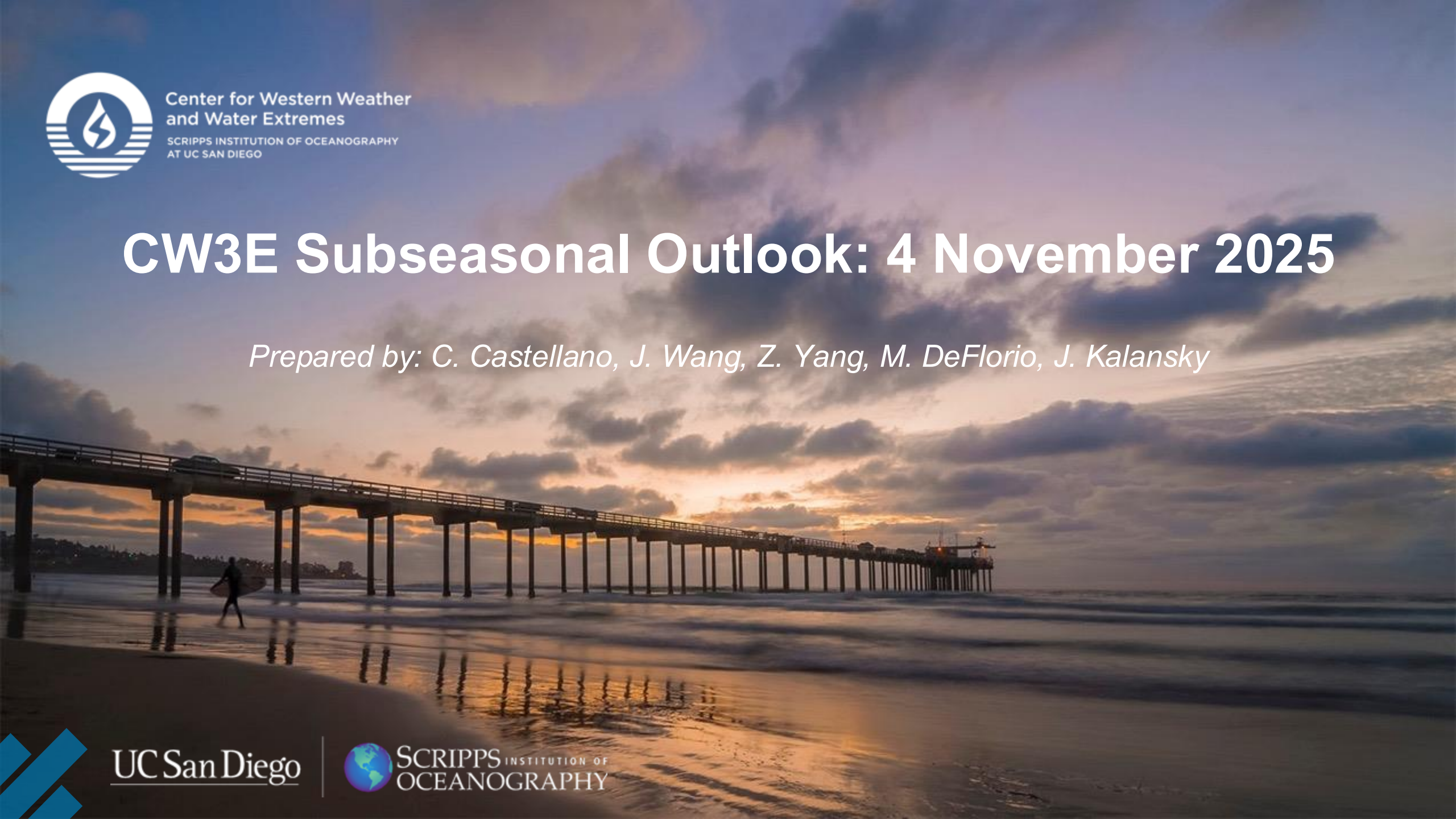

CW3E Subseasonal Outlook: 4 November 2025

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

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/**

- **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 2–6
  - ECCC (Canadian Model): Weeks 2–4
  - ECMWF (European model): Weeks 2–6

- ***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 3 Nov 2025

Region	Week 2 (10–16 Nov)				Week 3 (17–23 Nov)				Week 4 (24–30 Nov)			
	NCEP[1,2,3]	ECCC[1]	ECMWF[1,2]	Multi-Model Forecast	NCEP[1,2,3]	ECCC[1]	ECMWF[1,2]	Multi-Model Forecast	NCEP[1,2,3]	ECCC[1]	ECMWF[1,2]	Multi-Model Forecast
WA/OR		N/A				N/A				N/A		
Northern CA		N/A				N/A				N/A		
Central CA		N/A				N/A				N/A		
Southern CA		N/A				N/A				N/A		

Higher Confidence | Lower Confidence

- Below normal
- Near normal
- Above normal
- ? Uncertain/lack of skill

- Models favor above-normal precipitation in Northern CA during Week 2; more uncertainty in Central and Southern CA
- High degree of uncertainty in precipitation over all of CA during Weeks 3 and 4, but NCEP is leaning towards above-normal precipitation during Week 4

Subseasonal products included in this Outlook:

[1]CW3E/JPL Atmospheric River Activity Forecasts (DeFlorio et al. 2019, Zhang et al. 2023)
[2]CW3E/JPL Ridging Forecasts (Gibson et al. 2020)
[3]IRI North American Weather Regime Forecasts (Robertson et al. 2020)

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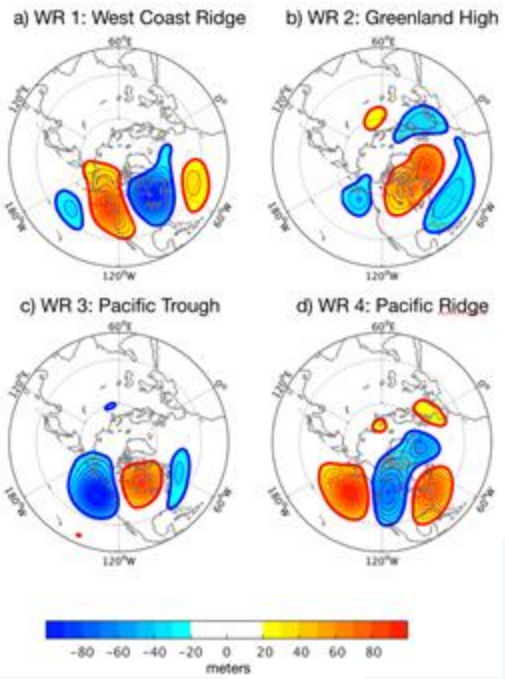
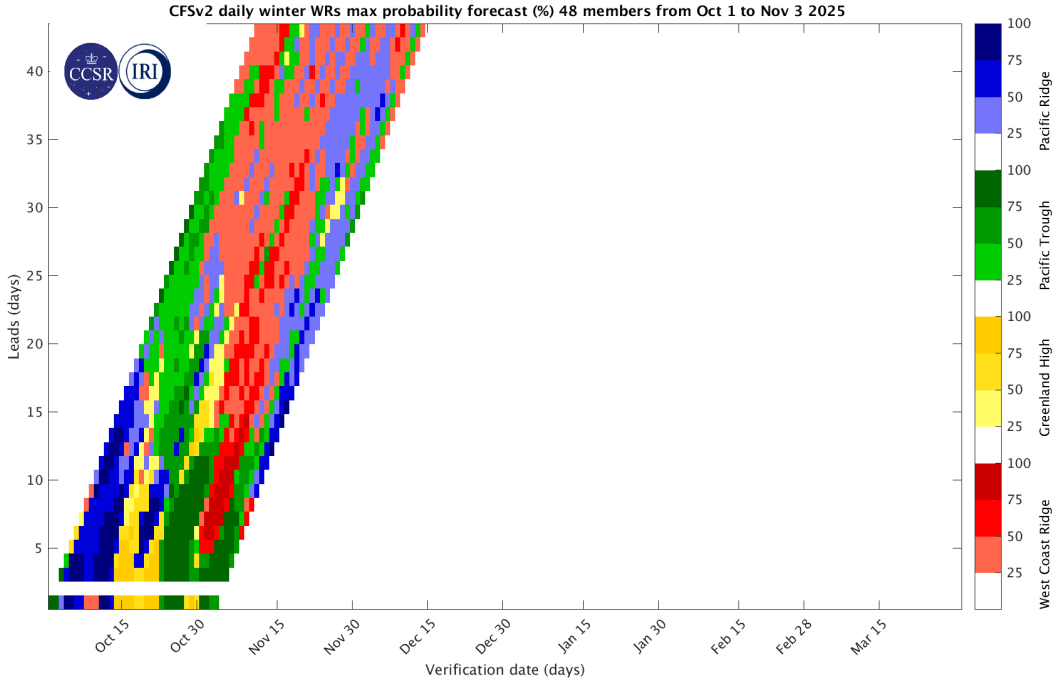
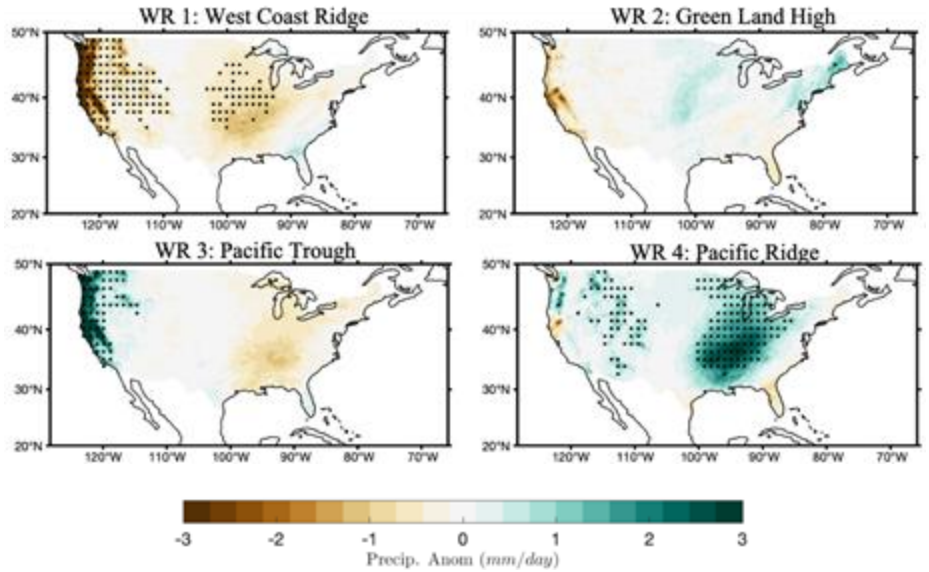
Potential Regime Shifts and Persistence







Product	Week 2 (10–16 Nov)	Week 3 (17–23 Nov)	Week 4 (24 Nov – 1 Dec)
IRI North American Weather Regime Forecasts	**Pacific Ridge**	**Pacific Ridge**	Pacific Ridge ↷ Pacific Trough

Regime Persistence (Pacific Ridge) ↷ Regime Shift Uncertain

- Potential for persistence of Pacific Ridge regime during Weeks 2–3
- Potential for regime shift from Pacific Ridge to Pacific Trough (wet and warm pattern of CA) during Week 4

Summary

MJO/QBO Conditions

- Strong MJO convection is currently located over the Maritime Continent (Phase 5); QBO is in the easterly phase
  - Without considering QBO/ENSO conditions, MJO in Phases 4&5 is associated with a decrease in onshore moisture transport and extreme precipitation over California at lag times of 1–2 weeks

