



Center for Western Weather
and Water Extremes

SCRIPPS INSTITUTION OF OCEANOGRAPHY
AT UC SAN DIEGO

CW3E S2S Outlook: 9 Mar 2022

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UC San Diego



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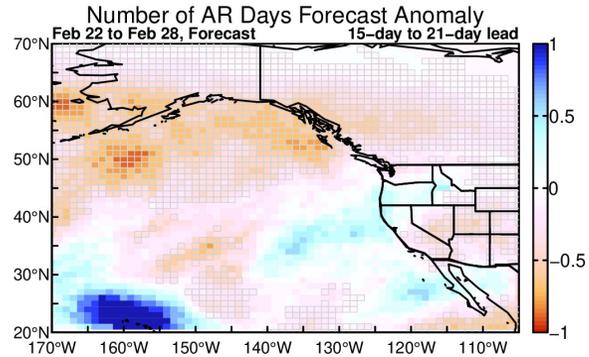
Summary

- **Forecast Verification (22 Feb–7 Mar):** NCEP Week 3 AR activity forecasts were superior to ECMWF forecasts during 22–28 Feb; Both Week 3 forecasts missed a stalled AR event over coastal Oregon during 1-2 Mar
- **Week 2 forecasts (15–21 Mar):** Models disagree on the likelihood of AR activity over Northern California and Oregon on 20 Mar, with NCEP showing higher probabilities (40–60%) compared to ECMWF (10–30%)
- NCEP GEFS model predicts the MJO will be in the Indian Ocean during the next two weeks, which climatologically leads to a high probability of AR activity in Washington and low probability of AR activity to the south
- **Week 3 forecasts (22–28 Mar):** Models disagree on the likelihood of AR activity over the western US
 - NCEP model is predicting above-normal AR activity over the western US, while ECMWF model is predicting below-normal AR activity over the western US, especially in California
- Both models show moderate-to-high confidence in ridging activity west of California (West-Ridge type) during Weeks 1–2 and ridging activity over the southwestern US (South-Ridge type) during Weeks 3–4
 - The West-Ridge (South-Ridge) type is typically associated with wet conditions in the Pacific Northwest and dry conditions in Central and Southern California (throughout the southwestern US)
 - NCEP is showing higher confidence in the occurrence of ridging activity
- CW3E statistical model based on February SST is predicting a dipole pattern of rainfall with significantly drier than normal conditions in the southwestern US and wetter than normal conditions in the northwestern US during Mar–May

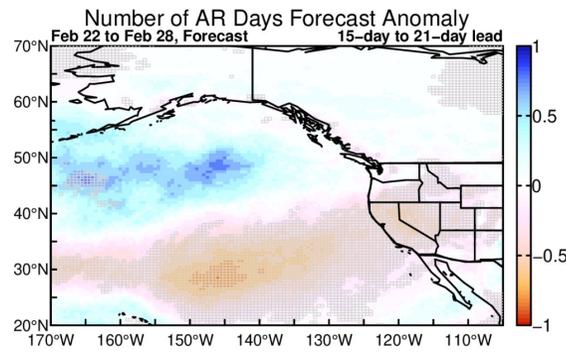
Looking Back: Week 3 AR Activity Forecasts

Valid: 22–28 Feb 2022

NCEP Experimental Forecast Initialized: Feb 07, 2022



ECMWF Experimental Forecast Initialized: Feb 07, 2022

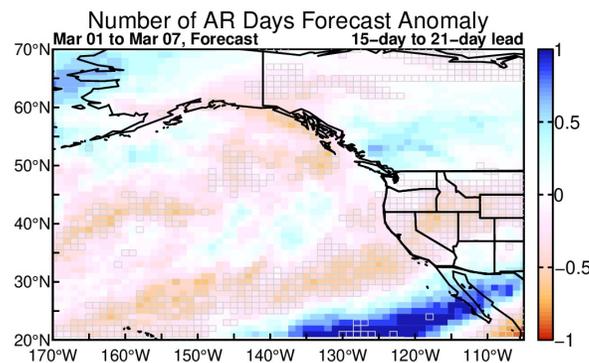


NCEP Week 3 Forecasts Verified

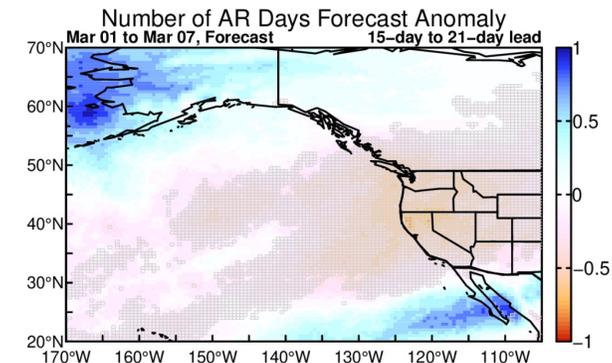
- NCEP: Below-normal AR activity over the southwestern US; slightly above-normal AR activity over Northern California and Oregon
- ECMWF: Below-normal AR activity over the western US, especially California

