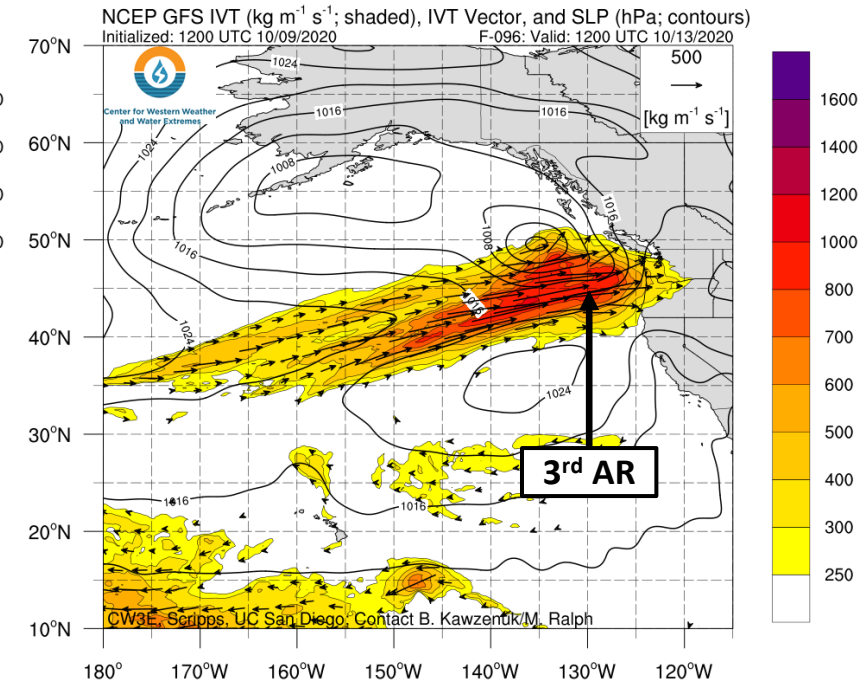
A) Valid: 0000 UTC 10 Oct (F-12)



B) Valid: 0000 UTC 12 Oct (F-60)



C) Valid: 1200 UTC 13 Oct (F-96)



