



Center for Western Weather  
and Water Extremes

SCRIPPS INSTITUTION OF OCEANOGRAPHY  
AT UC SAN DIEGO

# CW3E Subseasonal Outlook: 1 April 2026

*Prepared by: J. Wang, C. Castellano, Z. Yang, M. DeFlorio, J. Kalansky*

UC San Diego



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# CW3E Subseasonal Outlooks: Glossary & Context

- The outlooks are based on CW3E subseasonal forecast products that can be found here: [https://cw3e.ucsd.edu/s\\_and\\_s\\_forecasts/](https://cw3e.ucsd.edu/s_and_s_forecasts/)
- CW3E subseasonal (2–6 weeks lead time) atmospheric river, ridging, and circulation regime products use three different global ensemble prediction systems to create these products:
  - NCEP CFSv2 (US Model): Weeks 2–4
  - ECCO (Canadian Model): Weeks 2–4
  - ECMWF (European model): Weeks 2–4
- *On the following slides, the term confidence refers to the forecasters' interpretation of the magnitude of the anomalies, the level of ensemble agreement, and the skill of the products used to generate the forecasts. All the tools used are shown in the outlook presentation.*
- *The thresholds for below-normal, near-normal, and above-normal conditions are determined by forecast product and noted on each forecast product slide*

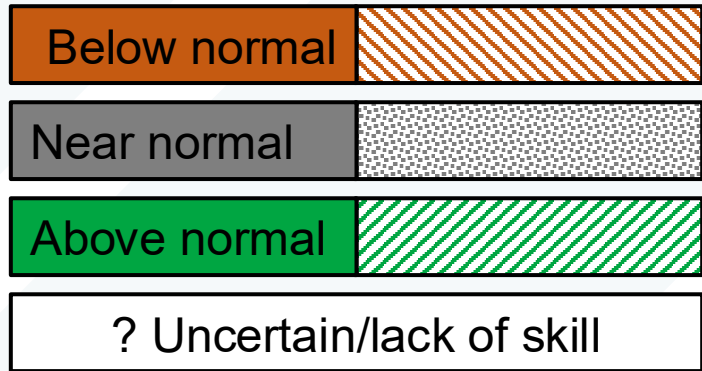
# Summary: Subseasonal Precipitation Outlook by Model

This slide shows the CW3E synthesis of subseasonal products by model

## Forecasts Initialized 30 Mar 2026

Region	Week 2 (6–12 Apr)				Week 3 (13–19 Apr)				Week 4 (20–26 Apr)			
	NCEP <sup>1</sup>	ECMWF <sup>1,2</sup>	ECMWF <sup>1,2</sup>	Multi-Model Forecast	NCEP <sup>1</sup>	ECMWF <sup>1,2</sup>	ECMWF <sup>1,2</sup>	Multi-Model Forecast	NCEP <sup>1</sup>	ECMWF <sup>1,2</sup>	ECMWF <sup>1,2</sup>	Multi-Model Forecast
WA/OR	Below normal	Below normal	Uncertain	Below normal	Near normal	Above normal	Uncertain	Uncertain	Below normal	Near normal	Uncertain	Uncertain
Northern CA	Near normal	Below normal	Uncertain	Uncertain	Above normal	Near normal	Uncertain	Uncertain	Near normal	Near normal	Uncertain	Near normal
Central CA	Above normal	Below normal	Uncertain	Uncertain	Above normal	Near normal	Uncertain	Uncertain	Above normal	Near normal	Uncertain	Uncertain
Southern CA	Above normal	Near normal	Uncertain	Uncertain	Above normal	Near normal	Uncertain	Uncertain	Above normal	Near normal	Uncertain	Uncertain

Higher Confidence | Lower Confidence



- Forecasts show uncertainty in precipitation conditions over CA during Weeks 2–3
- Forecasts tilt the odds toward near-normal precipitation in Northern CA during Week 4; more uncertainty over Central and Southern CA

### Subseasonal products included in this Outlook:

<sup>1</sup>CW3E/JPL Atmospheric River Activity Forecasts ([DeFlorio et al. 2019](#), [Zhang et al. 2023](#))

<sup>2</sup>CW3E/JPL Ridging Forecasts ([Gibson et al. 2020](#))

<sup>3</sup>IRI North American Weather Regime Forecasts ([Robertson et al. 2020](#)) – Unavailable This Week

<sup>4</sup>CW3E West Coast Weather Regime Forecasts (Guirguis et al. [2023a](#) and [2023b](#))

# Summary

## **MJO/QBO Conditions**

- Strong MJO convection is currently located over the Central Pacific/Western Hemisphere (Phase 1); QBO is in the easterly phase
  - Without considering QBO/ENSO conditions, MJO in the Western Hemisphere is associated with an increase in extreme precipitation over Central and Southern CA at lag times of 1–2 weeks
  - The statistical relationship between the MJO over the Central Pacific and extreme precipitation is consistent with the NCEP Week 2–4 AR activity forecasts
- NCEP is forecasting MJO convection to weaken in the middle of Week 1, then re-strengthen over the Western Pacific in the middle of Week 2

## **Week 2 Forecasts (6–12 Apr):**

- Models somewhat disagree on AR activity over CA
  - NCEP is forecasting near-normal AR activity over Northern CA, slightly above-normal AR activity over Central CA, and above-normal AR activity over Southern CA
  - ECCO is forecasting slightly below-normal AR activity over Northern CA, near-normal to slightly below-normal AR activity over Central CA, both with high confidence, and near-normal AR activity over Southern CA
  - ECMWF is forecasting near-normal AR activity over Northern and Central CA, and near-normal to slightly above-normal AR activity over Southern CA
- ECMWF Ridging outlook shows high likelihood of above-normal South-ridge activity (wet conditions in Northern CA; dry conditions in Southern CA)
- IRI North American weather regime forecasts and CW3E West Coast weather regime forecasts do not extend to Weeks 2–4 (last valid forecast date is 31 Mar)

# Summary

## **Week 3 Forecasts (13–19 Apr):**

- Models somewhat disagree on AR activity over CA
  - NCEP is forecasting near-normal to above-normal AR activity over Northern CA, and slightly above-normal to above-normal AR activity over Central and Southern CA
  - ECCC is forecasting near-normal AR activity over CA
  - ECMWF is forecasting near-normal to slightly above-normal AR activity over CA
- ECMWF Ridging outlook shows uncertainty in frequency and location of ridging activity during Weeks 3–4

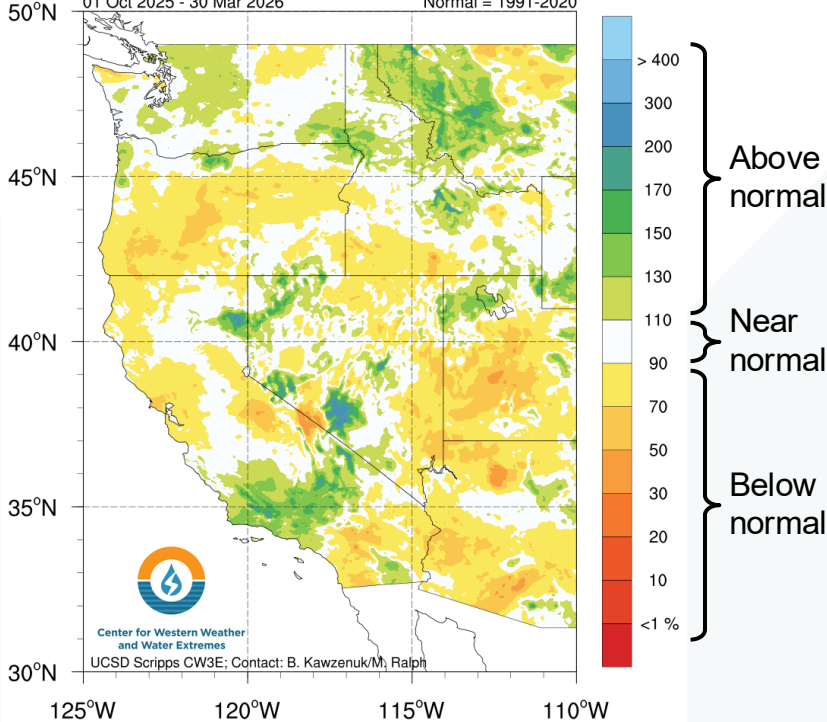
## **Week 4 Forecasts (20–26 Apr):**

- Models generally agree on near-normal to slightly below-normal AR activity over Northern CA, but somewhat disagree on AR activity over Central and Southern CA during Week 4
  - In Northern CA, NCEP and ECMWF are forecasting near-normal to slightly below-normal AR activity with higher confidence in slightly below-normal AR activity, and ECCC is forecasting near-normal AR activity
  - In Central and Southern CA, ECCC and ECMWF are forecasting near-normal AR activity, and NCEP is forecasting near-normal to above-normal AR activity over Central CA, and above-normal AR activity over Southern CA