Valid: 1–7 Mar 2022

NCEP Experimental Forecast Initialized: Feb 14, 2022



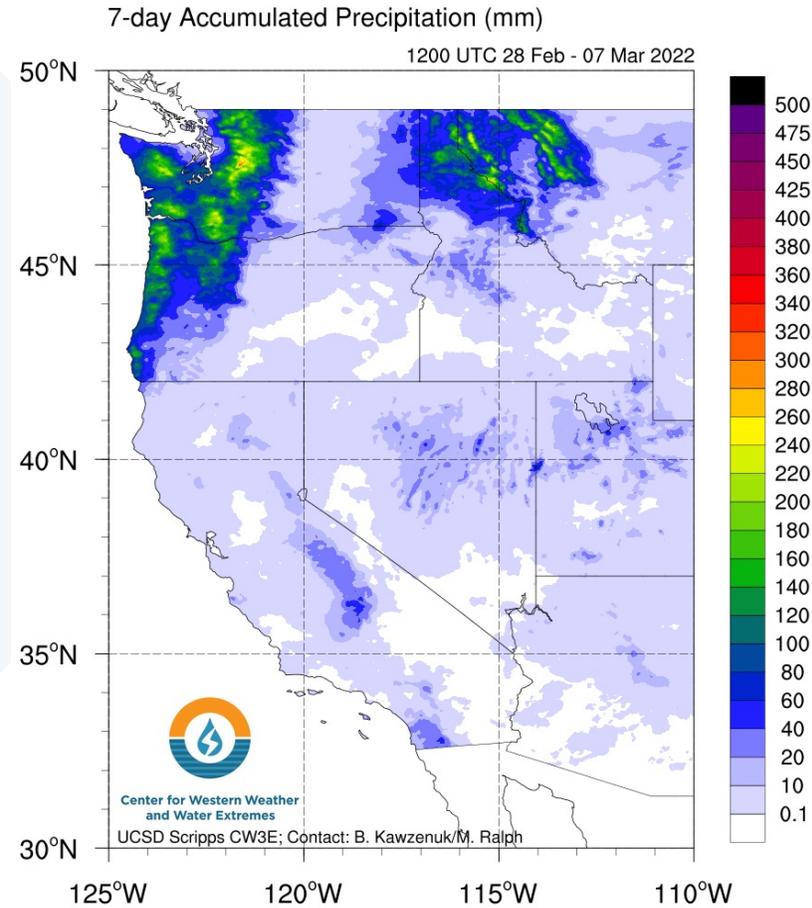
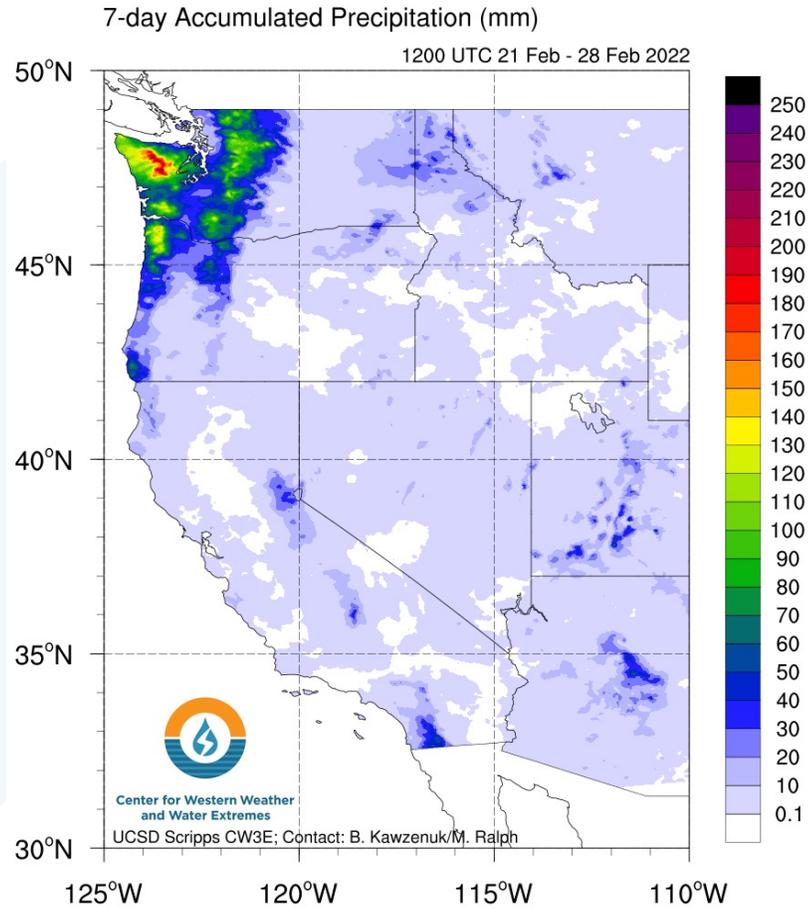
ECMWF Experimental Forecast Initialized: Feb 14, 2022



Both Week 3 Forecasts missed the stalled AR over coastal Oregon

- NCEP: Below-normal AR activity over the western US, especially California; Above-normal AR activity over the Baja Peninsula and British Columbia
- ECMWF: Below-normal AR activity over the western US, especially Northern California

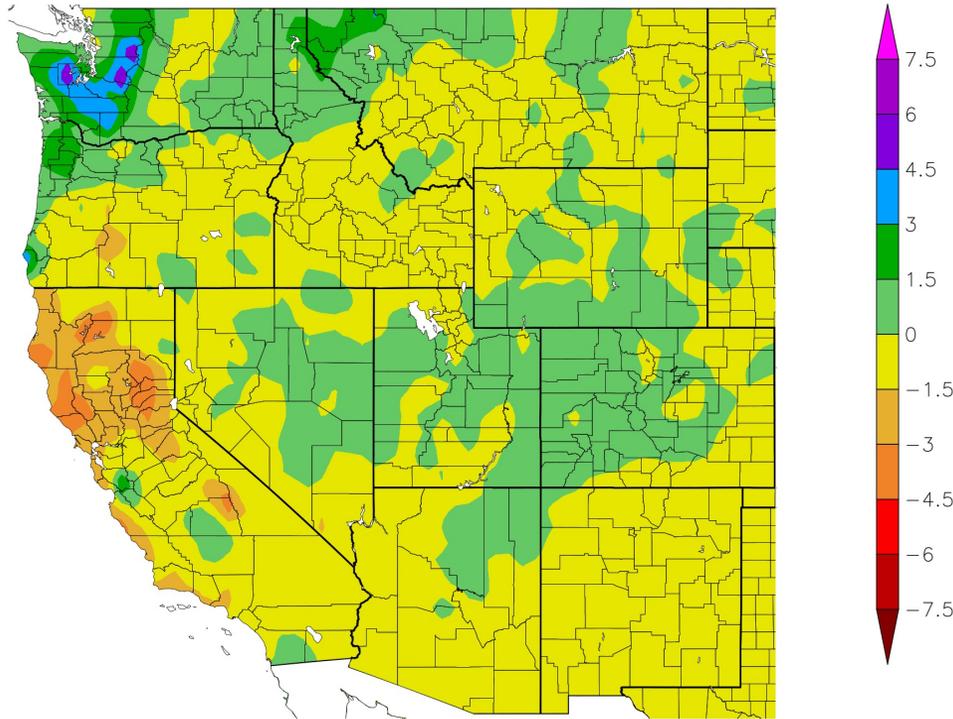
Looking Back: Accumulated Precipitation (21 Feb–7 Mar)



