

CW3E Atmospheric River Outlook

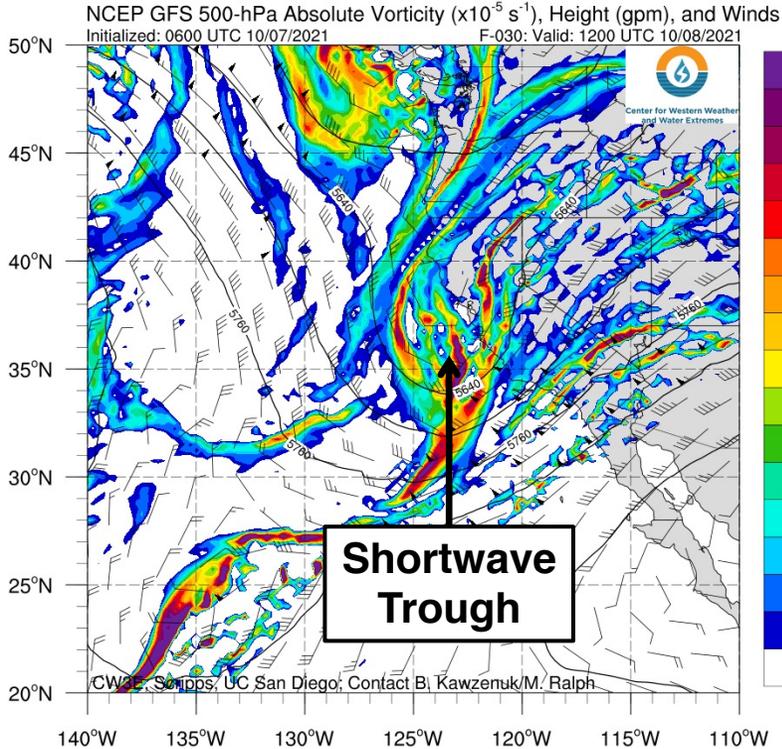
Atmospheric River to Bring Rain to Southern California and Interior Southwestern U.S.

- An atmospheric river (AR) is forecasted to make landfall across Southern California today
- AR 2 conditions are forecasted in coastal San Diego County, with maximum IVT values $> 500 \text{ kg m}^{-1} \text{ s}^{-1}$
- AR 2 conditions are also possible over portions of the interior southwestern U.S. due to substantial inland penetration of this AR
- The heaviest precipitation (0.5–1.5 inches) associated with this AR is expected over the Peninsular and eastern Transverse Ranges in Southern California and the higher terrain in southwestern Utah, northern Utah, and southeastern Idaho

