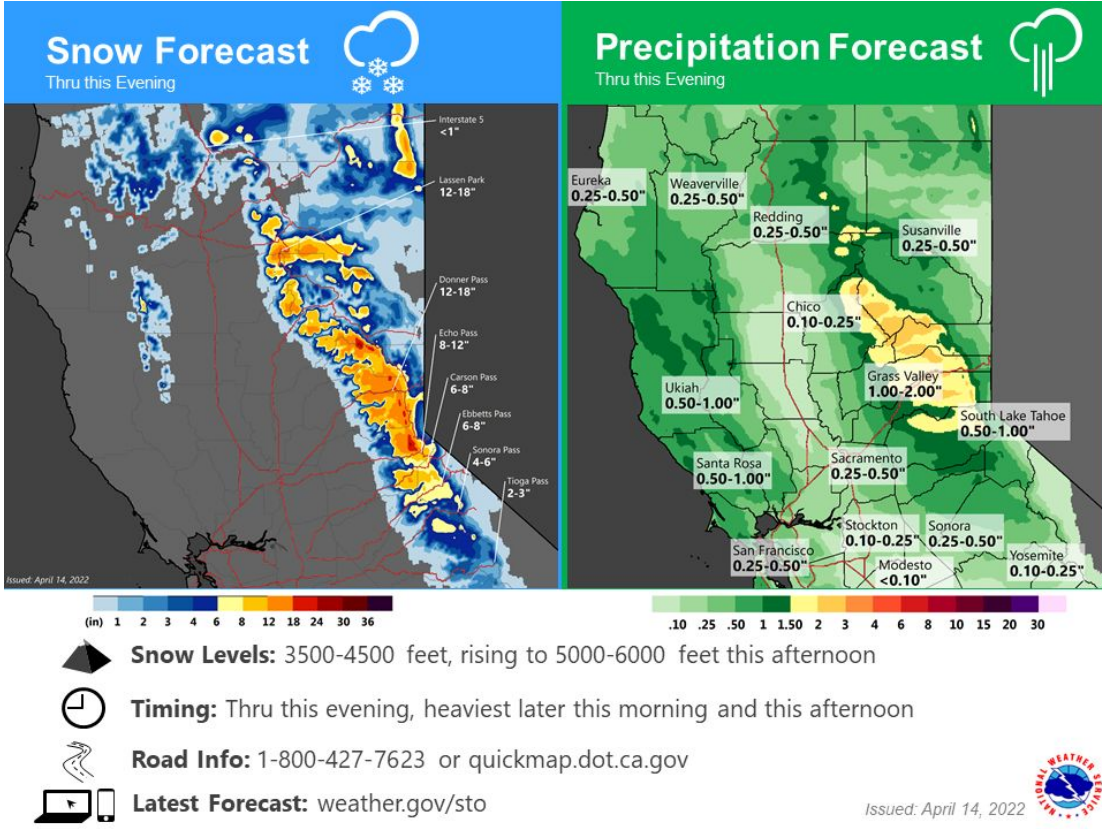
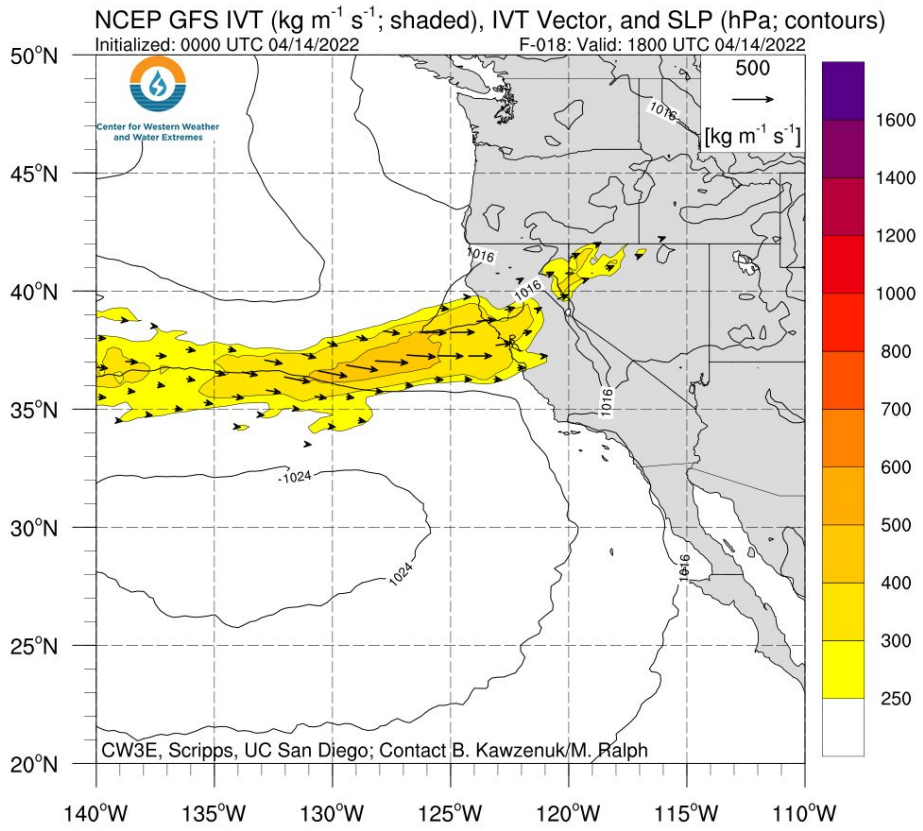


CW3E Atmospheric River Outlook: 14 April 2022

Atmospheric Rivers to Bring Beneficial Precipitation to Northern portions of the US West Coast

- Ongoing atmospheric river (AR) is expected to continue to bring precipitation to Northern CA through this evening with additional AR activity forecasted over Oregon and Northern CA over the next 5 days
- A quick-moving shortwave trough is forecast to bring additional precipitation to Northern CA on 16 Apr
- A second AR is forecasted to make landfall on 18 Apr and bring AR 1-2 conditions (based on the Ralph et al. 2019 AR Scale) to coastal Northern California and Oregon, but there is uncertainty in the timing, location, and duration of AR conditions
- Compared to the 00Z ECMWF, the 00Z GFS is forecasting higher precipitation totals over the Northern California Coast Ranges and over western Washington and Oregon
- The sequence of weak ARs will bring beneficial late season precipitation to regions currently experiencing severe and prolonged drought, although it likely will not end the severe drought conditions across the region.