- Two landfalling ARs produced heavy precipitation (> 7 inches in some areas) in the Olympic Mountains, the Washington Cascades, and the Northern Oregon Coast Ranges on 27–28 Feb
- The AR was stalled over coastal Oregon and continued producing precipitation in western Oregon, western Washington, northern Idaho, and northwestern Montana on 1-2 Mar
- Observed precipitation during 21-28 Feb is generally more consistent with the NCEP Week 3 AR activity forecasts valid during the same period

Looking Back: 14-day Precipitation Anomaly (22 Feb–7 Mar)

Departure from Normal Precipitation (in)
2/22/2022 – 3/7/2022

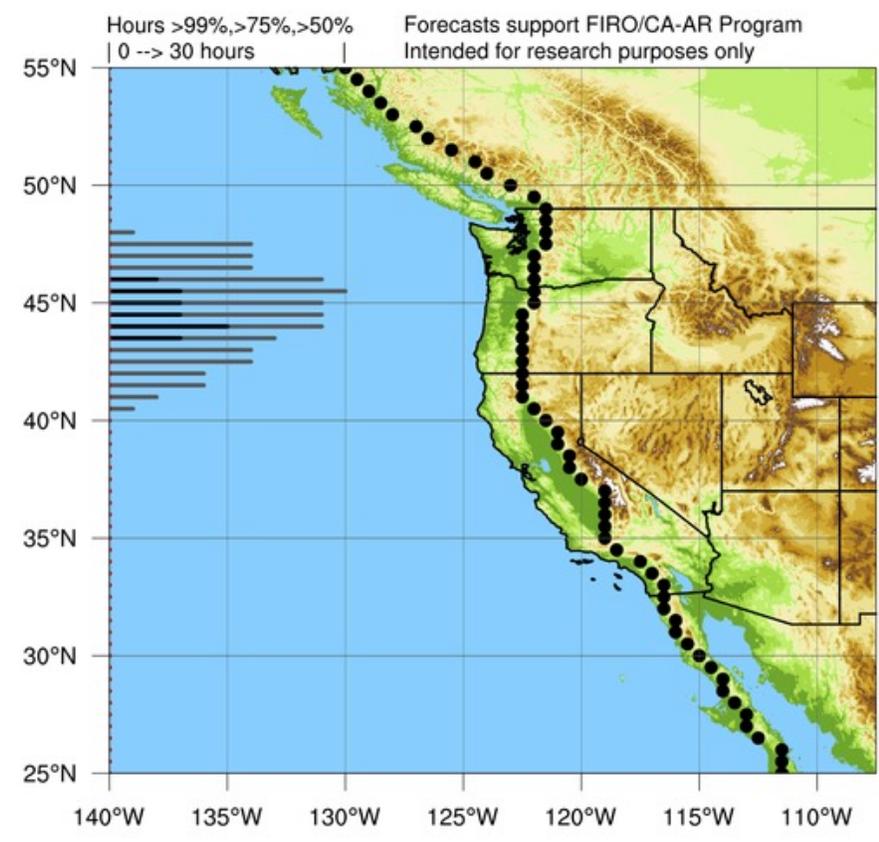
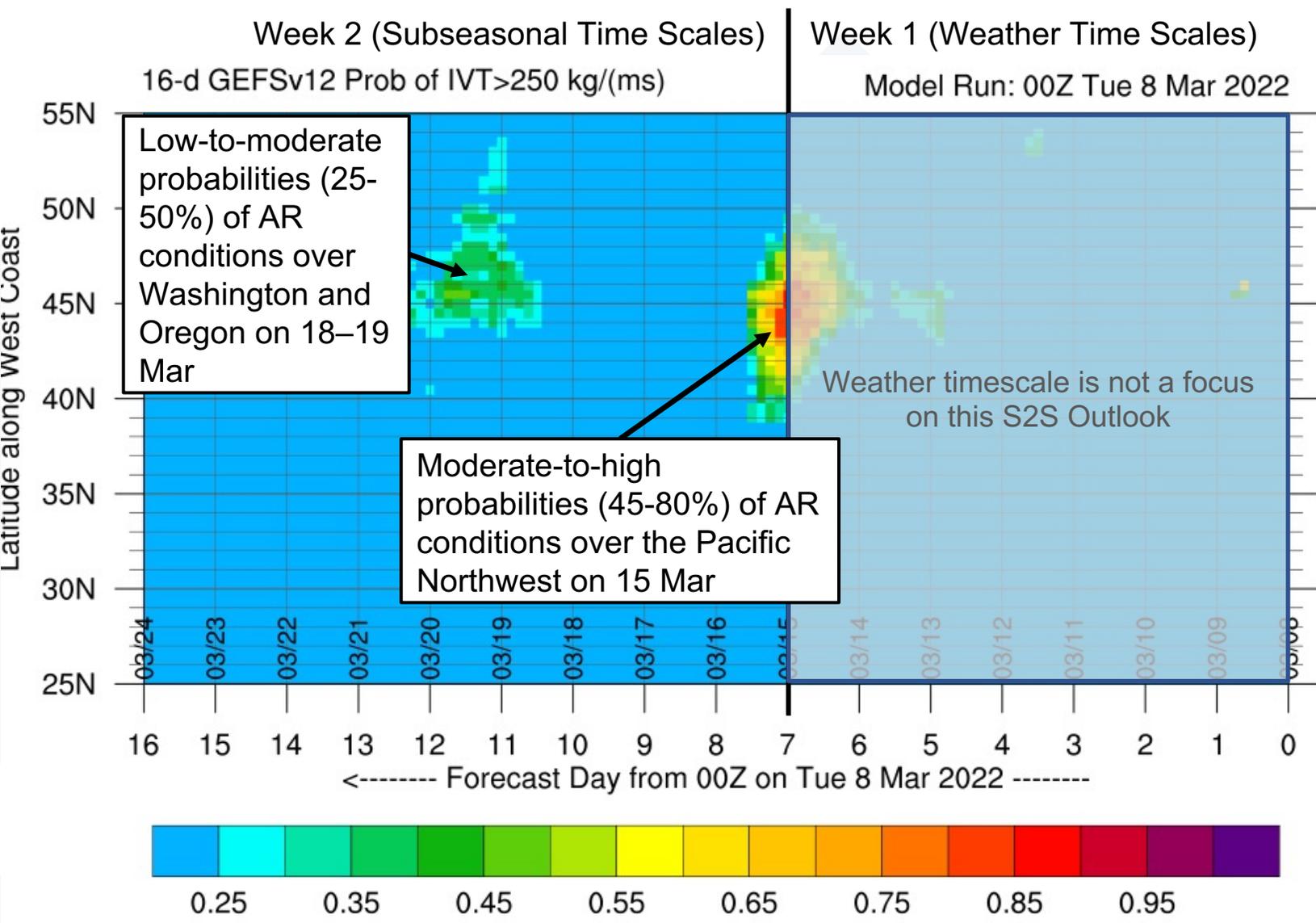