AR Outlook: 7 Oct 2021

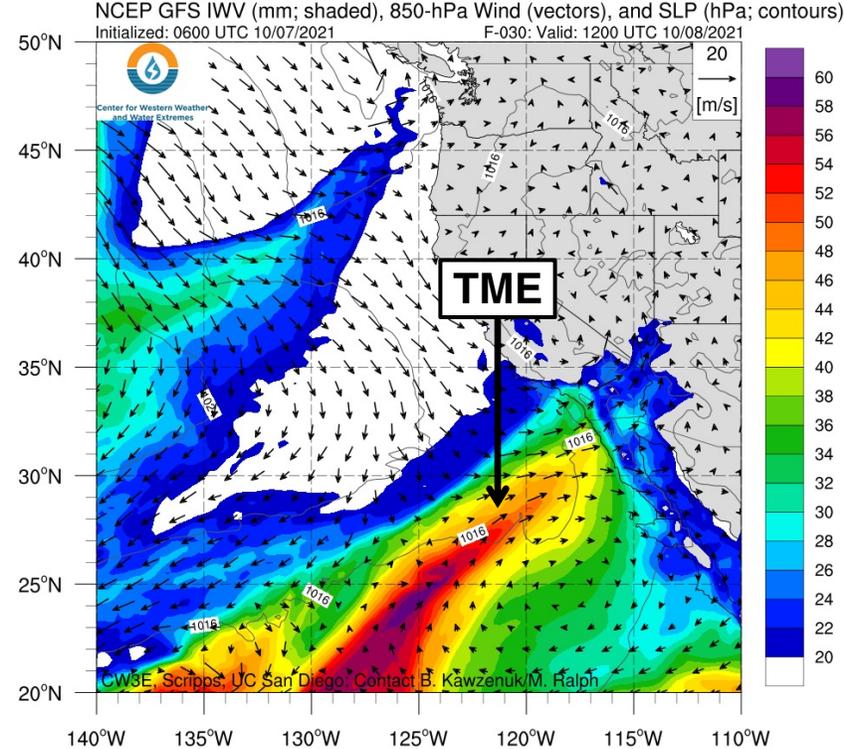
(A) GFS 500-hPa Analysis

Valid: 5 AM PT 8 Oct (F-30)



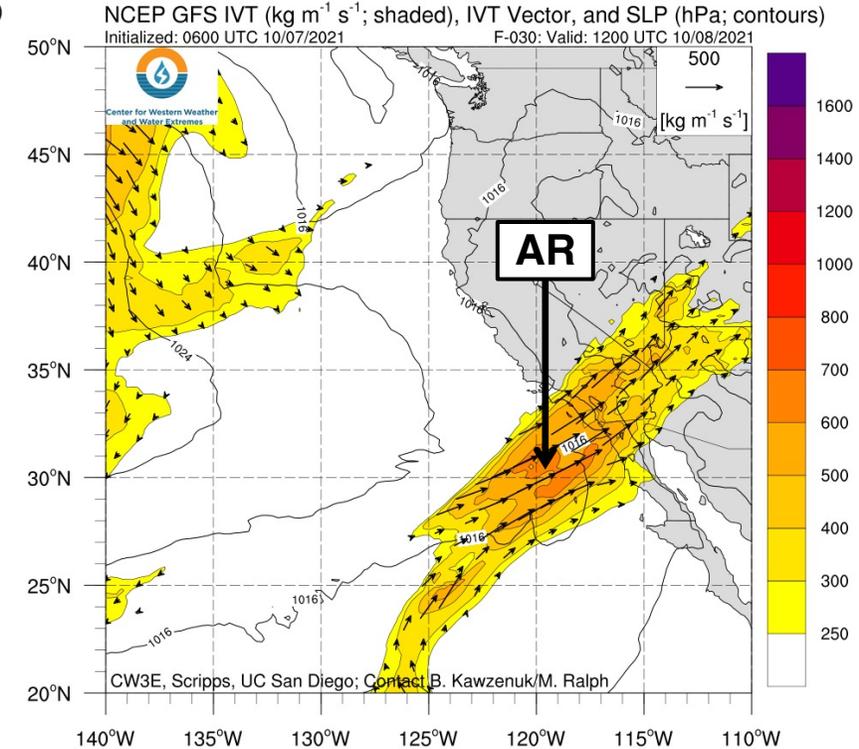
(B) GFS IWV Analysis

Valid: 5 AM PT 8 Oct (F-30)