# Hydrologic Summary

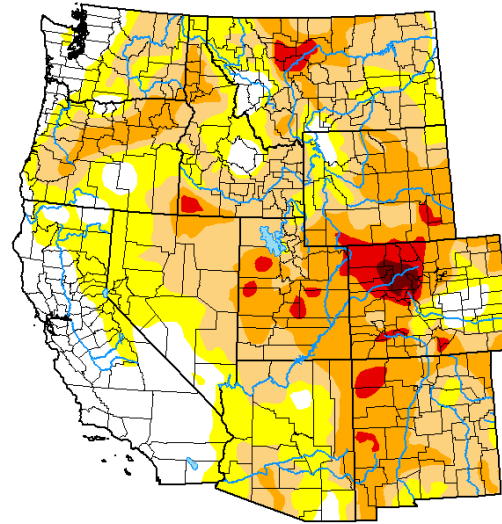
## Precipitation

PRISM Water Year to Date Precipitation Anomaly (%)  
01 Oct 2025 - 30 Mar 2026 Normal = 1991-2020



## Drought Conditions

### U.S. Drought Monitor West



March 24, 2026

(Released Thursday, Mar. 26, 2026)

Valid 8 a.m. EDT

	Drought Conditions (Percent Area)					
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	17.53	82.47	57.51	26.62	4.05	0.52
Last Week 03-17-2026	20.05	79.95	55.84	19.42	2.51	0.07
3 Months Ago 12-23-2025	31.66	68.34	44.23	19.68	1.81	0.05
Start of Calendar Year 01-06-2026	40.61	59.39	36.26	14.36	1.16	0.06
Start of Water Year 09-30-2025	18.15	81.85	64.82	44.12	12.00	0.69
One Year Ago 03-25-2025	34.77	65.23	49.06	29.85	13.30	1.21

Intensity:

None	D2 Severe Drought
D0 Abnormally Dry	D3 Extreme Drought
D1 Moderate Drought	D4 Exceptional Drought

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:  
Rocky Blotta  
NCEI/NOAA

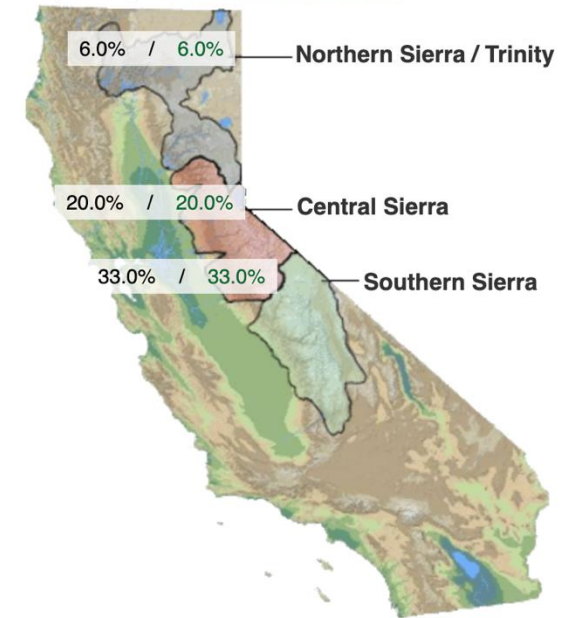


## Snowpack Conditions

Provided by the California Cooperative Snow Surveys

Data For: 30-Mar-2026

% Apr 1 Avg. / % Normal for this Date



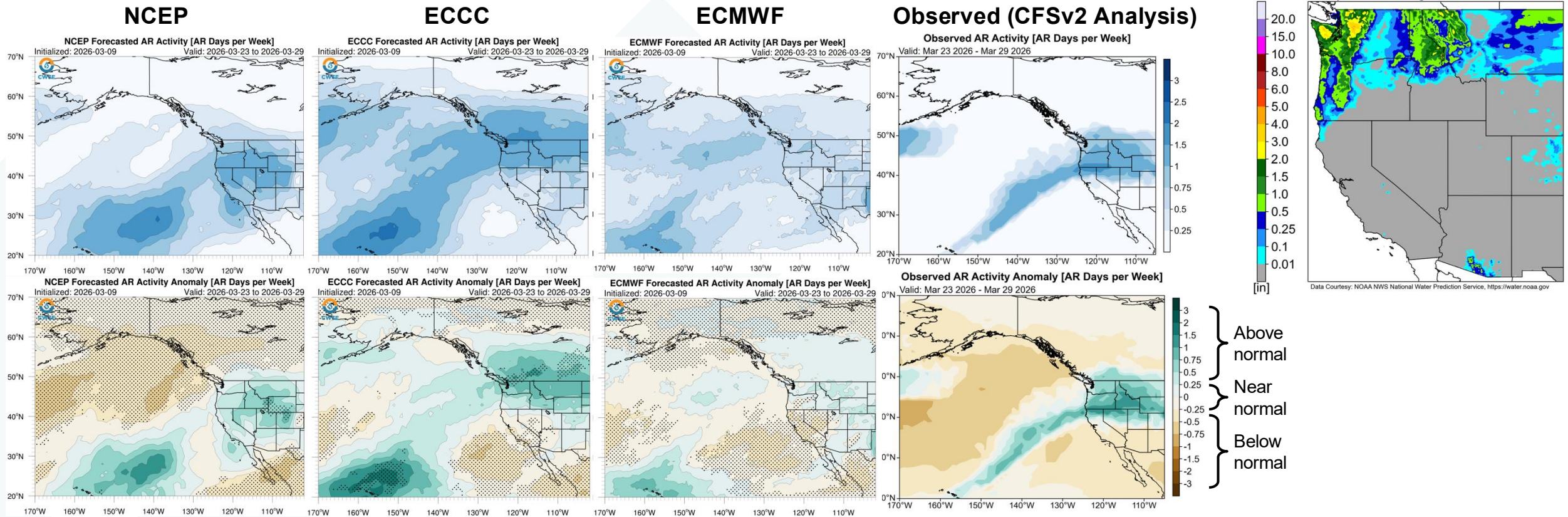
Source: California DWR

Disclaimer: In addition to climate indicators, the U.S. Drought Monitor also uses impact reports from local observers about crop failures or water restrictions to quantify drought.

- As of 30 Mar, water-year-to-date precipitation is still running **slightly above normal to above normal (>110% of normal)** in portions of Central and Southern CA and **slightly below normal to near normal (70–110% of normal)** across most of the rest of the state
- The most recent drought monitor update is showing abnormally dry conditions in portions of interior Northern and Central CA
- As of 30 Mar, estimated snowpack is **well-below normal (<50% of normal)** statewide, with the largest deficit in the Northern Sierra Nevada/Trinity region (**6% of normal**), followed by the Central Sierra Nevada (**20% of normal**) and Southern Sierra Nevada (**33% of normal**)