- NCEP is forecasting MJO convection to propagate eastward into the Western Pacific (Phases 6&7) during Weeks 1–2

Week 2 forecasts (10–16 Nov):

- Models agree on above-normal AR activity over Central and Southern CA during Week 2, but disagree somewhat over Northern CA
  - NCEP is forecasting near-normal to slightly above-normal AR activity over Northern CA, whereas ECMWF is forecasting above-normal AR activity

- Ridging outlooks show high likelihood of persistent ridging activity near the US West Coast during Weeks 1–2
  - NCEP and ECMWF are both forecasting a high likelihood of above-normal South-ridge activity (dry conditions over Southern CA)
  - NCEP is also forecasting a high likelihood of above-normal West-ridge activity (dry conditions over Central and Southern CA)

- IRI weather regime tool shows moderate-to-high likelihood of Pacific Ridge (near-normal precipitation and below-normal temperature in CA) during Week 2

Summary

Week 3 Forecasts (17–23 Nov):

- Models disagree on AR activity over CA during Week 3
  - NCEP is forecasting above-normal AR activity over all of CA, whereas ECMWF is forecasting near-normal AR activity

- Ridging outlooks show uncertainty in frequency and location of ridging activity during Weeks 3–4
  - ECMWF is also forecasting a moderate likelihood of above-normal West-ridge activity (dry conditions over Central and Southern CA)

- IRI weather regime tool shows low-to-moderate likelihood of Pacific Trough (near-normal precipitation and below-normal temperature in CA) regime persistence through the end of Week 3

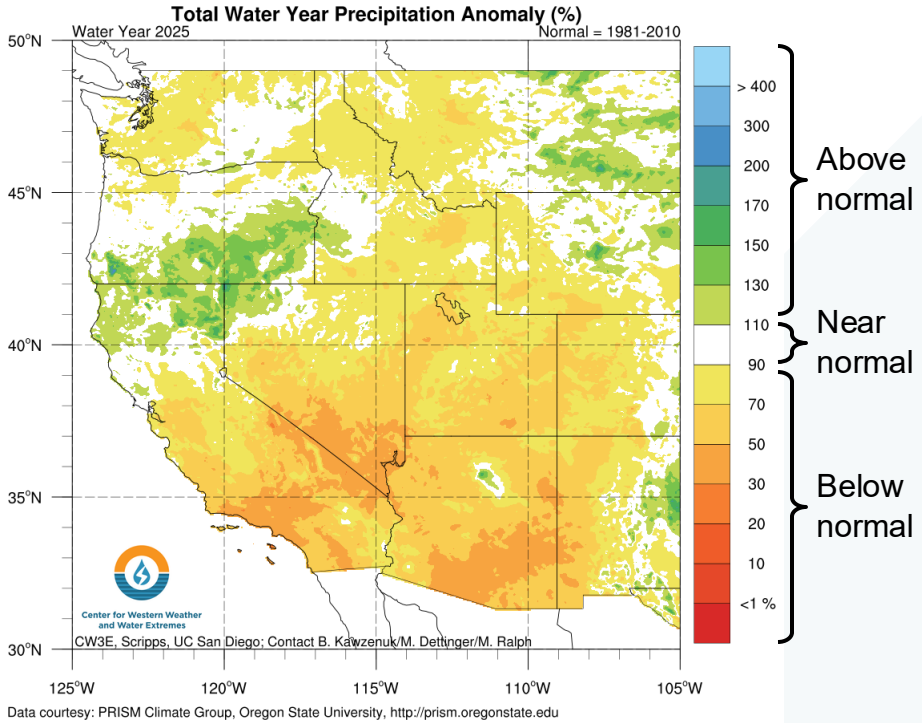
Week 4 Forecasts (24–30 Nov):

- Models disagree on AR activity over CA during Week 4
  - NCEP is forecasting above-normal AR activity over all of CA, whereas ECMWF is forecasting near-normal AR activity

- IRI weather regime tool shows low-to-moderate likelihood of transition to Pacific Trough (above-normal precipitation and temperature in CA) during Week 4

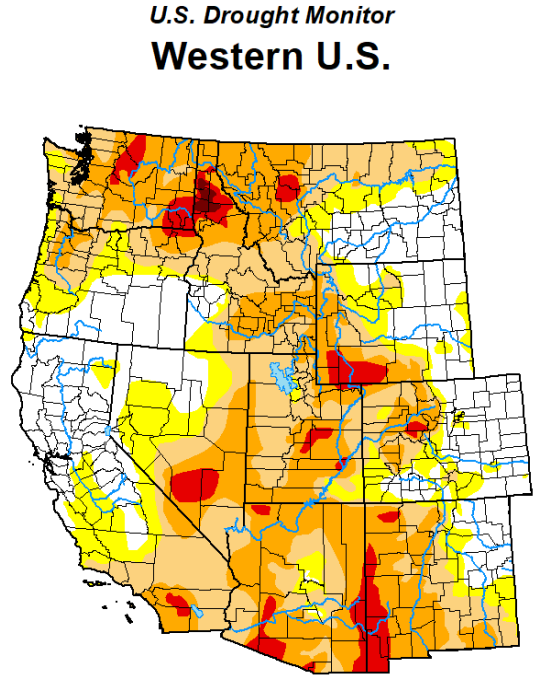
Hydrologic Summary

WY 2025 Precipitation



Data courtesy: PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu

Drought Conditions



October 28, 2025
(Released Thursday, Oct. 30, 2025)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	26.30	73.70	58.03	32.56	5.64	0.22
Last Week 10-21-2025	25.70	74.30	58.15	33.84	6.52	0.28
3 Months Ago 07-29-2025	12.86	87.14	67.29	42.00	13.11	0.99
Start of Calendar Year 01-07-2025	32.22	67.78	39.02	20.30	6.87	0.00
Start of Water Year 09-30-2025	18.15	81.85	64.82	44.12	12.00	0.69
One Year Ago 10-29-2024	15.18	84.82	44.14	18.52	5.01	0.18

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

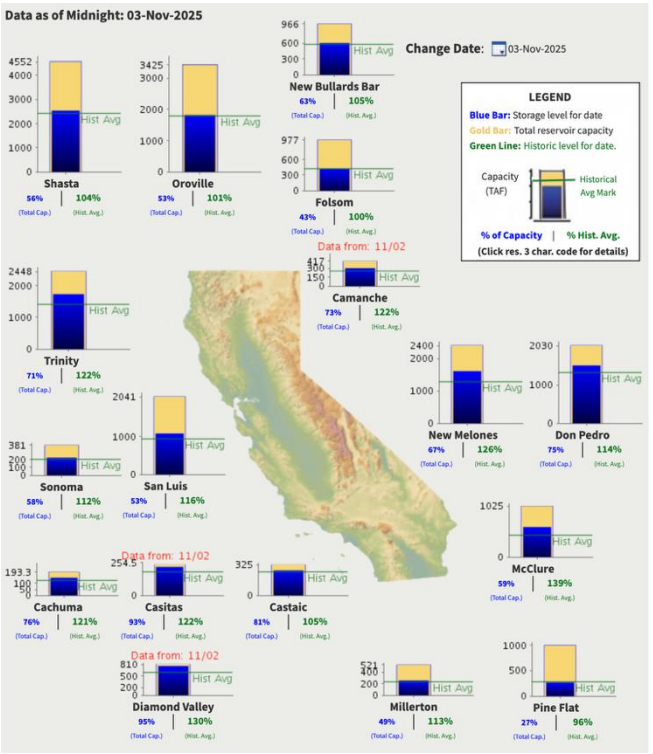
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:
Richard Tinker
CPC/NOAA/NWS/NCEP

droughtmonitor.unl.edu

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.

Reservoir Conditions



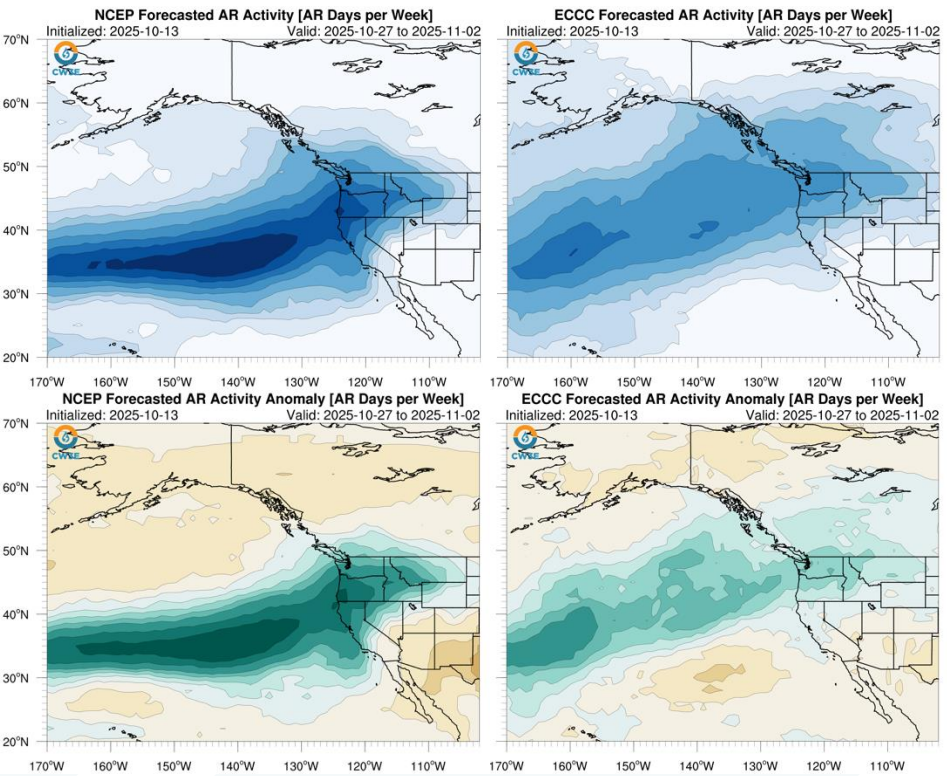
Source: California DWR

- Water year (WY) 2025 precipitation was **near-normal** to **slightly above-normal (90–130% of normal)** in Northern CA, **below-normal (50–90% of normal)** in Central CA, and **well-below normal (30–70% of normal)** in Southern CA
- The most recent drought monitor update is showing **abnormally dry conditions (D0)** in portions of Central CA and **moderate-to-severe drought (D1–D2)** in much of Southern CA
- As of 3 Nov, most large reservoirs in California are operating at ≥50% capacity and near or above-normal storage for this time of year