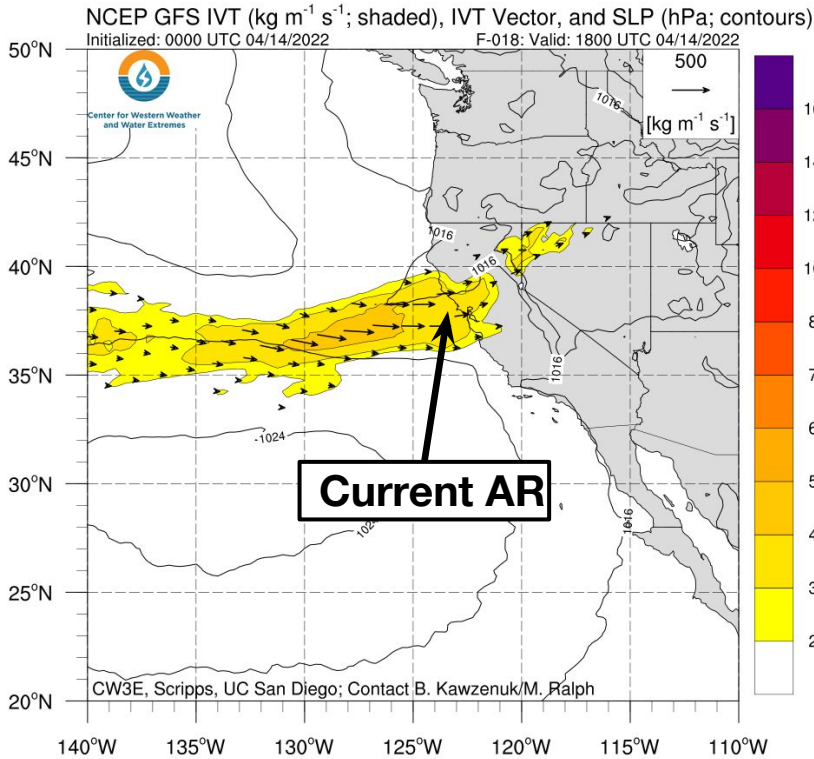
Current Conditions



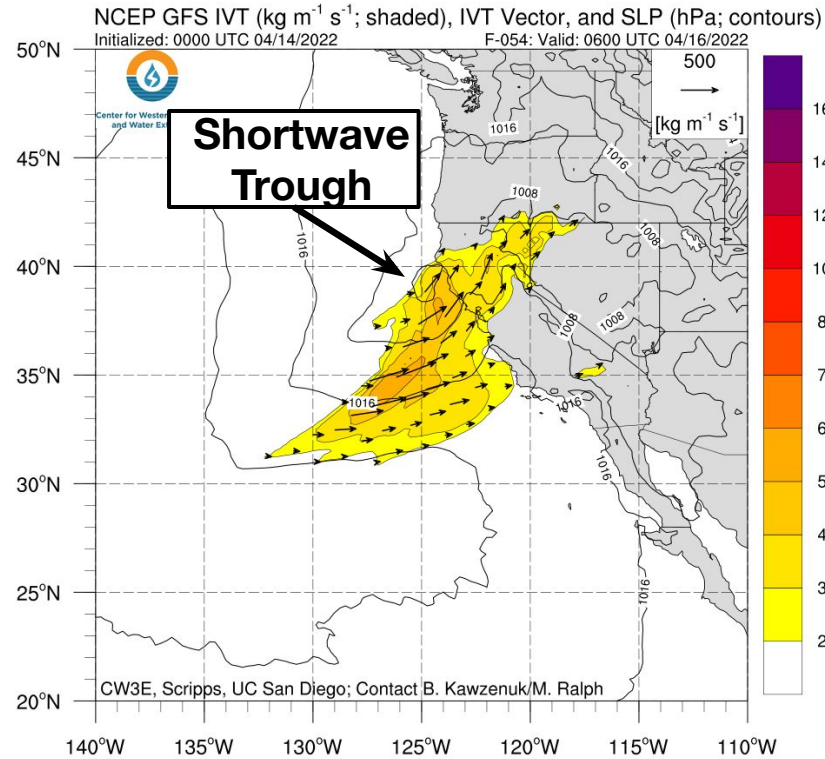
- A weak atmospheric river currently impacting Northern California is contributing to precipitation along the Northern Sierra Nevada
- The current impacts include significant snowfall accumulations along the peaks and mountain passes of the Sierra Nevada