# Looking Back: Week 3 AR Activity Forecasts

Forecasts Initialized 9 Mar 2026; Valid: 23–29 Mar 2026

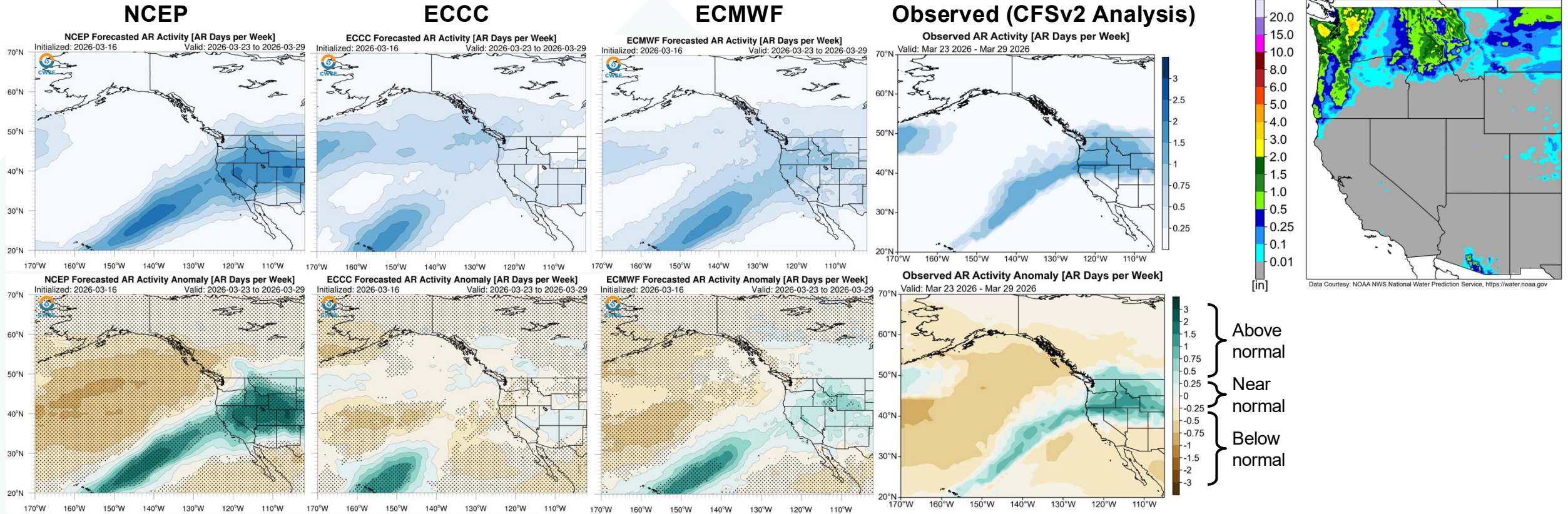


Shading: Fractional # of AR days forecast over a 7-day period (top) and forecast minus model climatology (bottom; green/blue = higher than climatology; brown = lower than climatology)

- At 3-week lead times, ECCC generally captured the axis of enhanced AR activity extending from the Central North Pacific to the Pacific Northwest, but displaced northward than observed
- NCEP also captured the broad pattern of AR activity, but with a southward shift in spatial extent and overestimated the AR activity over Central and Southern CA
- ECMWF underestimated AR activity in Northern CA
- An AR brought light to moderate precipitation (up to 4 inches) to the Pacific Northwest during 23–26 Mar

# Looking Back: Week 2 AR Activity Forecasts

Forecasts Initialized 16 Mar 2026; Valid: 23–29 Mar 2026



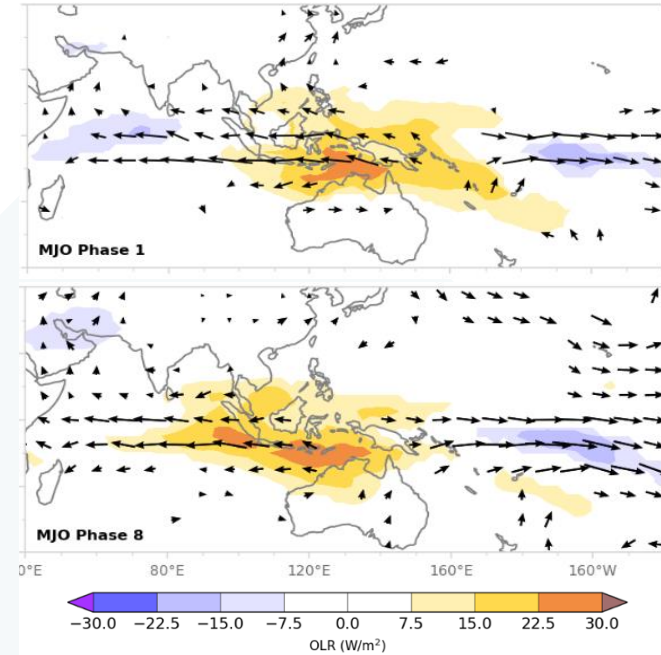
Shading: Fractional # of AR days forecast over a 7-day period (top) and forecast minus model climatology (bottom; green/blue = higher than climatology; brown = lower than climatology)

- At 2-week lead times, NCEP and ECMWF generally captured the axis of enhanced AR activity but underestimated the amplitude of the ridge near California, leading to an overestimation of AR activity in Central and Southern CA, particularly in NCEP
- An AR brought light to moderate precipitation (up to 4 inches) to the Pacific Northwest during 23–26 Mar

# Dynamical Model MJO Forecasts (NCEP)

## Observed MJO

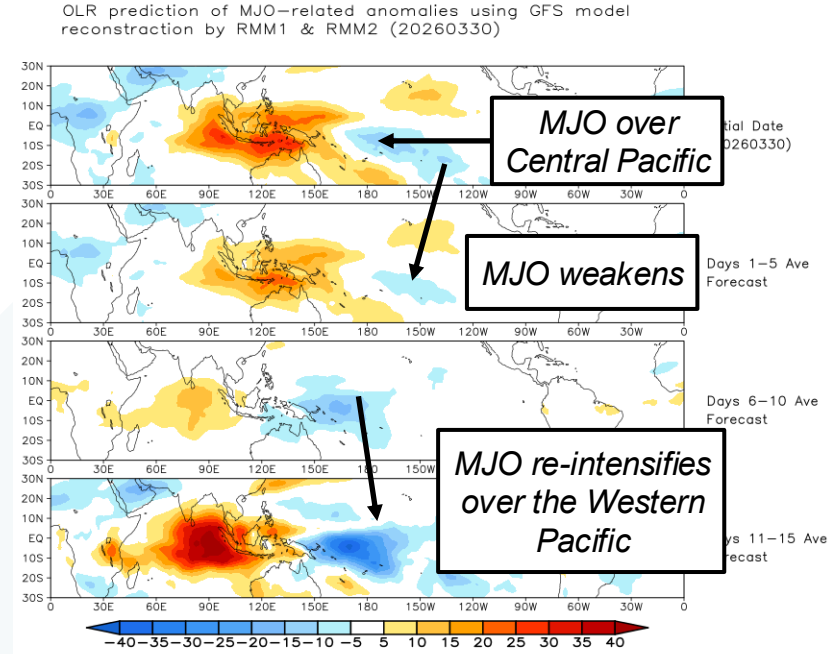
### Phases 8&1 (Western Hemisphere)



OLR = Outgoing longwave radiation

- As of 30 Mar, strong MJO convection is currently located over the Central Pacific/Western Hemisphere (Phase 1)
- NCEP is forecasting MJO convection to weaken and become less organized during Week 1, then re-strengthen over the Western Pacific in the middle of Week 2
- MJO convection over the Western Hemisphere is associated with a weak trough over the Northeast Pacific at lag times of 1–2 weeks, leading to slightly increased moisture transport and an increase in extreme precipitation frequency over Central and Southern CA

## Weeks 1–2 MJO Prediction



## Circulation and Moisture Transport Anomalies

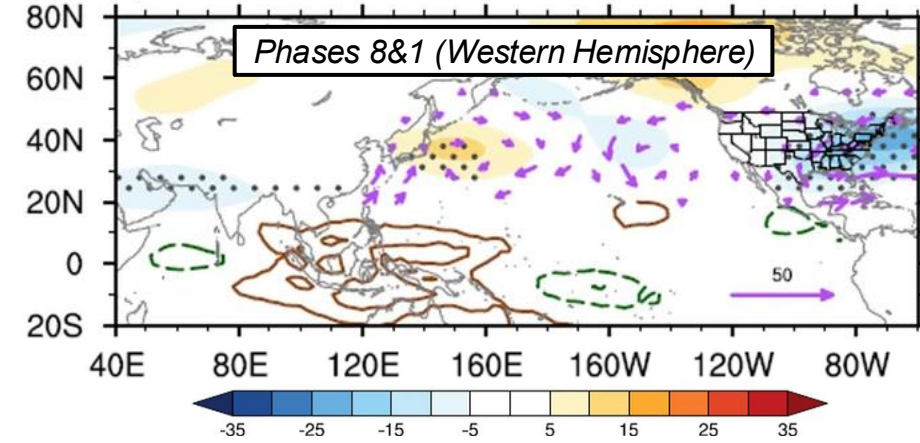


Figure 5 from Wang et al. (2024)

