



Center for Western Weather  
and Water Extremes

SCRIPPS INSTITUTION OF OCEANOGRAPHY  
AT UC SAN DIEGO

# CW3E S2S Outlook: 23 Feb 2022

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UC San Diego



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OCEANOGRAPHY

# Summary

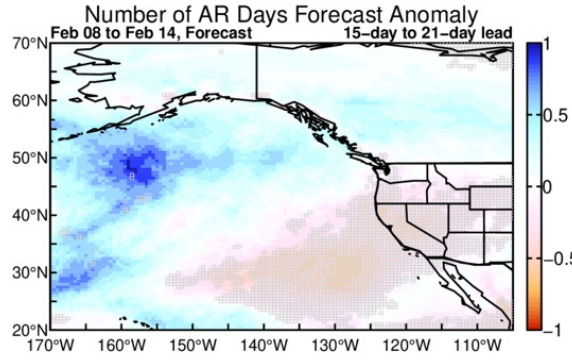
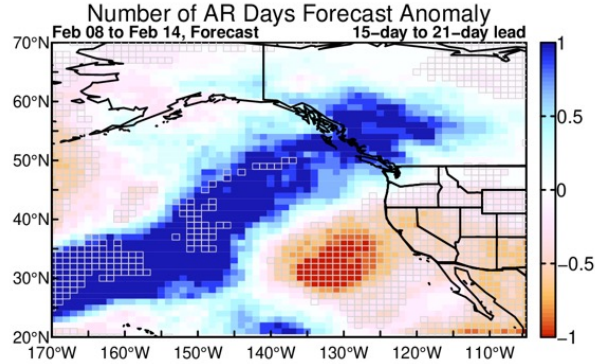
- **Week 2 forecasts (1–7 Mar):** Models disagree on the likelihood of landfalling AR activity over California and Oregon
  - NCEP is showing high probabilities (>70%) of AR activity over much of California and Oregon
  - ECMWF is showing much lower probabilities (0-30%) of AR activity over these areas
- NCEP GEFS model predicts the MJO will be located over the eastern Indian Ocean and the Maritime Continent during the next two weeks, which is generally unfavorable for AR activity over the western US
- **Week 3 forecasts (8–14 Mar):** Models continue to disagree on the likelihood of AR activity over California
  - NCEP is predicting significantly above-normal AR activity over California and Baja California and significantly below-normal AR activity over British Columbia and Washington
  - ECMWF is predicting below-normal AR activity over California and weaker magnitude of AR anomalies over the other regions above
- NCEP and ECMWF show high confidence in ridging activity over the western U.S. during Weeks 1–2
  - Both models suggest a high likelihood of the occurrence of the North-Ridge type which is typically associated with widespread dry conditions over the western U.S.
  - NCEP model also shows high confidence in the occurrence of the West-Ridge type which is associated with wet (dry) conditions over the Pacific Northwest (California)

# Looking Back: Week 3 AR Activity Forecasts

Valid: 8–14 Feb 2022

NCEP Experimental Forecast Initialized: Jan 24, 2022

ECMWF Experimental Forecast Initialized: Jan 24, 2022

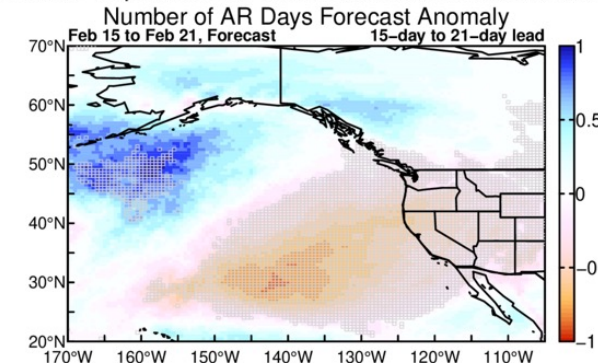
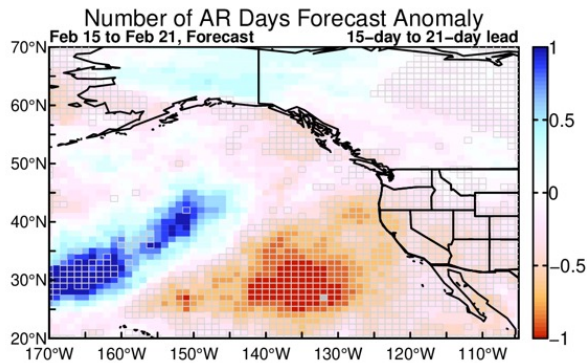


- NCEP: Below-normal AR activity over the western US, especially California; above-normal AR activity over British Columbia
- ECMWF: Below-normal AR activity over the western US; slightly above-normal AR activity over British Columbia