GFS IVT & SLP Forecasts

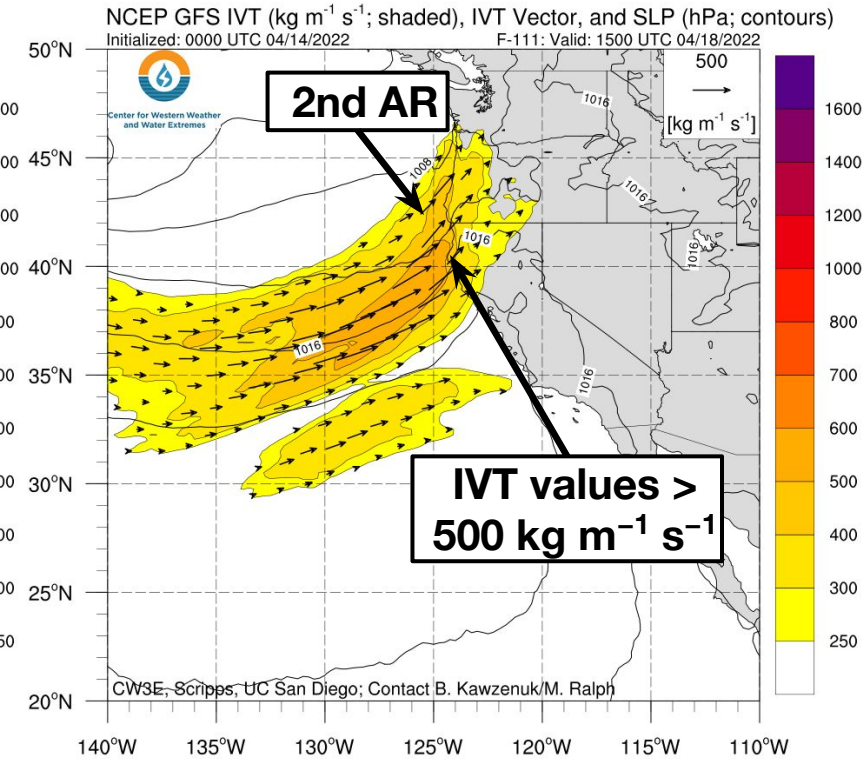
(A) Valid: 10 AM PT 14 Apr (F-18)



(B) Valid: 10 PM PT 15 Apr (F-54)



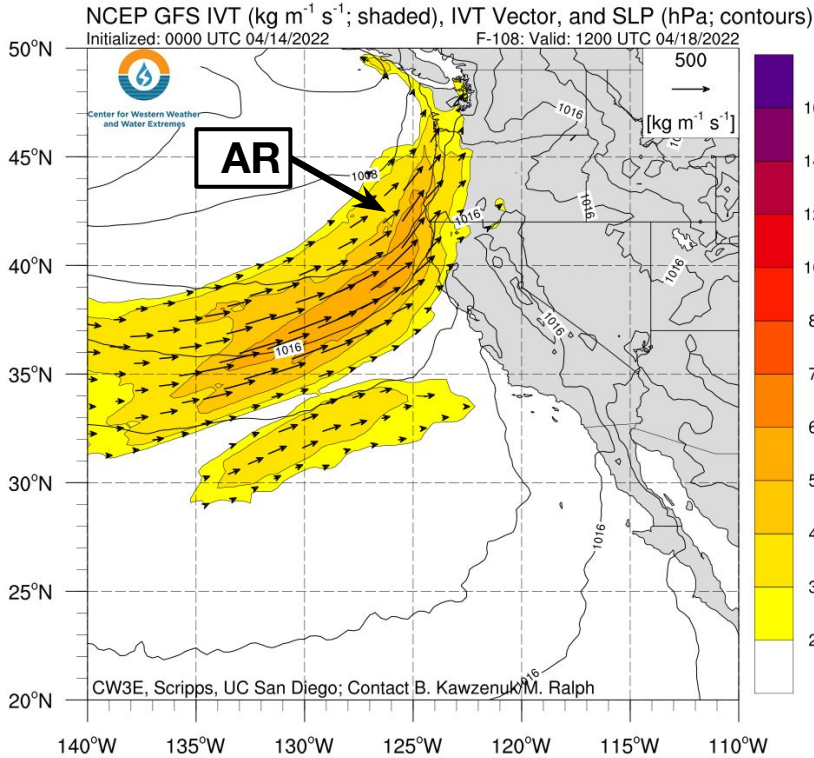
(C) Valid: 7 AM PT 18 Apr (F-111)



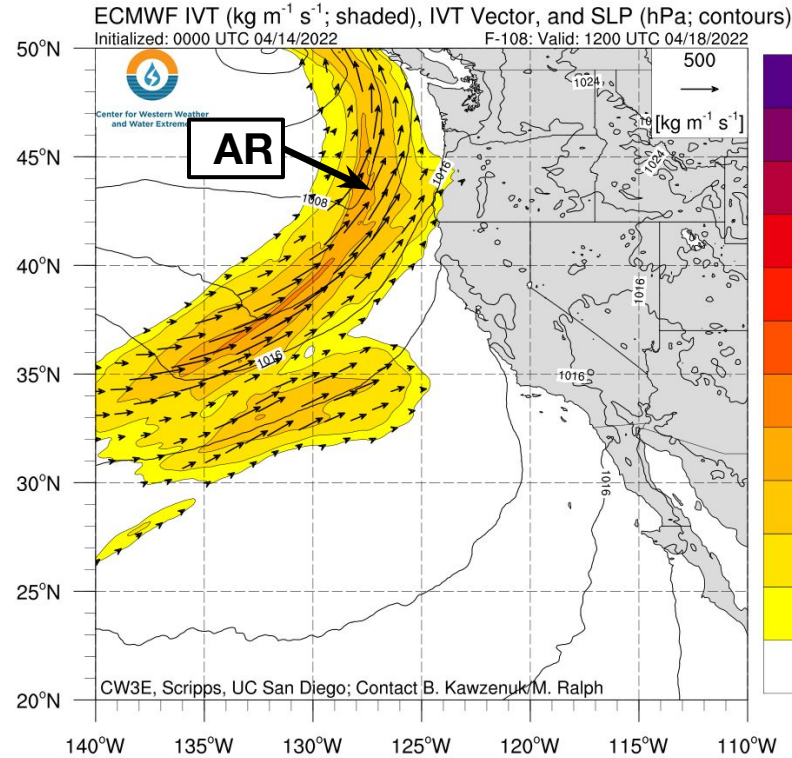
- The current AR is forecast to continue affecting Northern California through this evening (Figure A)
- A quick moving shortwave trough is forecast to bring additional precipitation into Northern California on 15 Apr (Figure B)
- The strongest moisture transport is forecast to occur with a 2nd AR that makes landfall in Oregon on 18 Apr with IVT values approaching $500 \text{ kg m}^{-1} \text{ s}^{-1}$ near the California/Oregon border (Figure C)
- Uncertainty in the track and intensity of the 2nd AR is leading to uncertainty in the strength and duration of AR conditions