Composite Z500 anomalies (shading; orange = positive; blue = negative), IVT anomalies (vectors); and OLR anomalies (brown = suppressed convection; green = enhanced convection)

## Extreme Precipitation Frequency

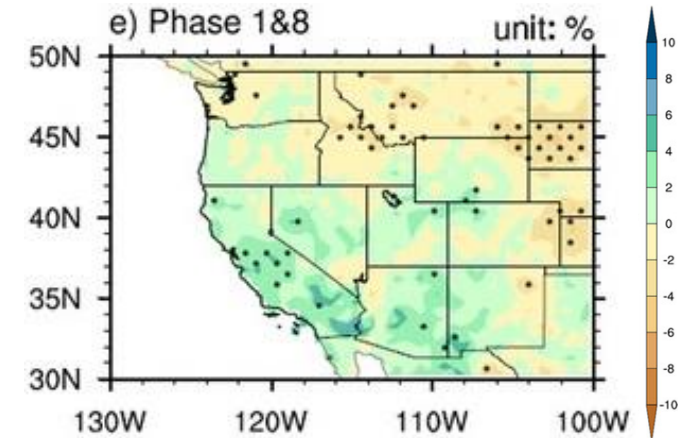
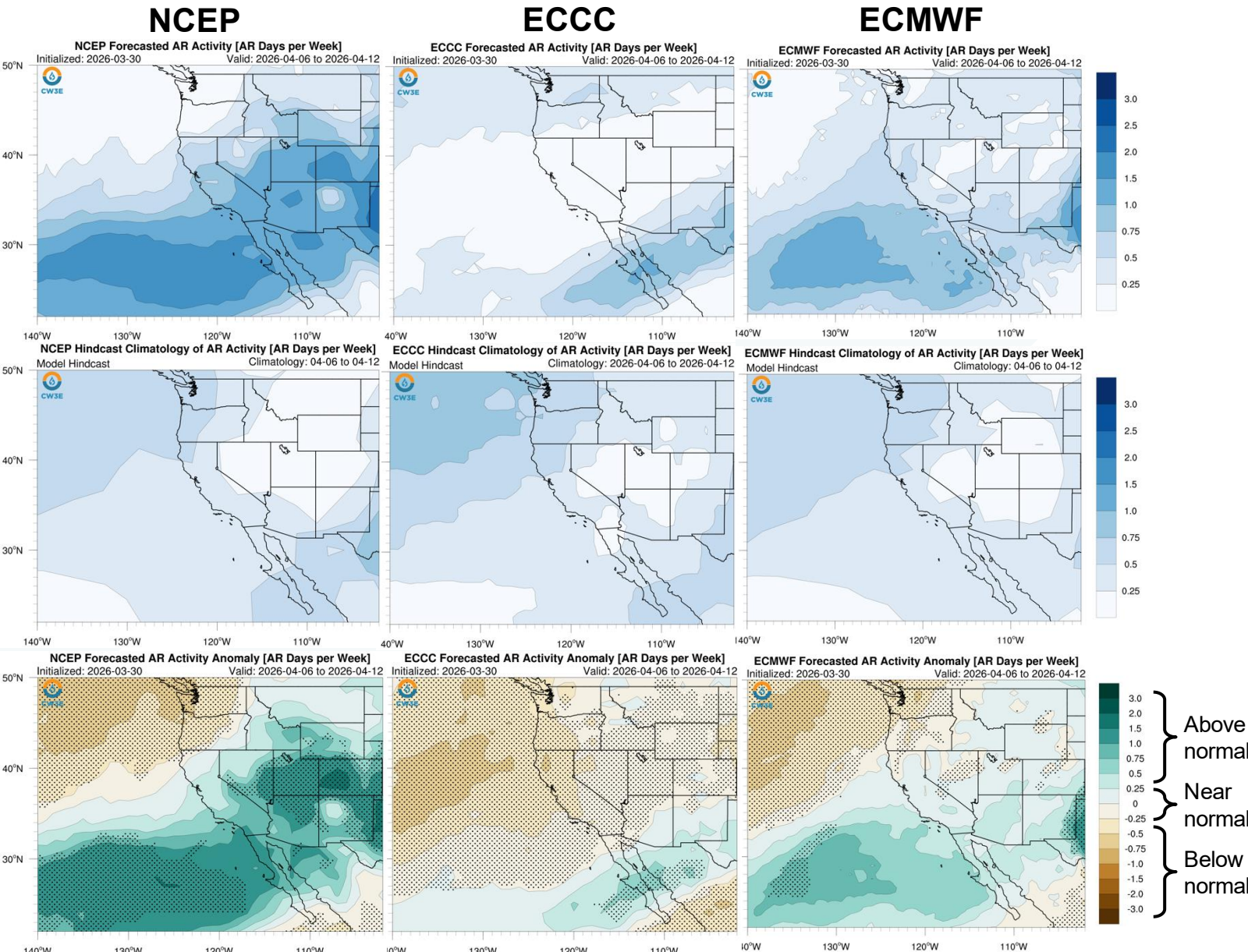


Figure 3 from Wang et al. (2023)

Percent Change in frequency of extreme precipitation (brown = decreased frequency; green/blue = increased frequency)

# AR Activity Forecasts: Week 2 (NCEP vs. ECCC vs. ECMWF)

**Forecasts Initialized 30 Mar 2026**



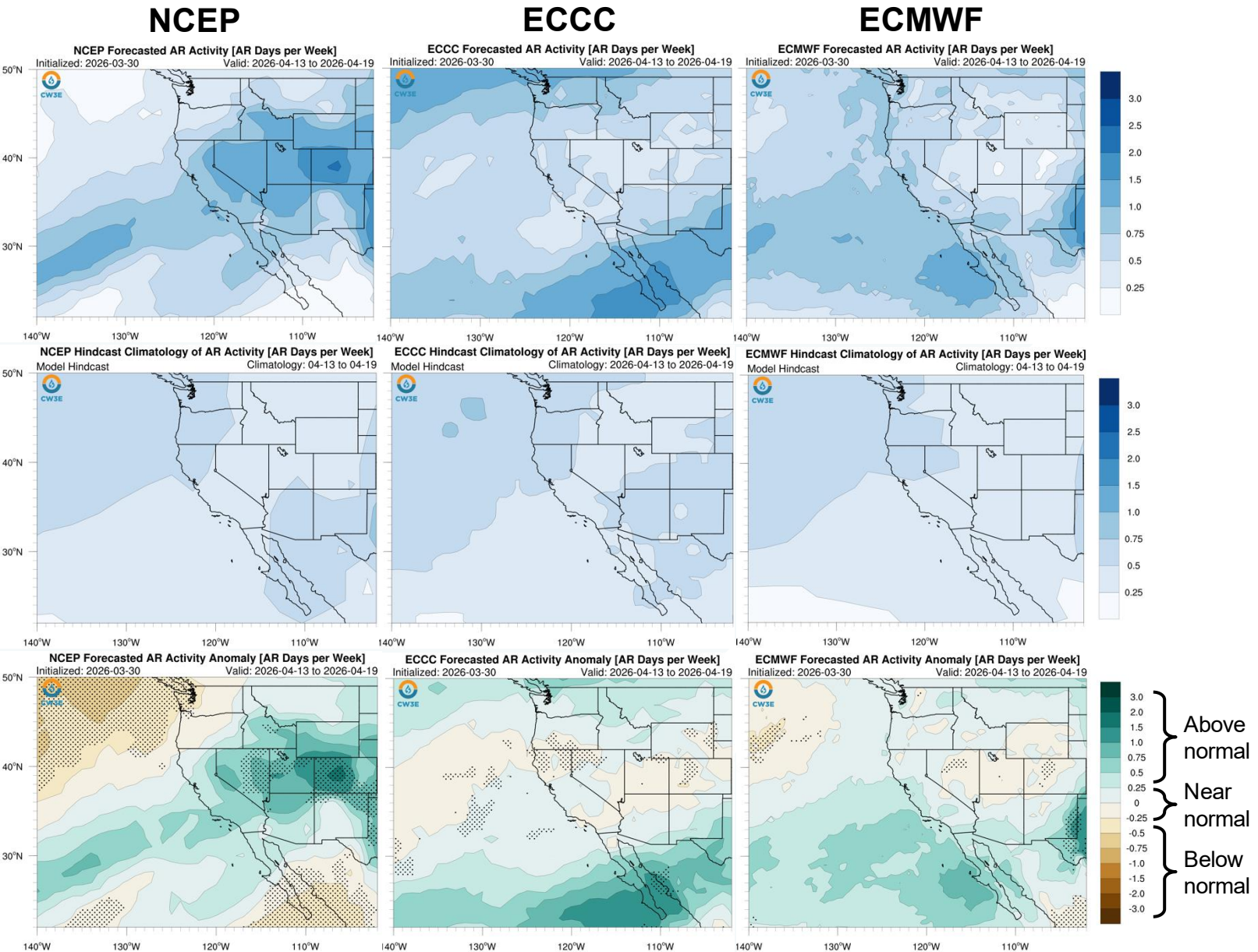
- NCEP is forecasting near-normal AR activity over Northern CA, slightly above-normal AR activity over Central CA, and above-normal AR activity over Southern CA during Week 2 (6–12 Apr)
- ECCC is forecasting slightly below-normal AR activity over Northern CA, near-normal to slightly below-normal AR activity over Central CA, both with high confidence, and near-normal AR activity over Southern CA
- ECMWF is forecasting near-normal AR activity over Northern and Central CA, and near-normal to slightly above-normal AR activity over Southern CA