- Abnormally dry conditions have continued across much of California, especially in the northern portion
- Abnormally wet conditions in much of Washington, especially in the Olympic Mountains and the Washington Cascades

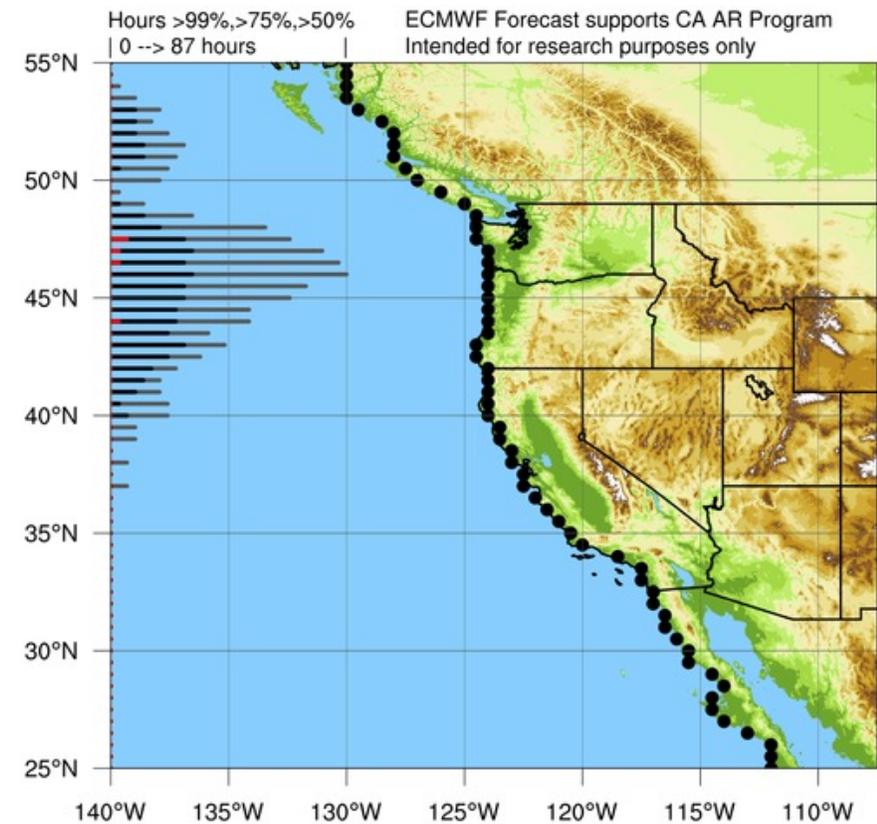
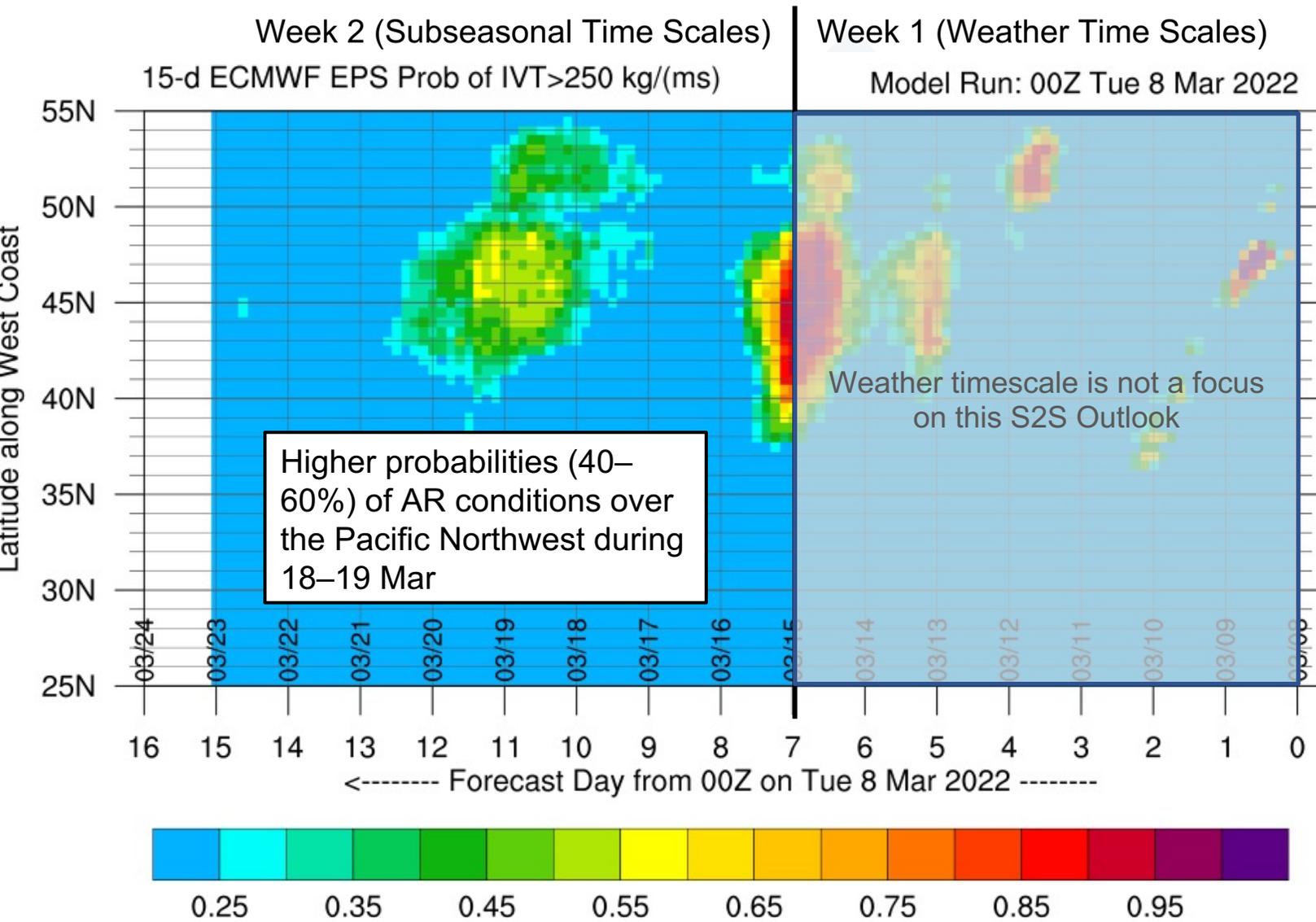
Generated 3/8/2022 at HPRCC using provisional data.