Looking Back: Week 3 AR Activity Forecasts

Forecasts Initialized 13 Oct 2025; Valid: 27 Oct – 2 Nov 2025

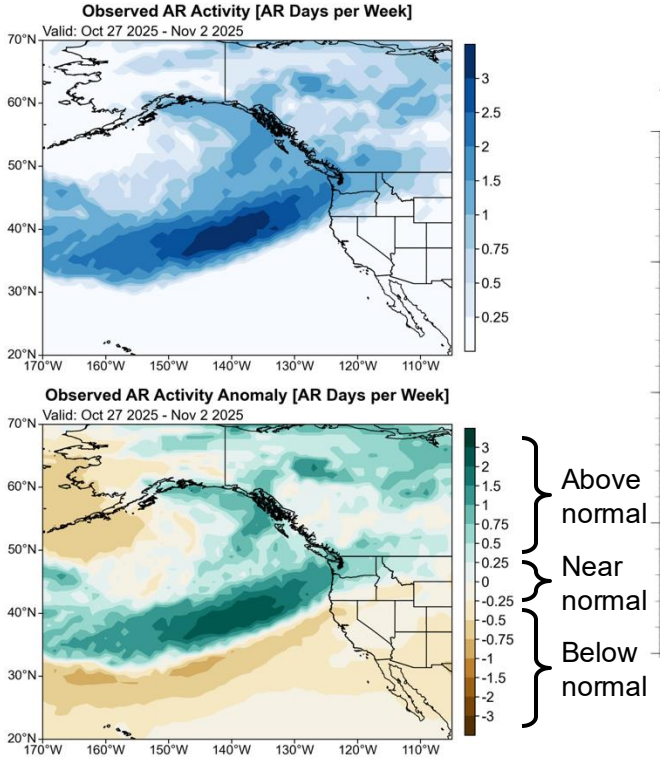
NCEP



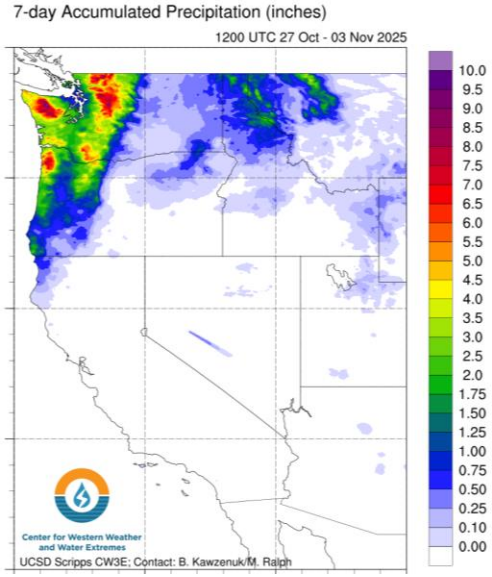
ECCC

ECMWF Forecast Unavailable

Observed (CFSv2 Analysis)



Observed Precipitation



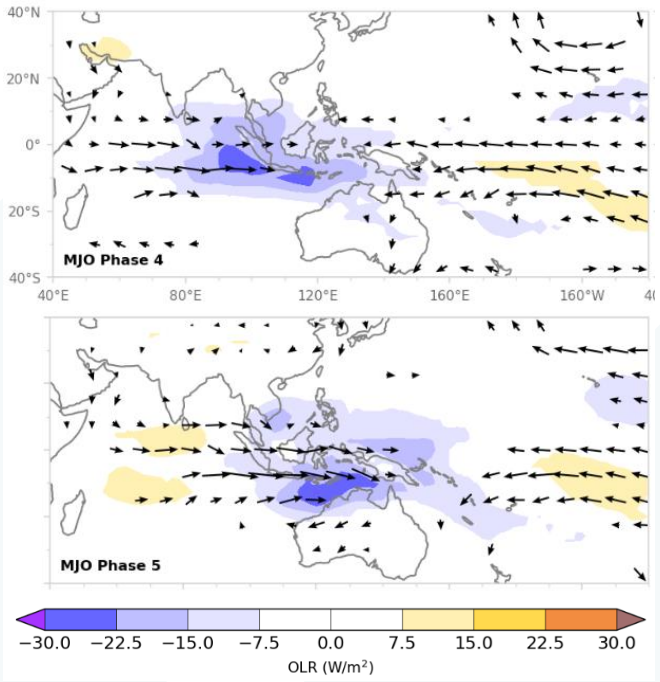
Shading: Fractional # of AR days forecast over a 7-day period (top) and forecast minus model climatology (bottom; green/blue = higher than climatology; brown = lower than climatology)

- NCEP and ECCC captured the axis of enhanced AR activity extending from the central North Pacific to the Pacific Northwest
- NCEP overestimated AR activity over land, particularly in Oregon, Northern, and Central CA; ECCC underestimated AR activity over the ocean
- An AR produced 1–2 inches of precipitation over the Olympic Peninsula and Washington Cascades on 28–29 Oct.
- A strong AR produced 3–7 inches of precipitation in the Olympic Mountains, Washington Cascades, and Northern Oregon Coast Range on 31 Oct – 1 Nov

Dynamical Model MJO Forecasts (NCEP)

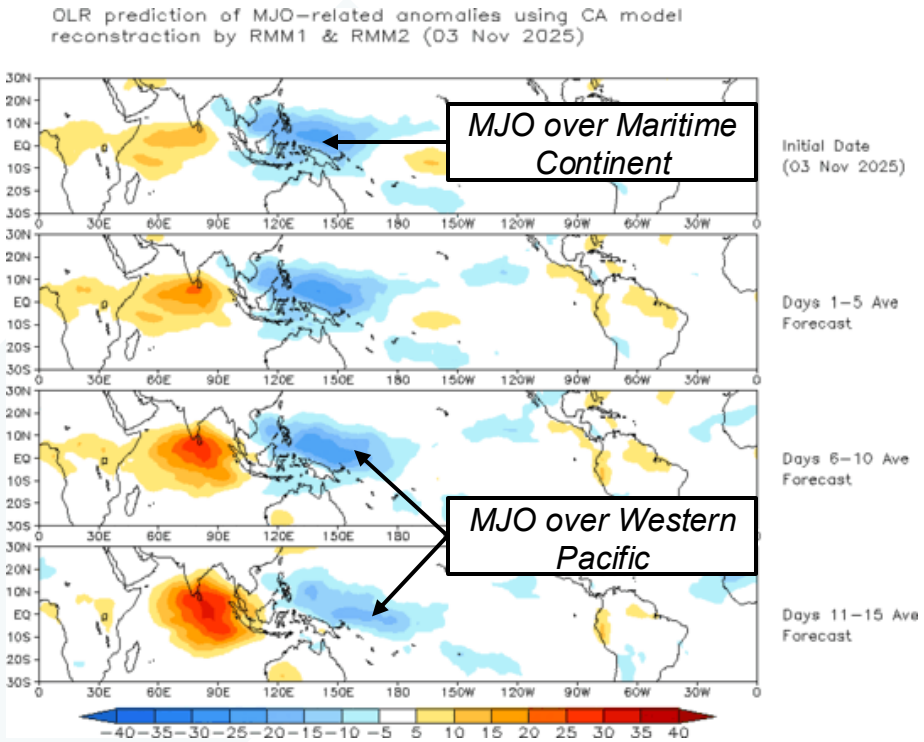
Observed MJO

Phases 4&5 (Maritime Continent)



OLR = Outgoing longwave radiation

Weeks 1–2 MJO Prediction



Circulation and Moisture Transport Anomalies

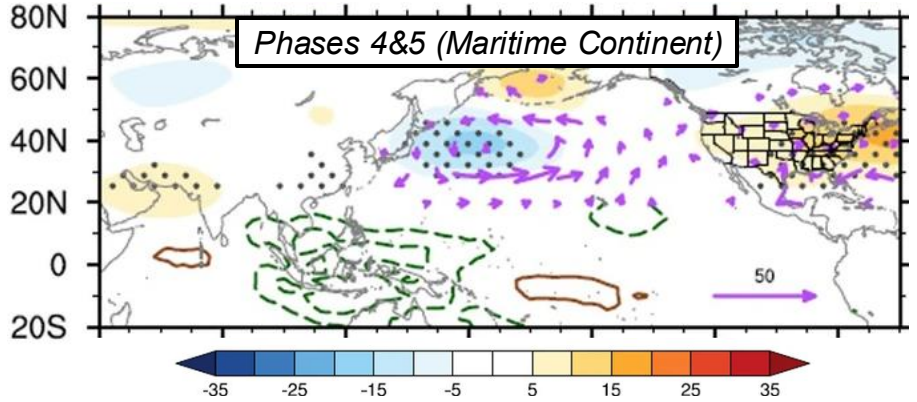


Figure 5 from Wang et al. (2024)

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

Extreme Precipitation Frequency

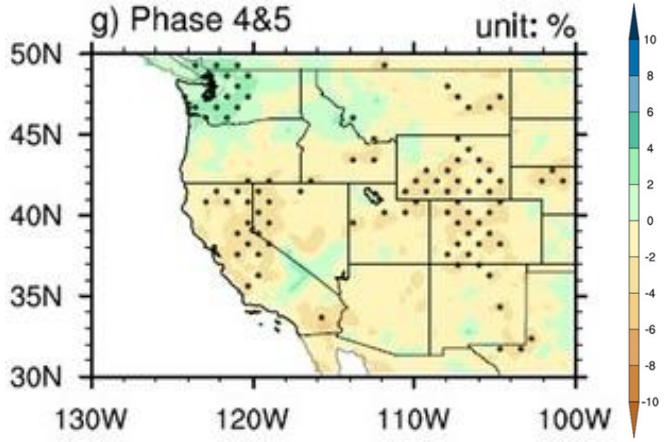


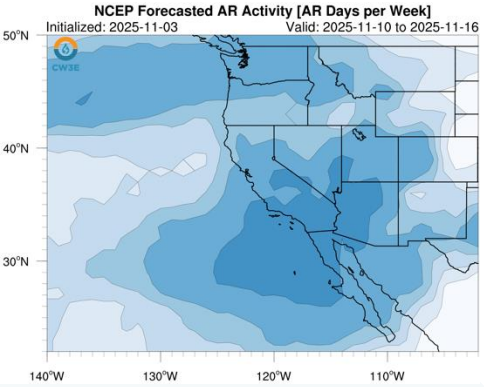
Figure 3 from Wang et al. (2023)

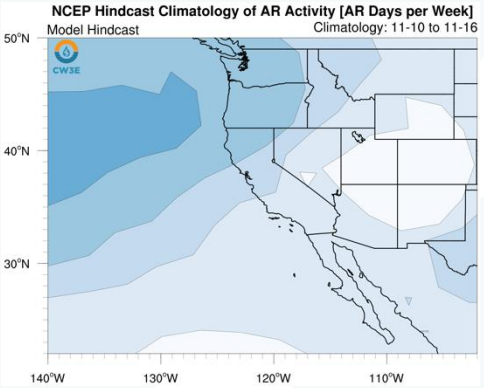
Percent Change in frequency of extreme precipitation (brown = decreased frequency; green/blue = increased frequency)

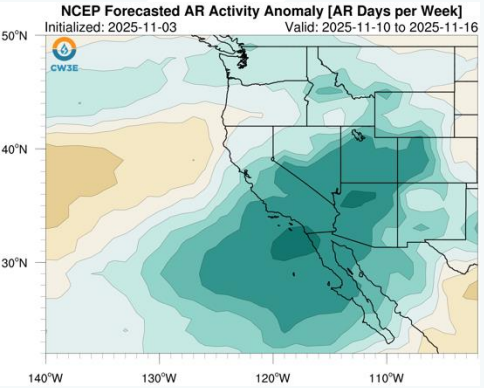
- As of 3 Nov, strong MJO convection is currently located over the Maritime Continent (Phase 5)
- NCEP is forecasting MJO convection to remain strong and propagate eastward into the Western Pacific (Phases 6&7) during Weeks 1–2
- MJO activity over the Maritime Continent is associated with a weak ridge over the western US at lag times of 1–2 weeks, leading to decreased moisture transport into California and a decrease in extreme precipitation frequency