Models somewhat disagree on AR activity over CA during Week 2 (6–12 Apr)

Shading: Fractional # of AR days forecast over a 7-day period (top), model climatology (middle), and forecast minus model climatology (bottom; green/blue = higher than climatology; brown = lower than climatology)

# AR Activity Forecasts: Week 3 (NCEP vs. ECCC vs. ECMWF)

Forecasts Initialized 30 Mar 2026



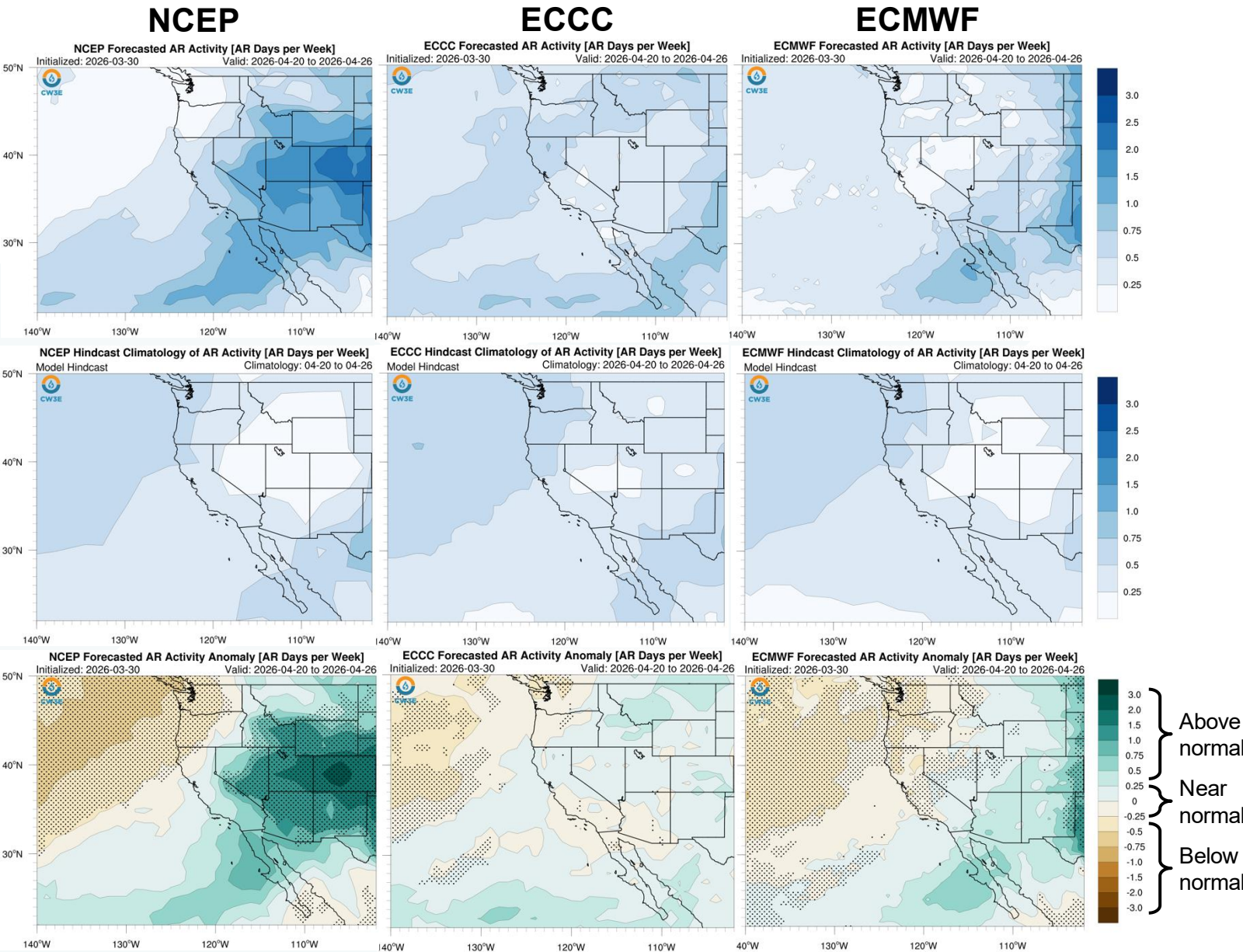
- NCEP is forecasting near-normal to above-normal AR activity over Northern CA, and slightly above-normal to above-normal AR activity over Central and Southern CA during Week 3 (13–19 Apr)
- ECCC is forecasting near-normal AR activity over CA
- ECMWF is forecasting near-normal to slightly above-normal AR activity over CA

Models somewhat disagree on AR activity over CA during Week 3 (13–19 Apr)

Shading: Fractional # of AR days forecast over a 7-day period (top), model climatology (middle), and forecast minus model climatology (bottom; green/blue = higher than climatology; brown = lower than climatology)

# AR Activity Forecasts: Week 4 (NCEP vs. ECCC vs. ECMWF)

**Forecasts Initialized 30 Mar 2026**

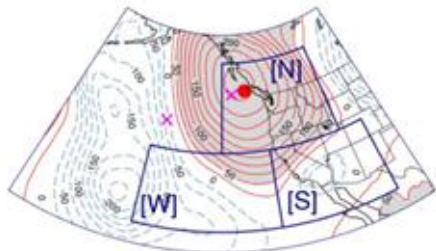


- In Northern CA, NCEP and ECMWF are forecasting near-normal to slightly below-normal AR activity with higher confidence in slightly below-normal AR activity, and ECCC is forecasting near-normal AR activity during Week 4 (20–26 Apr)
- In Central and Southern CA, ECCC and ECMWF are forecasting near-normal AR activity, and NCEP is forecasting near-normal to above-normal AR activity over Central CA, and above-normal AR activity over Southern CA

Models generally agree on near-normal to slightly below-normal AR activity over Northern CA, but somewhat disagree on AR activity over Central and Southern CA during Week 4 (20–26 Apr)

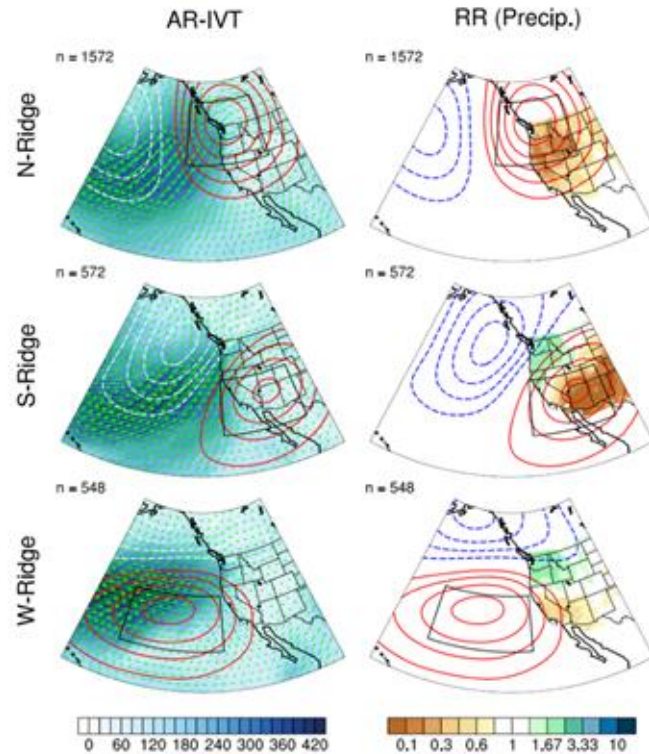
Shading: Fractional # of AR days forecast over a 7-day period (top), model climatology (middle), and forecast minus model climatology (bottom; green/blue = higher than climatology; brown = lower than climatology)

