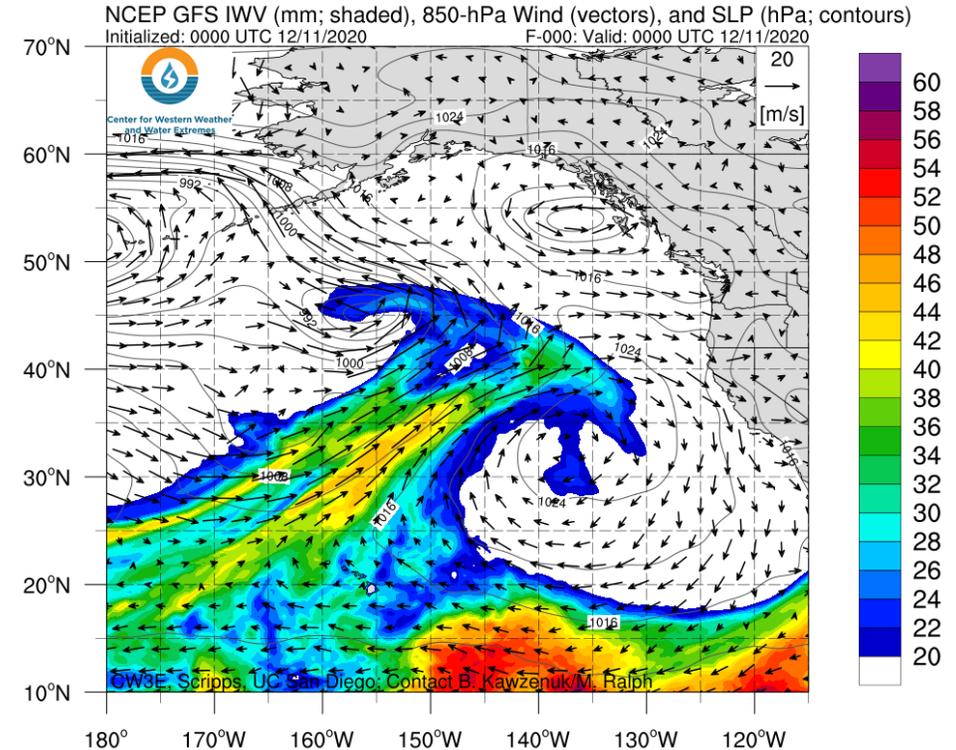
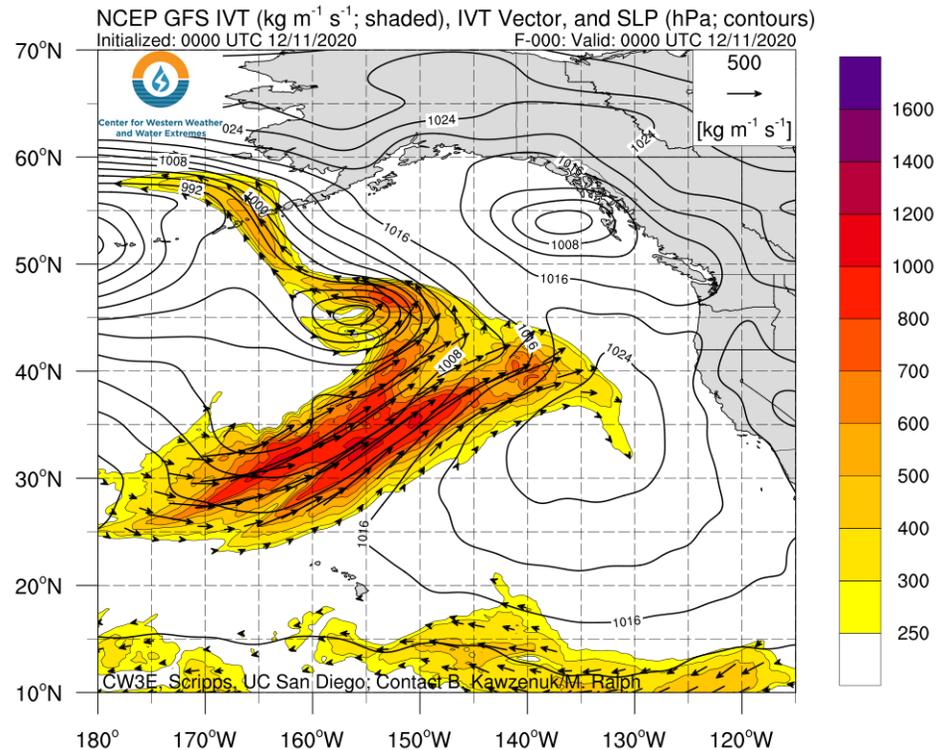
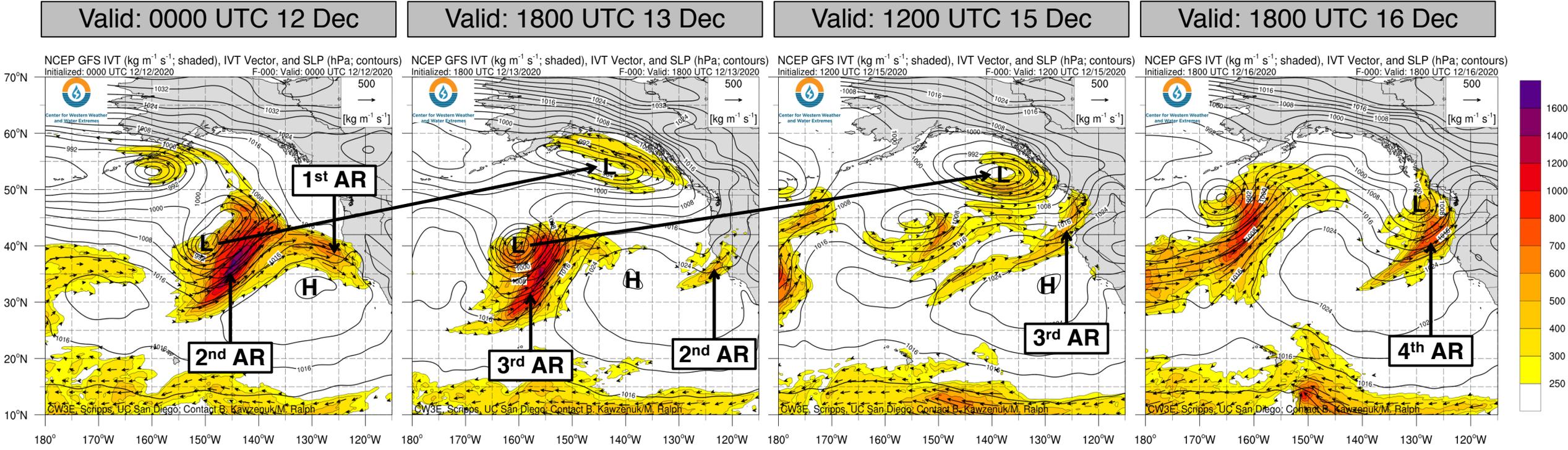