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

NCEP

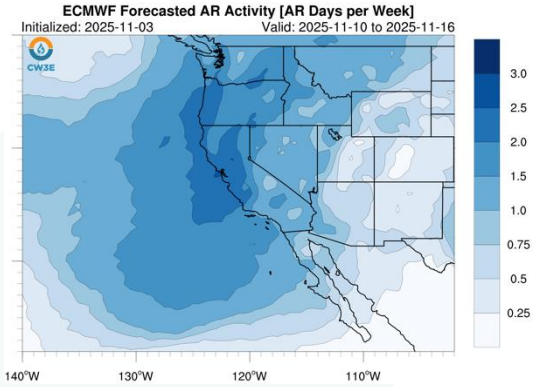


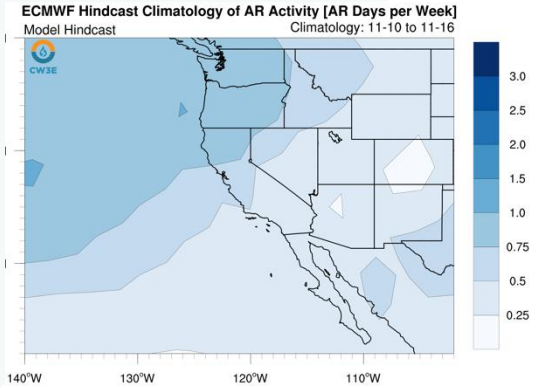


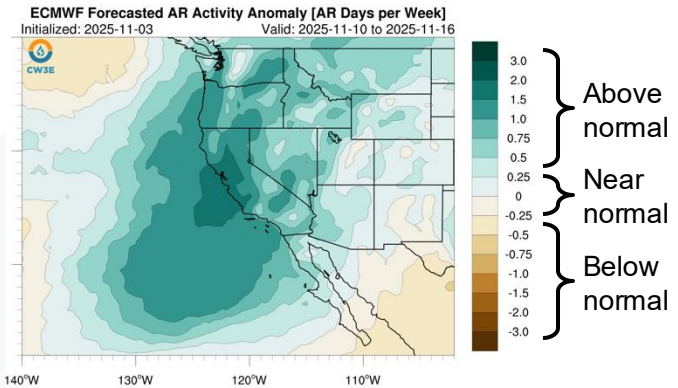


ECCC Forecast Unavailable

ECMWF







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)

Forecasts Initialized 3 Nov 2025

- NCEP and ECMWF are both forecasting above-normal AR activity in Central and Southern CA during Week 2 (10–16 Nov)
- In Northern CA, NCEP is forecasting near-normal to slightly above-normal AR activity and ECMWF is forecasting above-normal AR activity
- The strongest signal for above-normal AR activity is displaced to the southeast in NCEP and to the northwest in ECMWF

Models agree on above-normal AR activity over Central and Southern CA, but disagree somewhat on AR activity over Northern CA during Week 2 (10–16 Nov)

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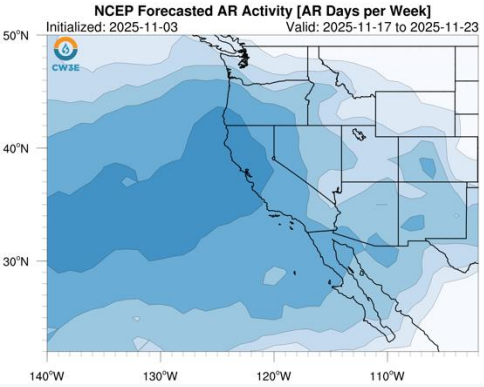
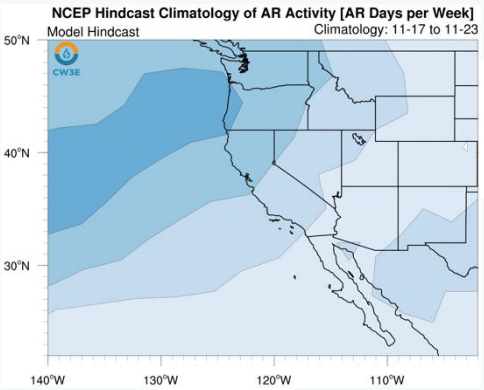
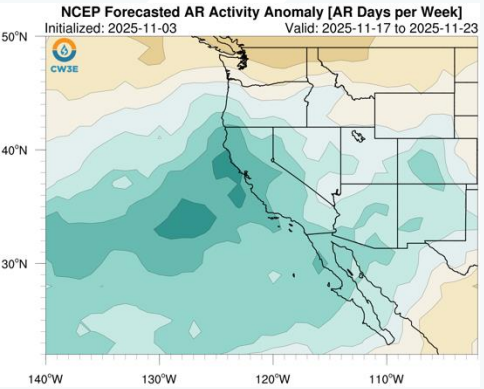
AR Activity Forecasts: Week 3 (NCEP vs. ECCC vs. ECMWF)

NCEP

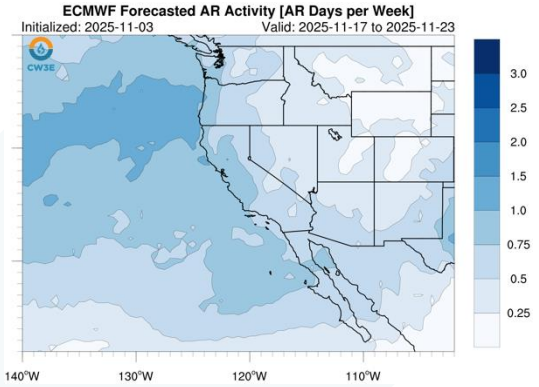


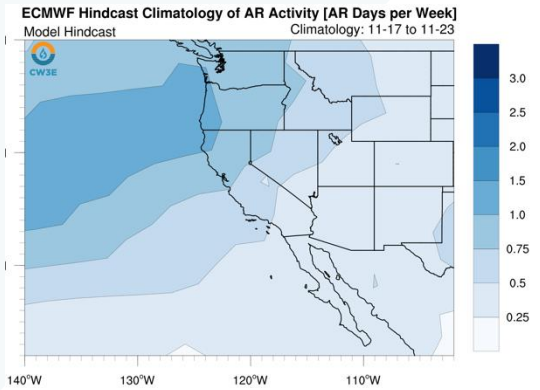


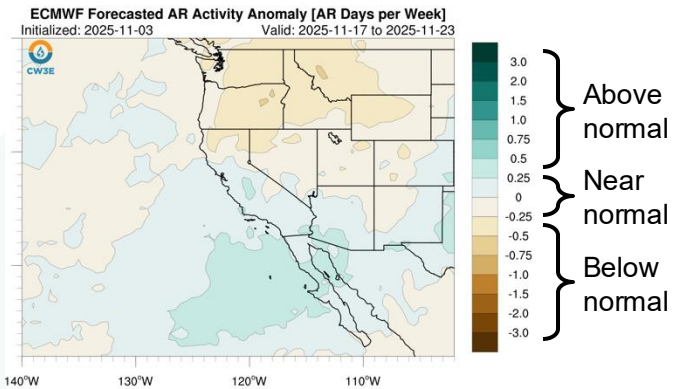


ECCC Forecast Unavailable

ECMWF







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)

Forecasts Initialized 3 Nov 2025

- NCEP is forecasting above-normal AR activity over all of CA during Week 3 (17–23 Nov)
- ECMWF is forecasting near-normal AR activity over all of CA

Models disagree on AR activity over CA during Week 3 (17–23 Nov)

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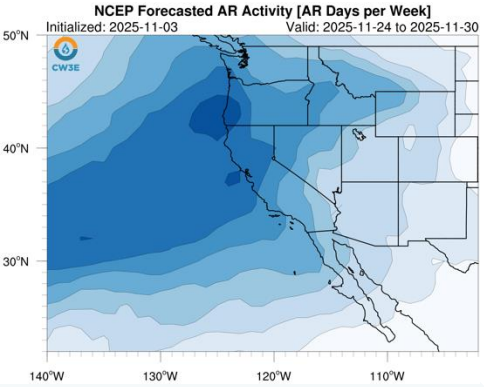
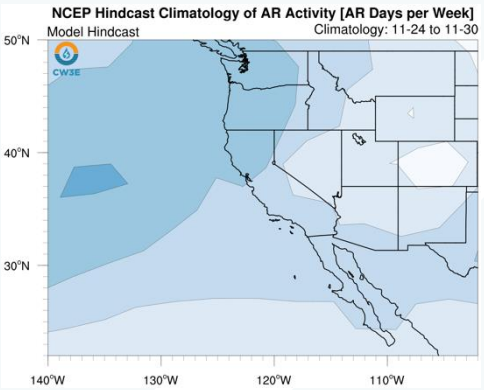
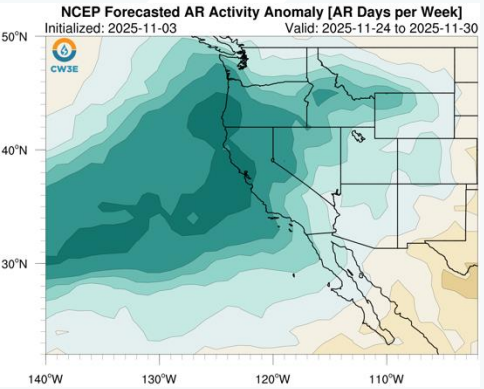
AR Activity Forecasts: Week 4 (NCEP vs. ECCC vs. ECMWF)

Forecasts Initialized 3 Nov 2025

NCEP

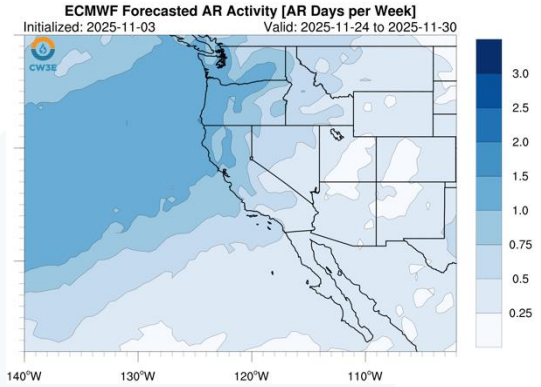


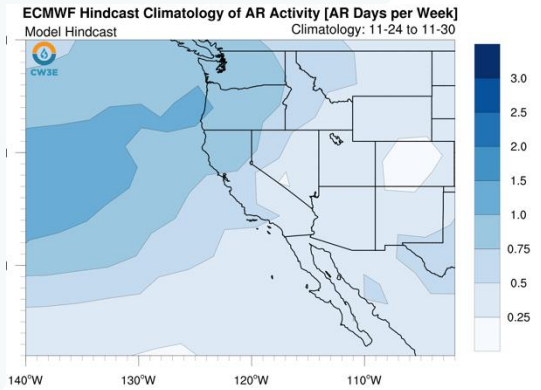


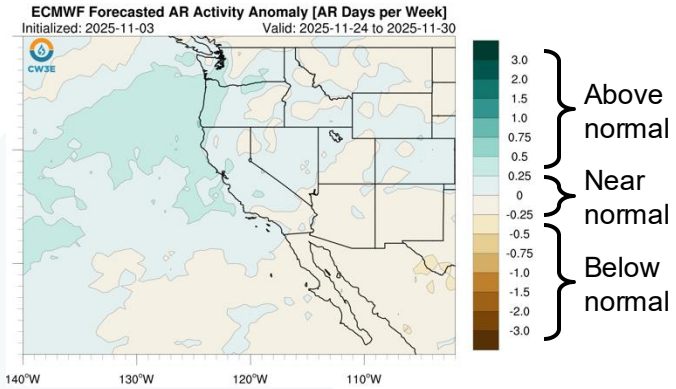


ECCC Forecast Unavailable

ECMWF







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)

- NCEP is forecasting above-normal AR activity over all of CA during Week 4 (24–30 Nov), especially over Northern CA
- ECMWF is forecasting near-normal AR activity over all of CA

