



Center for Western Weather
and Water Extremes

SCRIPPS INSTITUTION OF OCEANOGRAPHY
AT UC SAN DIEGO

CW3E S2S Outlook: 2 Mar 2022

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

UC San Diego



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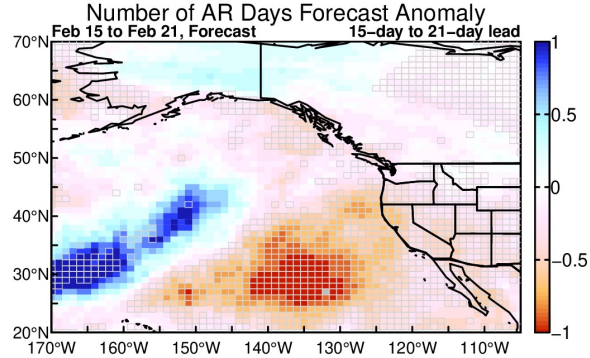
Summary

- **Forecast Verification (15–28 Feb):** NCEP and ECMWF Week 3 AR activity forecasts both verified during 15–21 Feb; NCEP Week 3 AR activity forecasts were superior to ECMWF forecasts during 22–28 Feb
 - Multiple landfalling ARs and heavy precipitation were observed in the Pacific Northwest during 22–28 Feb
- **Week 2 forecasts (8–14 Mar):** Models show low likelihood of landfalling AR activity over the western US
 - ECMWF is showing slightly higher probabilities (10–20%) of AR activity in California compared to NCEP
- **Week 3 forecasts (15–21 Mar):** Models show potential for above-normal AR activity in the western US, but disagree on the location
 - ECMWF is predicting higher AR activity over Central and Southern CA, while NCEP is predicting higher AR activity in Northern CA and the Pacific Northwest
- NCEP and ECMWF both show high confidence in ridging activity over the southwestern US (South-Ridge type) during Weeks 1–2
 - The South-Ridge type is typically associated with wet conditions over the Pacific Northwest and widespread dry conditions throughout the southwestern US
- Models show moderate confidence in ridging activity over the southwestern US (South-Ridge type) during Weeks 3–4, but disagree on the likelihood of ridging activity west of California (West-Ridge type)
 - NCEP is showing higher confidence in the occurrence of the West-Ridge type
 - The West-Ridge type is typically associated with wet conditions over the Pacific Northwest and dry conditions in Central and Southern CA

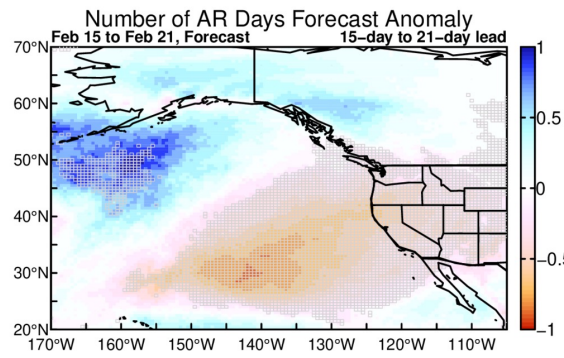
Looking Back: Week 3 AR Activity Forecasts

Valid: 15–21 Feb 2022

NCEP Experimental Forecast Initialized: Jan 31, 2022



ECMWF Experimental Forecast Initialized: Jan 31, 2022

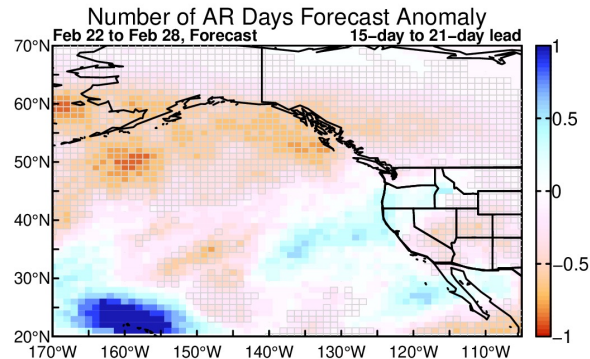


Both Week 3 Forecasts Verified

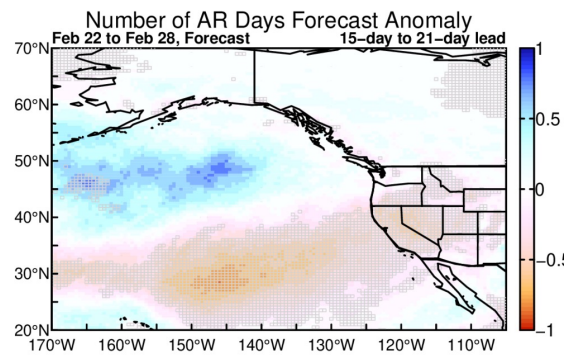
- NCEP: Below-normal AR activity over the western US, especially California
- ECMWF: Below-normal AR activity over the western US, especially Northern California and Oregon