# Background Info: Subseasonal Ridging Outlooks



N = North Ridge  
S = South Ridge  
W = West Ridge

This slide contains background information about the three different ridge types in CW3E's subseasonal ridging outlook tool



- The North-Ridge type is typically associated with widespread dry conditions across the entire western US
- The South-Ridge type is typically associated with dry conditions in Southern CA and the Colorado River Basin and wet conditions in the Pacific Northwest
- The West-Ridge type is typically associated with dry conditions over Central and Southern CA and wet conditions over the Pacific Northwest

## How each ridge type typically influences precipitation

**Left:** Maps showing the average influence of each ridge type (red contours) on integrated vapor transport (IVT, blue shading indicates greater moisture transport, arrows indicate direction) during atmospheric river events

**Right:** Maps showing the 'Relative Risk' (RR) of precipitation under each ridge type. Brown shading indicates a reduced chance of precipitation when ridging occurs. For example, a RR value of 0.2 indicates a 5-fold reduction in the likelihood of precipitation



Jet Propulsion Laboratory  
California Institute of Technology



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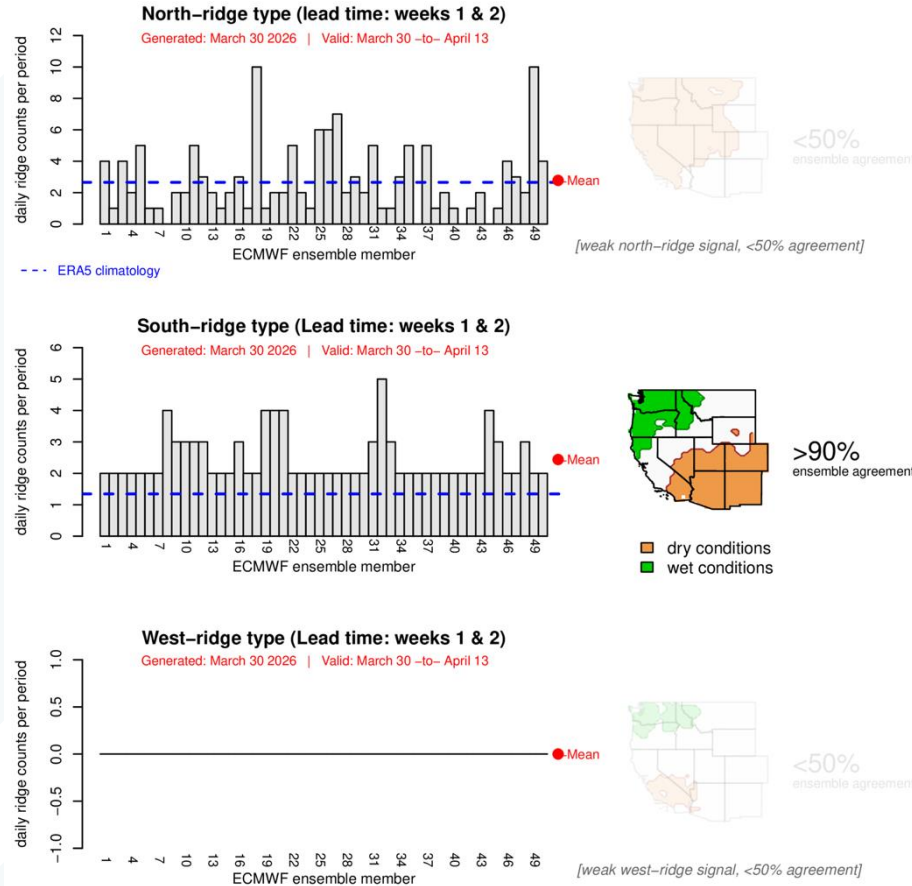
Contact: [pgibson@ucsd.edu](mailto:pgibson@ucsd.edu)  
Reference: Gibson et al. (2020)  
Journal of Climate

# Ridging Forecasts: Weeks 1–2 (ECMWF)

Forecasts Initialized 30 Mar 2026

## ECMWF

### CW3E Subseasonal Ridging Forecast (Uses ECMWF model)



- ECMWF is forecasting above-normal South-ridge activity with high confidence (>90% ensemble agreement) during Weeks 1–2 (30 Mar – 13 Apr)
- ECMWF is also forecasting near-normal North-ridge activity
- The West-ridge type forecasts are unavailable

NCEP  
Unavailable



ECMWF shows high likelihood of persistent ridging activity over the southwestern US during Weeks 1–2 (30 Mar – 13 Apr)



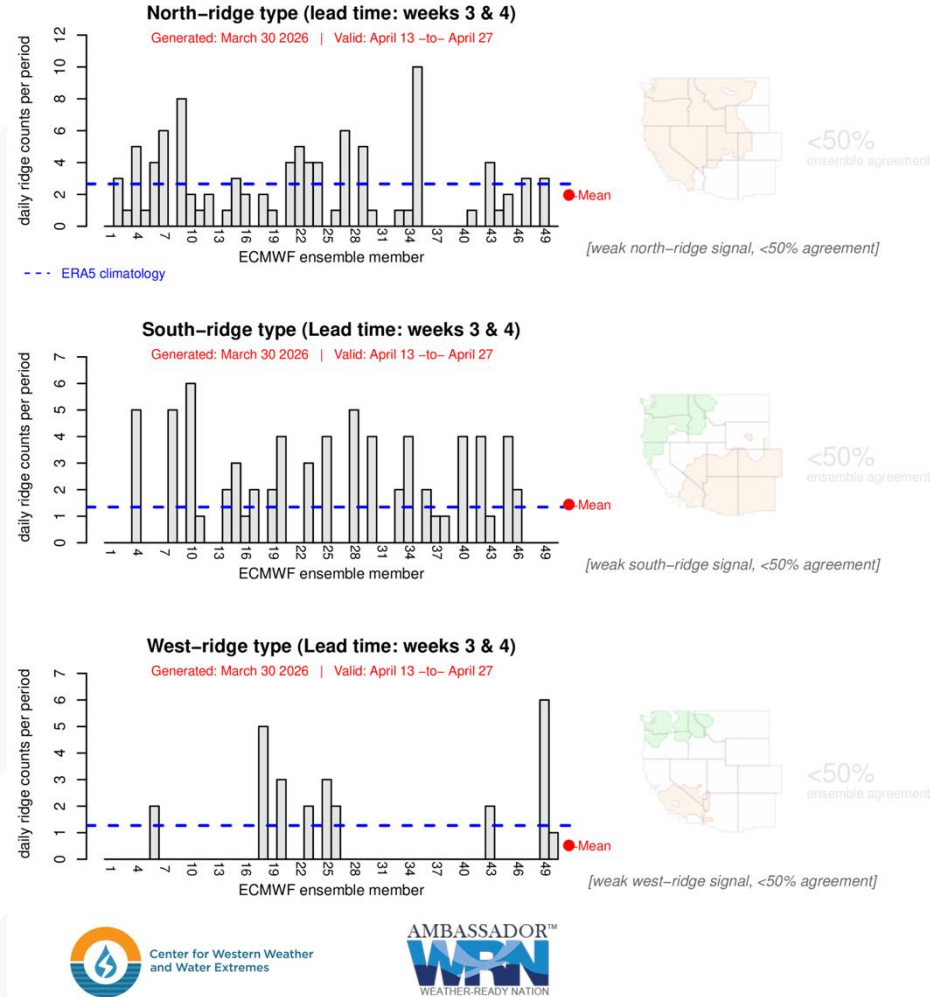
# Ridging Forecasts: Weeks 3–4 (ECMWF)