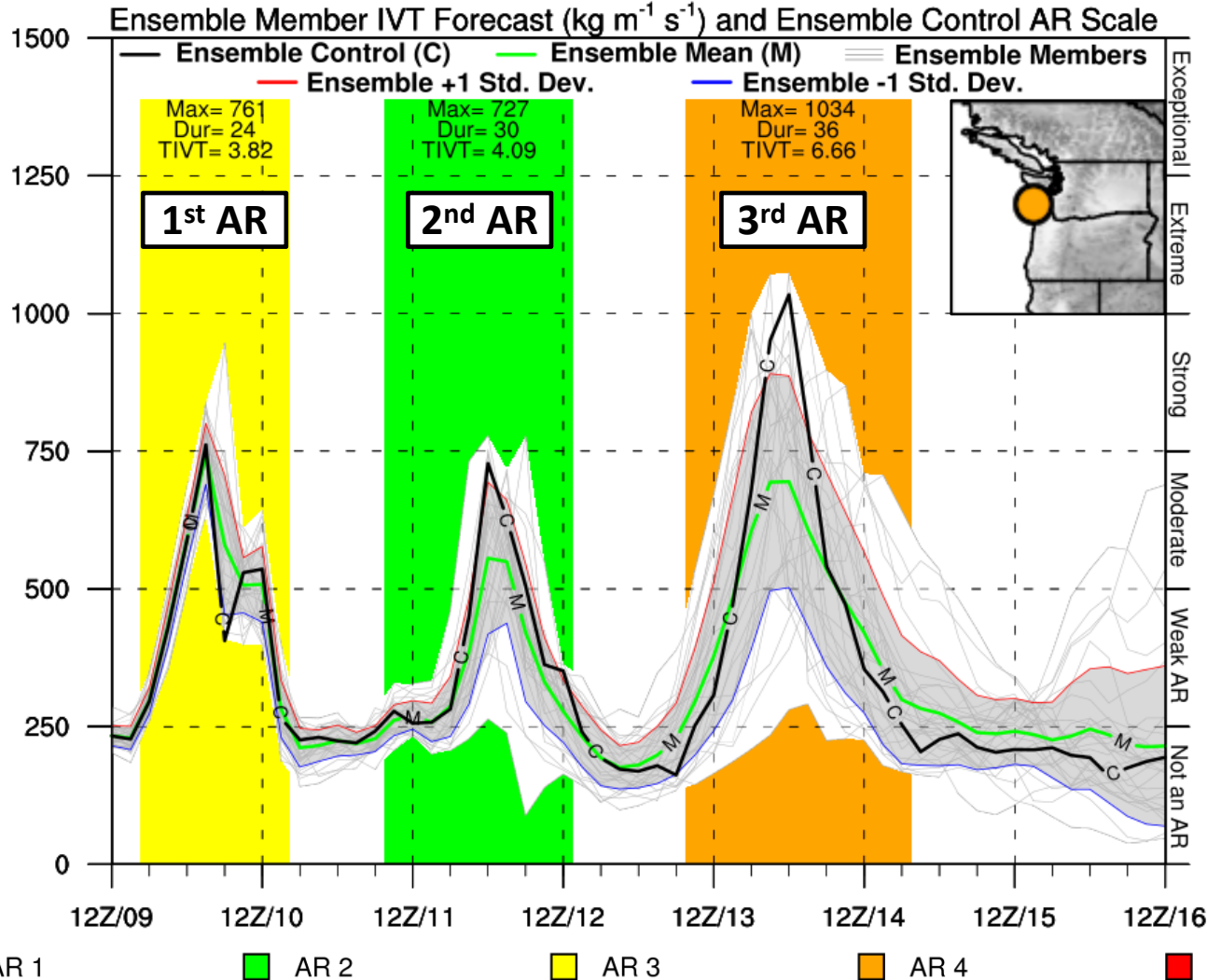
- These landfalling ARs will be associated with a series of low-pressure systems that are forecast to develop over the Northeast Pacific Ocean and move eastward in rapid succession
- The first AR is forecast to make landfall downstream of a surface cyclone over the Gulf of Alaska slightly before 00Z 10 Oct
- A second AR is forecast to make landfall in association with a weak surface low off the Washington coast slightly before 00Z 12 Oct
- A third AR, notably stronger than the first two ARs, is forecast to make landfall in association with an intensifying surface cyclone slightly before 12Z 13 Oct