Valid: 22–28 Feb 2022

NCEP Experimental Forecast Initialized: Feb 07, 2022



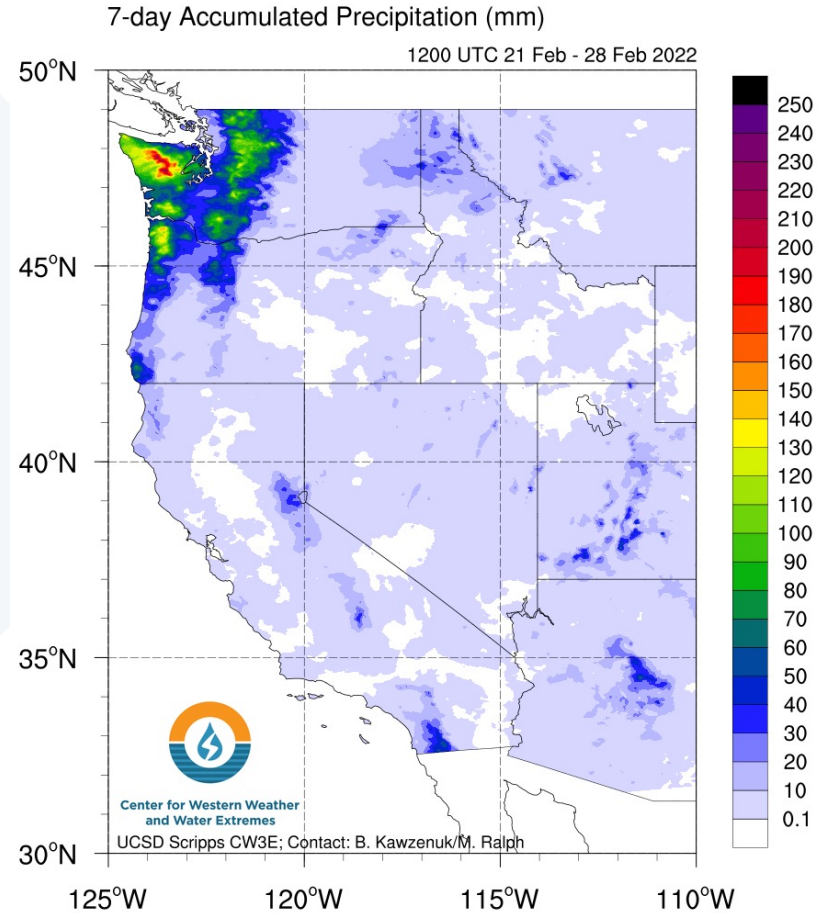
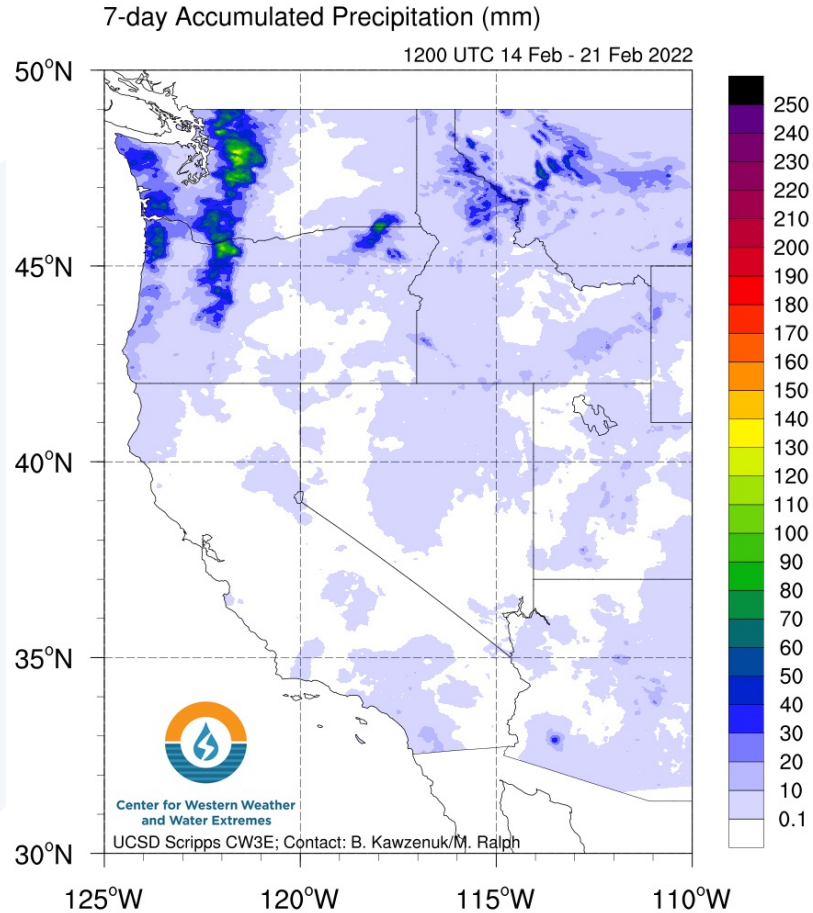
ECMWF Experimental Forecast Initialized: Feb 07, 2022