Valid: 15–21 Feb 2022

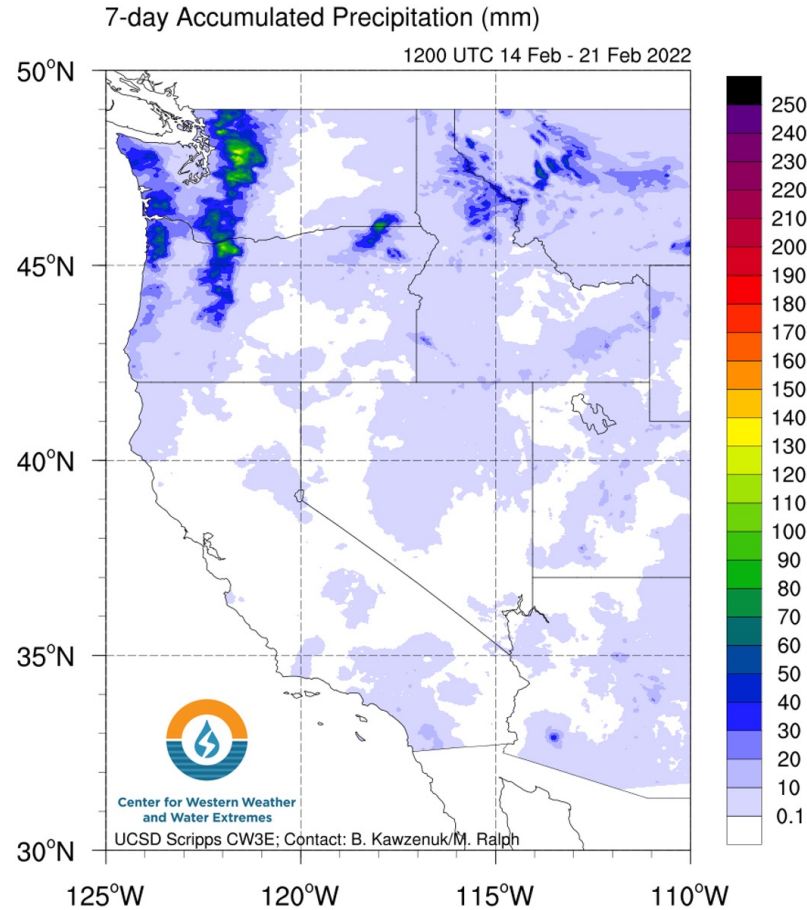
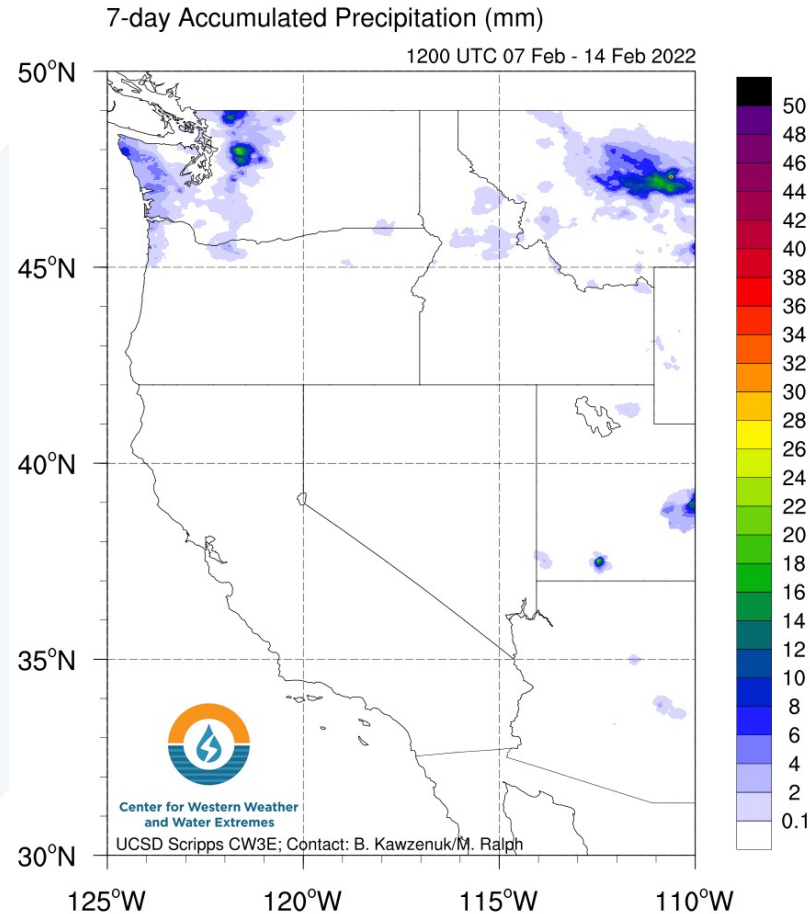
NCEP Experimental Forecast Initialized: Jan 31, 2022

ECMWF Experimental Forecast Initialized: Jan 31, 2022



- NCEP: Below-normal AR activity over the western US, especially California; slightly below-normal AR activity over British Columbia
- ECMWF: Below-normal AR activity over the western US; above-normal AR activity over Northern British Columbia

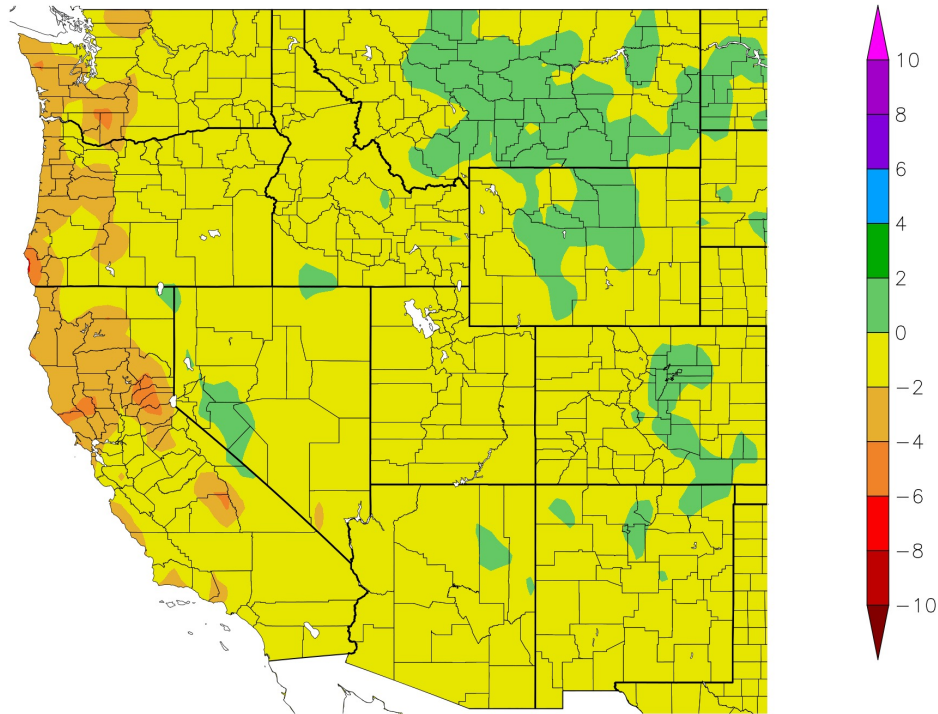
# Looking Back: Accumulated Precipitation (7–21 Feb)



- Multiple weak ARs brought light precipitation (generally < 1 inch total) to portions of western Washington during the second week of February. Otherwise, dry conditions were generally observed across the western US (e.g., California).
- An AR brought light-to-moderate precipitation (1-5 inches total) to western Washington and northwestern Oregon on Feb 16.