# AR Outlook: 9 Oct 2020

For California DWR's AR Program

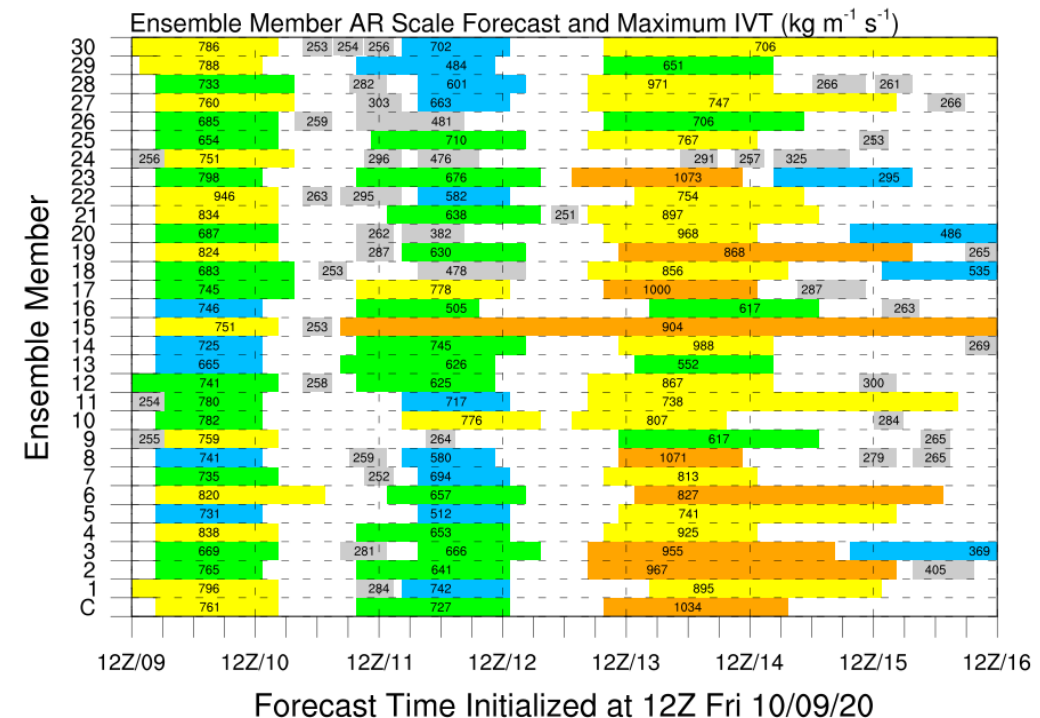
## GEFS AR Scale & IVT Forecasts

GFS Ensemble Initialized: 12Z Fri 10/09/20



Categorical AR Strength by Ralph/CW3E

- The GEFS IVT forecast plumes show three distinct AR episodes at  $46.5^\circ\text{N}$ ,  $124^\circ\text{W}$  (southwestern WA)
- These three landfalling ARs are forecast to produce AR 3, AR 2, and AR 4 conditions, respectively, based on the Ralph et al. (2019) AR Scale
- There is considerable uncertainty in the timing, magnitude, and duration of AR conditions during the second and third landfalling ARs