GFS vs. ECMWF IVT Forecasts: Valid

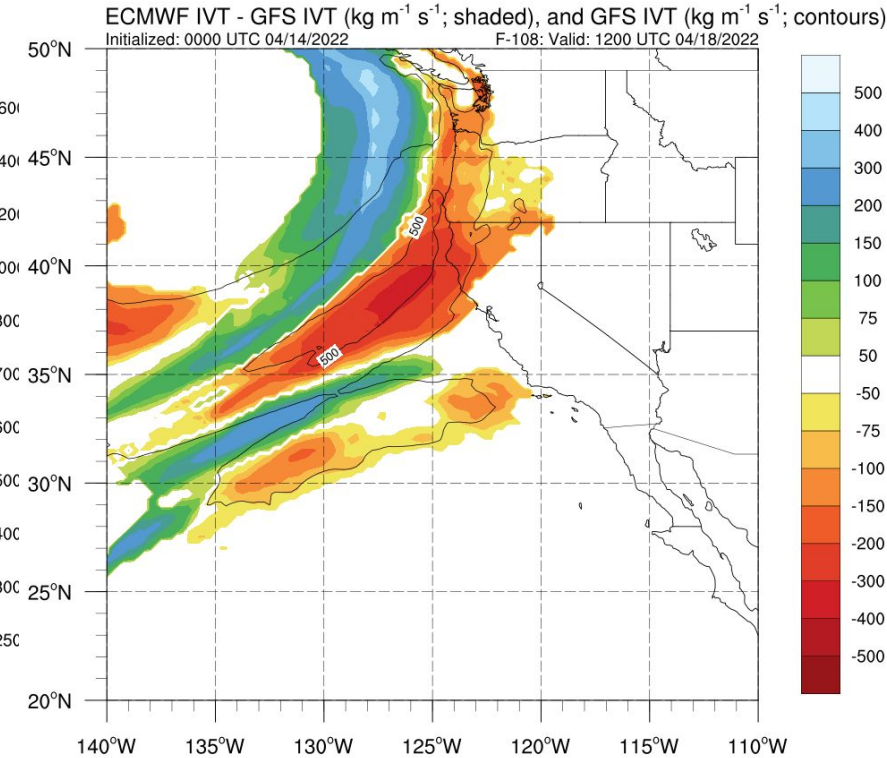
GFS



ECMWF

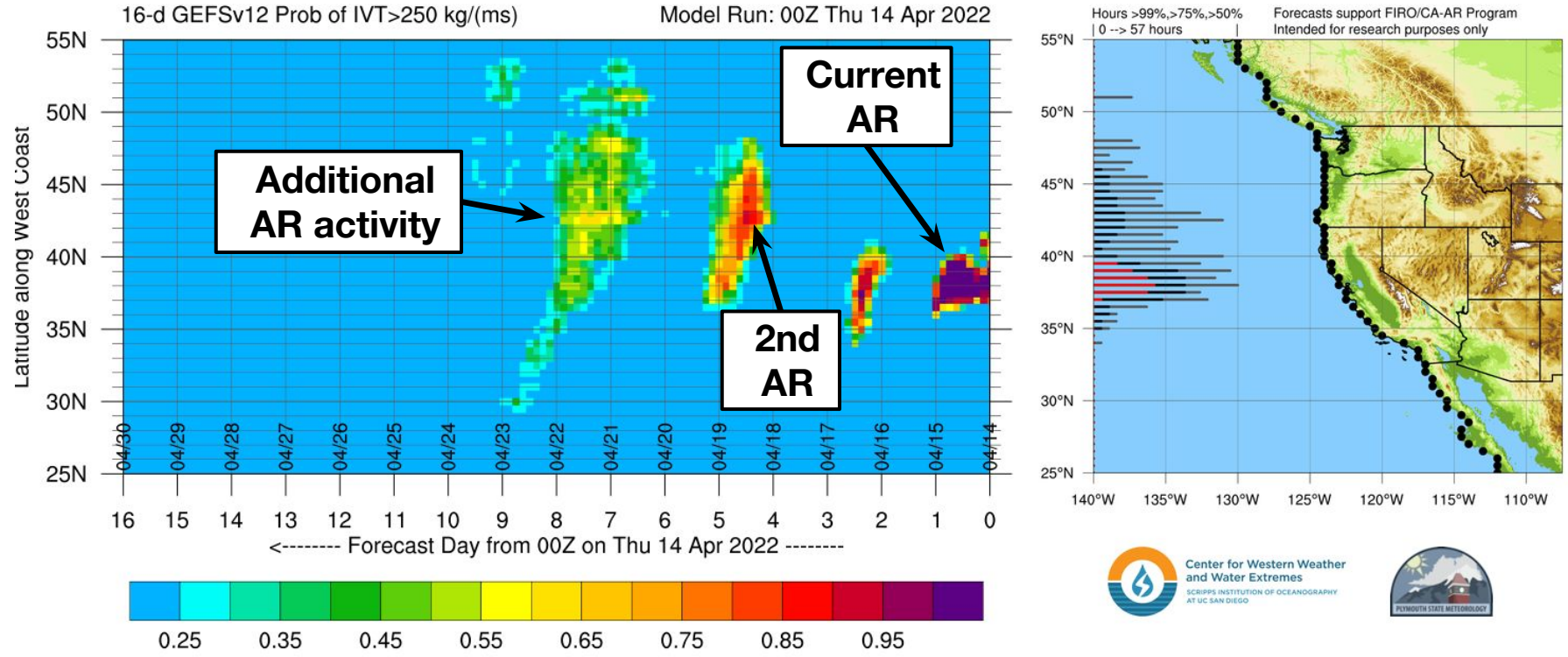


Difference (ECMWF - GFS)