## Active Weather Pattern Brings Multiple Episodes of Rain and Snow to the Western U.S.

- Several ARs associated with a series of cyclones over the Northeast Pacific Ocean have impacted the Western U.S. during the past 7 days
- These storms produced at least 2–5 inches of total precipitation in the Sierra Nevada, Cascades, and Pacific Coast Ranges, and lighter amounts across the Intermountain West
- An estimated 1–3 feet of snow fell in the higher terrain of the Sierra Nevada, Cascades, and northeastern Nevada
- Total water-year-to-date precipitation remains well-below normal across much of California



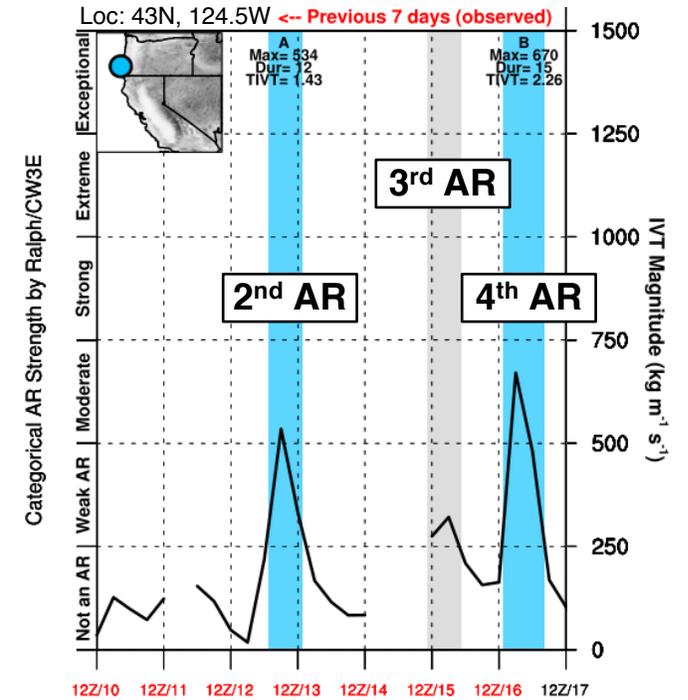
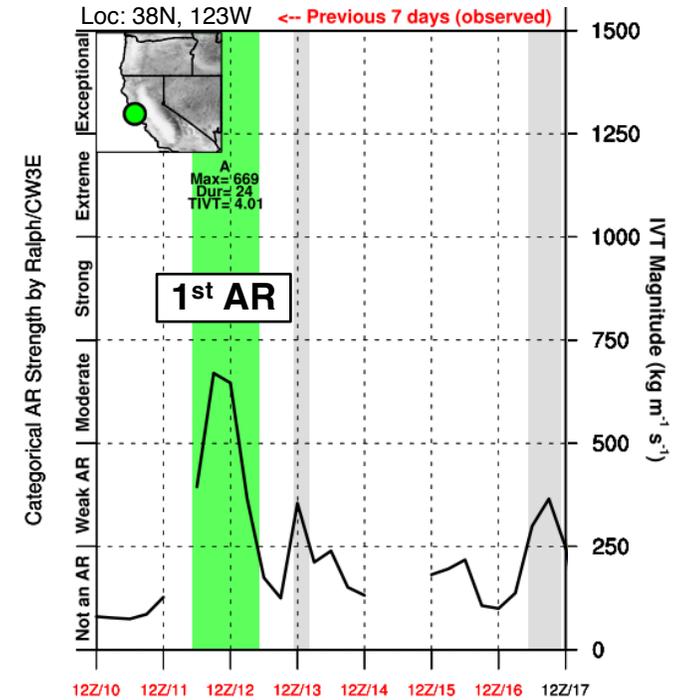
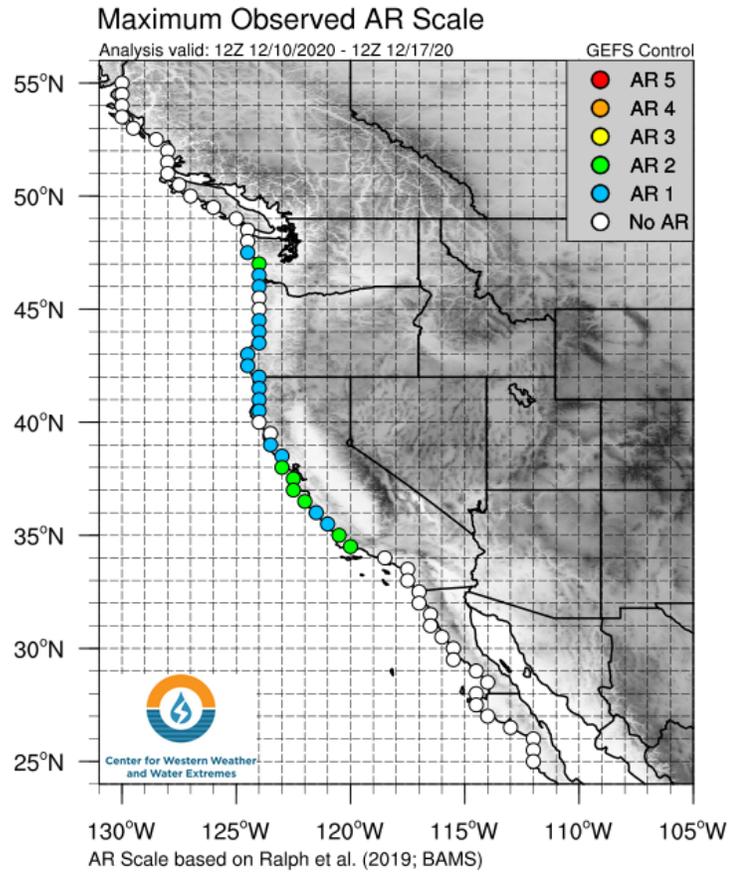
## GFS IVT & SLP Analyses



- The first AR made landfall in California on the northern periphery of a surface anticyclone around 00Z 12 Dec
- As time progressed, multiple ARs formed in association with a series of cyclogenesis events over the Northeast Pacific Ocean
- The second and third ARs rapidly weakened as they approached the U.S. West Coast
- The last AR made landfall on 16 Dec in association with a secondary surface cyclone that formed southwest of Vancouver Island
- The second and fourth ARs produced the most significant and widespread impacts

## GEFS IVT & AR Scale Analyses

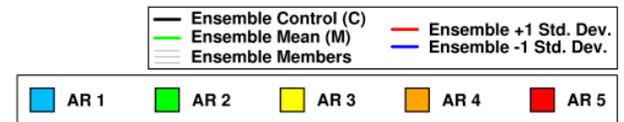
\*GEFS = NCEP Global Ensemble Forecast System



Analysis and Forecast Time Centered on 12Z Thu 12/17/20



Image created: 16 UTC 12/17/2020

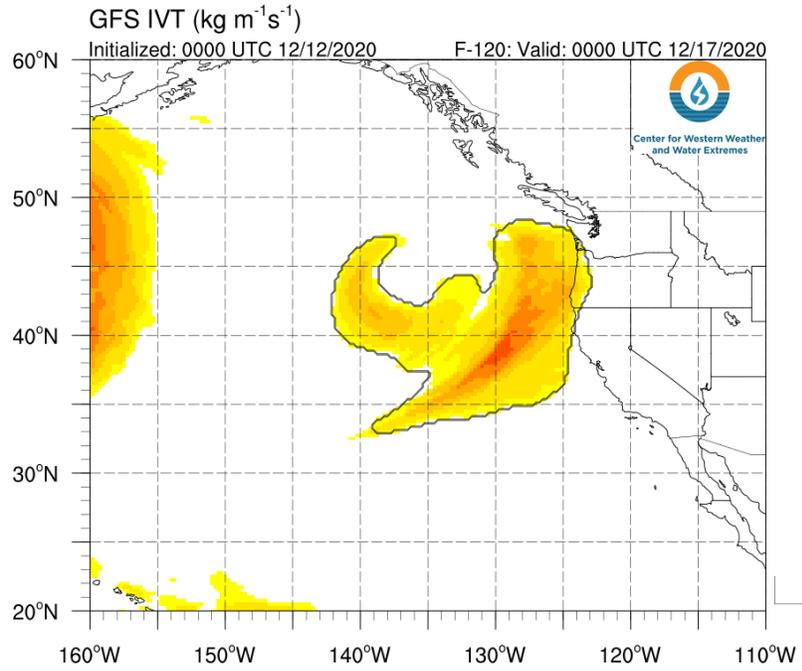


More information: <http://cw3e.ucsd.edu> AR Scale based on Ralph et al. (2019; BAMS), contact M. Ralph