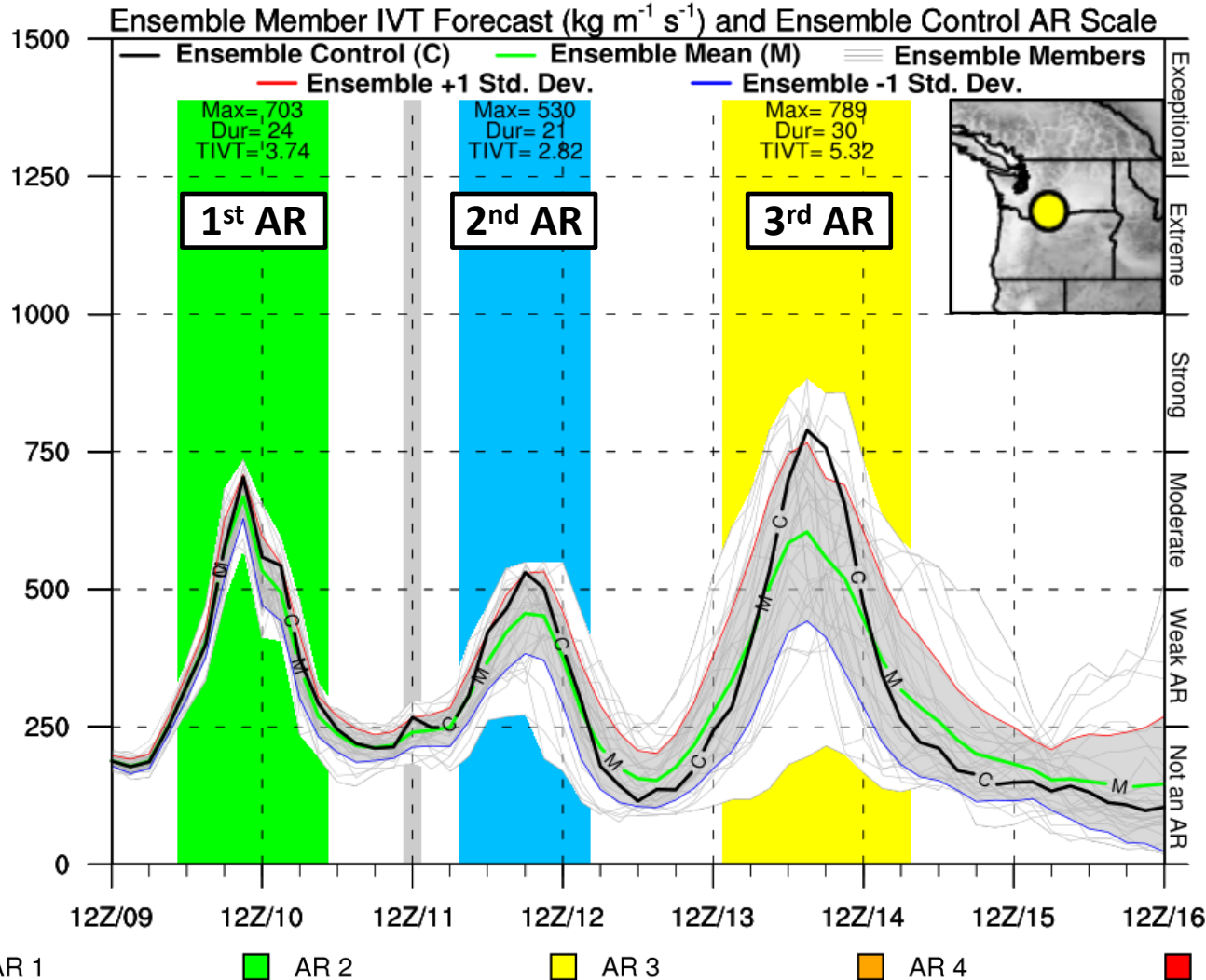


# AR Outlook: 9 Oct 2020

For California DWR's AR Program

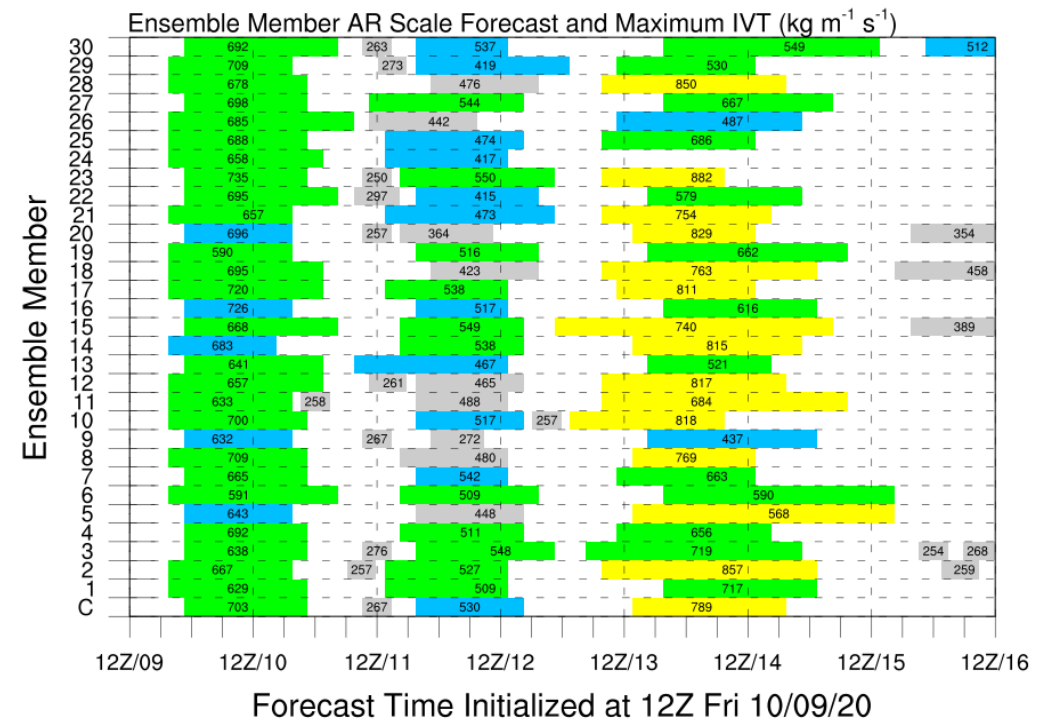
## GEFS AR Scale & IVT Forecasts

GFS Ensemble Initialized: 12Z Fri 10/09/20



- The GEFS IVT forecast plumes also suggest that these three landfalling ARs will penetrate into interior portions of the Pacific Northwest
- AR 3 conditions are currently forecast at  $46^{\circ}\text{N}$ ,  $121^{\circ}\text{W}$  (south-central WA) in association with the third landfalling AR
- Once again, there is uncertainty in the timing, magnitude, and duration of AR conditions during the second and third ARs