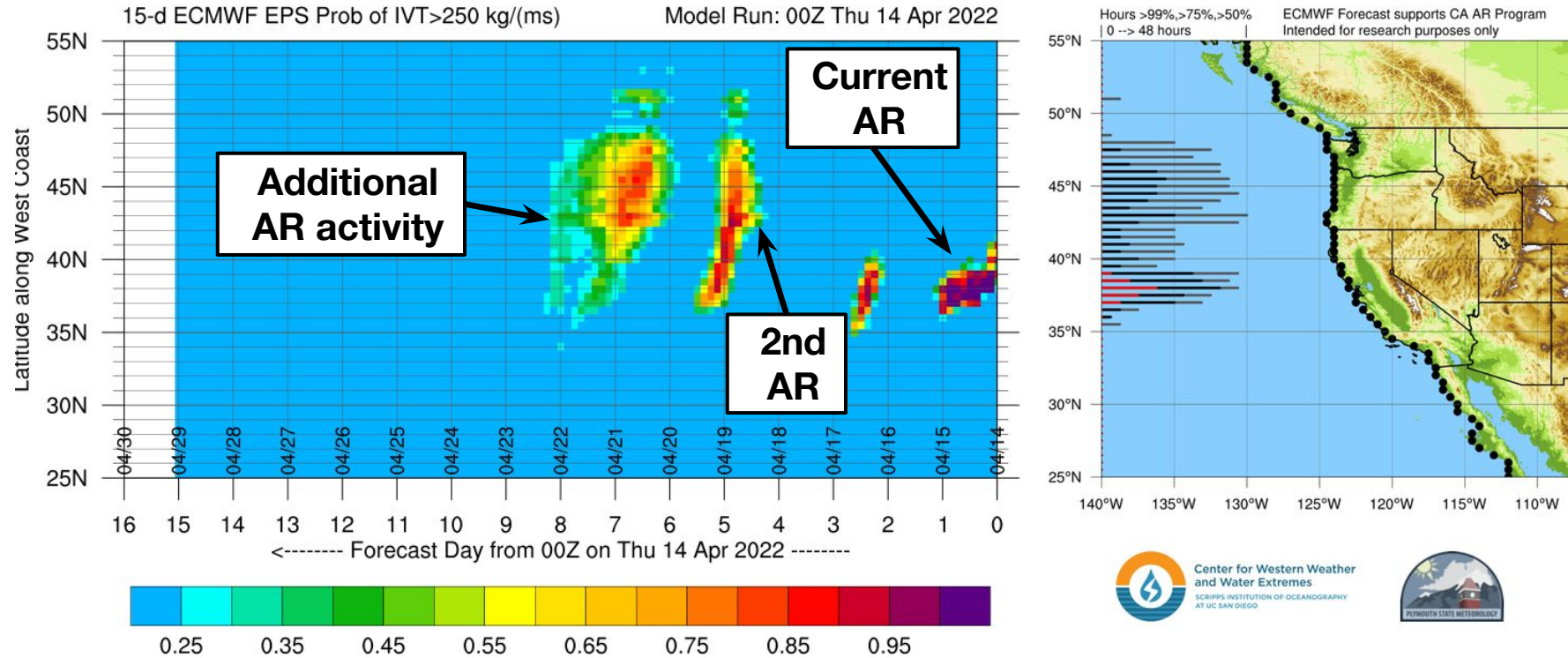
- There are some model-to-model differences in the evolution of the second AR
- The 00Z GFS is forecasting the strongest moisture transport to move onshore several hours earlier than the 00Z ECMWF
- Moisture transport in the 00Z ECMWF is shown to be oriented in a more northerly direction than the 00Z GFS, keeping stronger values of IVT offshore

Probability of AR Conditions Along Coast (GEFS)