Models disagree on AR activity over CA during Week 4 (24–30 Nov)

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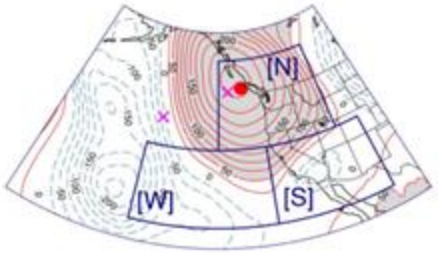
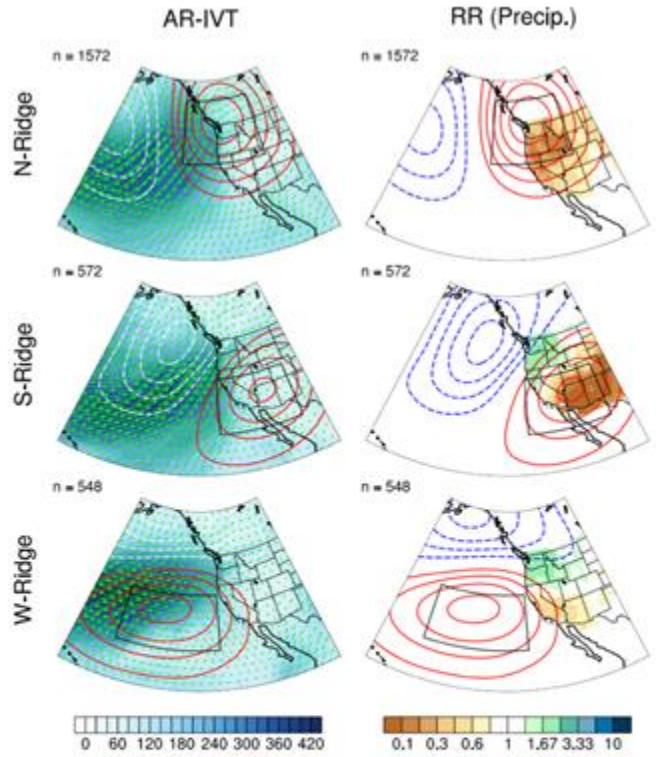
Background Info: Subseasonal Ridging Outlooks



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



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

- 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

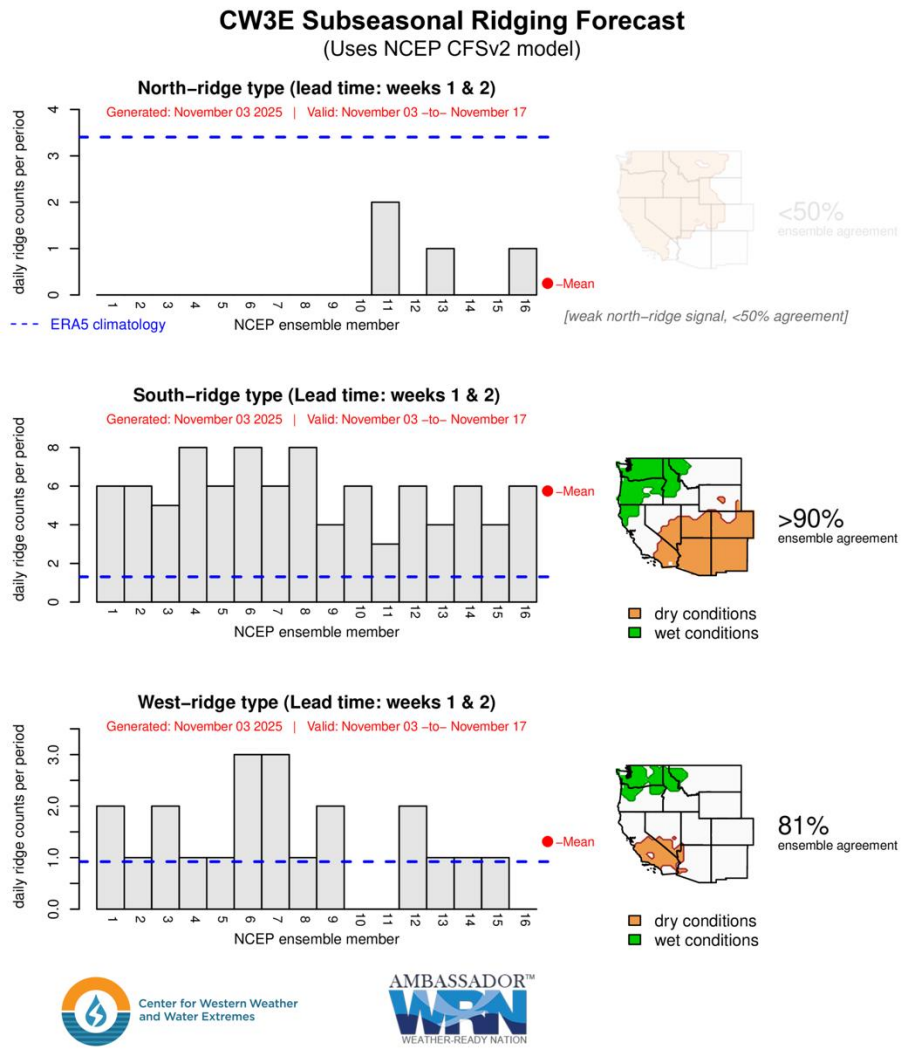
Jet Propulsion Laboratory
California Institute of Technology

Center for Western Weather and Water Extremes
Scripps Institution of Oceanography at UC San Diego

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

Ridging Forecasts: Weeks 1–2 (NCEP vs. ECMWF)

NCEP



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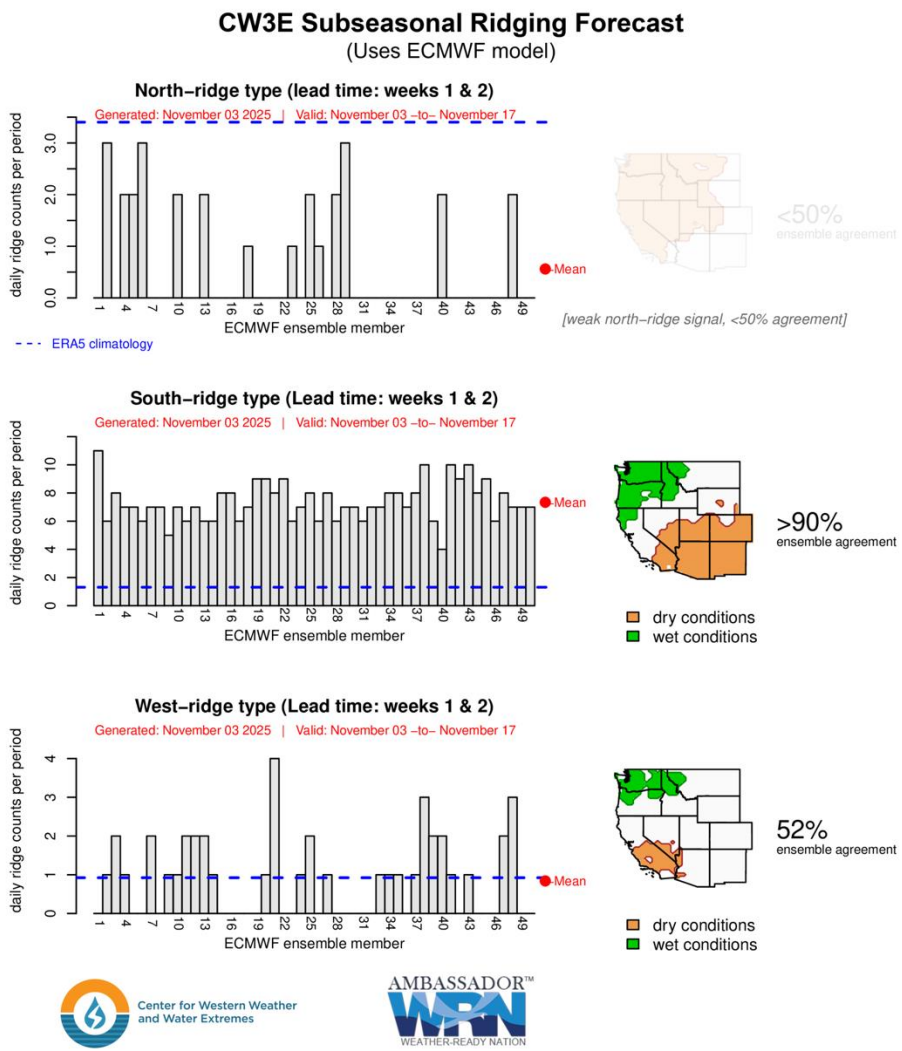
ECMWF



Center for Western Weather and Water Extremes

AMBASSADOR WRN WEATHER-READY NATION

Forecasts Initialized 3 Nov 2025

- NCEP and ECMWF are both forecasting a high likelihood (>90% ensemble agreement) of above-normal South-ridge activity during Weeks 1–2 (3–17 Nov)
- NCEP is also forecasting a high likelihood (81% agreement) of above-normal West-ridge activity, whereas ECMWF is forecasting a moderate likelihood (52% agreement) of above-normal West-ridge activity
- Both models are forecasting very low North-ridge activity

Models agree on high likelihood of above-normal ridging activity over southwestern US during Weeks 1–2 (3–17 Nov)