(C) GFS IVT Analysis

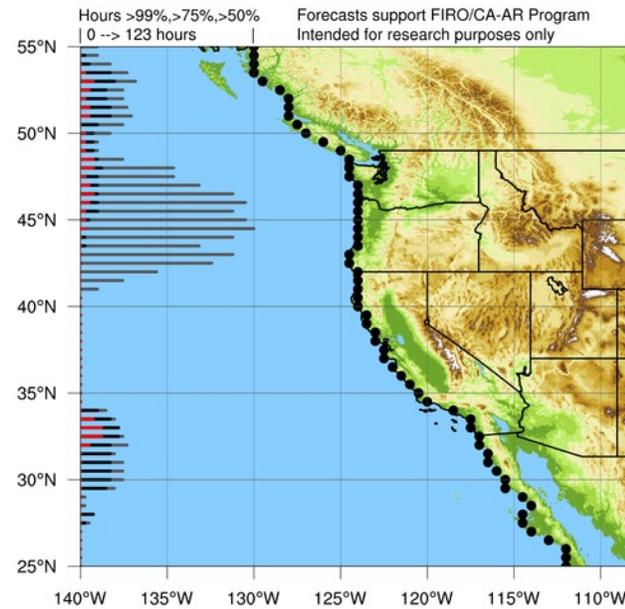
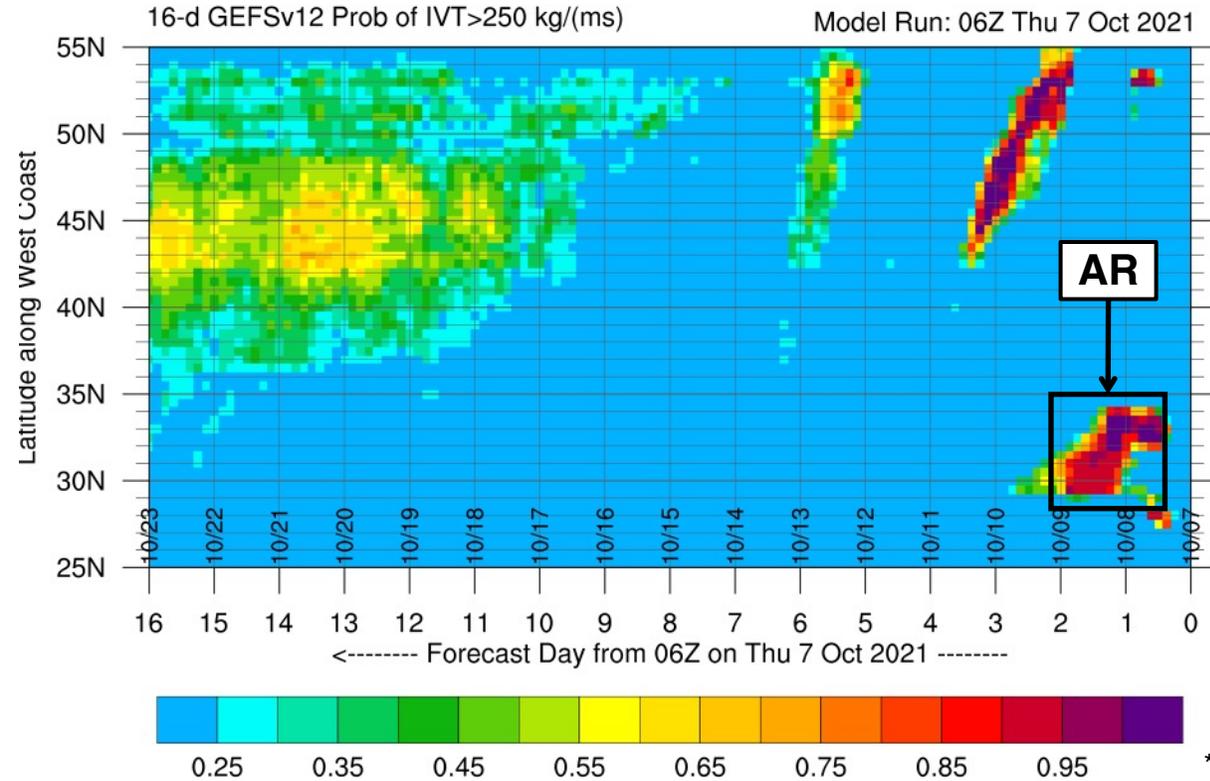
Valid: 5 AM PT 8 Oct (F-30)