# Looking Back: 14-day Precipitation Anomaly (8–21 Feb)

Departure from Normal Precipitation (in)  
2/8/2022 – 2/21/2022

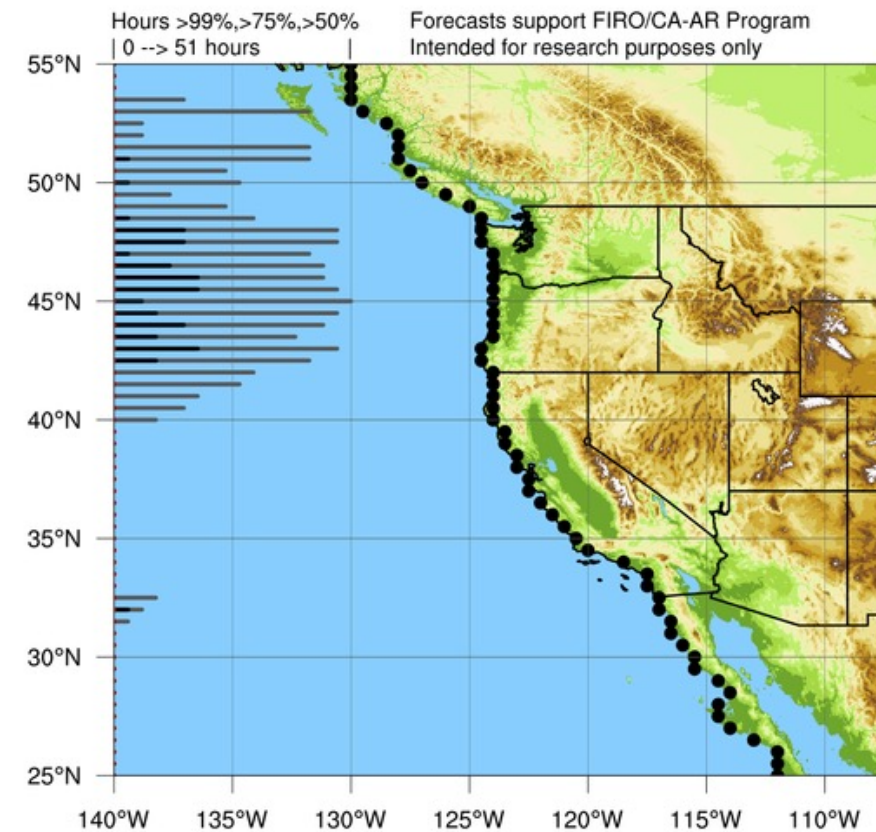
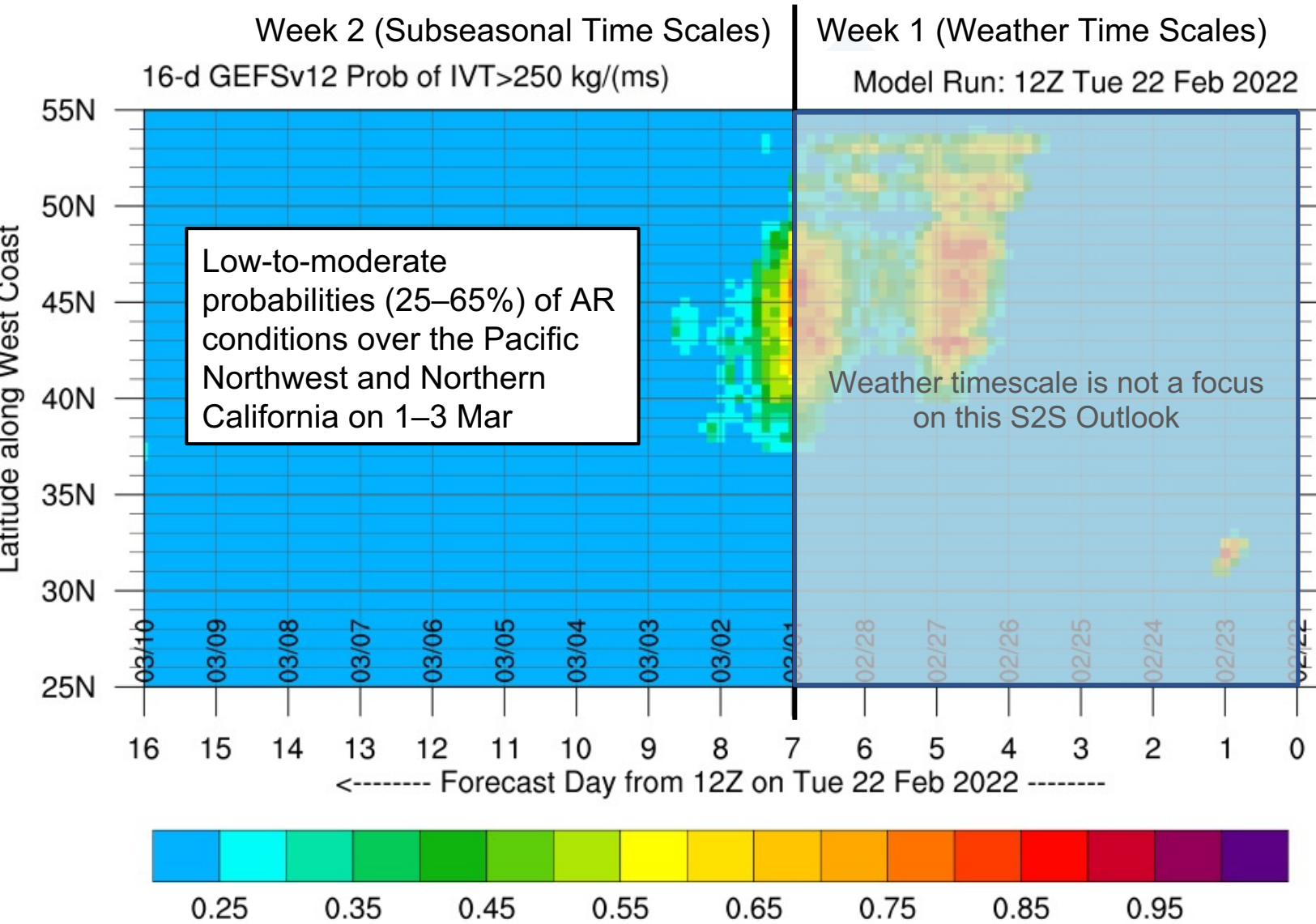