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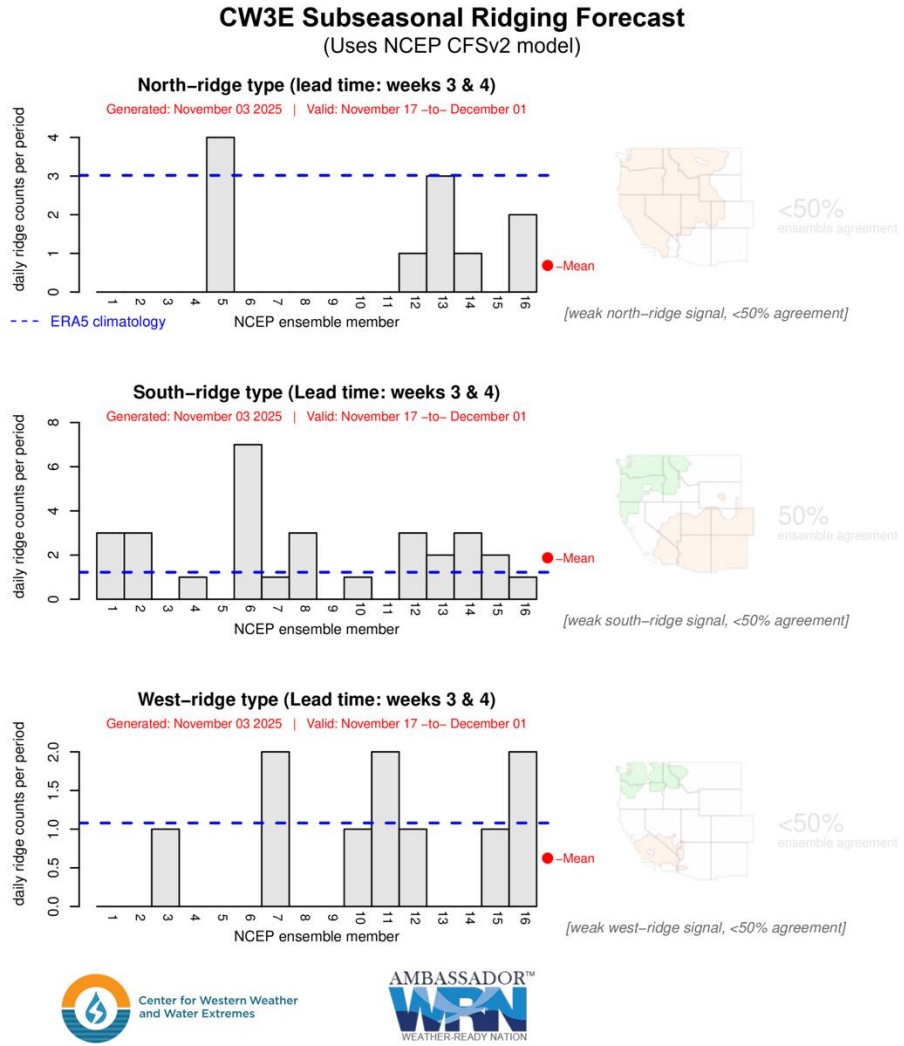
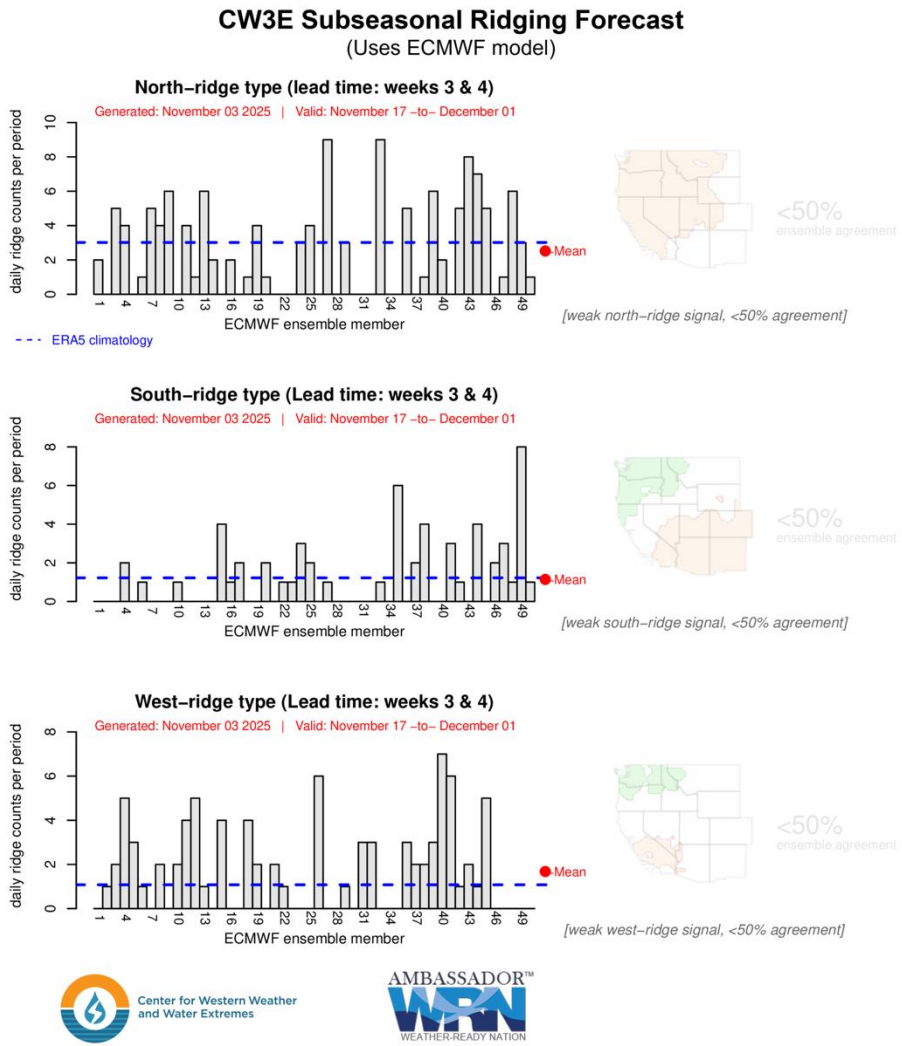
Ridging Forecasts: Weeks 3–4 (NCEP vs. ECMWF)

NCEP



ECMWF



Forecasts Initialized 3 Nov 2025

- NCEP is forecasting slightly above-normal South-ridge activity with low confidence (<50% agreement) and below-normal North-ridge and West-ridge activity during Weeks 3–4 (17 Nov – 1 Dec)
- ECMWF is forecasting near-normal ridging activity overall, but there is a high degree of uncertainty in the exact location of ridging activity

Models show uncertainty in frequency and location of ridging activity near US West Coast during Weeks 3–4 (17 Nov – 1 Dec)

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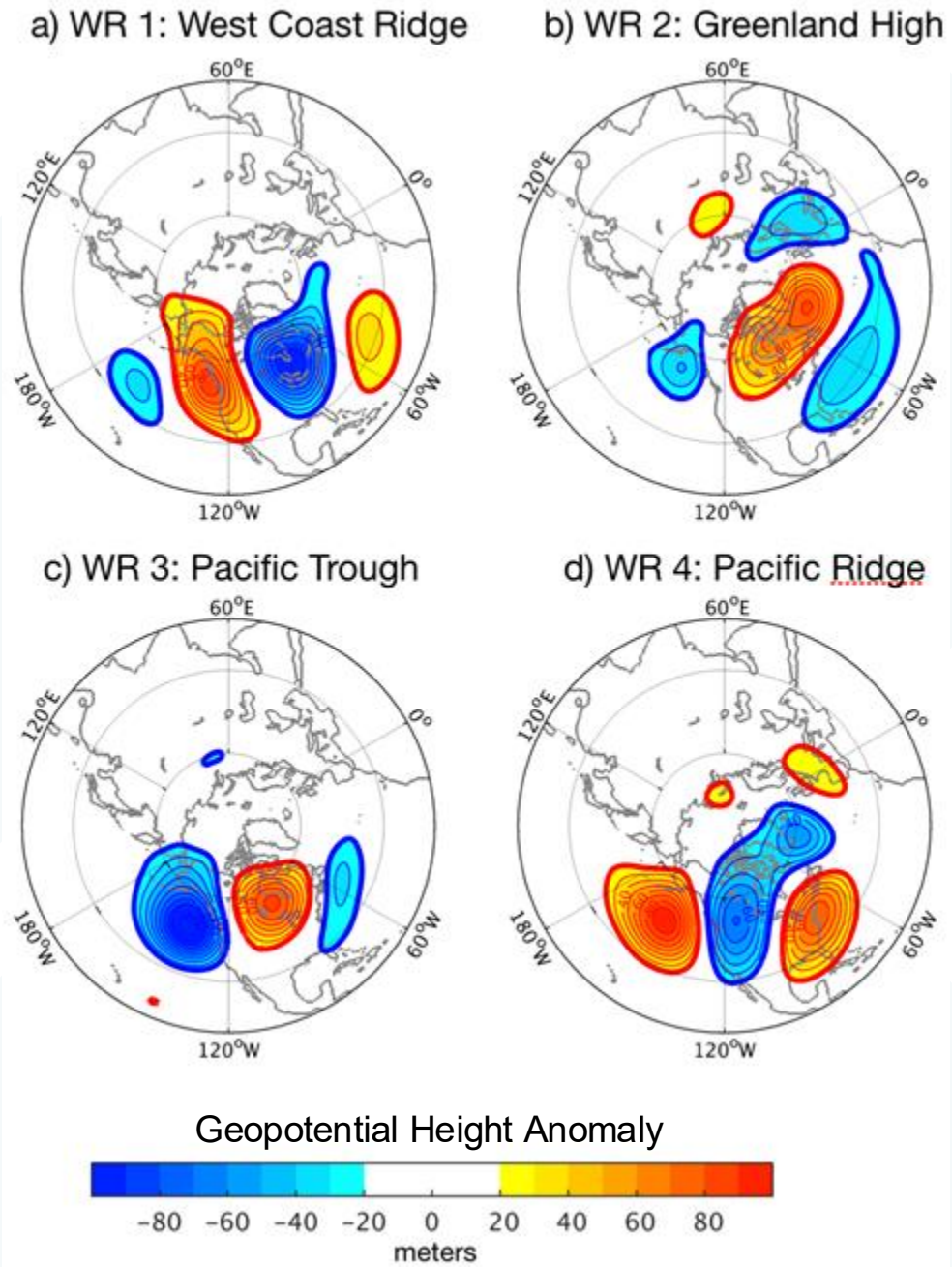
Background Info: IRI Subseasonal Weather Regime Forecasts

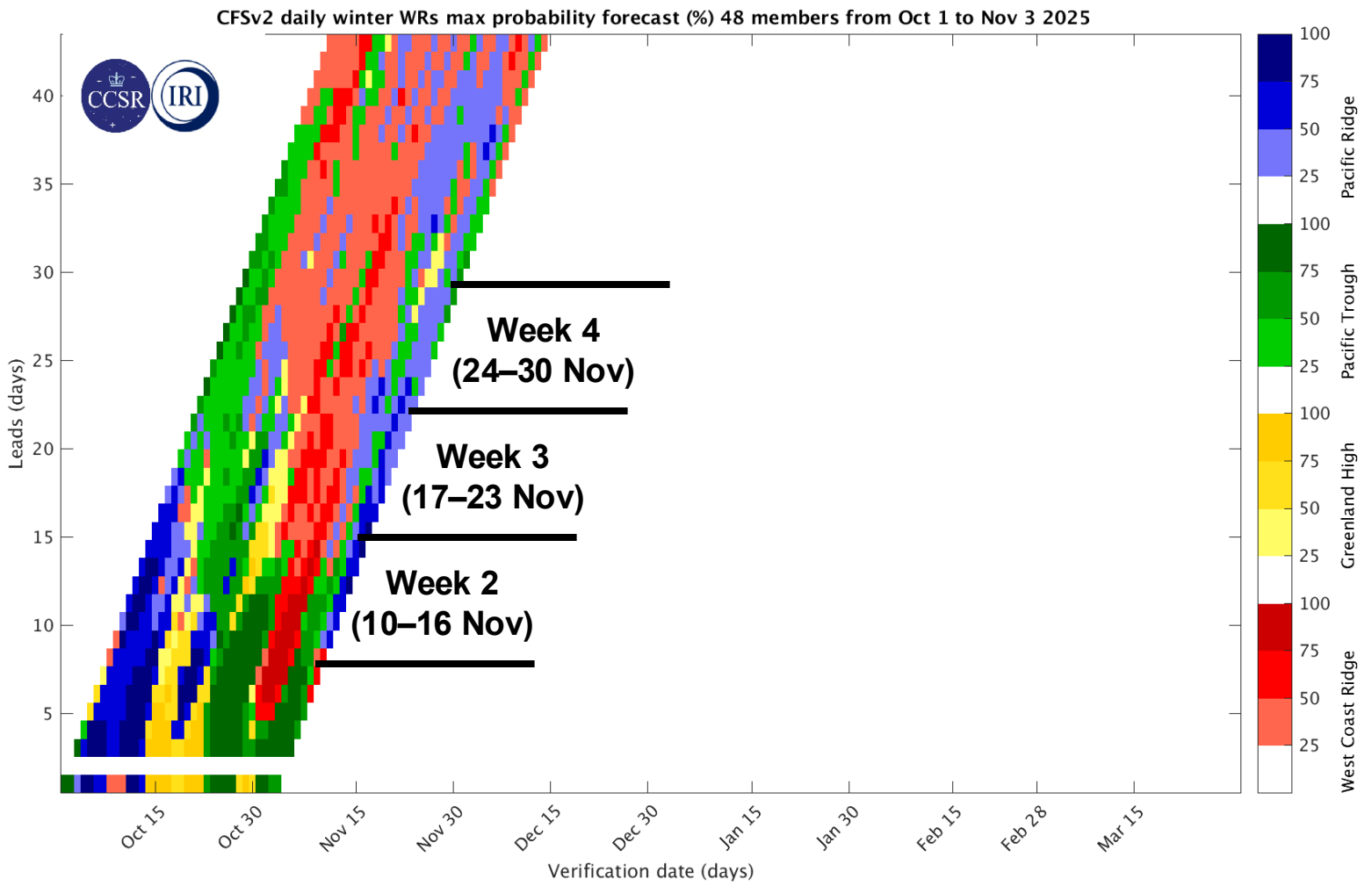


This slide contains background information about IRI's North American weather regime forecast product