- The 06Z 7 Oct deterministic GFS forecast shows a 500-hPa shortwave trough approaching the U.S. West Coast around 5 AM PT 8 Oct (Figure A)
- This trough will interact with a region of very moist air over the Eastern Pacific Ocean, resulting in a tropical moisture export (TME) (Figure B)
- Strengthening low-to-midlevel southwesterly flow within this moisture plume will lead to the development and intensification of AR conditions across the southwestern U.S., with IVT values $> 500 \text{ kg m}^{-1} \text{ s}^{-1}$ forecasted over Southern California (Figure C)

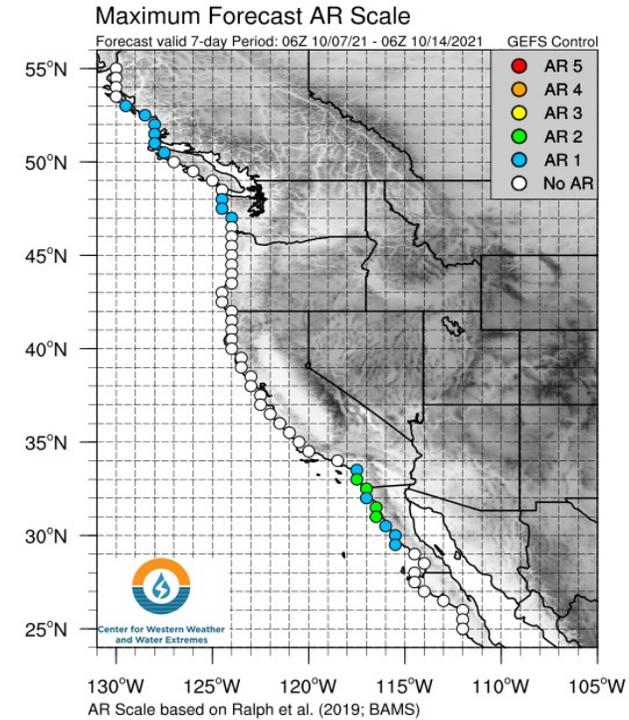
AR Outlook: 7 Oct 2021

Probability of AR Conditions Along Coast



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

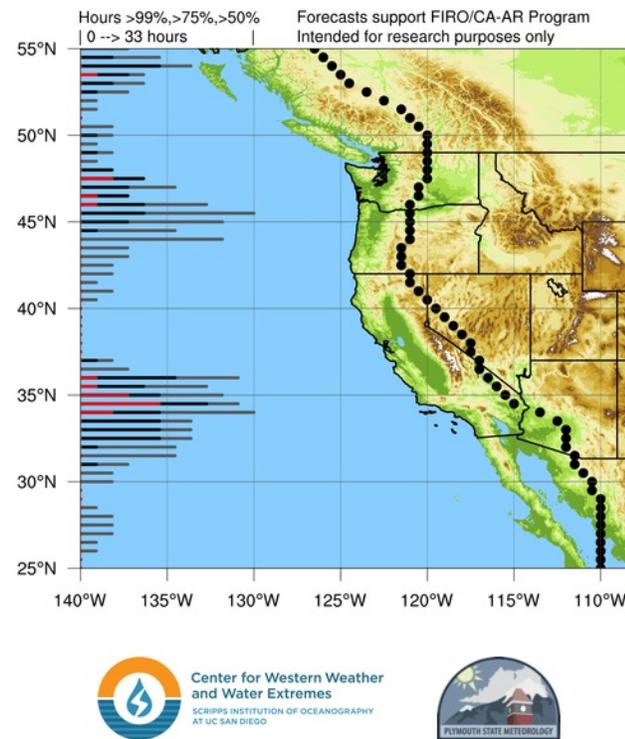
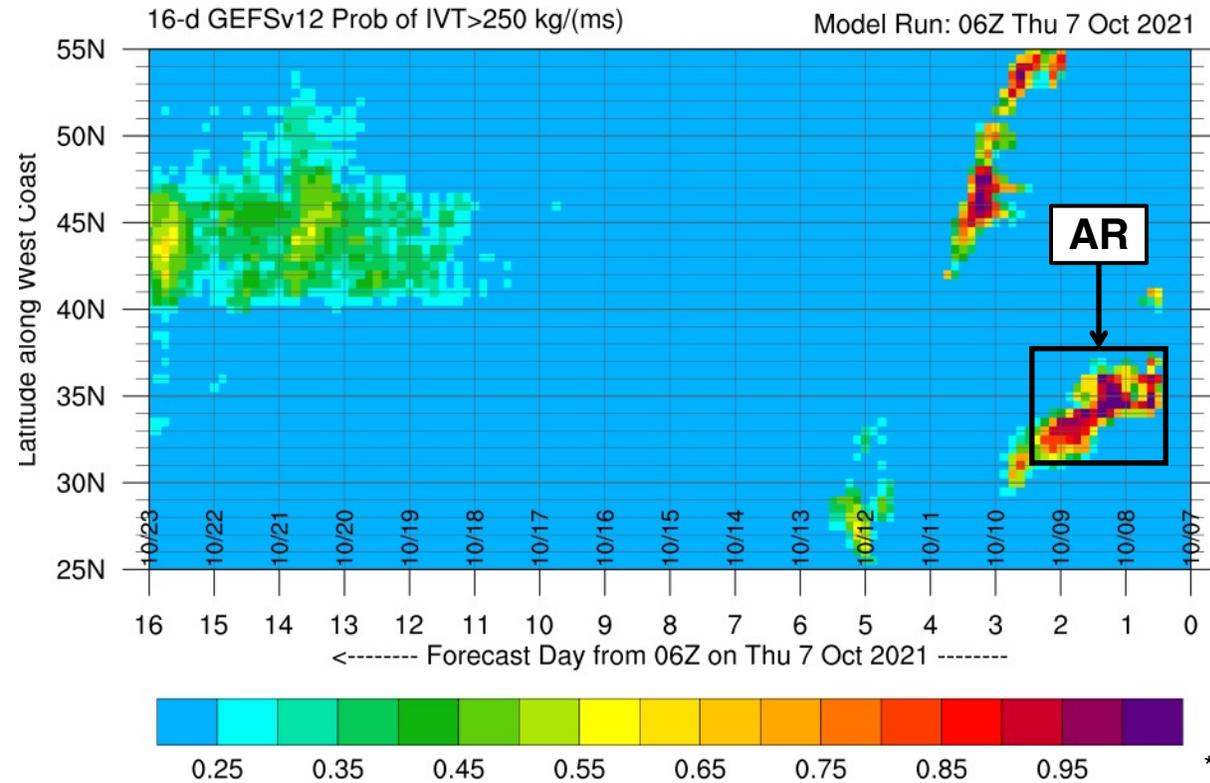
AR Scale



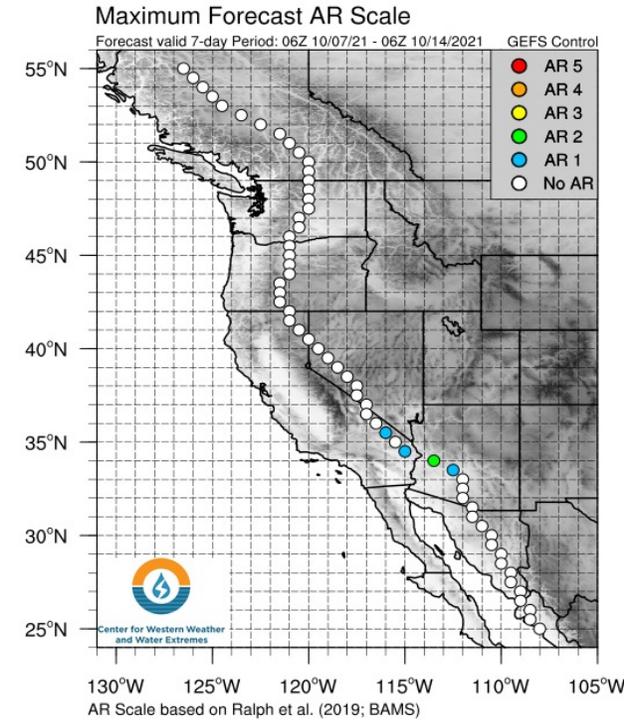
- The 06Z GEFS is showing very high confidence (> 95% probability) in a period of AR conditions (IVT > 250 kg m⁻¹ s⁻¹) over coastal Southern California today into tomorrow
- AR 2 conditions (based on the Ralph et al. 2019 AR Scale) are possible in San Diego County and northern Baja California