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

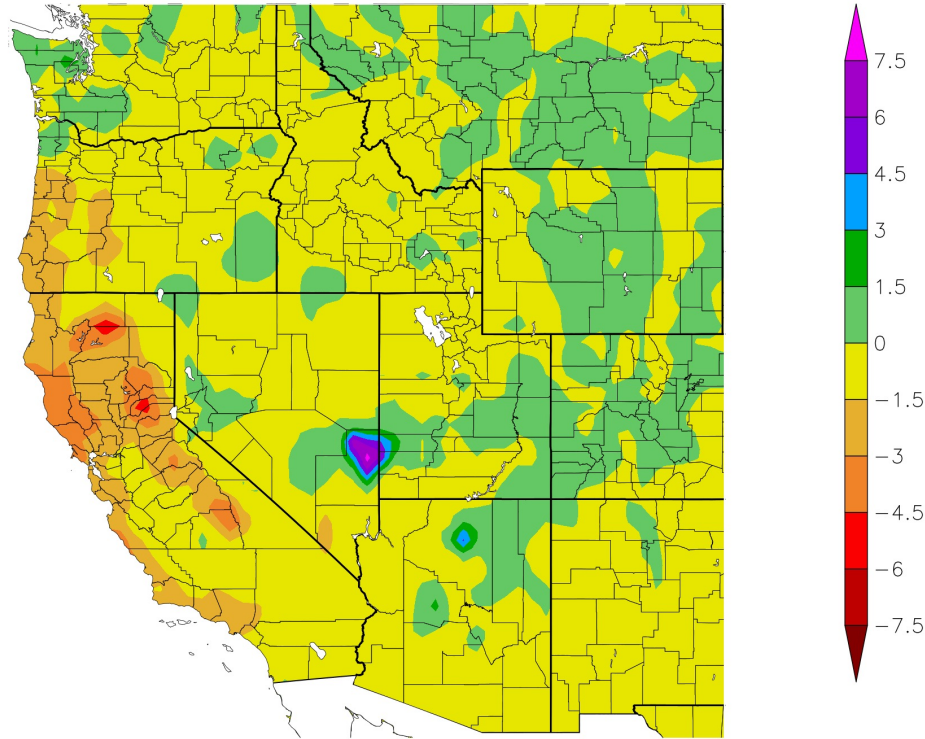
Looking Back: Accumulated Precipitation (15–28 Feb)



- Multiple weak systems brought light precipitation (< 3 inches) to western Washington and western Oregon on 15 Feb and 20–21 Feb
- 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