- Four dominant weather regimes identified using cluster analysis on daily 500-hPa geopotential height anomalies from MERRA data (1981–2015)

Reference: Robertson et al. (2020)
For more information about the forecast product:
https://wiki.iri.columbia.edu/index.php?n=Climate.S2S-WRs

IRI North American Weather Regime Forecasts



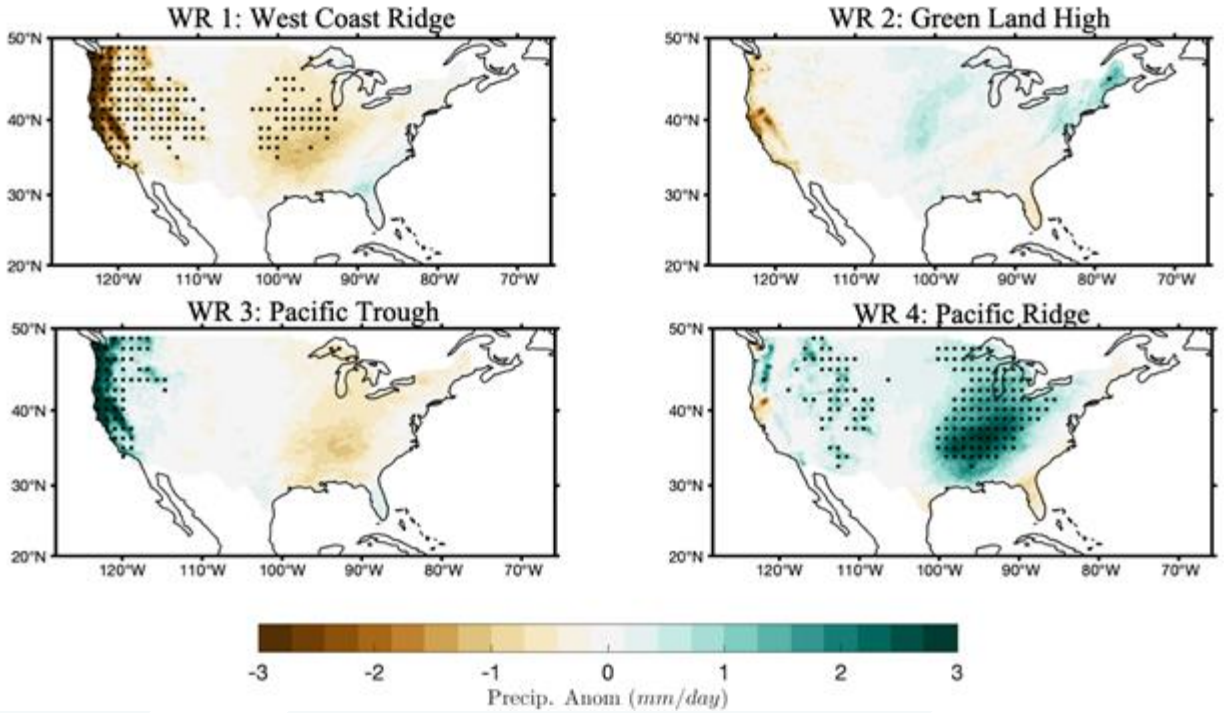
This graphic shows the which of the four North American weather regimes (different colors) is most likely to occur over the next 45 days. Darker (lighter) shading denotes higher (lower) probability of a particular regime. See the next slide for temperature/precipitation implications.

Forecast Initialized 3 Nov 2025

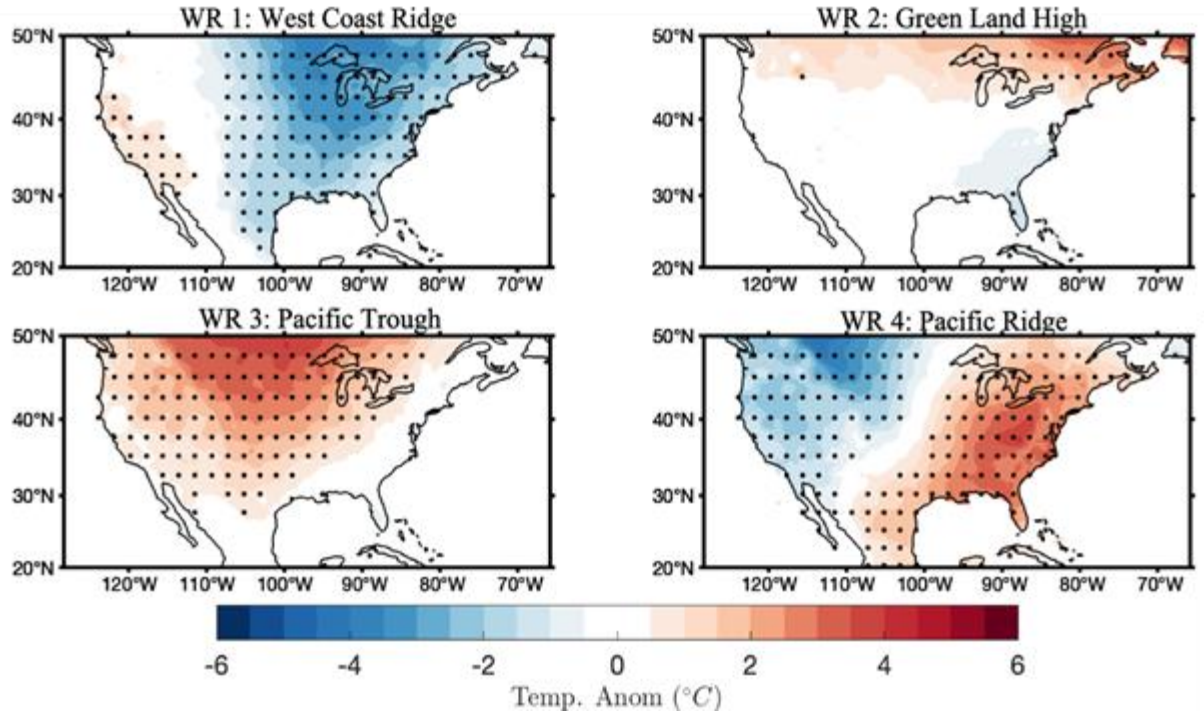
- Daily forecast out to 45-day lead time based on NCEP CFSv2 ensemble
- Moderate-to-high likelihood (≥50% ensemble agreement) of shift from West Coast Ridge to Pacific Ridge at the beginning of Week 2 (10–16 Nov)
- Low-to-moderate likelihood (25–75% agreement) of persistence of Pacific Ridge regime through the end of Week 3 (17–23 Nov)
- Low-to-moderate likelihood (25–75% agreement) of shift to Pacific Trough regime during second half of Week 4 (27–30 Nov)

IRI North American Weather Regime Forecasts

Precipitation Anomalies



Temperature Anomalies

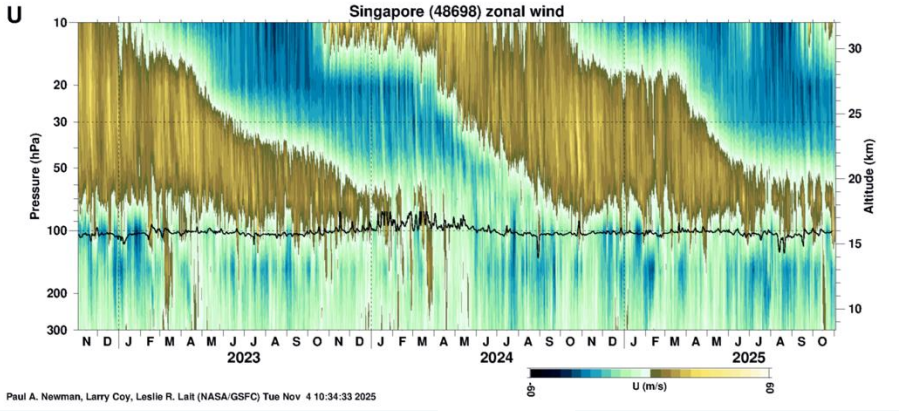


This graphic shows composite mean precipitation (left) and temperature (right) anomalies associated with each weather regime. Stippling (black dots) indicate statistically significant anomalies.

- Near-normal precipitation and below-normal temperature predicted over CA during Week 2 (10–16 Nov) with moderate-to-high confidence in Pacific Ridge regime
- Near-normal precipitation and below-normal temperature predicted over CA during Week 3 (17–23 Nov) and first half of Week 4 (24–26 Nov) with low-to-moderate confidence in Pacific Ridge regime
- Above-normal precipitation and temperature predicted over CA during second half of Week 4 (27–30 Nov) with low-to-moderate confidence in Pacific Trough regime

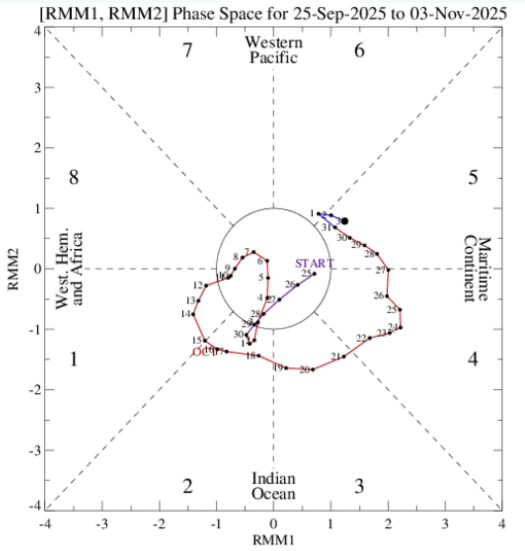
Background Info: AR Activity and Precipitation Based on MJO and QBO