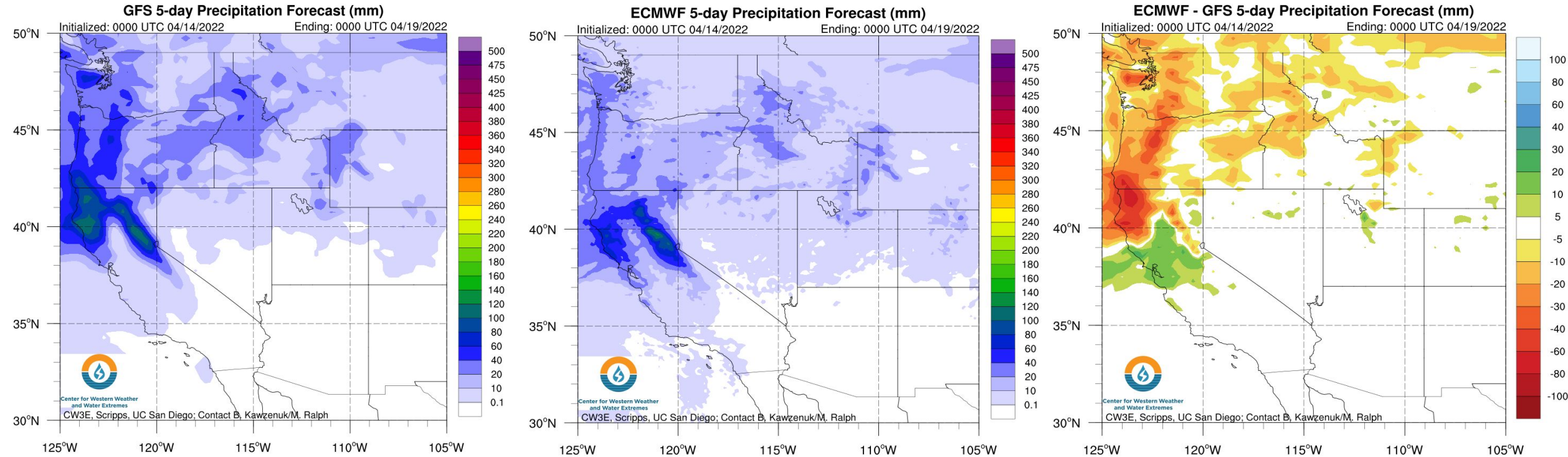
- The 00Z GEFS is showing very high confidence ($> 95\%$ probability) in AR conditions ($IVT > 250 \text{ kg m}^{-1} \text{ s}^{-1}$) over coastal Northern California to continue through 14 Apr
- The 00Z GEFS is also showing moderate-to-high confidence (55–85% probability) in a 2nd AR over Northern California and Oregon on 18 Apr
- Additional AR activity is possible for 20-22 Apr for much of the US West Coast with considerable uncertainty

Probability of AR Conditions Along Coast (ECMWF EPS)



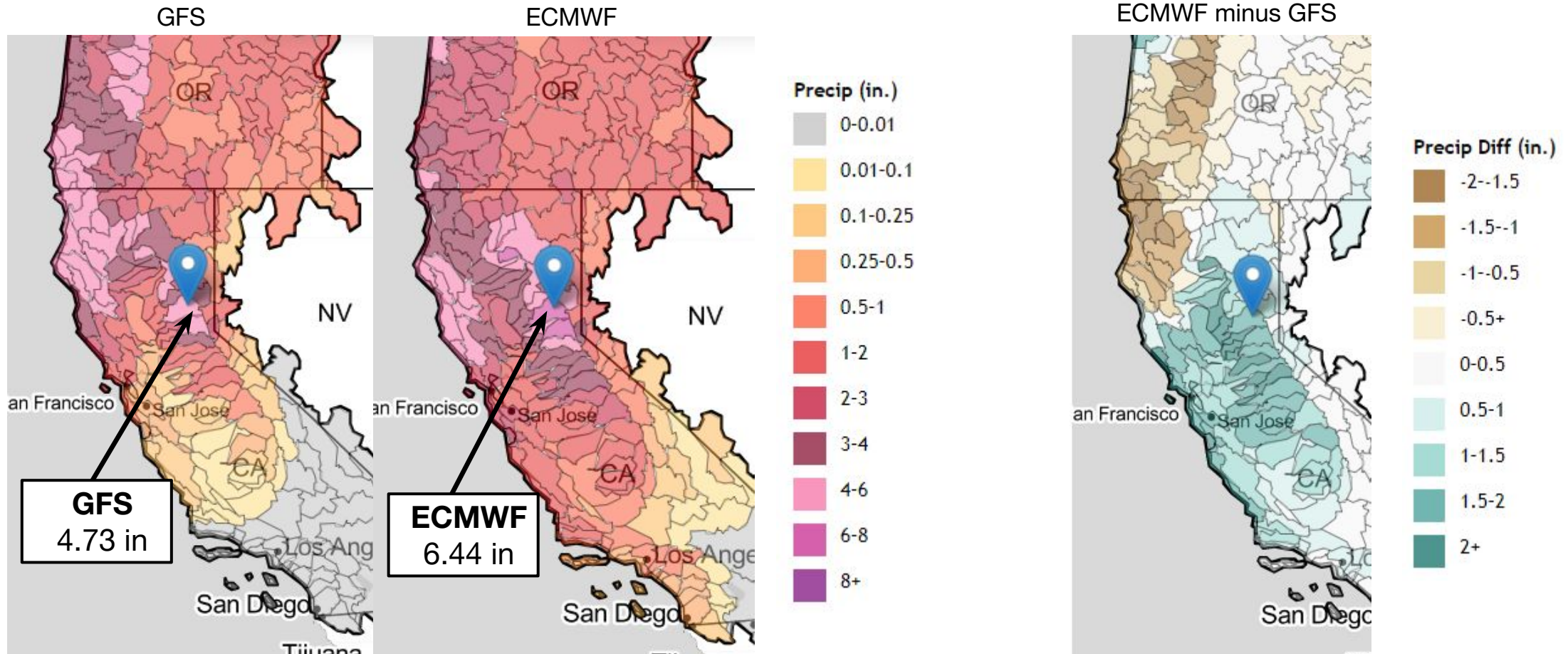
- Similar to the GEFS, The 00Z ECMWF EPS is showing very high confidence (> 95% probability) in AR conditions ($IVT > 250 \text{ kg m}^{-1} \text{ s}^{-1}$) over coastal Northern California to continue through 14 Apr
- The 00Z ECMWF EPS is also showing moderate-to-high confidence (55–85% probability) in a 2nd AR over Northern California and Oregon on 18 Apr. The ECMWF EPS shows a later onset of AR conditions with shorter duration.
- The 00Z ECMWF EPS is showing higher probabilities than the 00Z GEFS of additional AR activity for 20-22 Apr for northern portions of the US West Coast.