NOAA Regional Climate Centers

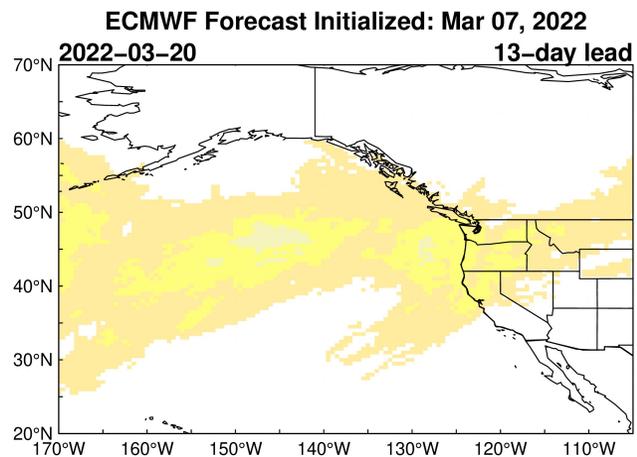
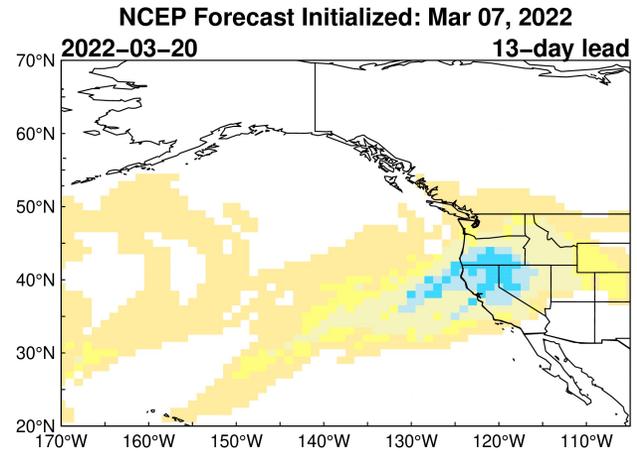
GEFS AR Landfall Tool: Valid 00Z 8–24 Mar



ECMWF EPS AR Landfall Tool: Valid 00Z 8–23 Mar



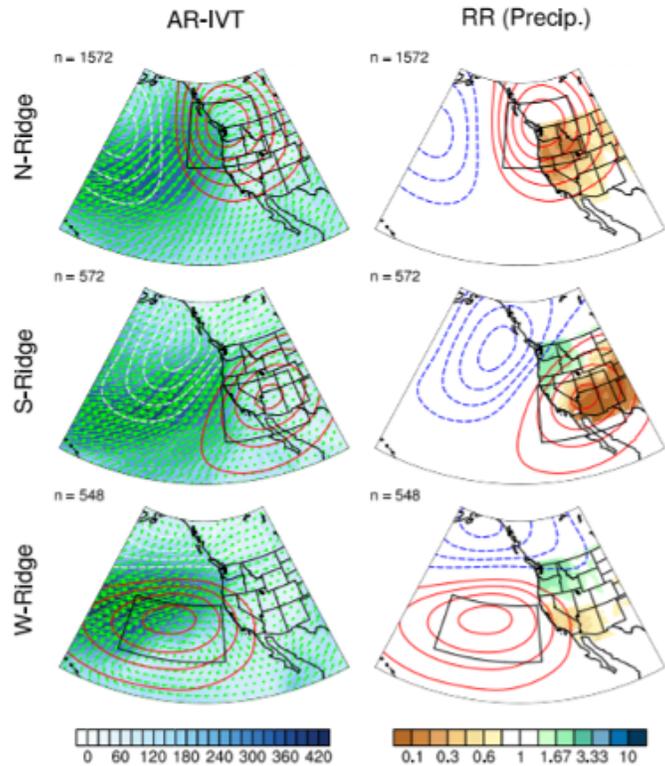
Subseasonal Outlooks: Week 2 AR Activity (NCEP vs. ECMWF)



- NCEP is showing moderate probabilities (40–60%) of AR activity over Northern California and Oregon on 20 Mar
- ECMWF is showing much lower probabilities (10–30%) of AR activity over Northern California and Oregon

Models disagree on the likelihood of landfalling AR activity over Northern California and Oregon during Week 2

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

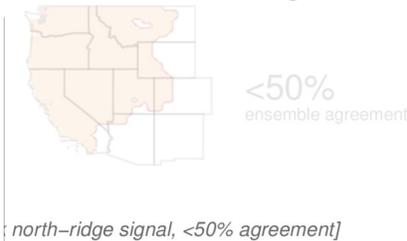


How each ridge type typically influences precipitation

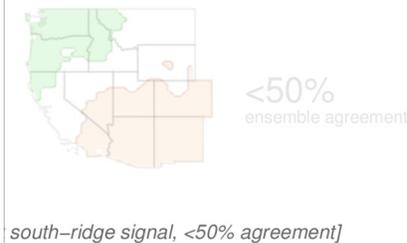
Left: Maps showing the average influence of each ridge type (red contours) on integrated vapor transport (IVT, blue shading indicates greater moisture transport, arrows indicate direction) during atmospheric river events