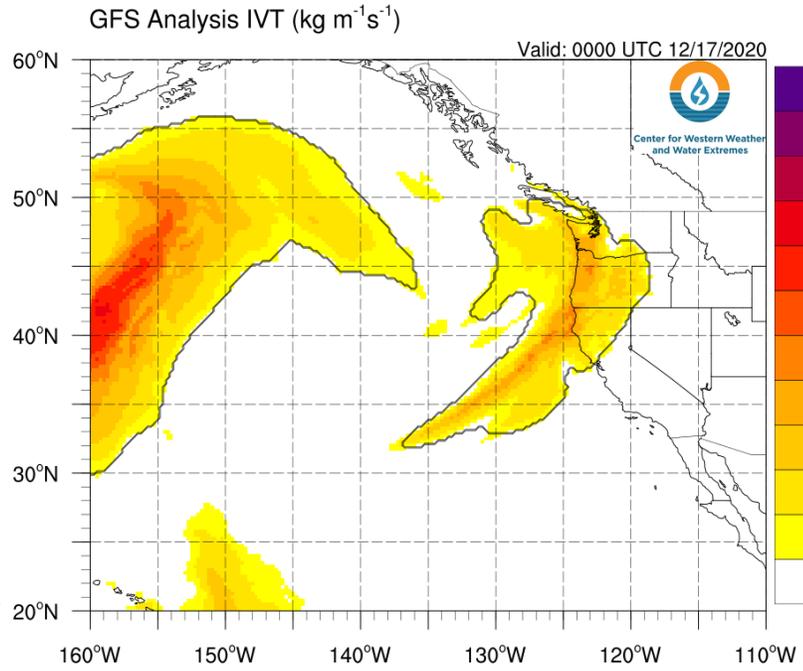
- Multiple ARs made landfall along the U.S. West Coast over the past 7 days
- AR 2 conditions were observed near the Bay Area during the first AR, but impacts were low due to the northwesterly flow
- The second and fourth ARs produced AR 1 conditions between Northern California and Washington

## AR/IVT Forecast Verification

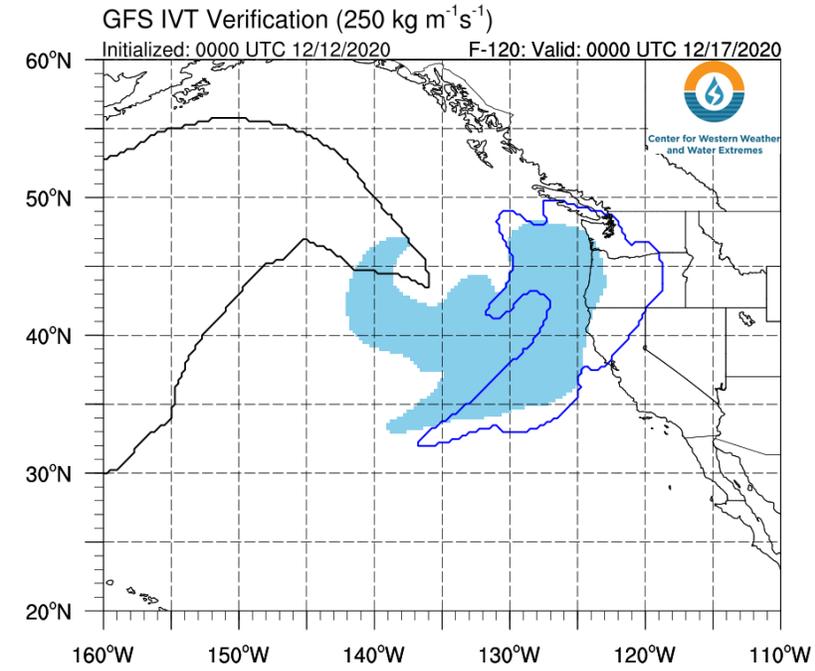
GFS IVT 120-h Forecast  
Initialized: 00Z 12 Dec



GFS IVT Analysis  
Valid: 00Z 17 Dec



GFS IVT Object Verification  
IVT  $\geq 250 \text{ kg m}^{-1} \text{s}^{-1}$



- The overall structure, IVT magnitude, and timing was well-forecasted at a 5-day (120-h) lead time
- The observed landfall location over Northern California and the Pacific Northwest was forecasted accurately
- The AR made landfall within 6 hours of the forecasted landfall time