- Abnormally dry conditions over the US West Coast, especially in the Pacific Coast Ranges and the Sierra Nevada

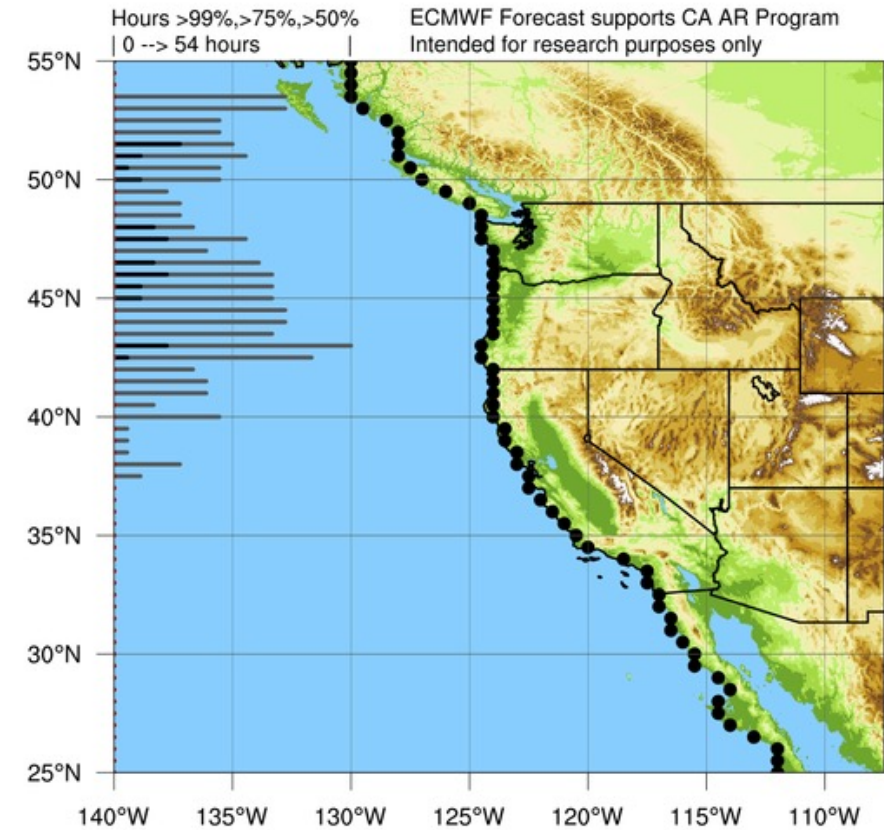
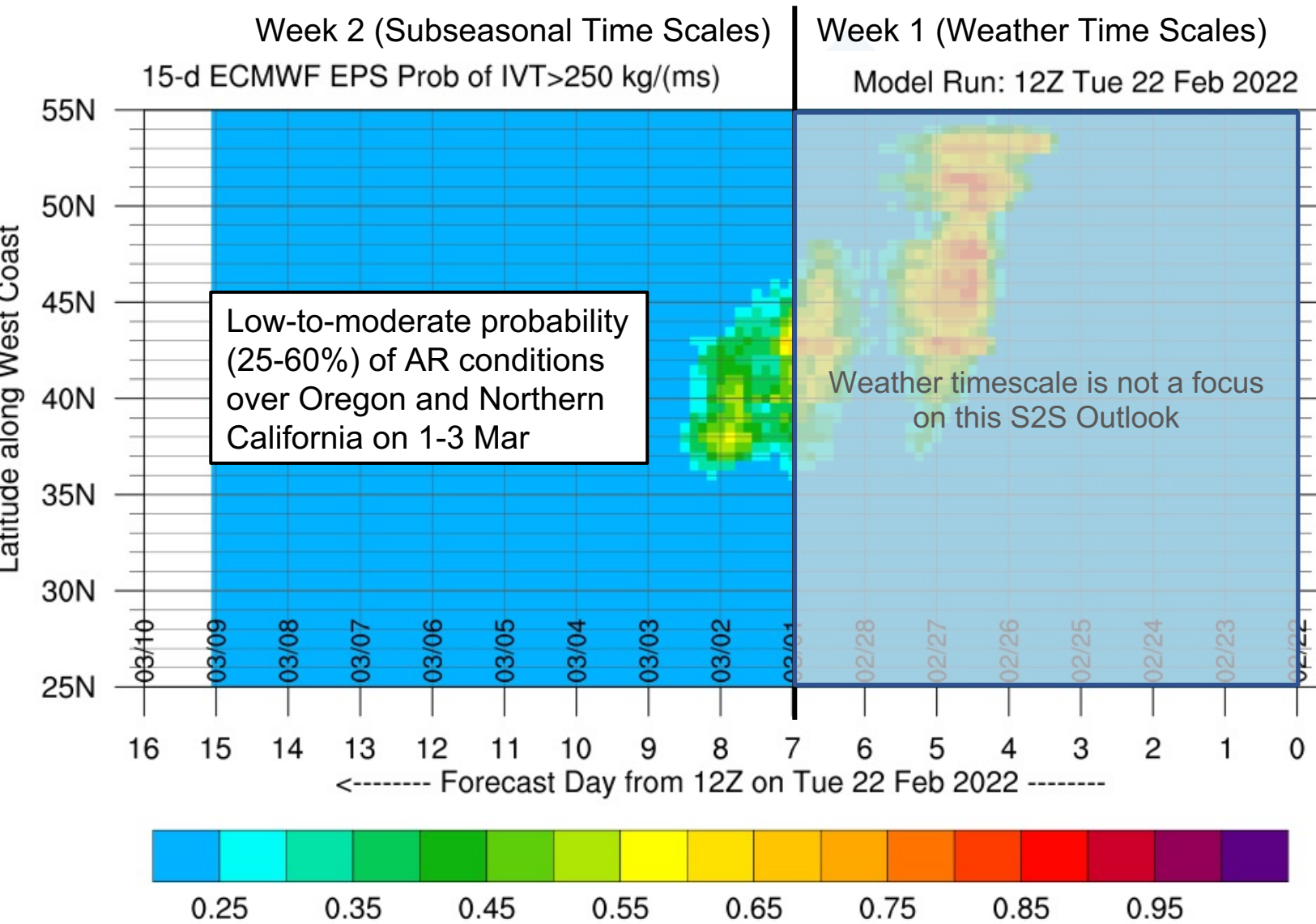
Generated 2/22/2022 at HPRCC using provisional data.