AR Outlook: 7 Oct 2021

Probability of AR Conditions Inland



AR Scale



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

- The 06Z GEFS is also showing very high confidence (> 90% probability) in a period of AR conditions over portions of the interior southwestern U.S. in association with this AR
- Inland penetration of higher IVT values may lead to AR 2 conditions in Arizona

AR Outlook: 7 Oct 2021

GEFS AR Scale and IVT Forecasts

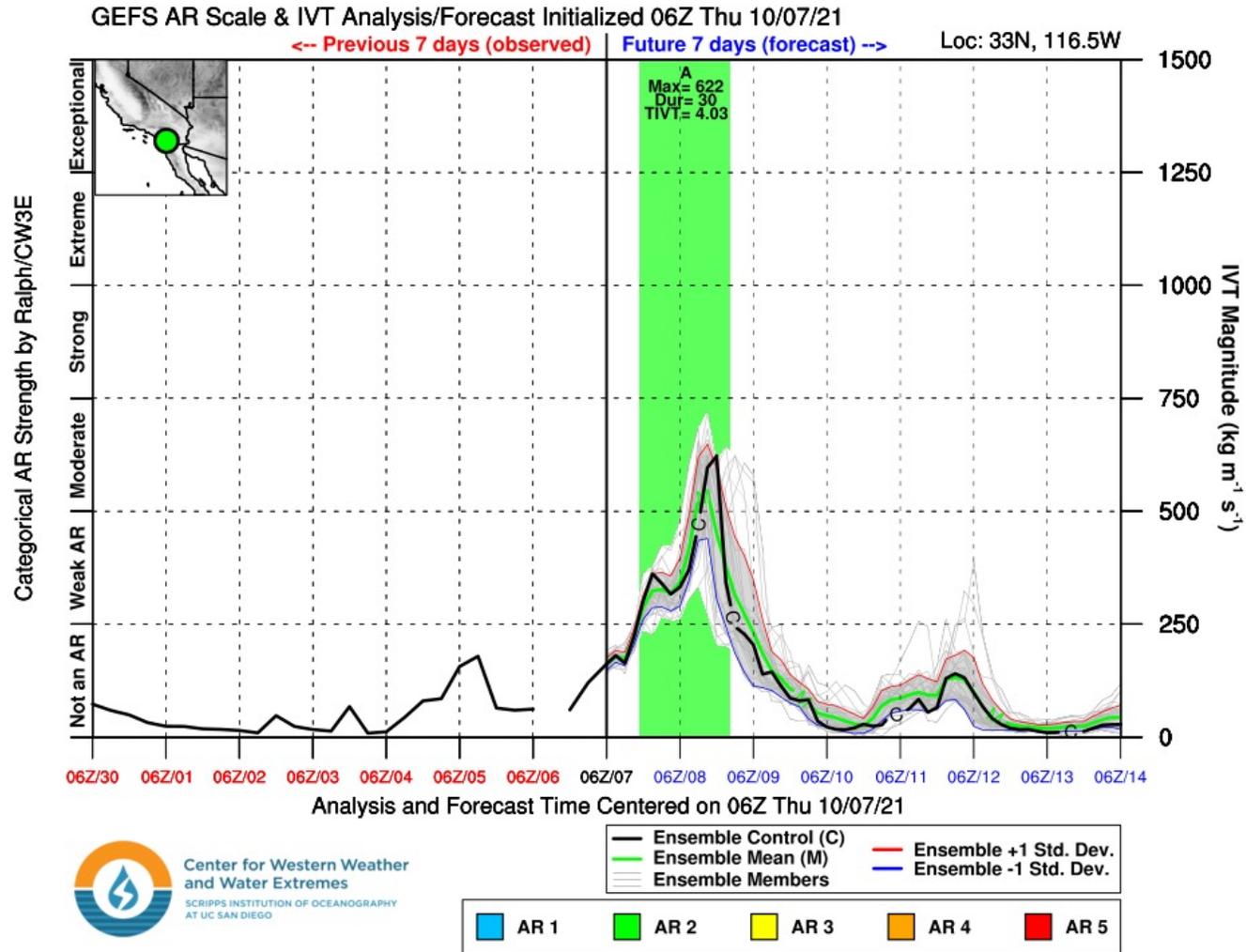
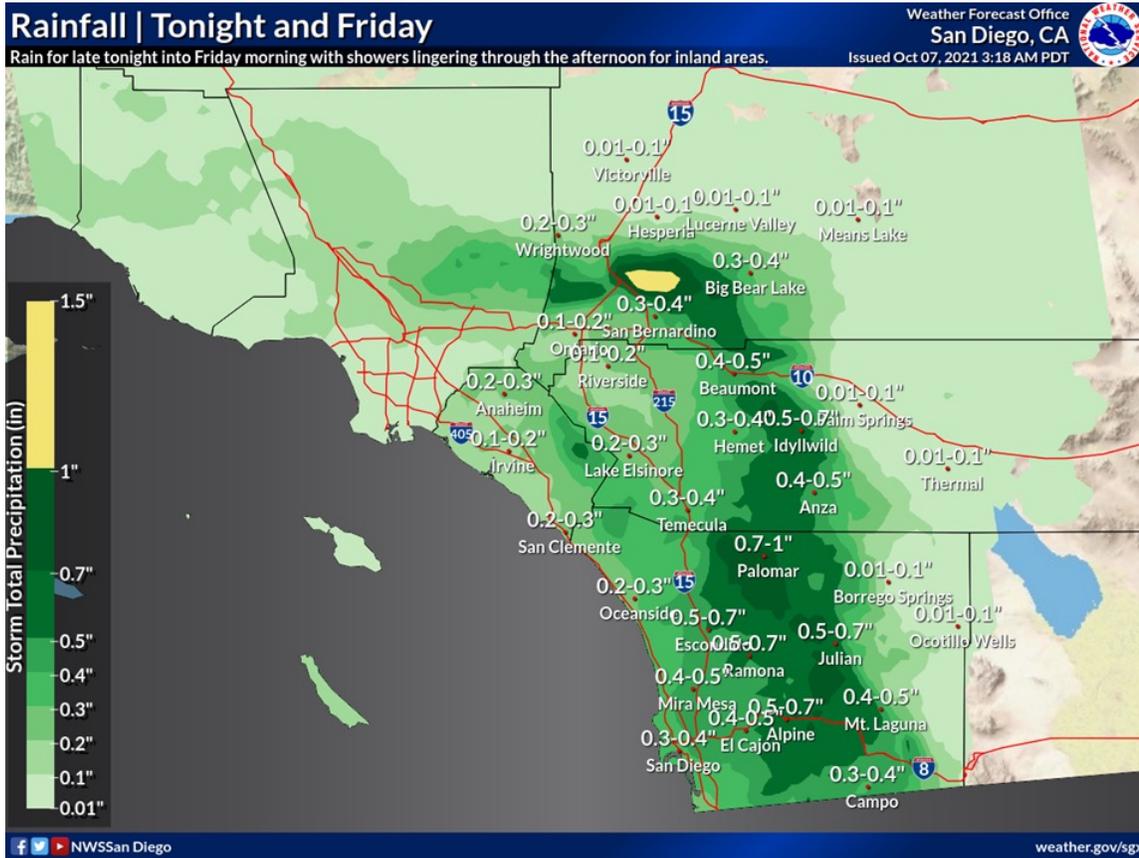