Model QPF: GFS vs. ECMWF



- Global model 5-day QPF differences are primarily due to the uncertainty in the evolution of the second AR
- Compared to the 00Z ECMWF, the 00Z GFS is forecasting much higher precipitation totals over the northern California Coast Ranges and over western Washington and Oregon
- Compared to the 00Z GFS, the 00Z ECMWF is forecasting higher precipitation totals over the Bay Area and Sacramento Valley
- 5-day QPF differences are near 2 inches over the northern California Coast Ranges and near 1 inch in the Northern Sierras
- Both models are showing the potential for 5 inches of precipitation in some areas

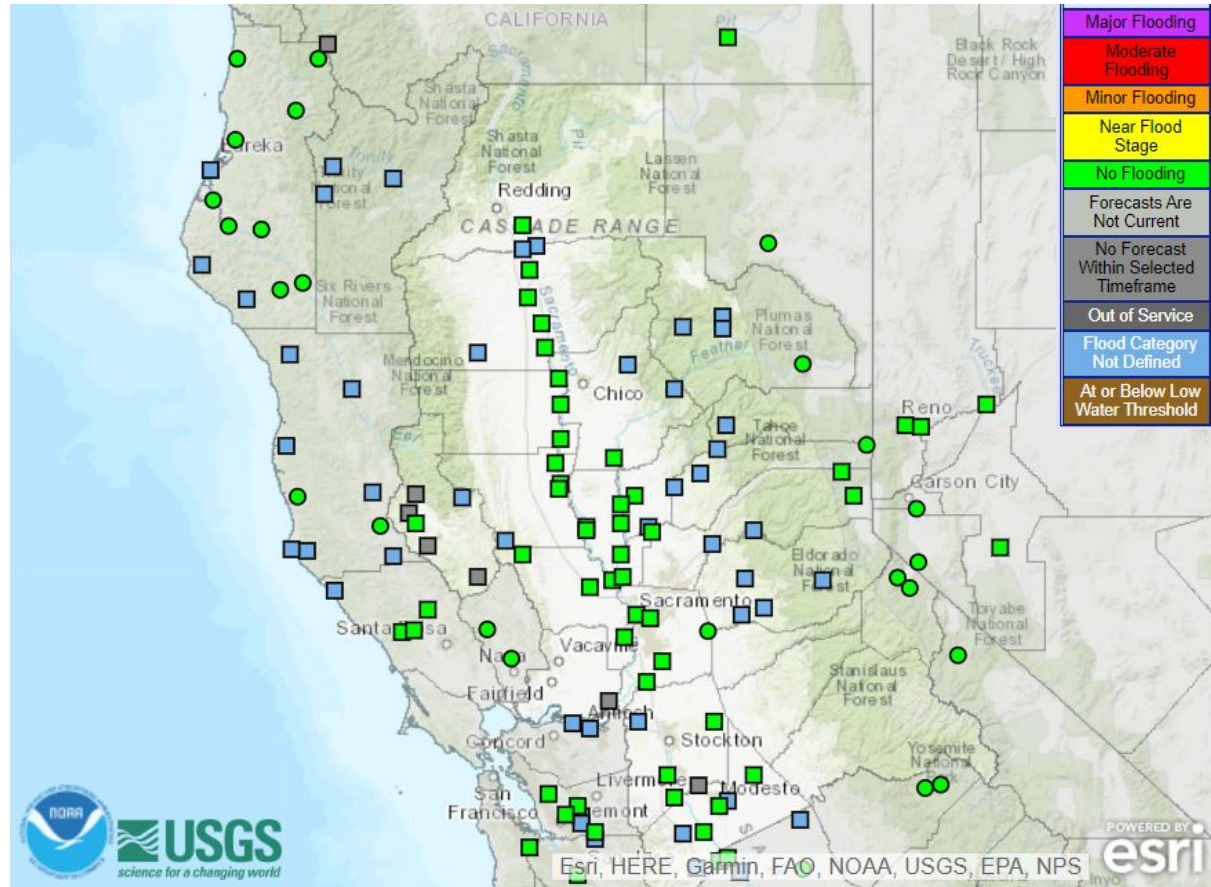
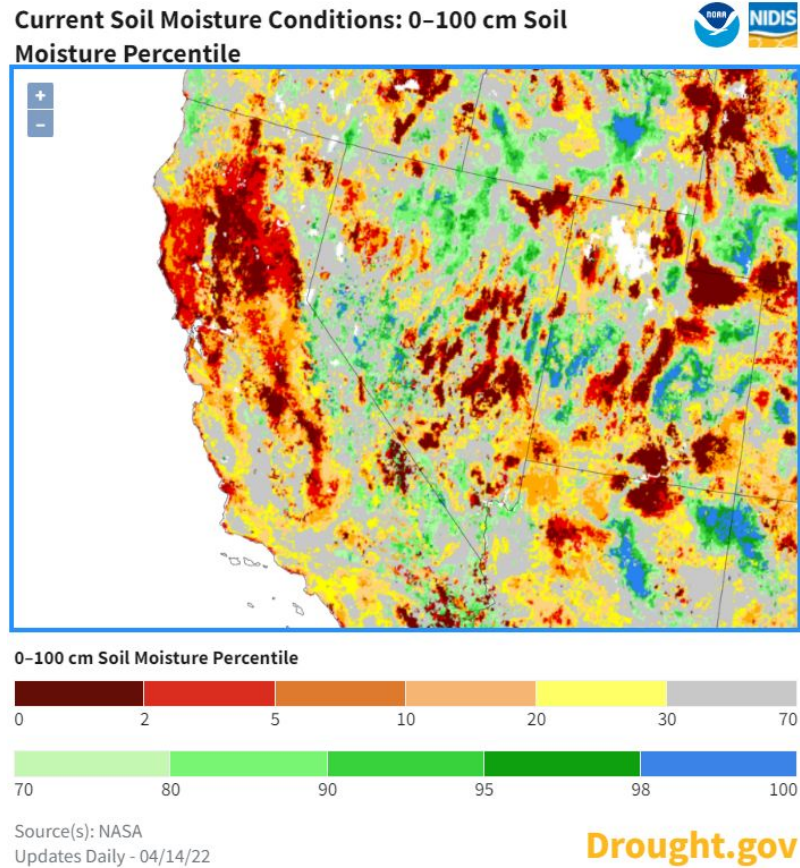
Watershed Impacts: Upper Yuba 10-day Precipitation Forecasts