NOAA Regional Climate Centers

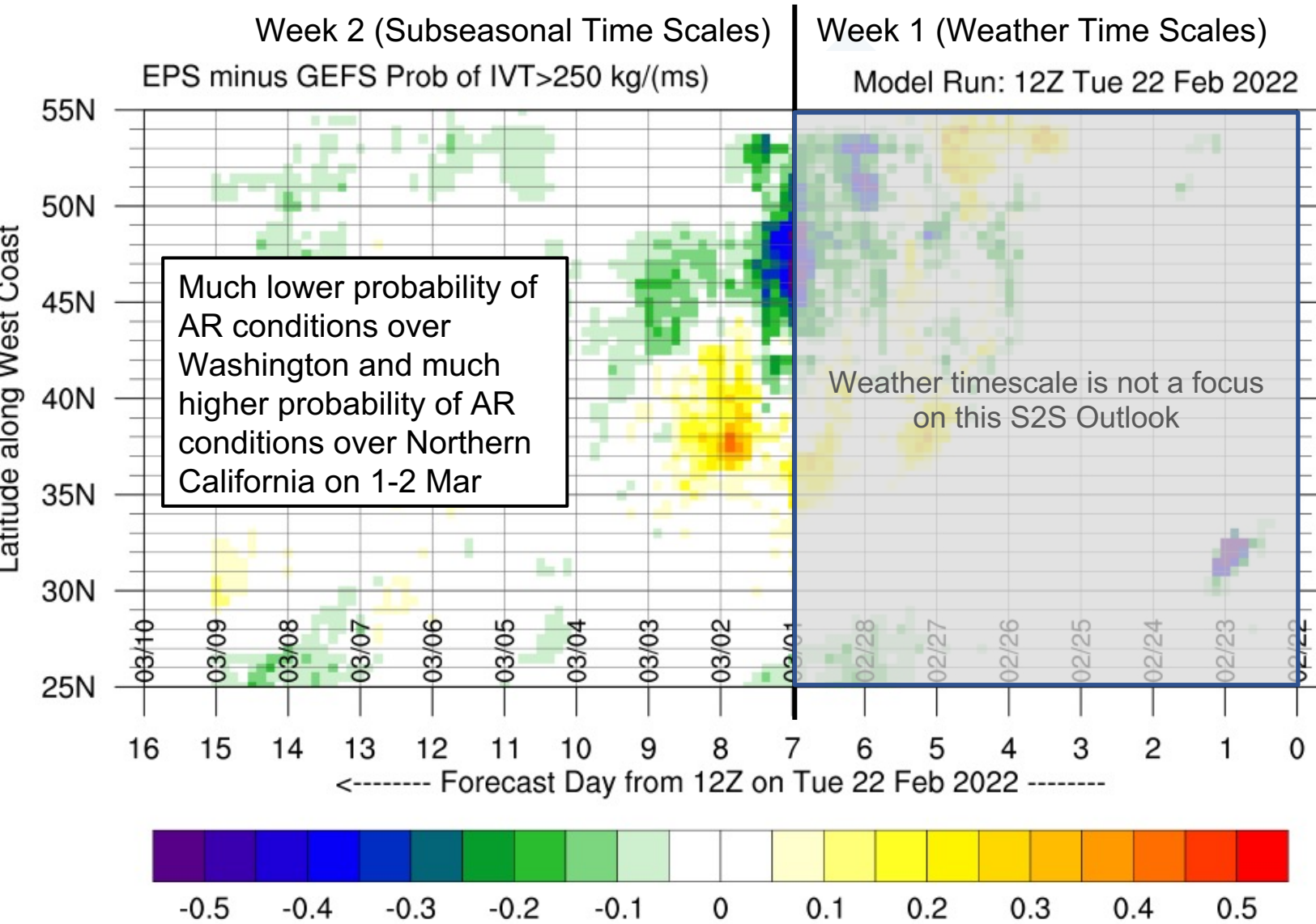
# GEFS AR Landfall Tool: Valid 12Z 22 Feb – 10 Mar