- Observed precipitation during the previous two weeks is generally consistent with the NCEP Week 3 AR activity forecasts valid during the same period

Looking Back: 14-day Precipitation Anomaly (15–28 Feb)

Departure from Normal Precipitation (in)
2/15/2022 – 2/28/2022

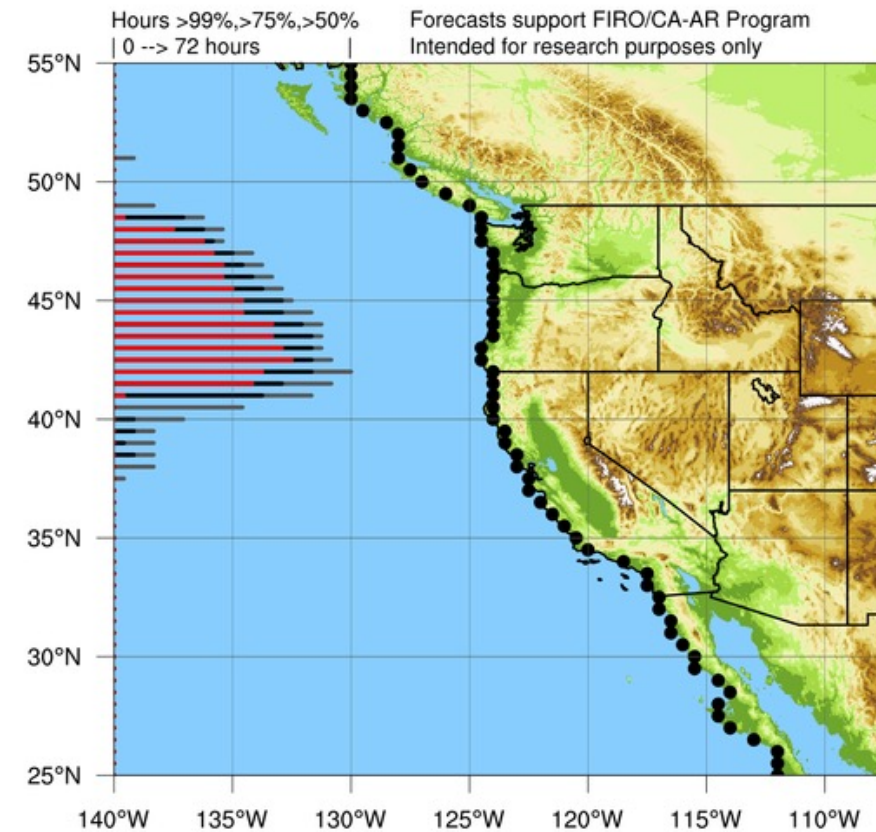
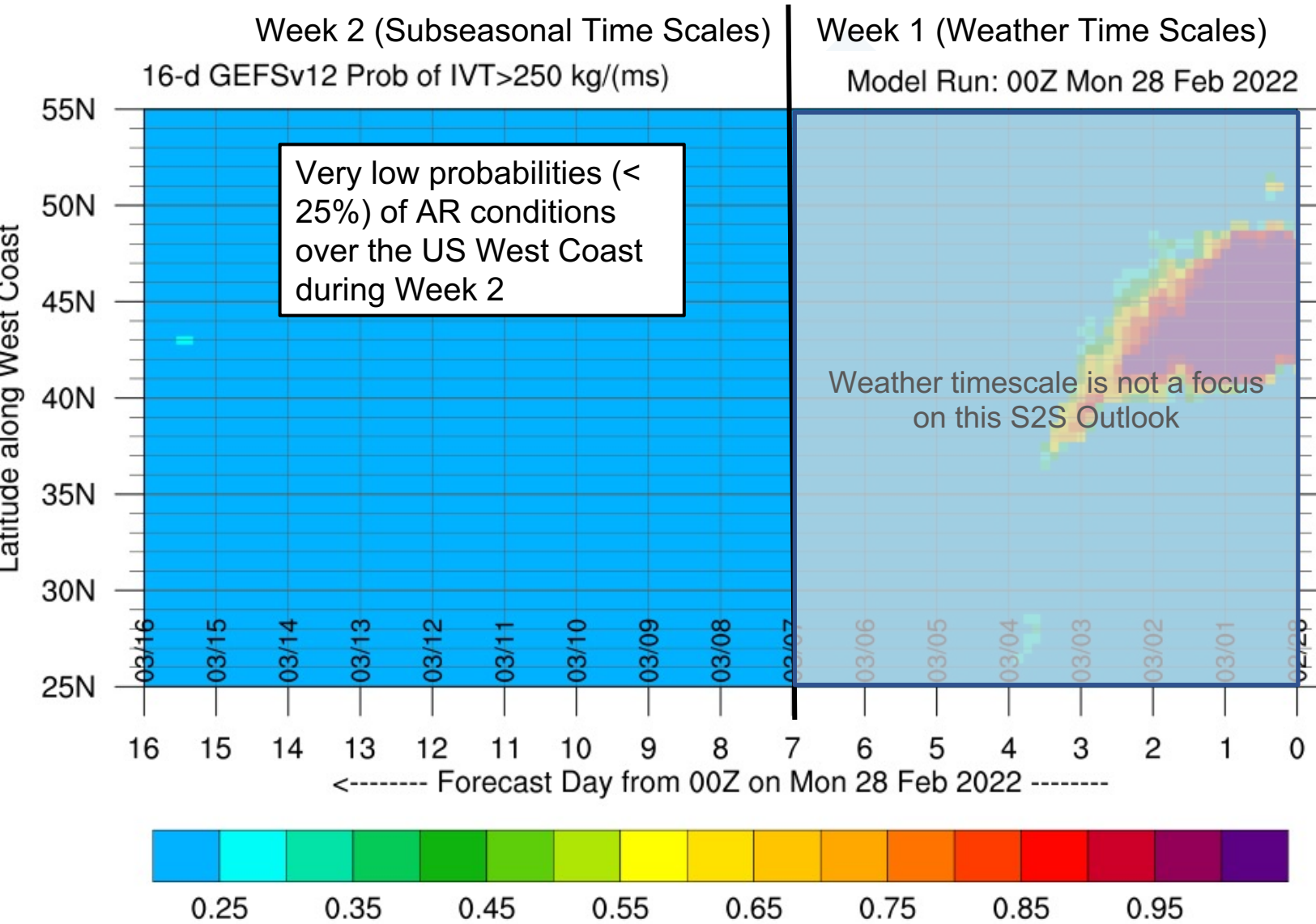