- There is still some uncertainty in total watershed precipitation with differences between the GFS and ECMWF in the Upper Yuba watershed near 2 inches over the next 10 days
- Due to the extremely dry conditions across the region, precipitation from these systems will improve soil moisture conditions while also adding to the current snowpack

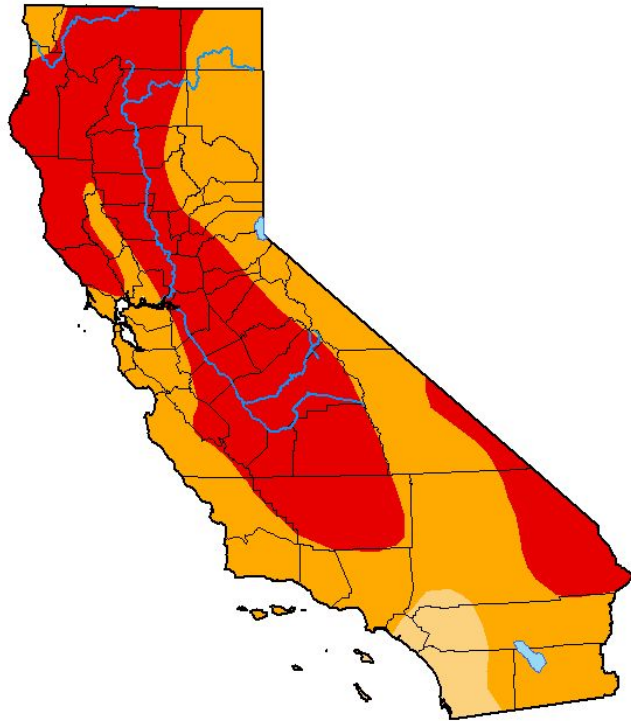
Hydrologic Impacts

4-day Maximum Forecast Flood Category Through: 04/17/2022 19:40:13 UTC



- ARs will bring precipitation to areas of Northern California currently experiencing severe and extreme drought levels
- Given the very dry soil conditions, these events are likely to be more beneficial rather than hazardous, and major hydrologic impacts are not expected.

U.S. Drought Monitor California



April 12, 2022
(Released Thursday, Apr. 14, 2022)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	95.75	46.87	0.00
Last Week 04-05-2022	0.00	100.00	100.00	93.65	40.67	0.00
3 Months Ago 01-11-2022	0.00	100.00	99.25	66.39	1.39	0.00
Start of Calendar Year 01-04-2022	0.00	100.00	99.30	67.62	16.60	0.84
Start of Water Year 09-28-2021	0.00	100.00	100.00	93.93	87.88	45.66
One Year Ago 04-13-2021	0.78	99.22	94.14	76.97	38.68	5.36

Intensity:

None	D0 Abnormally Dry	D1 Moderate Drought	D2 Severe Drought	D3 Extreme Drought	D4 Exceptional Drought
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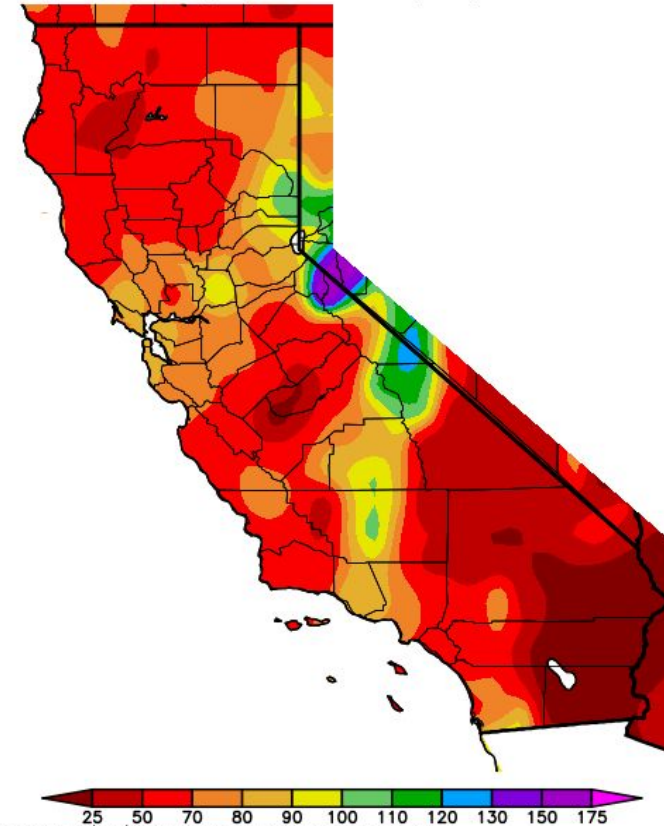
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to <https://droughtmonitor.unl.edu/About.aspx>

Author:
Richard Tinker
CPC/NOAA/NWS/NCEP



droughtmonitor.unl.edu

Percent of Average Precipitation (%)
10/1/2021 – 4/13/2022



Generated 4/14/2022 at WRCC using provisional data.
NOAA Regional Climate Centers

- Late season precipitation from these storms may provide some drought relief to portions of Northern California
- As of 12 Apr, severe drought conditions persist throughout California with extreme drought conditions over Northern California, the Central Valley, and the desert Southwest
- Much of California remains below normal for water year-to-date precipitation