# ECMWF EPS AR Landfall Tool: Valid 12Z 22 Feb – 9 Mar

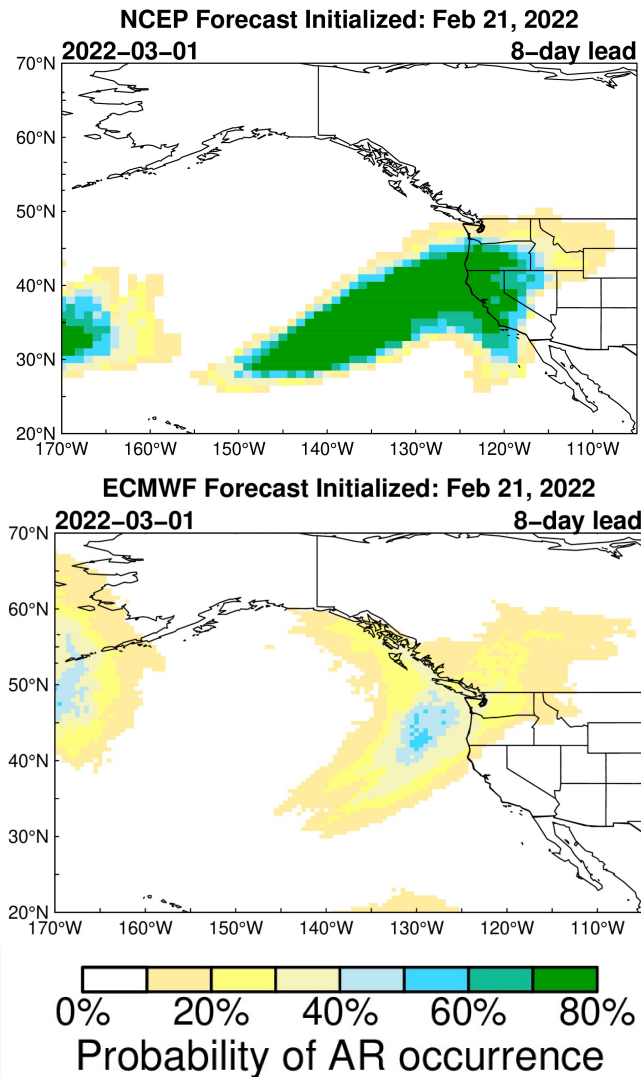


# ECMWF Minus GFS AR Landfall Tool: Valid 12Z 22 Feb – 9 Mar





# Subseasonal Outlooks: Week 2 AR Activity (NCEP vs. ECMWF)

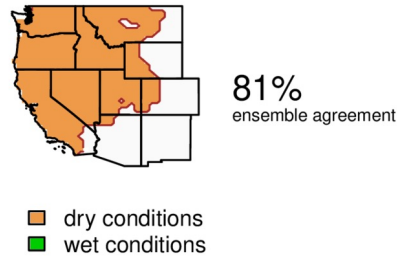


- NCEP model is showing high probabilities (>70%) of AR activity over Oregon and much of California on 1 Mar
- ECMWF model is showing much lower probabilities of AR activity in these areas, with the highest probabilities (10–30%) shifted towards the north over portions of Oregon, Washington, and Southern British Columbia

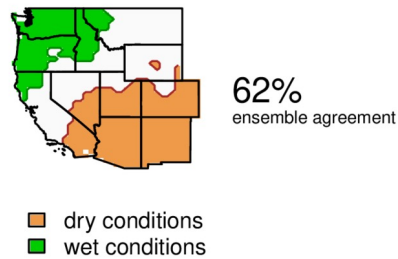
NCEP model is showing a much higher likelihood of AR activity in California and Oregon during Week 2

# Subseasonal Outlooks: Weeks 1–2 Ridging Forecasts (NCEP)

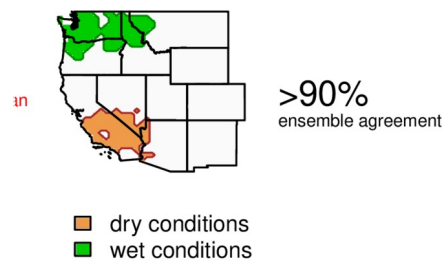
## North-Ridge



## South-Ridge

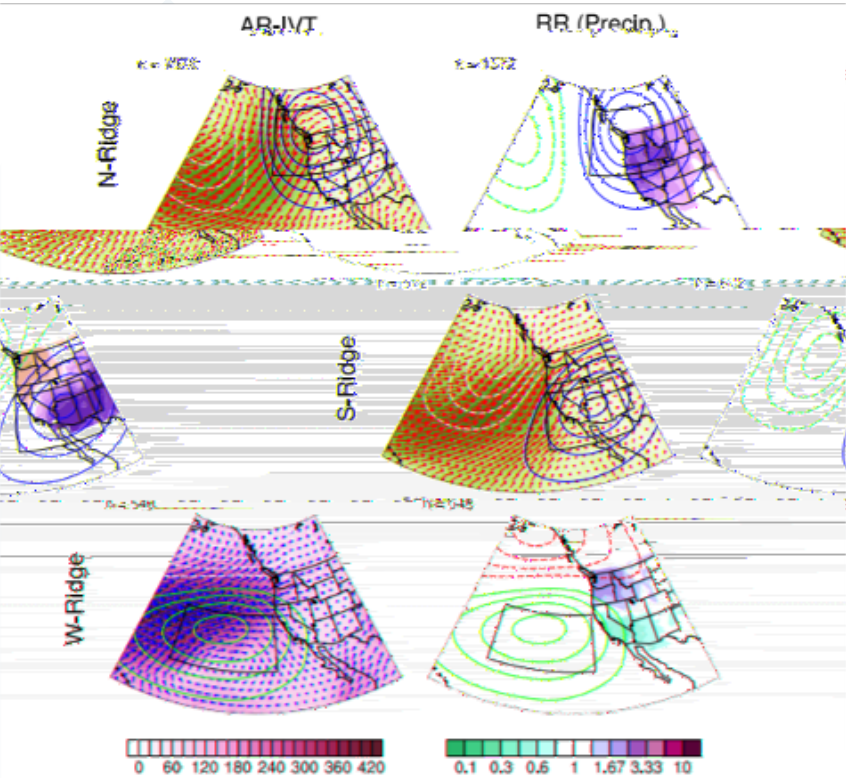


## West-Ridge



- NCEP shows high confidence (>90% or 81% ensemble agreement) in the occurrence of the West-Ridge and North-Ridge type during Weeks 1–2 (21 Feb – 7 Mar); There is moderate confidence (62%) in the occurrence of the South-Ridge type.
- All the three ridge types are associated with dry conditions over the southwestern U.S.. But there is a high likelihood that there will be wet conditions over the Pacific Northwest during Weeks 1-2.
- ECMWF shows high confidence (84% ensemble agreement) in the occurrence of the North-Ridge type during Weeks 1–2 (not shown)

The models agree on the likelihood of the North-Ridge type but disagree on the likelihood of the South-Ridge and West-Ridge type during Weeks 1–2



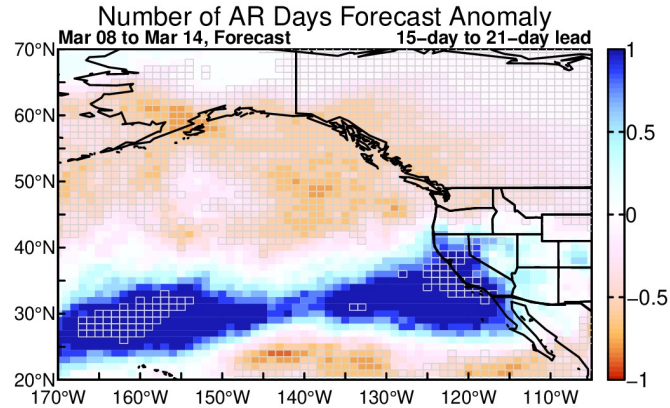
### How each ridge type typically influences precipitation