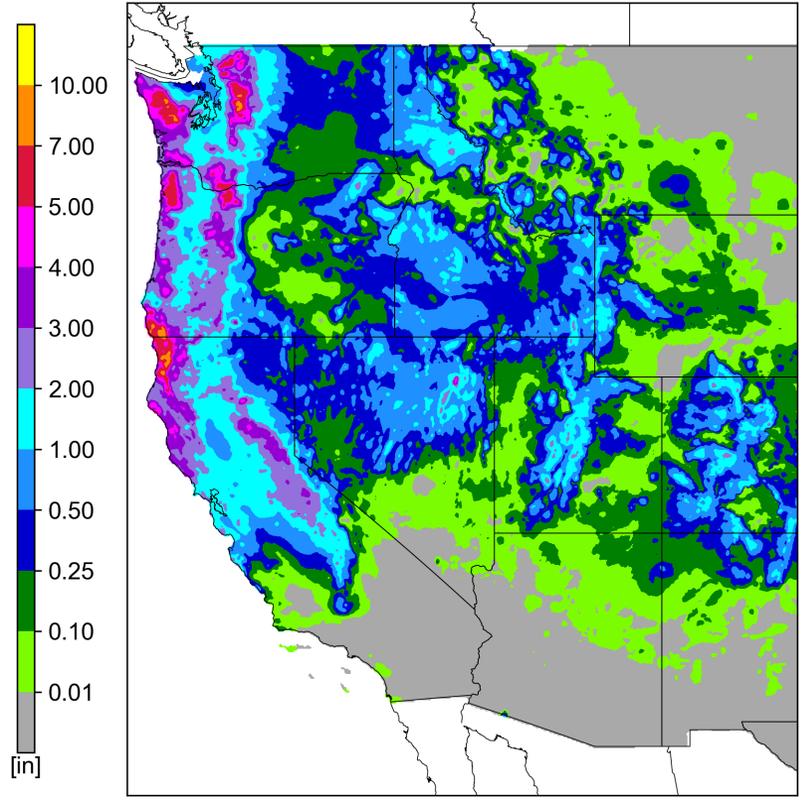
Shading = forecasted AR objects (grey if no AR observed)  
Contours = observed AR objects (black if no AR forecasted)