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

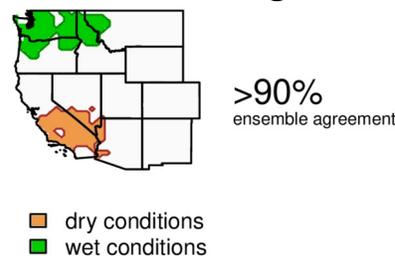
North-Ridge



South-Ridge



West-Ridge

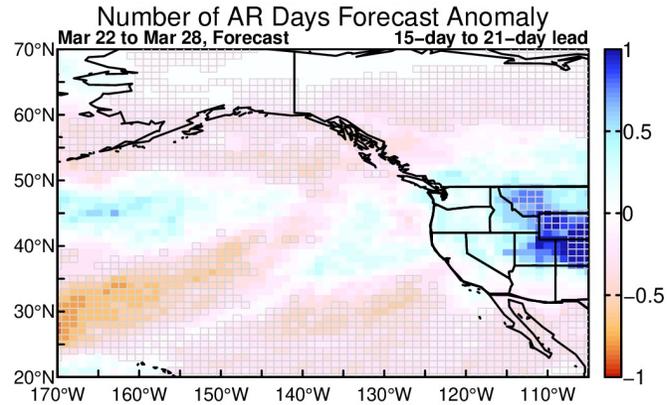


- NCEP and ECMWF both show moderate-to-high confidence (> 90% ensemble agreement in NCEP and 68% ensemble agreement in ECMWF) in the occurrence of the West-Ridge type during Weeks 1–2 (7–21 Mar)
- The West-Ridge type is typically associated with wet conditions over the Pacific Northwest and dry conditions in Central and Southern California
- ECMWF model also shows a likelihood of occurrence (76% ensemble agreement) of the South-Ridge type (not shown)

The models both suggest a likelihood of the West-Ridge type during Weeks 1–2 with higher confidence in NCEP

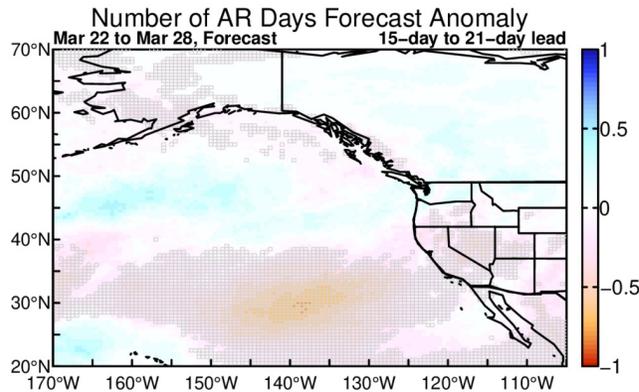
Subseasonal Outlooks: Week 3 AR Activity (NCEP vs. ECMWF)

NCEP Experimental Forecast Initialized: Mar 07, 2022



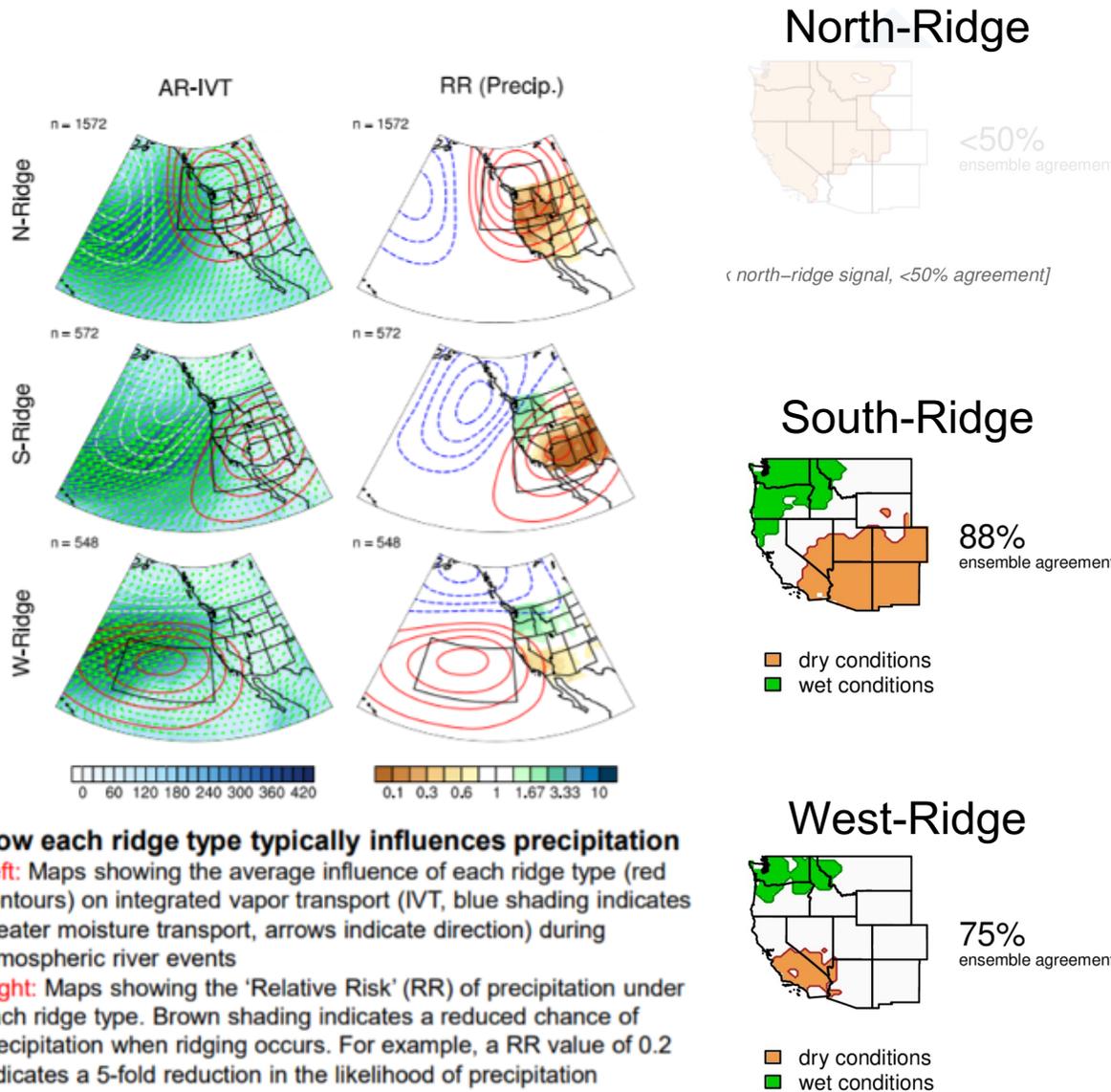
- NCEP model is predicting above-normal AR activity over the western US, especially more inland regions during Week 3 (22–28 Mar)
- ECMWF model is predicting the opposite with below-normal AR activity over the western US, especially in California during Week 3