- Abnormally dry conditions have continued across much of California, especially in the Coast Ranges, the Cascades, and the Sierra Nevada
- Dry conditions in California are consistent with a lack of landfalling AR activity during this period, which was forecasted by both NCEP and ECMWF at 3-week lead times

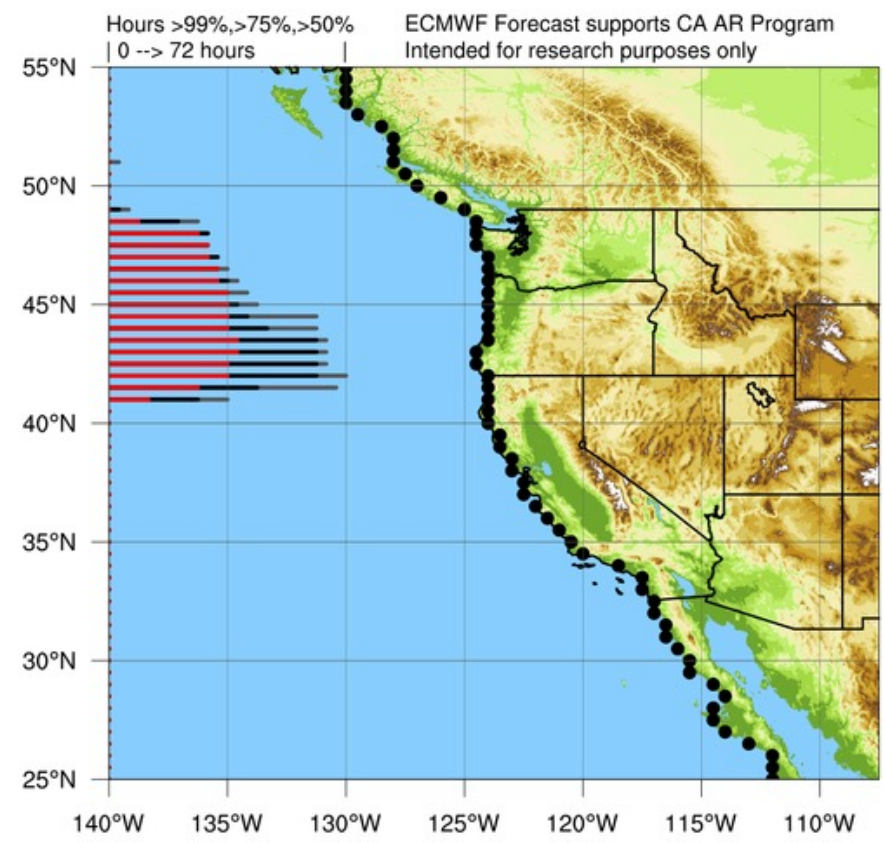
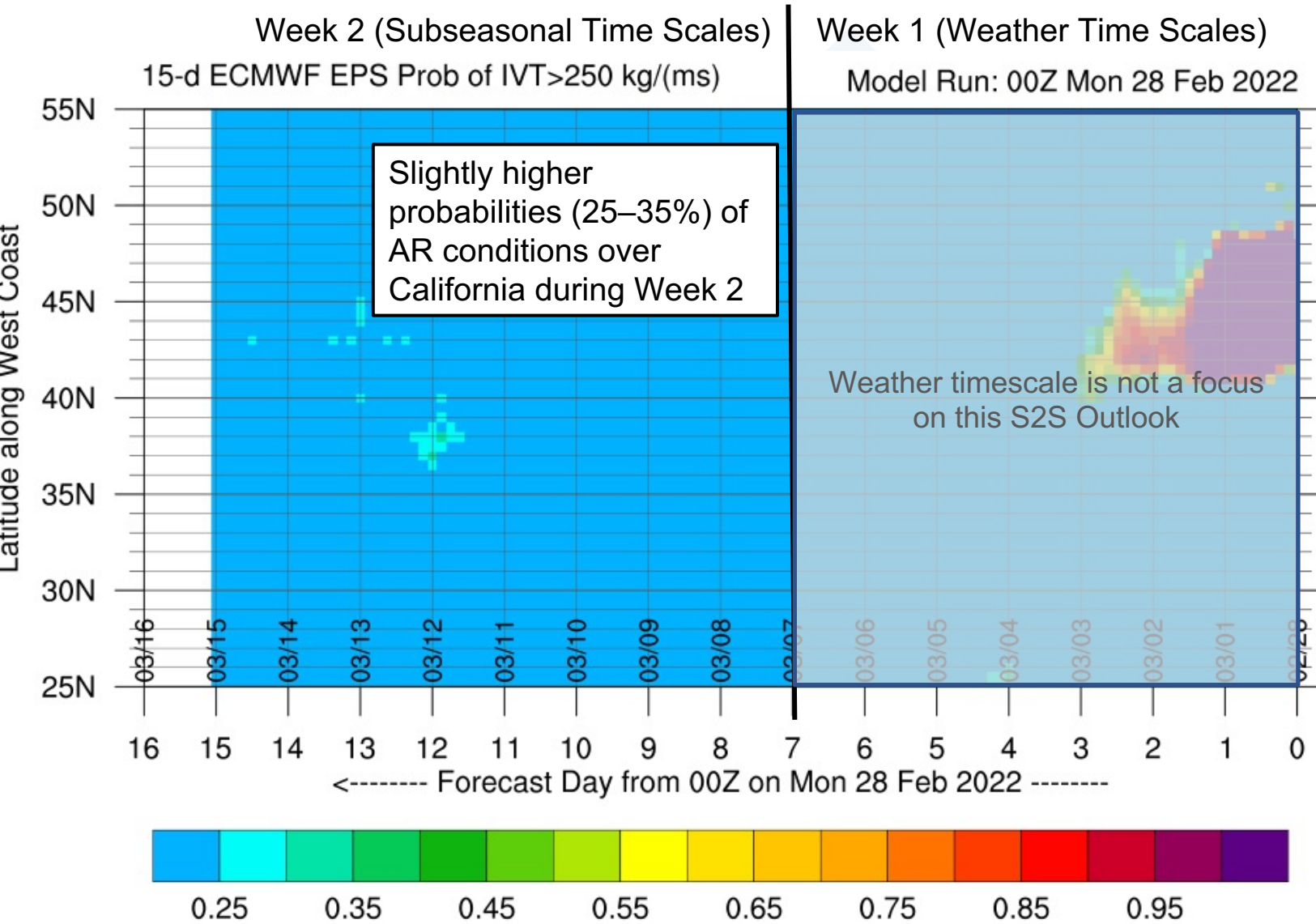
Generated 3/1/2022 at HPRCC using provisional data.

NOAA Regional Climate Centers

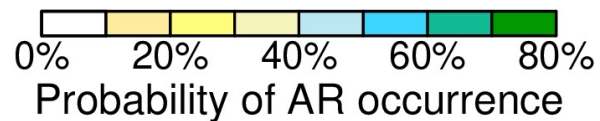
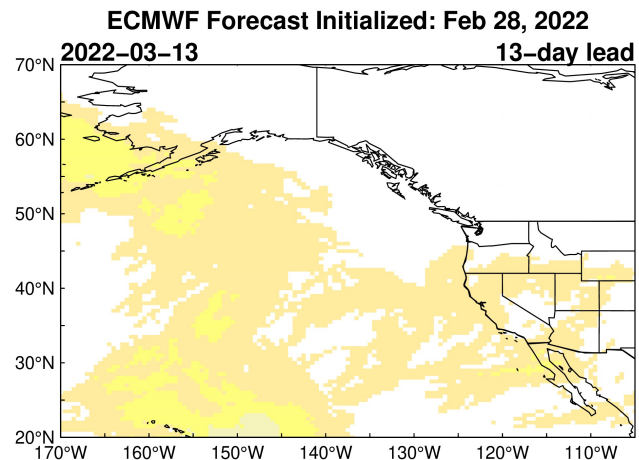
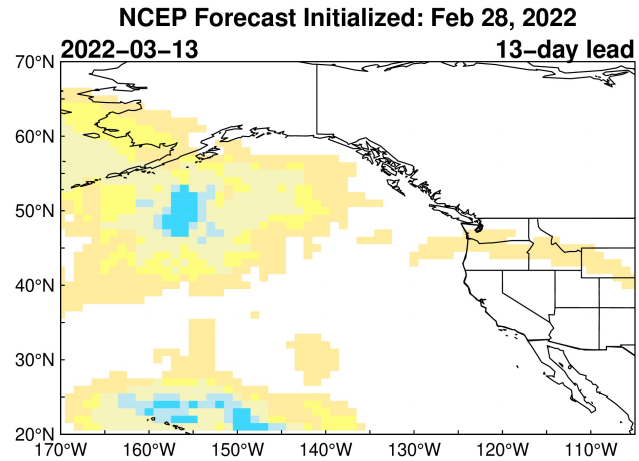
GEFS AR Landfall Tool: Valid 00Z 28 Feb – 16 Mar