**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

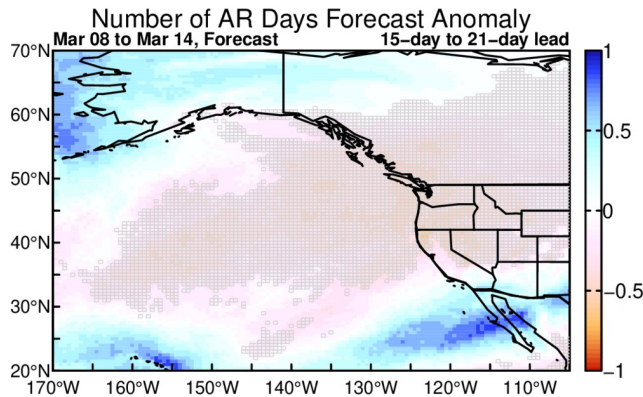
**Right:** Maps showing the 'Relative Risk' (RR) of precipitation under each ridge type. Brown shading indicates a reduced chance of precipitation when ridging occurs. For example, a RR value of 0.2 indicates a 5-fold reduction in the likelihood of precipitation

# Subseasonal Outlooks: Week 3 AR Activity (NCEP vs. ECMWF)

NCEP Experimental Forecast Initialized: Feb 21, 2022



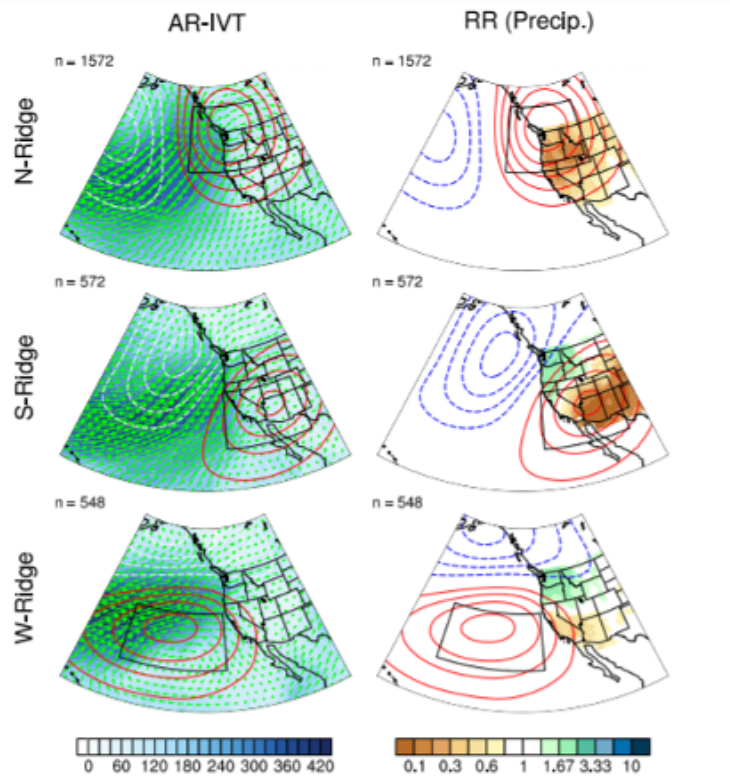
ECMWF Experimental Forecast Initialized: Feb 21, 2022



- NCEP model is predicting significantly below-normal AR activity over British Columbia and Washington and significantly above-normal AR activity over California and Baja California during Week 3 (8–14 Mar)
- ECMWF model is predicting a similar pattern of AR activity over British Columbia, Washington, and Baja California with weaker anomalies. But the predicted AR activity over California is the opposite (i.e., below-normal AR activity).

The models disagree on the likelihood of the above-normal AR activity in California during Week 3

# Subseasonal Outlooks: Weeks 3–4 Ridging Forecasts (NCEP)

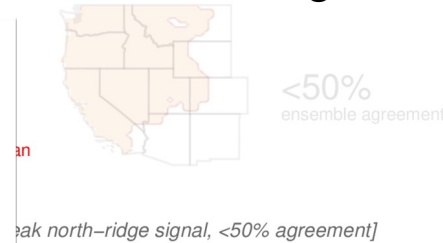


## How each ridge type typically influences precipitation

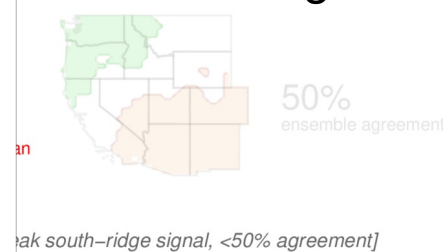
**Left:** Maps showing the average influence of each ridge type (red contours) on integrated vapor transport (IVT, blue shading indicates greater moisture transport, arrows indicate direction) during atmospheric river events