Forecasts Initialized 30 Mar 2026

NCEP  
Unavailable

## ECMWF

### CW3E Subseasonal Ridging Forecast (Uses ECMWF model)

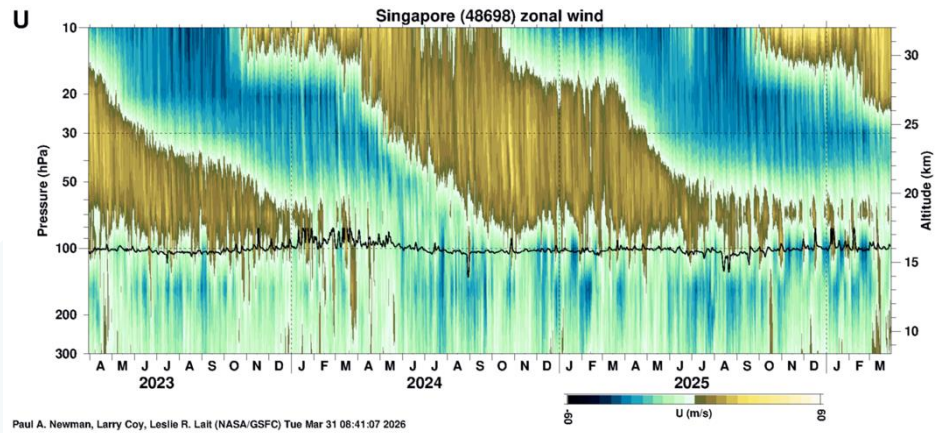


- ECMWF is forecasting near-normal South-ridge activity, slightly below-normal North-ridge activity, and below-normal West-ridge activity during Weeks 3–4 (13–27 Apr)

ECMWF shows uncertainty in frequency and location of ridging activity during Weeks 3–4 (13–27 Apr)

# Background Info: AR Activity and Precipitation Based on MJO and QBO

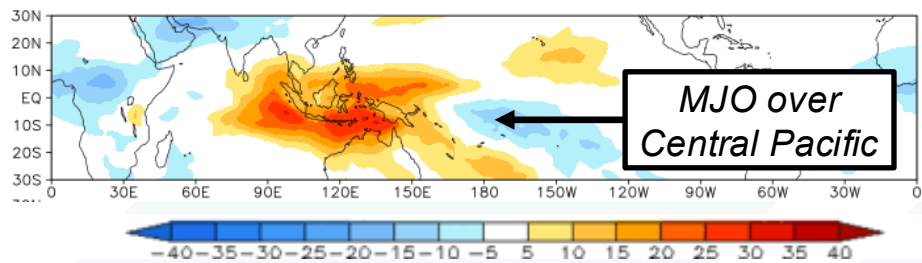
## QBO Conditions



**QBO is in the easterly phase at 50-hPa**

## MJO Conditions

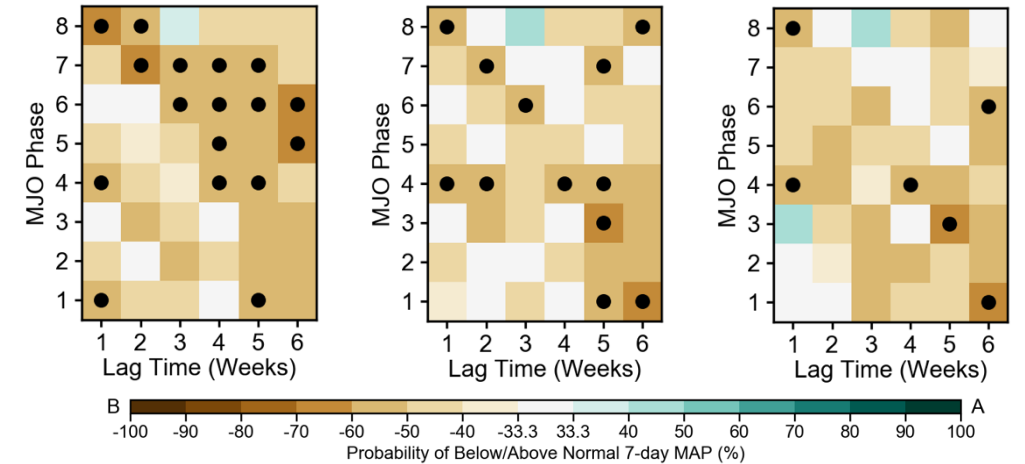
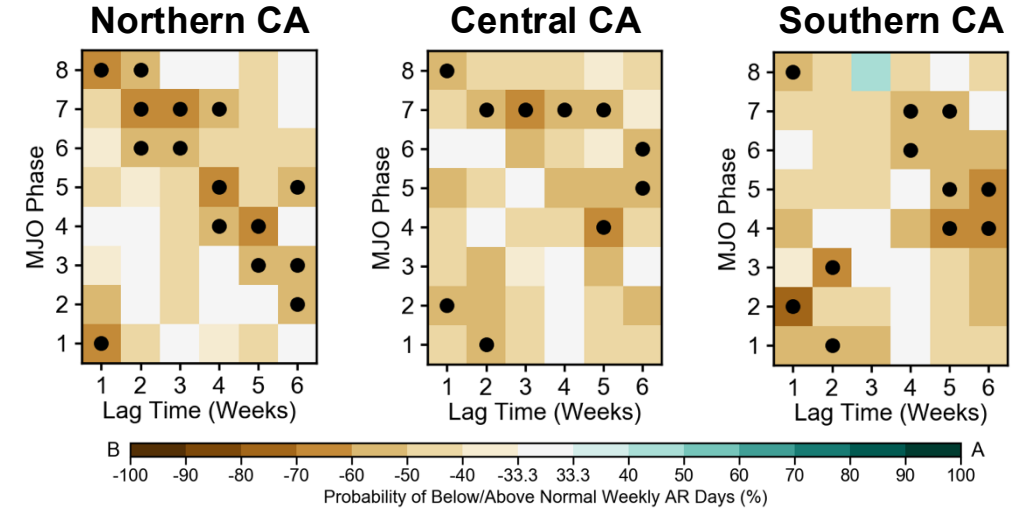
OLR prediction of MJO-related anomalies using GFS model reconstruction by RMM1 & RMM2 (20260330)