ECMWF EPS AR Landfall Tool: Valid 00Z 28 Feb – 15 Mar



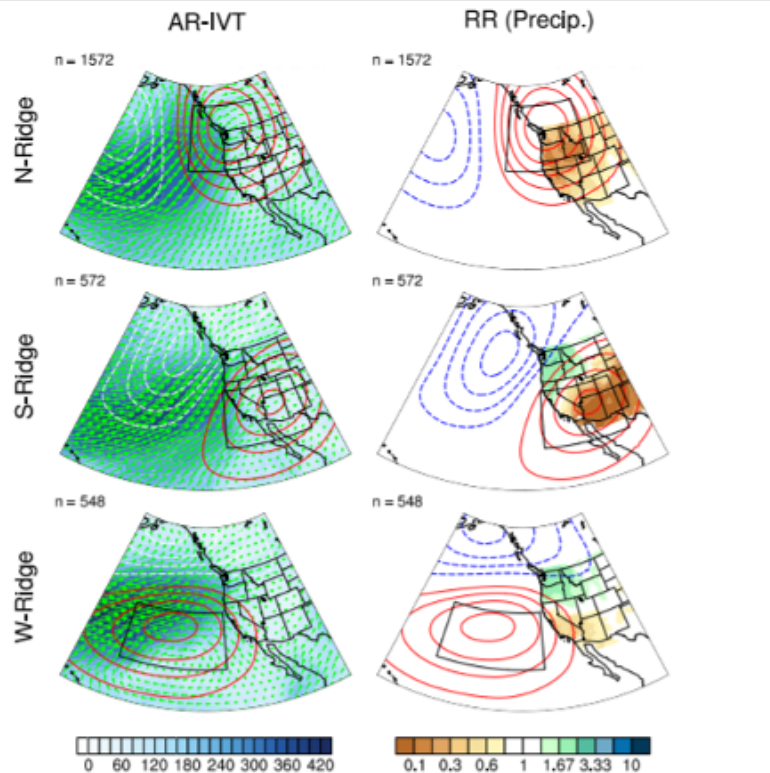
Subseasonal Outlooks: Week 2 AR Activity (NCEP vs. ECMWF)



- NCEP and ECMWF are both showing low probabilities of AR activity along the US West Coast during Week 2 (8–14 Mar)
- ECMWF is showing slightly higher probabilities (10–30%) of AR activity over California and the Baja Peninsula on 13 Mar

Both models suggest that landfalling AR activity is unlikely 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

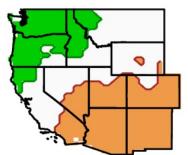


<50%
ensemble agreement

-Mean

[weak north-ridge signal, <50% agreement]

South-Ridge



>90%
ensemble agreement

-Mean

dry conditions
wet conditions

West-Ridge



<50%
ensemble agreement

-Mean

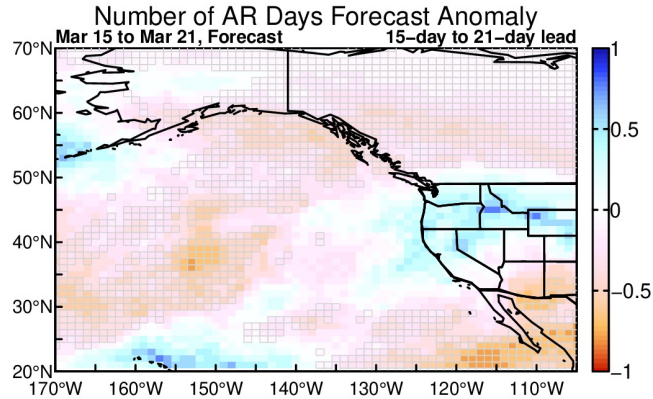
[weak west-ridge signal, <50% agreement]

- NCEP and ECMWF both show high confidence (> 90% ensemble agreement) in the occurrence of the South-Ridge type during Weeks 1–2 (28 Feb – 14 Mar)
- The South-Ridge type is typically associated with wet conditions over the Pacific Northwest and widespread dry conditions across the southwestern US
- Both models show low confidence (< 50% ensemble agreement) in the occurrence of the North-Ridge and West-Ridge types during Weeks 1–2

The models agree on the high likelihood of the South-Ridge type during Weeks 1–2

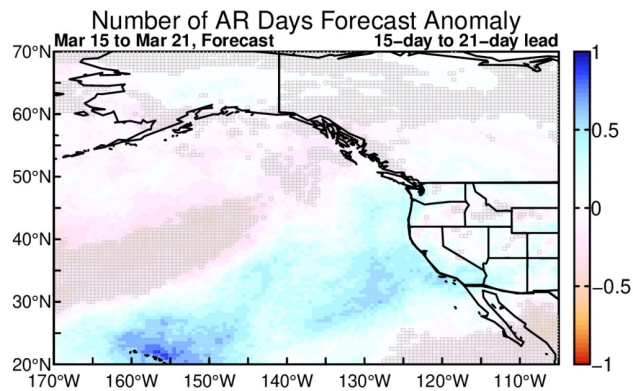
Subseasonal Outlooks: Week 3 AR Activity (NCEP vs. ECMWF)