# Event Summary: 11–17 Dec 2020

For California DWR's AR Program

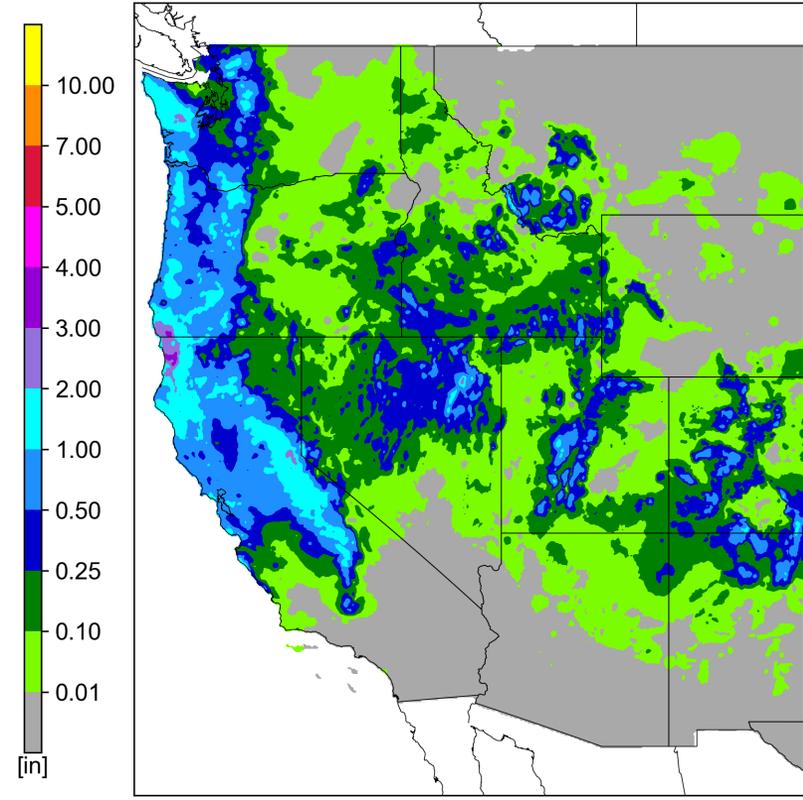
### NCEP Stage IV 7-day QPE

Valid: 1200 UTC 11–18 Dec 2020



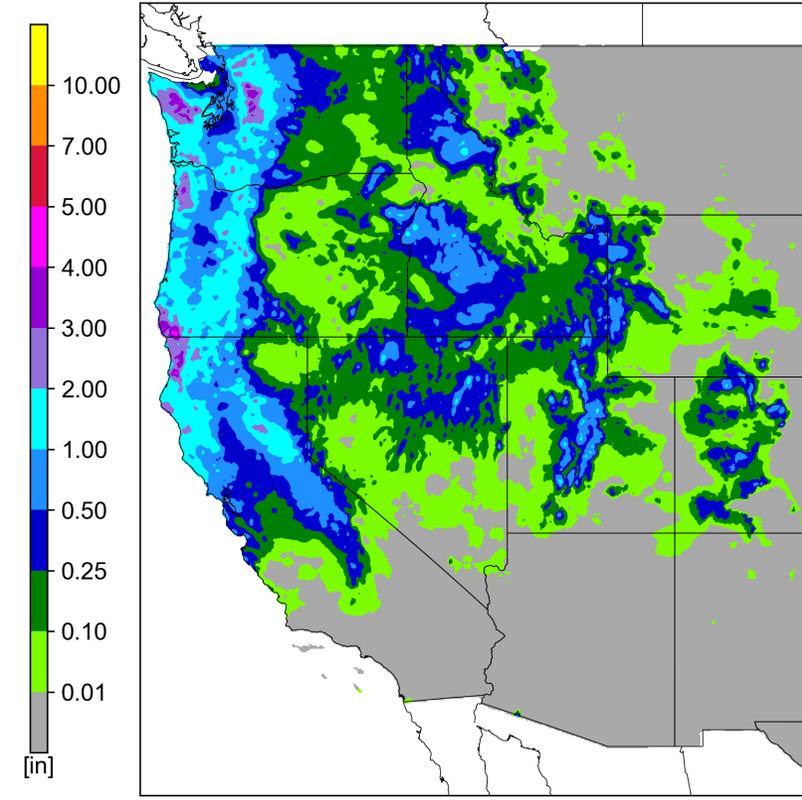
### NCEP Stage IV 24-h QPE

Valid: 1200 UTC 12–14 Dec 2020



### NCEP Stage IV 24-h QPE

Valid: 1200 UTC 16–18 Dec 2020



- These storms produced at least 2–5 inches of total precipitation over the Sierra Nevada, Cascades, and Pacific