**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

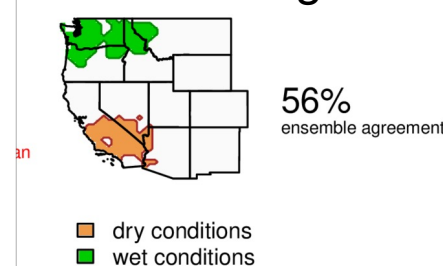
## North-Ridge



## South-Ridge



## West-Ridge

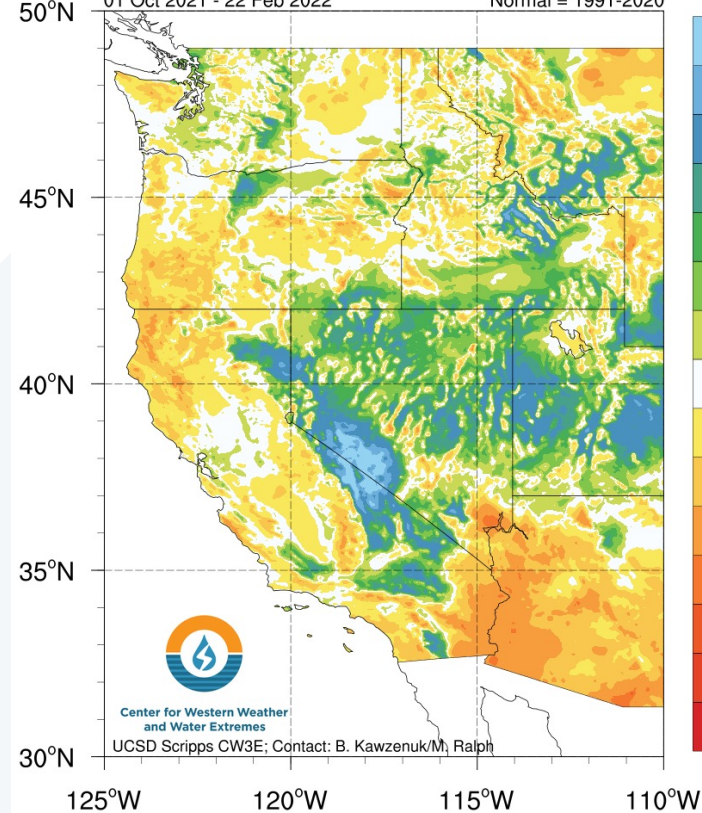


- NCEP shows moderate confidence (56% ensemble agreement) in the occurrence of the West-Ridge type during Weeks 3–4 (7 – 21 Mar)
- West-Ridge type is associated with dry conditions across Southern California and wet conditions across the Pacific Northwest
- ECMWF shows low confidence (< 50% ensemble agreement) in the occurrence of the West-Ridge type during Weeks 3–4 (not shown)

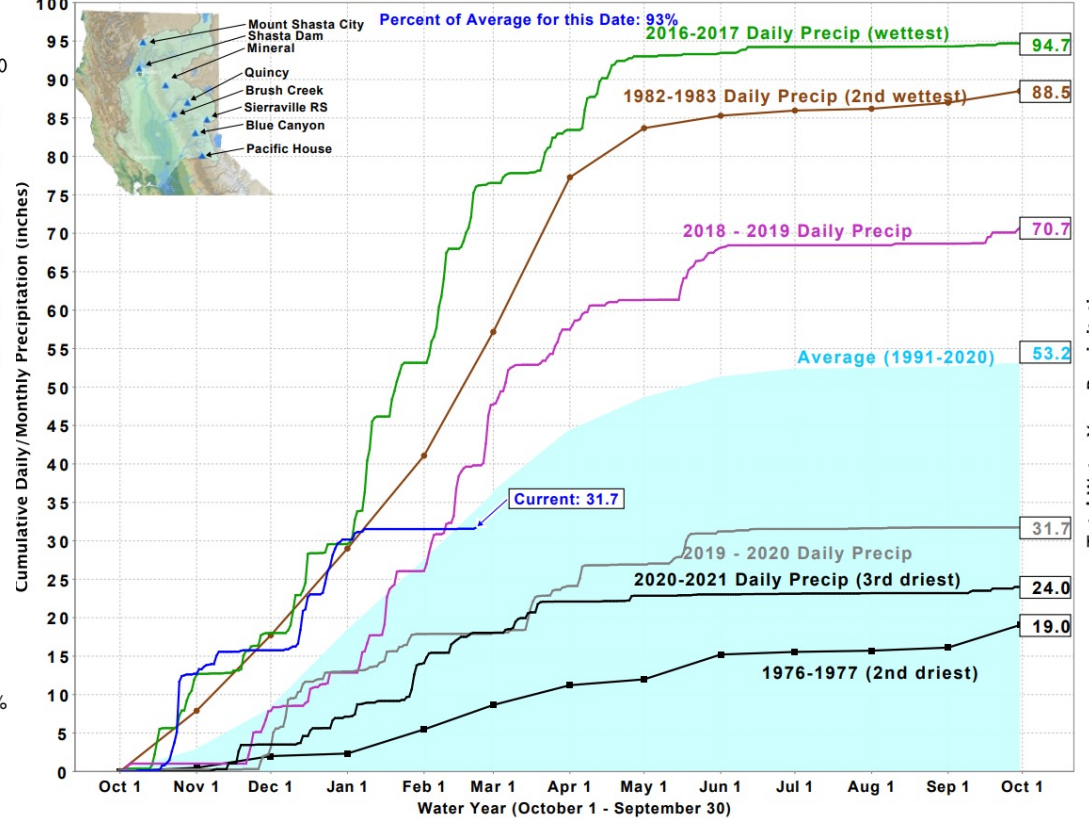
There is low-to-moderate confidence in the occurrence of the West-Ridge type near the US West Coast during Weeks 3–4

# Water Year Precipitation Summary

PRISM Water Year to Date Precipitation Anomaly (%)  
01 Oct 2021 - 22 Feb 2022  
Normal = 1991-2020

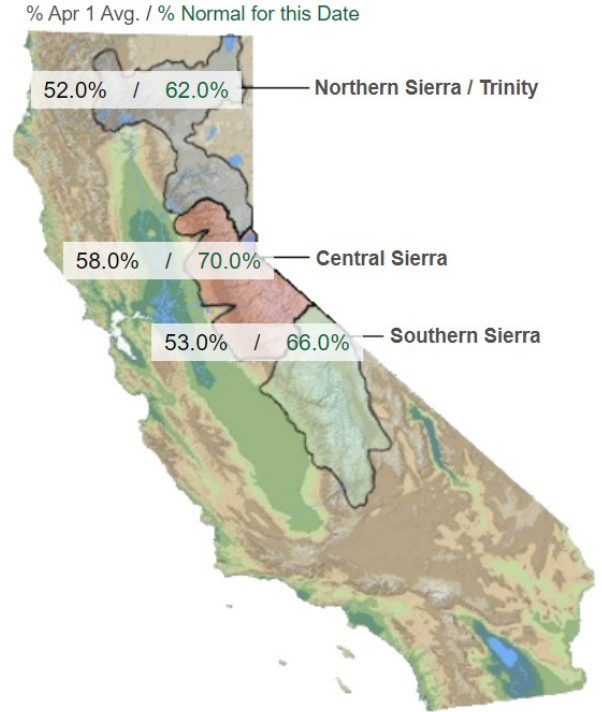


Northern Sierra Precipitation: 8-Station Index, February 22, 2022



Provided by the California Cooperative Snow Surveys

Data For: 22-Feb-2022



- As of 22 Feb, water-year-to-date precipitation is below normal over the Pacific Coast Ranges, the Oregon and Northern California Cascades, and the Sonoran Desert
- Water-year-to-date precipitation is significantly above normal across much of the Great Basin and portions of the Eastern Sierra Nevada and Mohave Desert
- After experiencing its wettest Oct-Dec period on record, the Northern Sierra Nevada has been exceptionally dry since early January
- Northern Sierra Nevada snowpack is now only 62% of normal for this time of year