NCEP Experimental Forecast Initialized: Feb 28, 2022



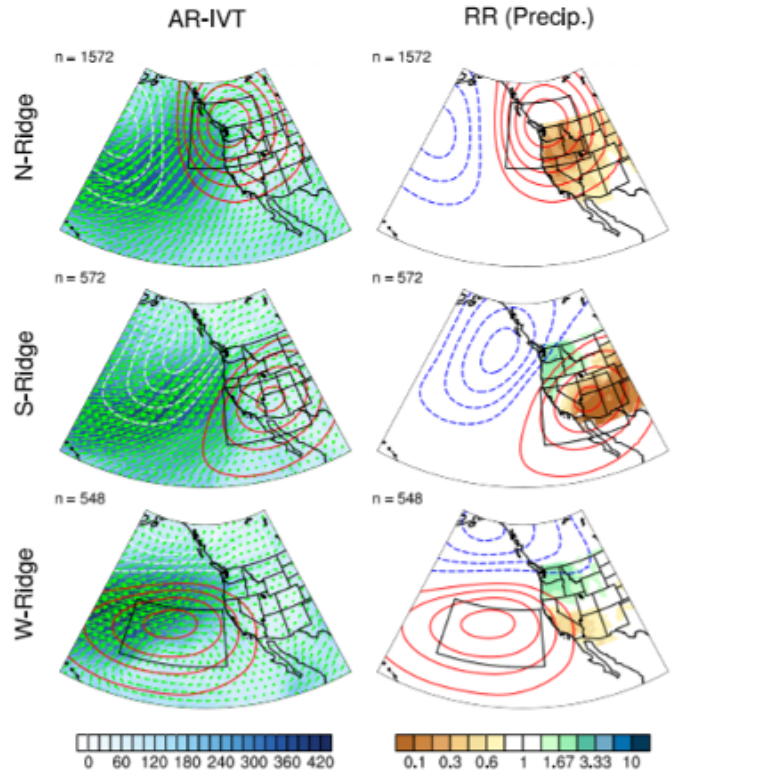
- NCEP model is predicting above-normal AR activity over the northwestern US and Northern California and below-normal AR activity over British Columbia and the Baja Peninsula during Week 3 (15–21 Mar)
- ECMWF model is predicting slightly above-normal AR activity along the US West Coast (especially California) and below-normal AR activity over the interior northwestern US during Week 3

ECMWF Experimental Forecast Initialized: Feb 28, 2022



Both models are showing the potential for above-normal AR activity over the western US during Week 3, but ECMWF shows more (less) AR activity in the south (north) compared to NCEP

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

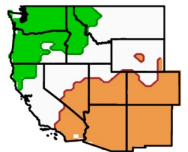
North-Ridge



<50%
ensemble agreement

-Mean
[weak north-ridge signal, <50% agreement]