Coast Ranges (> 7 inches locally), and lighter amounts (0.5–2 inches) across the Intermountain West
- The heaviest and most widespread precipitation fell during the 48-hour periods ending at 1200 UTC (4 AM PST) 14 Dec and 1200 UTC 18 Dec in association with the second and fourth ARs

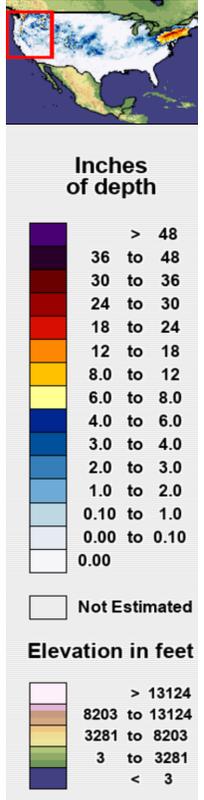
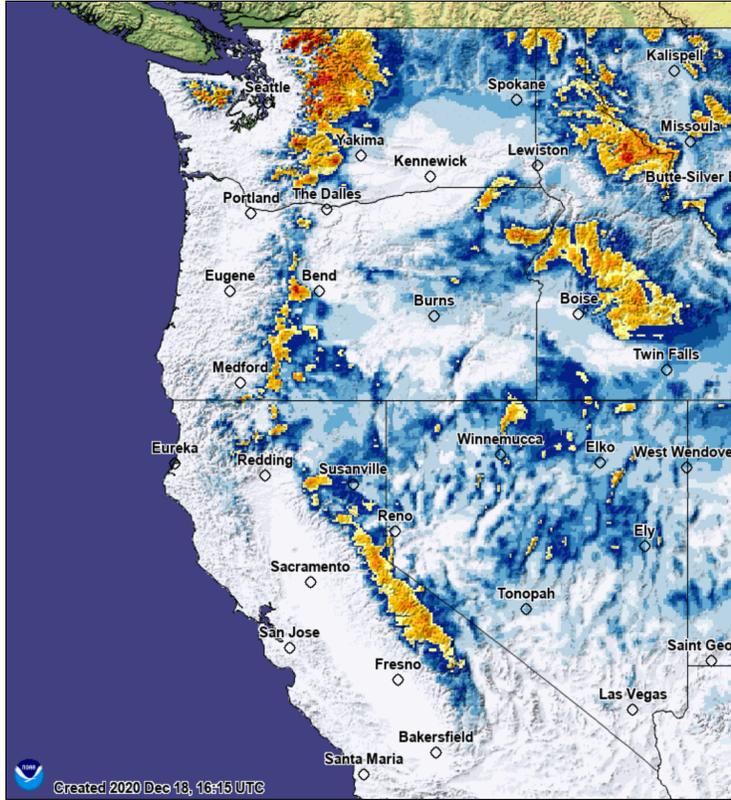
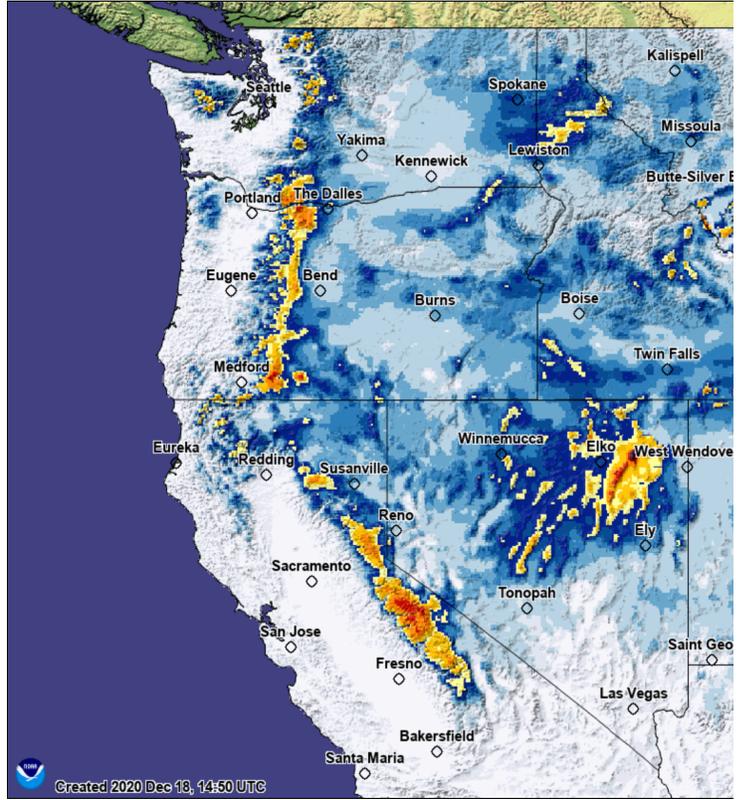
# Event Summary: 11–17 Dec 2020