ECMWF Experimental Forecast Initialized: Mar 07, 2022



Models disagree on the likelihood of AR activity over the western US during Week 3, especially in California and Oregon

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



How each ridge type typically influences precipitation

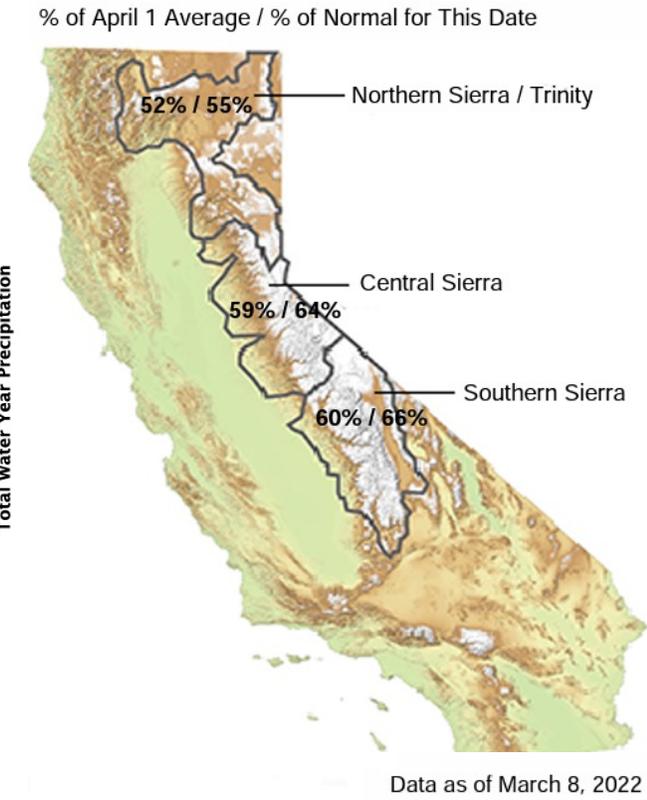
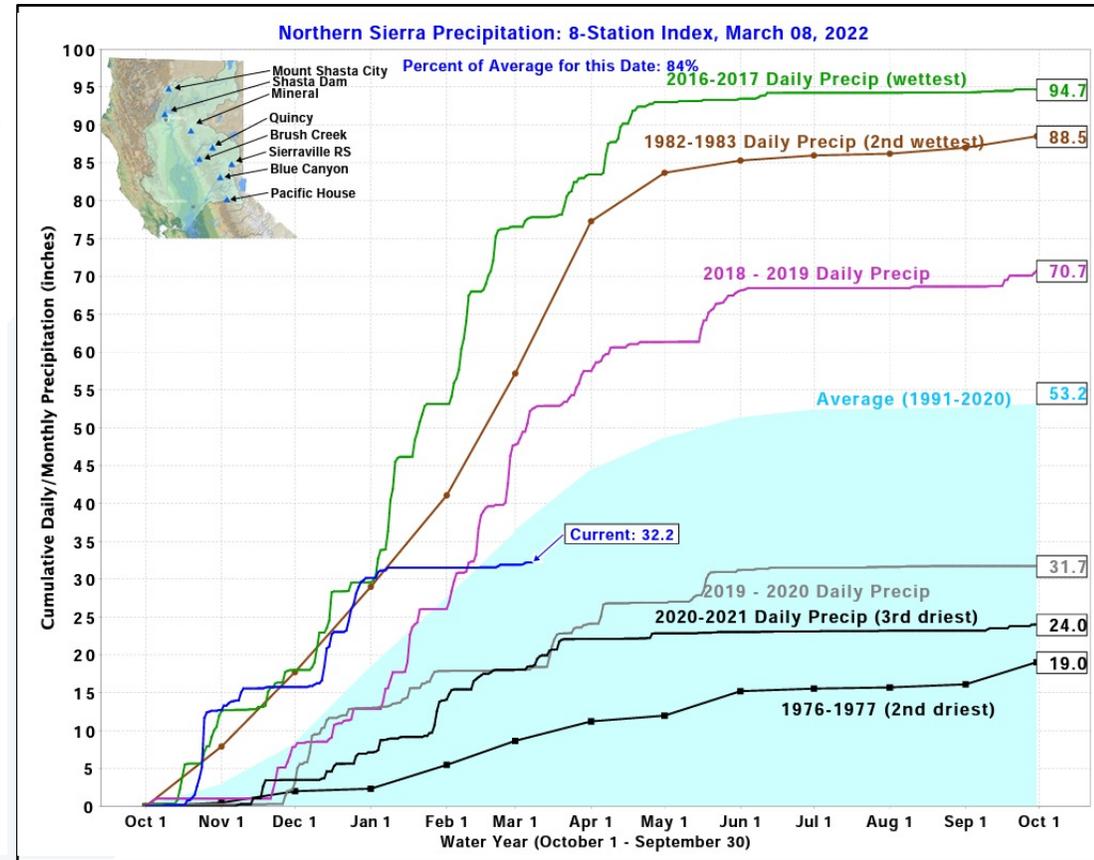
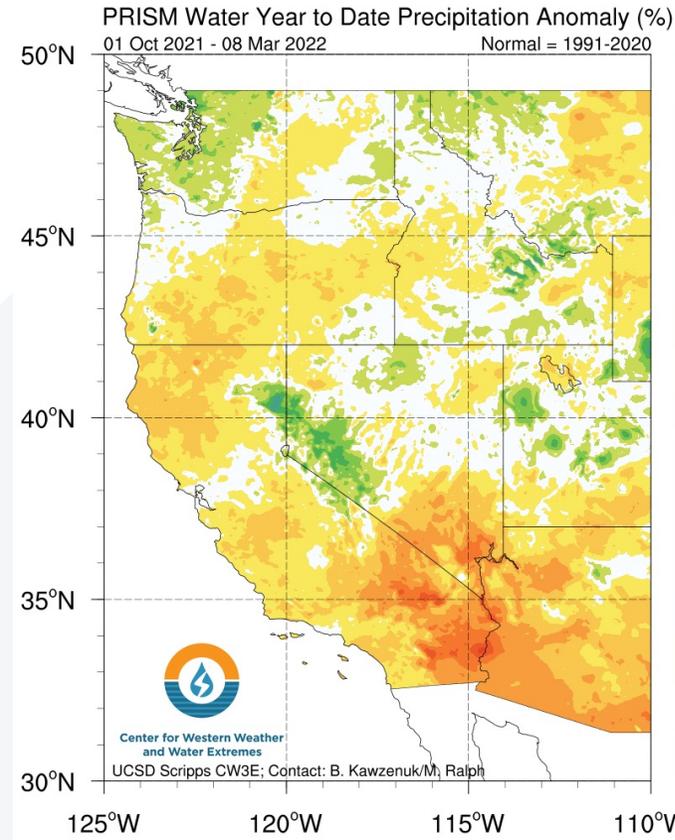
Left: Maps showing the average influence of each ridge type (red contours) on integrated vapor transport (IVT, blue shading indicates greater moisture transport, arrows indicate direction) during atmospheric river events