**MJO convection is currently located over the Central Pacific/Western Hemisphere (Phase 1)**

**Probability of Above/  
Below-Normal  
AR Occurrence  
(EQBO in JFM)**

**Probability of Above/  
Below-Normal  
Precipitation  
(EQBO in JFM)**



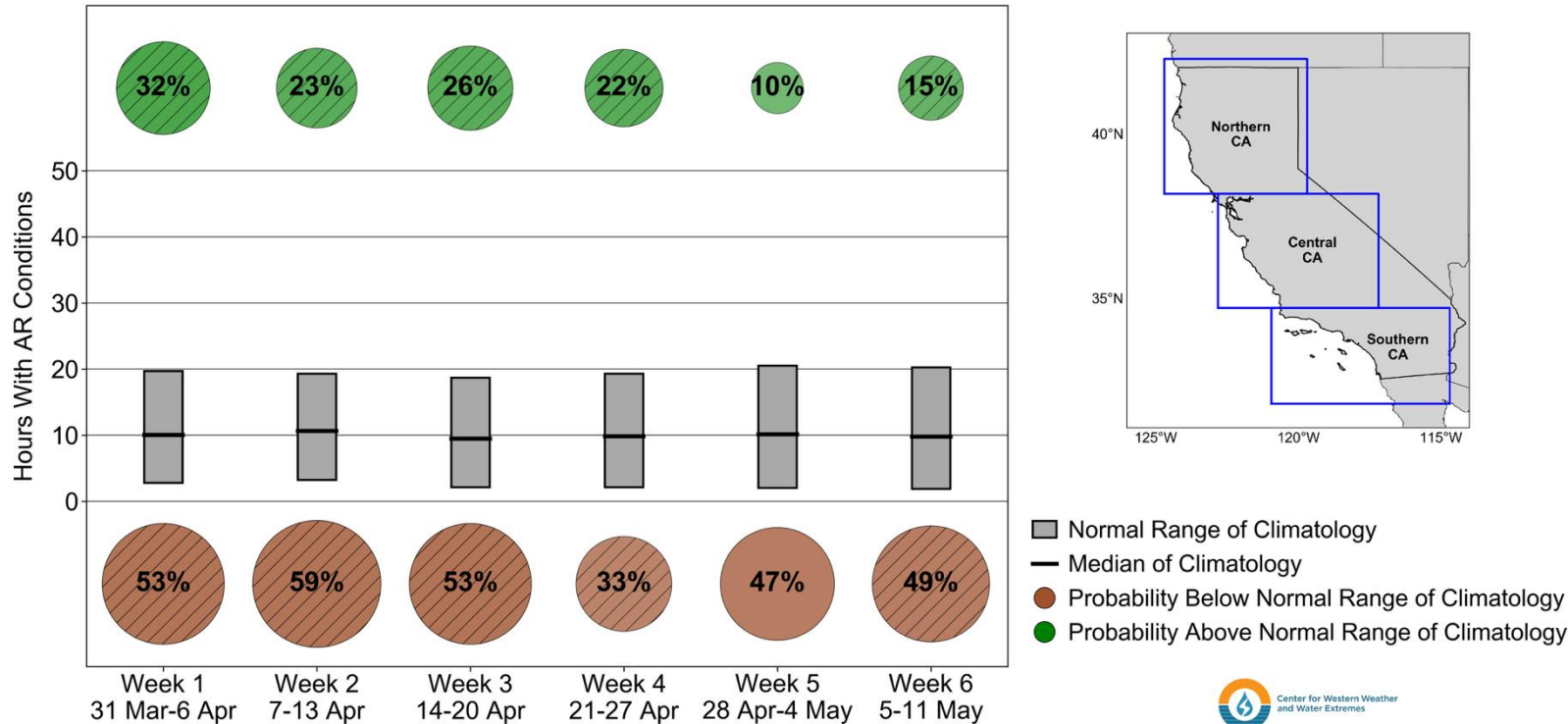
Probability matrices illustrating the weeks 1–6 lagged probability of below-normal (brown shading) or above-normal (green shading) AR occurrence and precipitation for all MJO phases when the QBO is in the westerly phase during JFM in Northern CA (left), Central CA (middle), and Southern CA (right). White squares indicate that the near-normal category has the highest probability. The black dots denote statistically significant probabilities of below- or above-normal conditions based on a bootstrapping analysis. Historical observations less (more) than the lower (upper) tercile of climatology (1981–2019 period) are considered below (above) normal.

# AR Activity and Precipitation Based on MJO and QBO

Forecasts Initialized 23 Mar 2026

## AR Occurrence: Southern CA

Southern CA Subseasonal AR Occurrence Outlook  
Issued: 30 Mar 2026 MJO Phase 1 EQBO



- CW3E's probabilistic AR occurrence forecast based on current MJO and QBO conditions (see forecast for all regions [here](#))
- **Moderate likelihood ( $\geq 40\%$  probability) of below-normal AR occurrence in Southern CA during Weeks 2–3 (7–20 Apr)**
- Moderate likelihood of below-normal AR occurrence in Northern CA during Week 2 (7–13 Apr) and Week 4 (21–27 Apr)
- Moderate likelihood of below-normal AR occurrence in Central CA during Weeks 2–3

\*Sum of probabilities of below-normal, near-normal, and above-normal conditions is 100%

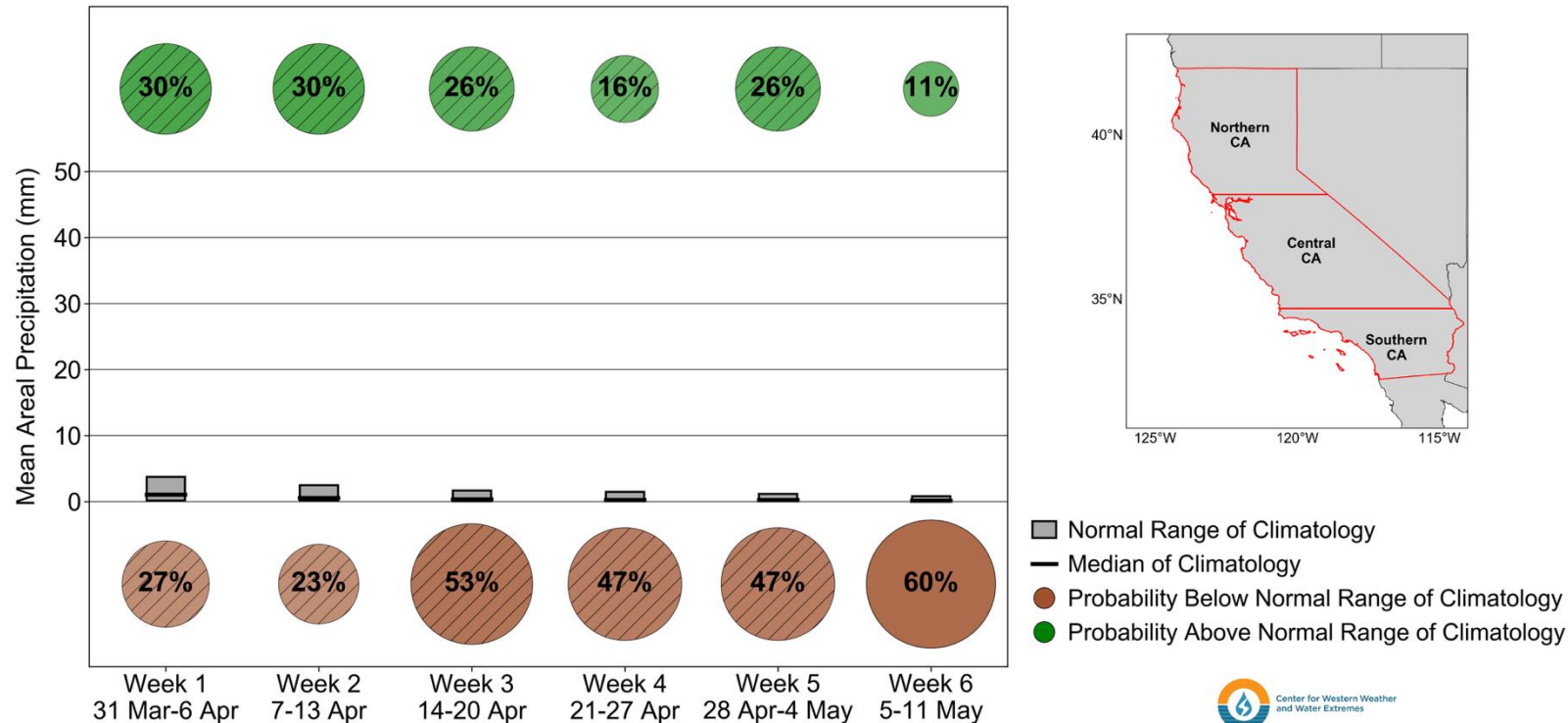
This product shows weekly probabilities of above-normal and below-normal AR occurrence in California. These probabilities are calculated for lead times of 1–6 weeks based on the current season (i.e., OND or JFM) and phases of the Madden-Julian Oscillation (MJO) and Quasi-biennial Oscillation (QBO). If MJO convection is weak or the QBO is in a neutral phase, no probabilities will be displayed. Circles without hatching denote periods with high confidence based on the hindcast skill assessment in [Castellano et al. \(2023\)](#).

# AR Activity and Precipitation Based on MJO and QBO

Forecasts Initialized 30 Mar 2026

## Precipitation: Southern CA

Southern CA Subseasonal Precipitation Outlook  
Issued: 30 Mar 2026 MJO Phase 1 EQBO



- CW3E's probabilistic precipitation forecast based on current MJO and QBO conditions (see forecast for all regions [here](#))
- **Moderate likelihood of below-normal precipitation in Southern CA during Weeks 3–4 (14–27 Apr)**
- Moderate likelihood of below-normal precipitation in Northern CA during Weeks 2–3 (7–20 Apr)
- Moderate likelihood of below-normal precipitation in Central CA during Week 3 (14–20 Apr)

\*Sum of probabilities of below-normal, near-normal, and above-normal conditions is 100%

This product shows weekly probabilities of above-normal and below-normal precipitation in California. These probabilities are calculated for lead times of 1–6 weeks based on the current season (i.e., OND or JFM) and phases of the Madden-Julian Oscillation (MJO) and Quasi-biennial Oscillation (QBO). If MJO convection is weak or the QBO is in a neutral phase, no probabilities will be displayed. Circles without hatching denote periods with high confidence based on the hindcast skill assessment in [Castellano et al. \(2023\)](#)