For California DWR's AR Program

## NOHRSC 72-h Interpolated Snowfall

Valid: 1200 UTC 11–14 Dec 2020

Valid: 1200 UTC 15–18 Dec 2020



Source: NOAA/NWS NOHRSC, <https://www.nohrsc.noaa.gov/>

### Happening Now

Valid: December 13, 2020 10:30 AM

80 Kingvale WB  
EAST WB I-80 AT KINGVALE  
Sunday, December 13, 2020 10:27:11 PST

80 Donner Summit  
Sunday, December 13, 2020 10:26:03 PST

80 Soda Springs  
SOUTH SW WEST SODA SPRINGS WB I-80  
Sunday, December 13, 2020 10:26:10 PST

50 Echo Summit  
NW NORTH NE HWY50 AT ECHO SUMMIT  
Sunday, December 13, 2020 10:25:05 PST

NWS Sacramento [Weather.gov/sto/](https://www.weather.gov/sto/)

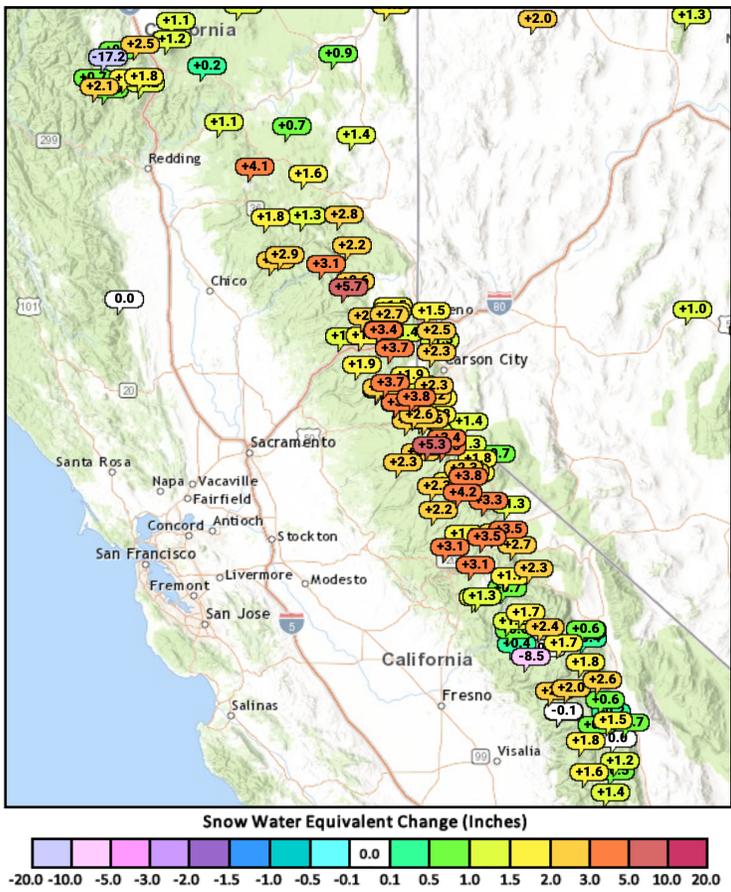
Sources: NWS Sacramento, <https://www.weather.gov/sto/>  
Caltrans, <https://dot.ca.gov/>

- An estimated 1–3 feet of total snow fell in the higher elevations of the Sierra Nevada, Cascades, and northeastern Nevada
- Heavy snow on 13 Dec created hazardous travel conditions and resulted in chain controls on Interstate 80 and Highway 50 near Lake Tahoe