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

- NCEP and ECMWF both show moderate-to-high confidence (54-88% ensemble agreement) in the occurrence of both the South-Ridge and West-Ridge types during Weeks 3–4 (21 Mar – 4 Apr) with a higher likelihood of the South-Ridge type
- The South-Ridge (West-Ridge) type is typically associated with wet conditions in the Pacific Northwest and dry conditions throughout the southwestern US (in Central and Southern California)

There is moderate-to-high confidence in the occurrence of the South-Ridge and West-Ridge types during Weeks 3–4

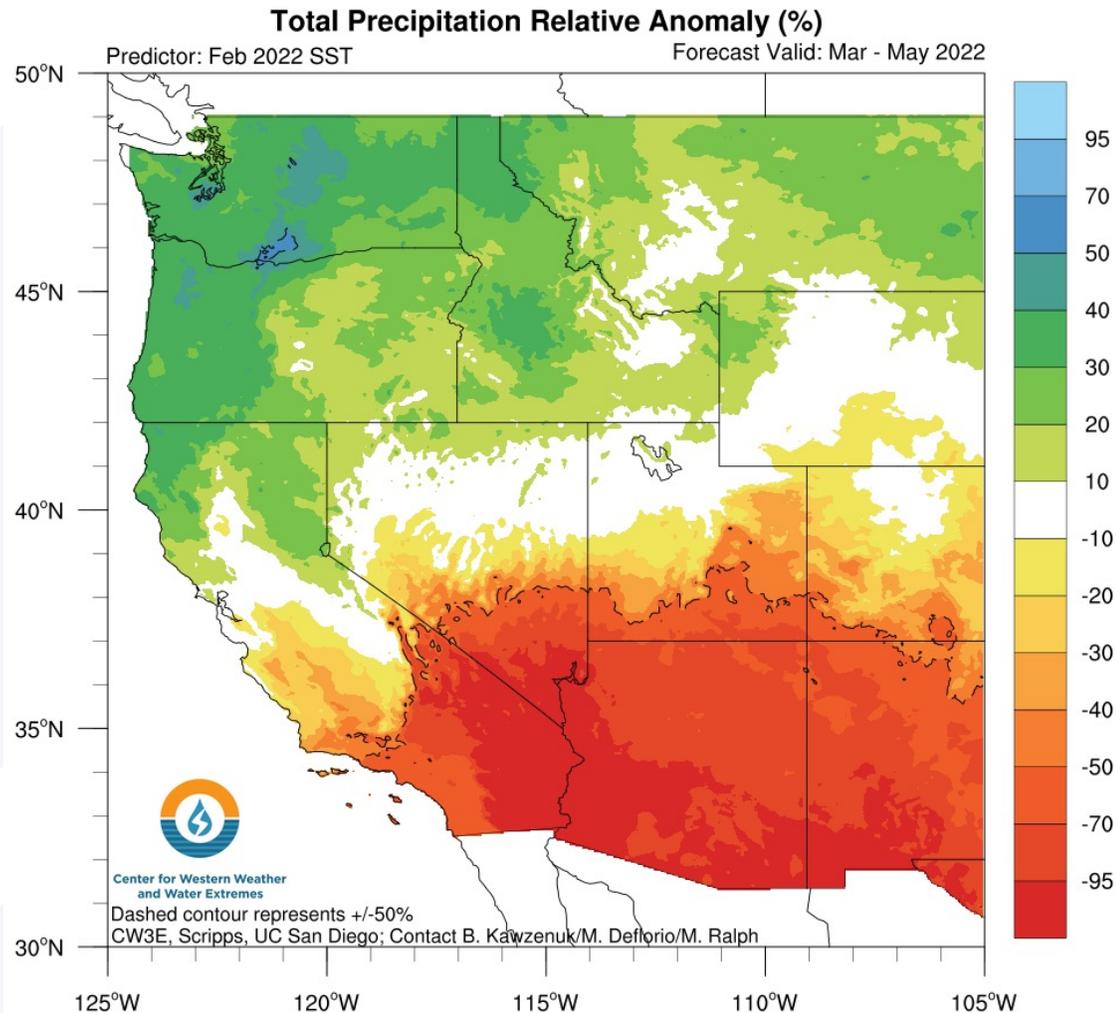
Water Year Precipitation Summary



Source: California Department of Water Resources

- As of 8 Mar, water-year-to-date precipitation is below normal across much of Oregon, California, and Arizona
- Water-year-to-date precipitation is above normal across portions of the Great Basin and western Washington
- After experiencing its wettest Oct–Dec period on record, total water year precipitation in the Northern Sierra Nevada is now only 84% of normal for this date (8 Mar)
- Northern Sierra Nevada snowpack is only 55% of normal for this date (8 Mar)

Seasonal CCA Outlooks: Mar–May 2022 Precipitation



- CW3E statistical model based on February SST is predicting significantly below-normal (> 50% below normal) Mar-May precipitation over Southern California, Southern Nevada, Arizona, and New Mexico
- Above-normal precipitation is predicted across portions of Northern California and the northwestern US
- The Mar-May outlook is generally consistent with the anomaly patterns predicted previously throughout the winter