QBO Conditions



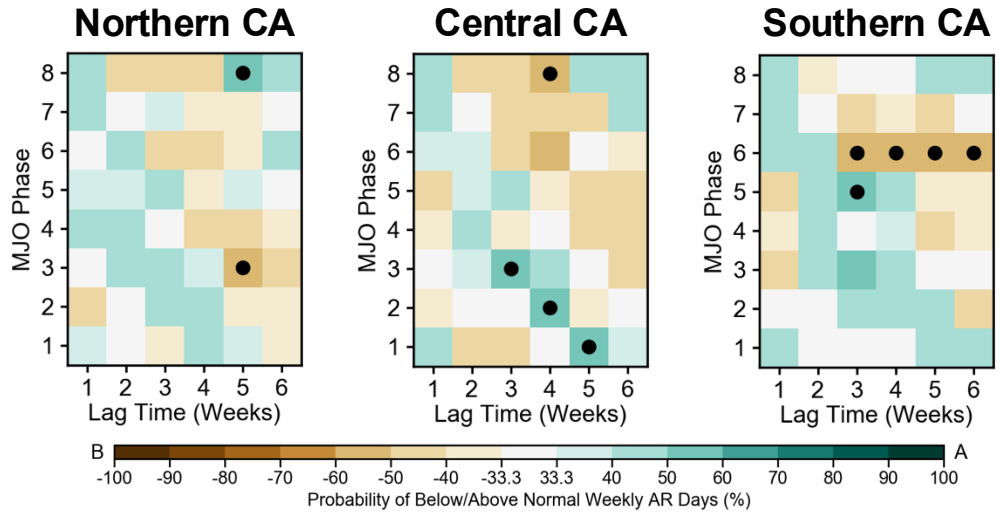
QBO is in the easterly phase at 50-hPa

MJO Conditions

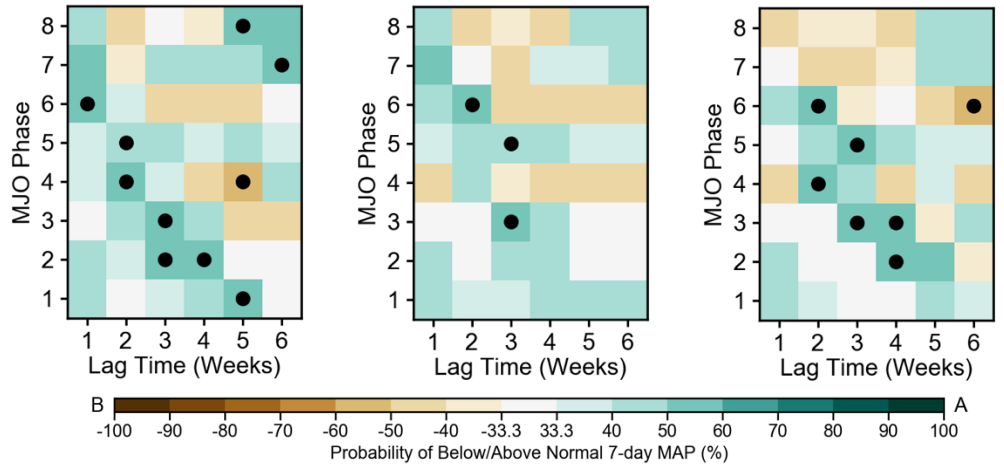


MJO convection is currently located over the Maritime Continent (Phase 5)

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



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

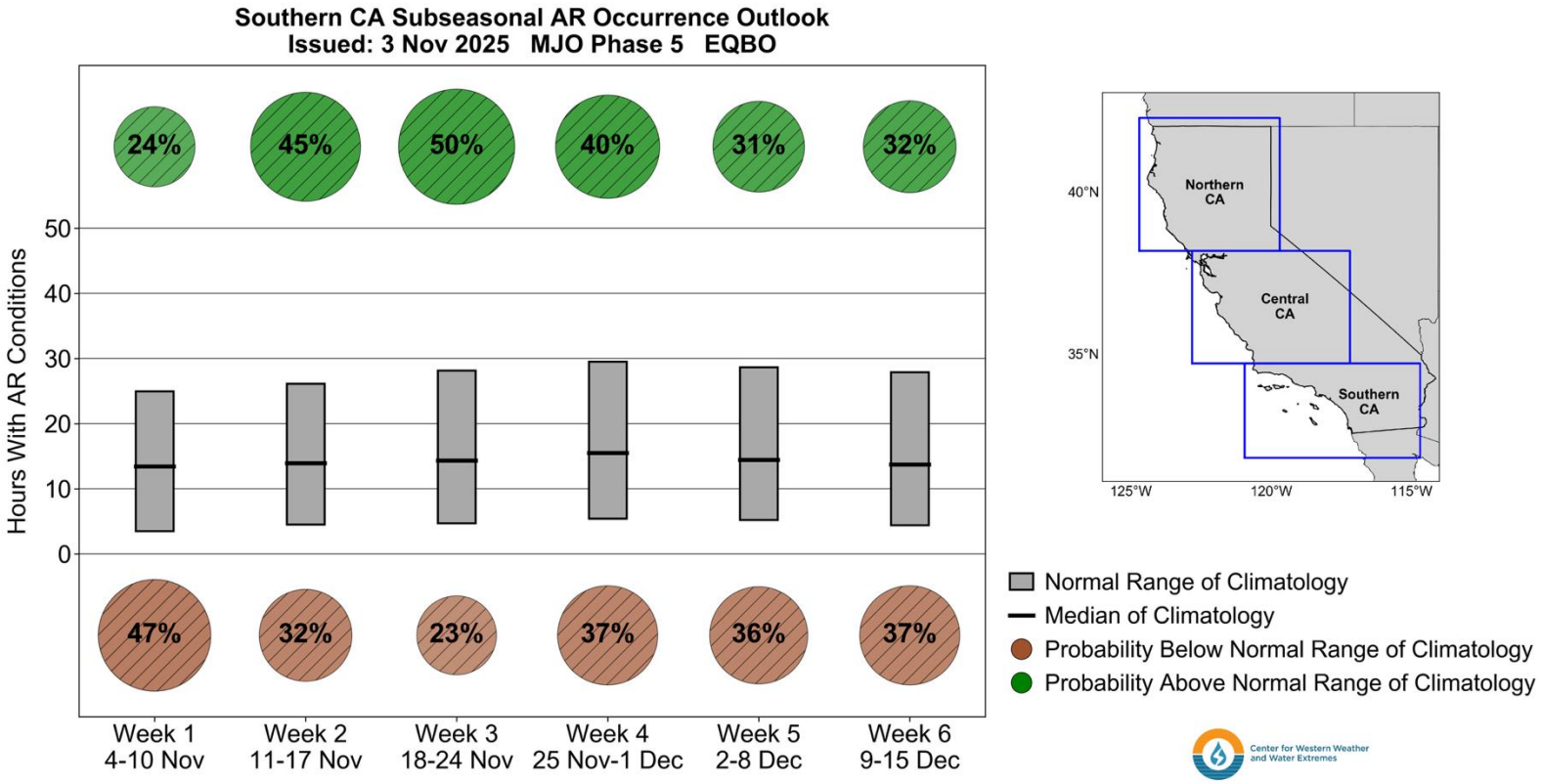


Probability matrices illustrating the weeks 1–6 lagged probability of below-normal (brown shading) or above-normal (green shading) AR occurrence and precipitation for all MJO phases when the QBO is in the westerly phase during OND in Northern CA (left), Central CA (middle), and Southern CA (right). White 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 3 Nov 2025

AR Occurrence: Southern CA



Normal Range of Climatology
Median of Climatology
Probability Below Normal Range of Climatology
Probability Above Normal Range of Climatology

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- CW3E's probabilistic AR occurrence forecast based on current MJO and QBO conditions (see forecast for all regions here)
- **Moderate likelihood (>40% probability) of above-normal AR occurrence during Weeks 2–3 (11–24 Nov) in Southern CA**
- Moderate likelihood of above-normal AR occurrence in Northern and Central CA during Week 3 (18–24 Nov)

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)

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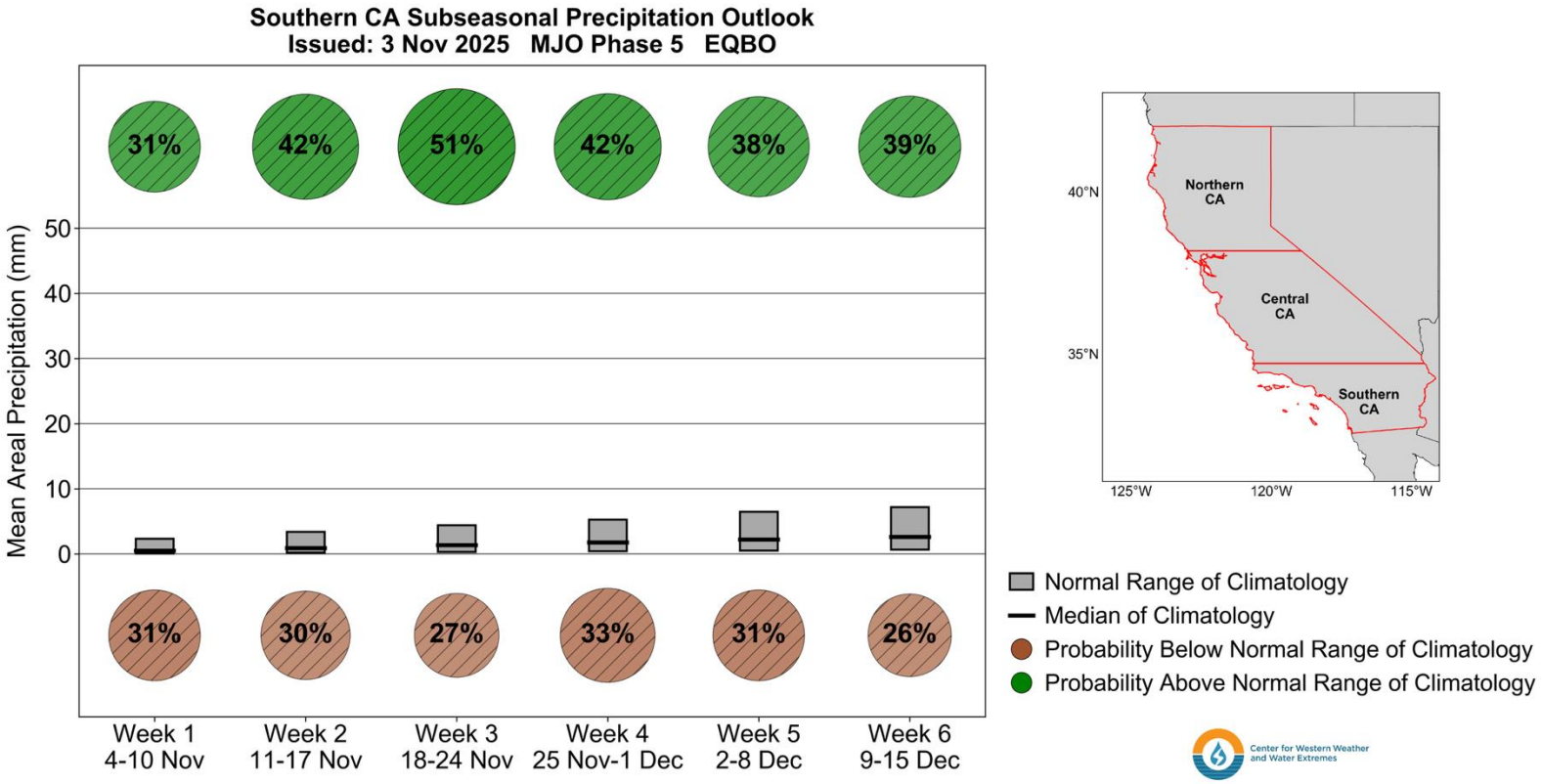
AR Activity and Precipitation Based on MJO and QBO

Forecasts Initialized 3 Nov 2025

Precipitation: Southern CA



Normal Range of Climatology
Median of Climatology
Probability Below Normal Range of Climatology
Probability Above Normal Range of Climatology

Center for Western Weather and Water Extremes

- CW3E's probabilistic precipitation forecast based on current MJO and QBO conditions (see forecast for all regions here)
- **Moderate likelihood of above-normal precipitation in Southern CA during Weeks 2–4 (11 Nov – 1 Dec)**
- Moderate likelihood of above-normal precipitation in Northern CA during Weeks 2–3 (11–24 Nov) and Central CA during Weeks 2–4

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)

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