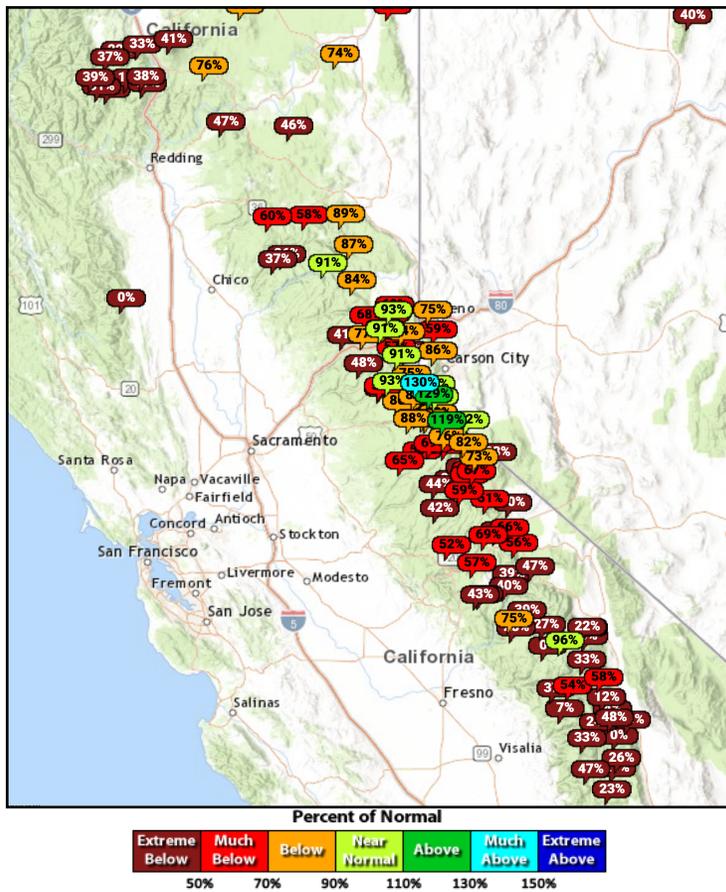
# Event Summary: 11–17 Dec 2020

For California DWR's AR Program

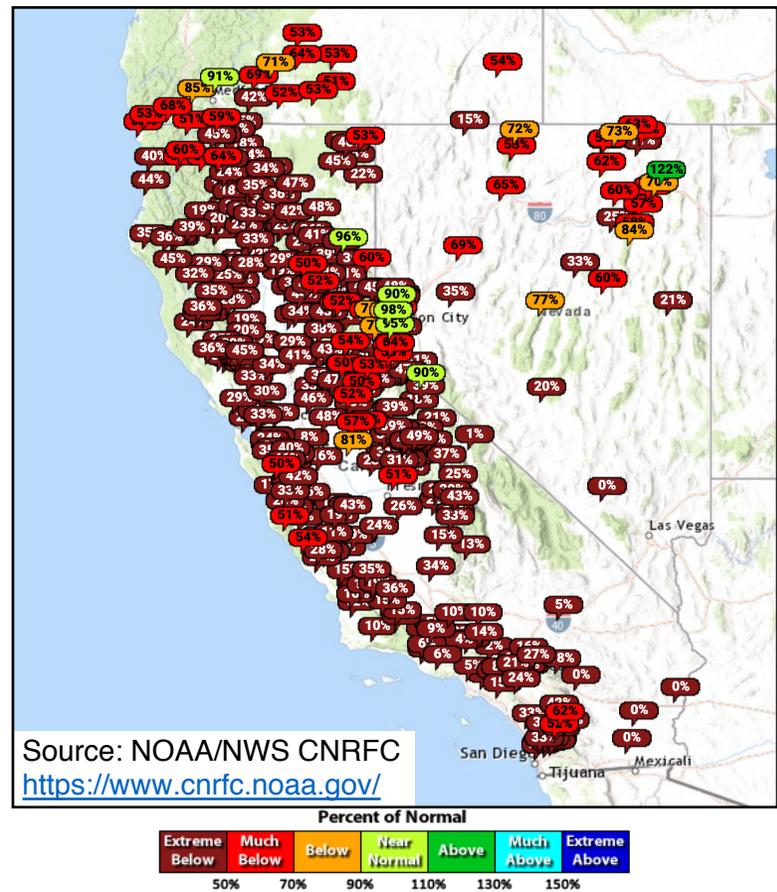
7-day SWE Change: Valid 18 Dec



SWE % of Normal: Valid 18 Dec



Water Year Precip % of Normal: Valid 18 Dec



Source: NOAA/NWS CNRFC  
<https://www.cnrfc.noaa.gov/>

- Between 11 Dec and 18 Dec, SWE increased by 2–5 inches in the Central and Northern Sierra
- Current SWE is below normal across much of the the Sierra Nevada, especially in the Southern Sierra
- Total water-year-to-date (since 1 Oct) precipitation is less than 50% of normal throughout much of California