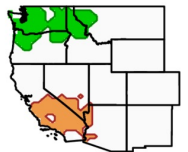
South-Ridge



62%
ensemble agreement

-Mean
dry conditions
wet conditions

West-Ridge



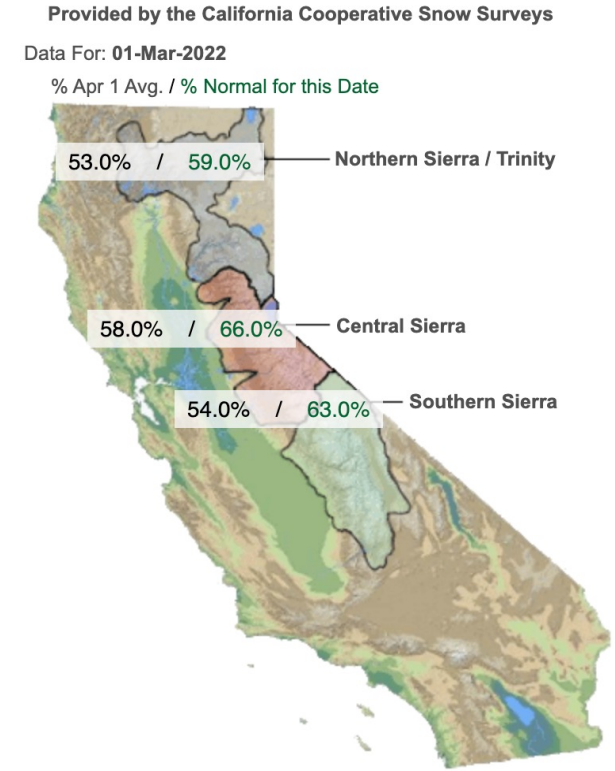
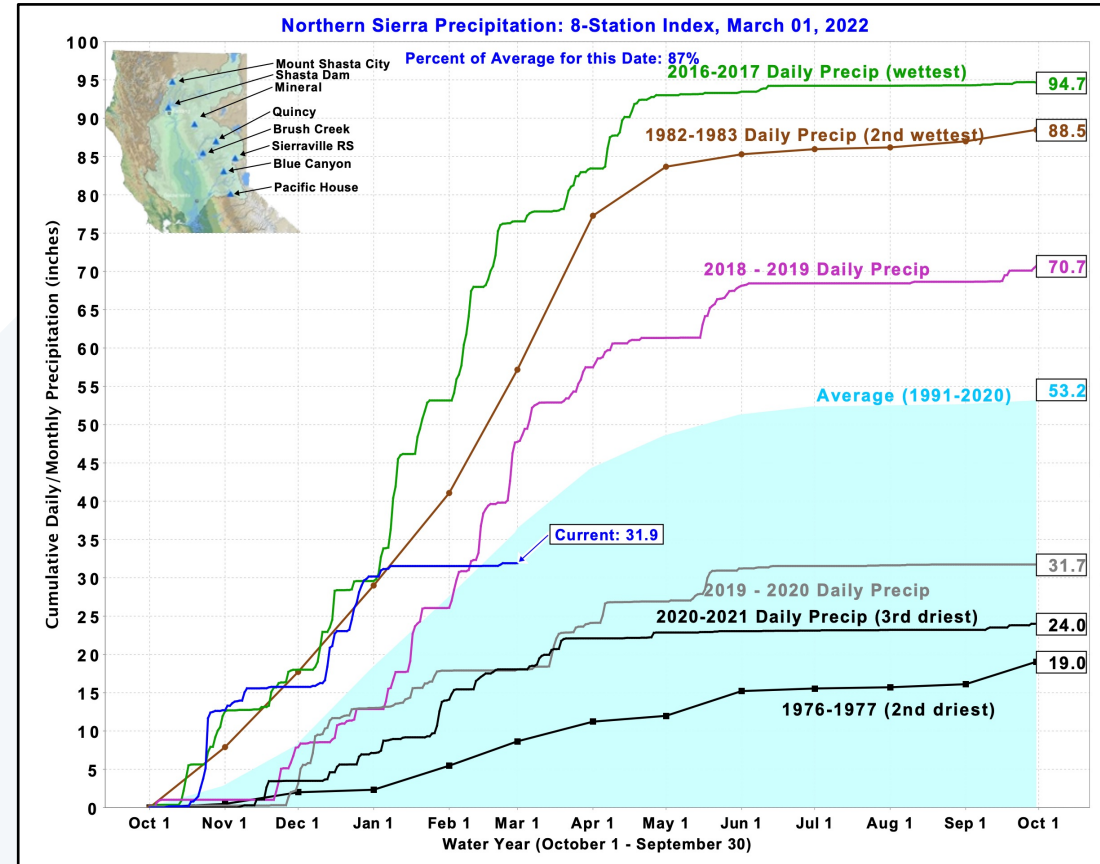
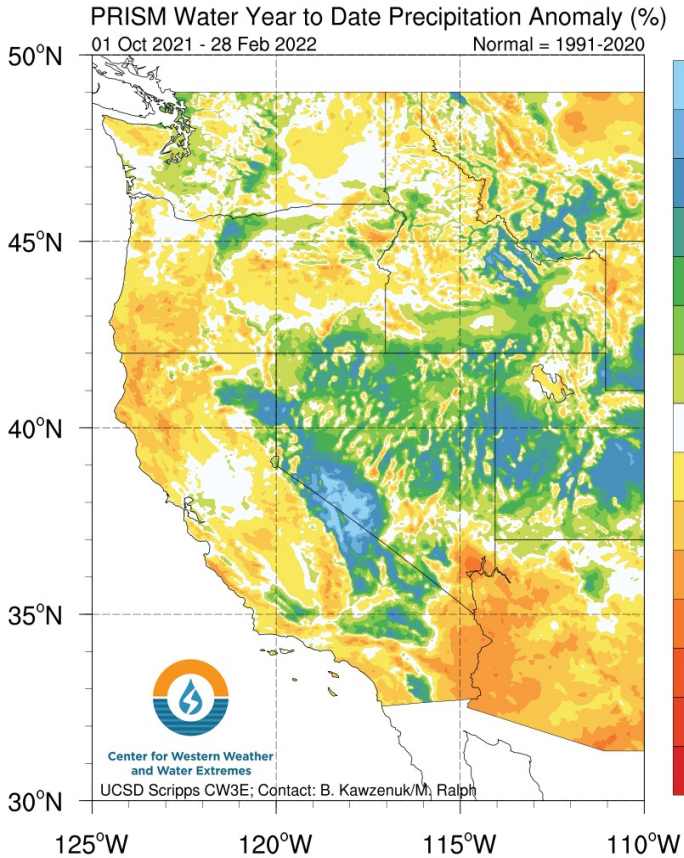
69%
ensemble agreement

-Mean
dry conditions
wet conditions

- NCEP and ECMWF both show moderate confidence (62% ensemble agreement) in the occurrence of the South-Ridge type during Weeks 3–4 (14–28 Mar)
- NCEP also shows moderate confidence (69% ensemble agreement) in the occurrence of the West-Ridge type during Weeks 3–4
- The West-Ridge type is typically associated with wet conditions in the Pacific Northwest and dry conditions in Central and Southern California

There is moderate confidence in the occurrence of the South-Ridge type during Weeks 3–4, but the models disagree on the likelihood of the West-Ridge type

Water Year Precipitation Summary



Source: California Department of Water Resources

- As of 28 Feb, water-year-to-date precipitation is below normal across much of Oregon, California, and Arizona
- Water-year-to-date precipitation is 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, total water year precipitation in the Northern Sierra Nevada is now only 87% of normal for this date (1 Mar)
- Northern Sierra Nevada snowpack is only 59% of normal for this date (1 Mar)