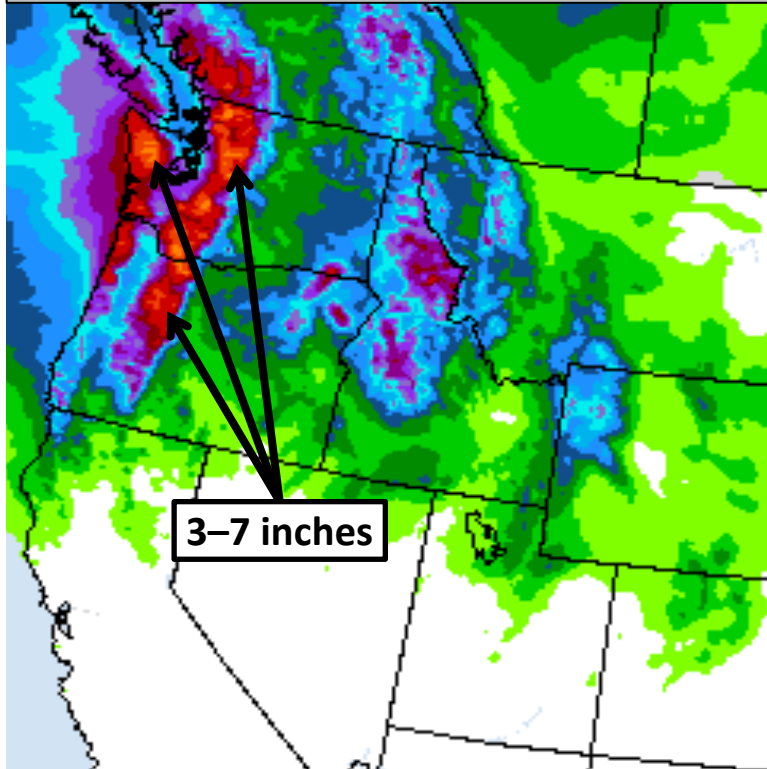
Categorical AR Strength by Ralph/CW3E



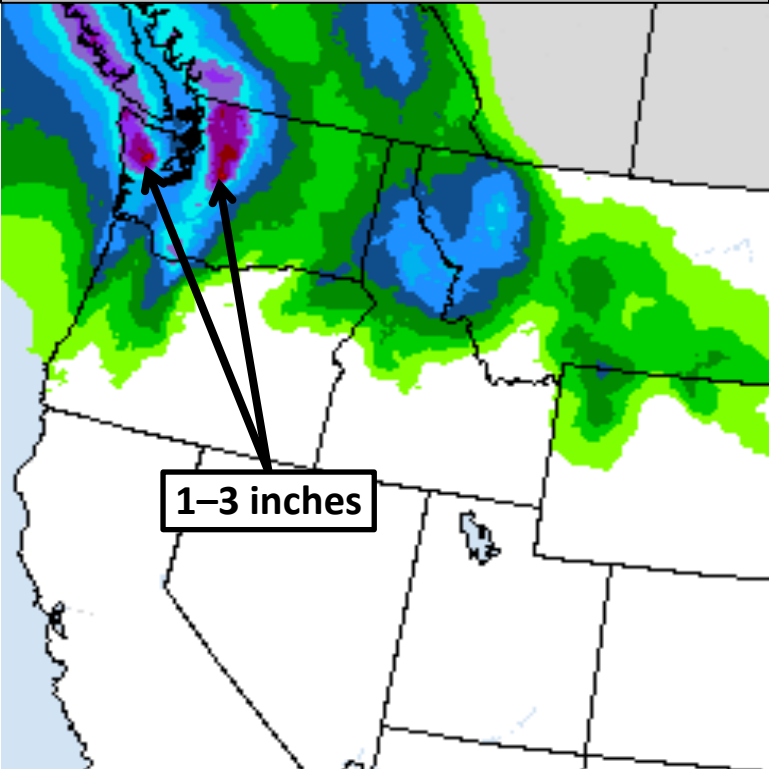
# AR Outlook: 9 Oct 2020

For California DWR's AR Program

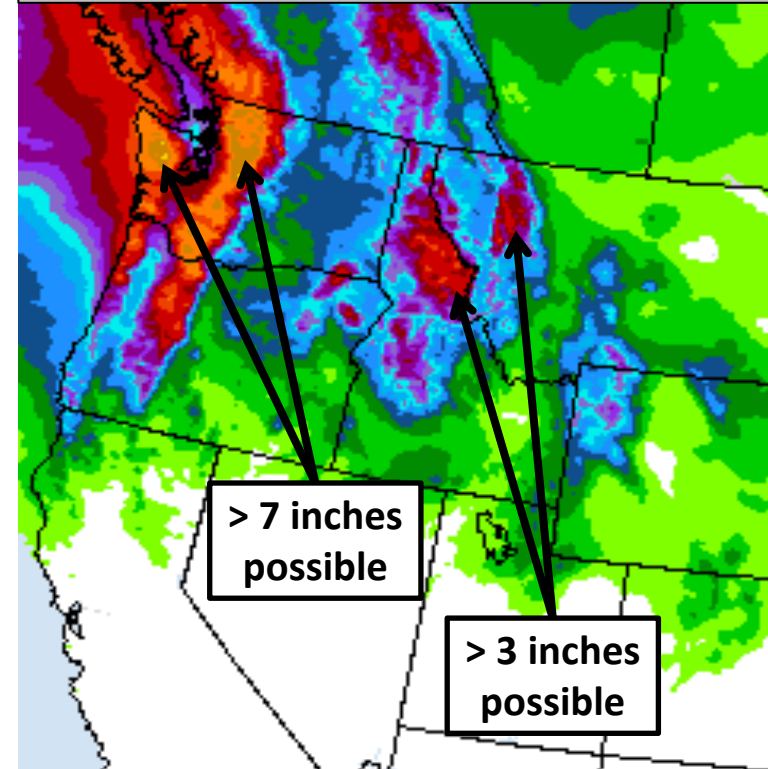
WPC Days 1–3 QPF: Valid 00Z 10–13 Oct



WPC Days 4–5 QPF: Valid 00Z 13–15 Oct



WPC 7-day QPF: Valid 00Z 10–17 Oct



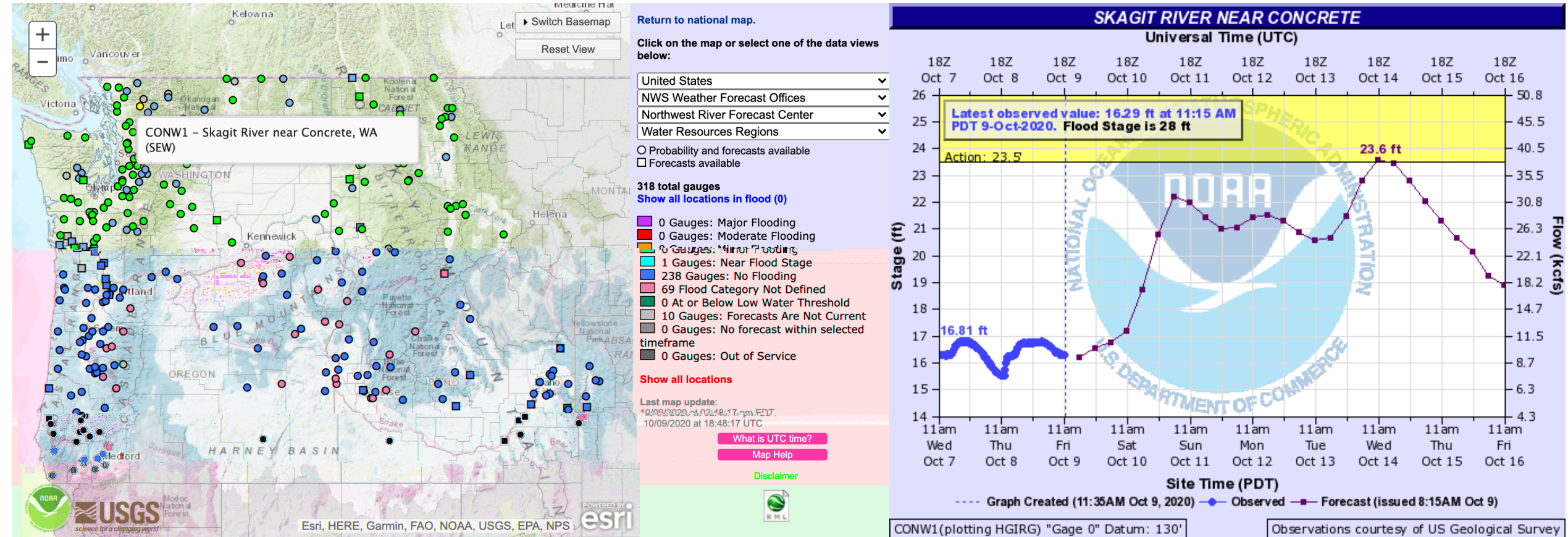
Source: NOAA/NWS WPC, <https://www.wpc.ncep.noaa.gov/>

- The NWS Weather Prediction Center (WPC) is forecasting 3–7 inches of precipitation over the northwestern Oregon Coast Ranges, the Olympic Peninsula, and the Cascades during the next 72 hours in association with the first two landfalling ARs
- Lighter precipitation amounts (1–3 inches) are expected across the rest of western Oregon and Washington, as well as over the higher terrain in the interior northwestern US
- An additional 1–3 inches of precipitation is forecast over the Olympic Peninsula and Washington Cascades in association with the third AR
- During the next 7 days, more than 7 inches of precipitation are possible over the Olympic Mountains and North Cascades, and more than 3 inches of precipitation are possible over the Northern Rockies

# AR Outlook: 9 Oct 2020

For California DWR's AR Program

## NWRFC 7-day Hydrologic Forecasts (Valid 1800 UTC 16 Oct)



Source: NOAA/NWS Advanced Hydrologic Prediction Service, <https://water.weather.gov/ahps/>

- While widespread flooding is not anticipated at this time, the Northwest River Forecast Center (NWRFC) is forecasting the Skagit River to reach Action Stage (23.5') on 14 Oct
- Localized flooding is possible due to multiple precipitation events occurring in close succession, especially downstream of the North Cascades where the heaviest precipitation is expected