Image created: 10 UTC 10/07/2021

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

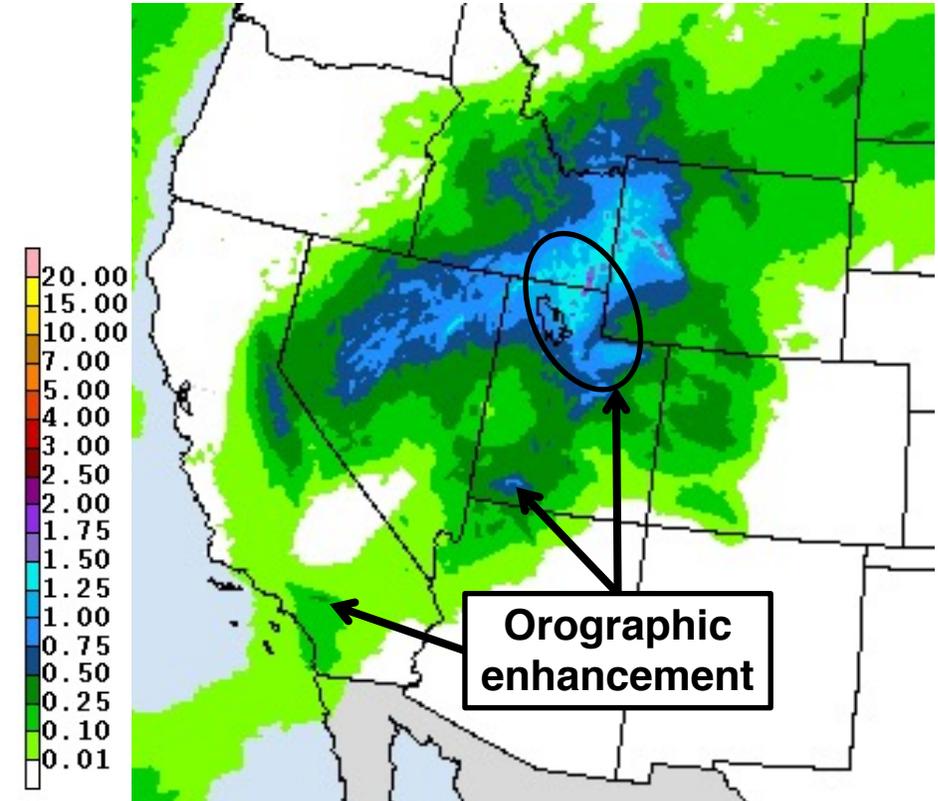
- Both the 06Z GEFS control run and the GEFS ensemble mean are forecasting an AR 2 at 33°N, 116.5°W (near Julian, CA) based on the Ralph et al. 2019 AR Scale
- The 06Z GEFS control run is forecasting a maximum IVT of 622 kg m⁻¹ s⁻¹ and an AR duration of 30 hours at this location
- There is generally good agreement among the ensemble members regarding the maximum IVT magnitude
- There is still some uncertainty in the duration of AR conditions, as well as the timing of the strongest moisture transport

Precipitation Impacts



Source: NWS San Diego, <https://www.weather.gov/sqx/>

WPC 48-h QPF:
Valid 5 AM PT 7-9 Oct 2021



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

- This AR is forecasted to bring about 0.25–0.50 inches of rainfall to coastal and inland valley portions of San Diego County
- The heaviest precipitation (0.5–1.5 inches) is expected in the Peninsular and eastern Transverse Ranges, as well as over the higher terrain in southwestern Utah, northern Utah, and southeastern Idaho
- Upslope moisture flux will likely lead to orographic enhancement of precipitation in these areas