



Center for Western Weather
and Water Extremes

SCRIPPS INSTITUTION OF OCEANOGRAPHY
AT UC SAN DIEGO

CW3E S2S Outlook: 23 Mar 2022

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Summary

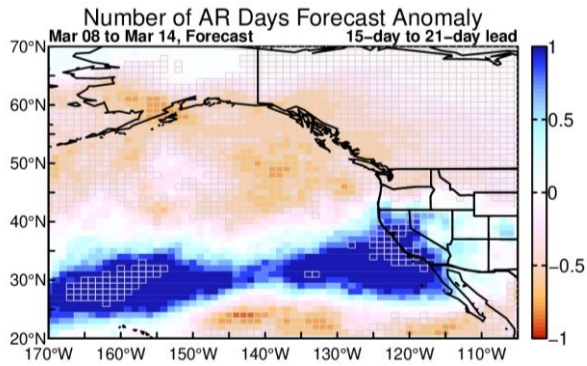
- **Forecast Verification (8–21 Mar):** ECMWF Week 3 AR activity forecasts verified in the Pacific Northwest during 8–14 Mar; NCEP Week 3 AR activity forecasts verified in the Pacific Northwest and Northern California during 15-21 Mar
 - Generally little AR activity and precipitation were observed over the US West Coast during 8–14 Mar
 - Multiple ARs brought precipitation to western Washington, Oregon, and portions of Northern California during 15-21 Mar
- **Week 2 forecasts (29 Mar–4 Apr):** Both models show low-to-moderate likelihood of landfalling AR activity over the western US on 29 Mar, and the probability is higher in ECMWF over Oregon and California
 - ECMWF is showing slightly higher probabilities of AR conditions in Oregon and California on 29 Mar and lower probabilities over the West Coast US on 3-5 Apr compared to NCEP
- NCEP GEFS model predicts very weak MJO activity during the next two weeks
- **Week 3 forecasts (5 – 11 Apr):** NCEP model shows the potential for above-normal AR activity over much of the western US except in Northern California, Oregon, and Washington
- NCEP model shows high confidence in the occurrence of the North-Ridge type during Weeks 1–2 and moderate confidence in the occurrence of the South and West-Ridge types during weeks 3-4
 - The North-ridge type is typically associated with widespread dry conditions across the entire US West
 - The South- and West-Ridge types are typically associated with wet conditions in the Pacific Northwest
 - The South-Ridge type is typically associated with widespread dry conditions over the southwestern US, whereas the West-Ridge type is typically associated with dry conditions in Central and Southern CA

Note: ECMWF subseasonal AR activity and ridging forecasts are unavailable at this time

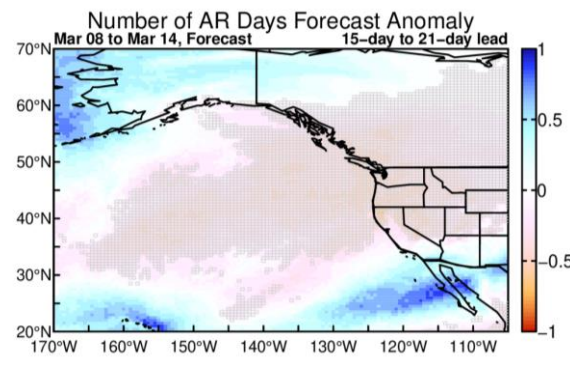
Looking Back: Week 3 AR Activity Forecasts

Valid: 8–14 Mar 2022

NCEP Experimental Forecast Initialized: Feb 21, 2022



ECMWF Experimental Forecast Initialized: Feb 21, 2022



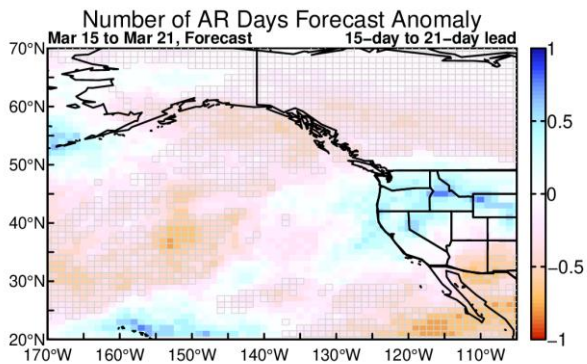
ECMWF Week 3 Forecast Verified in PNW

- NCEP: Significantly above-normal AR activity over California; below-normal AR activity over Washington and British Columbia
- ECMWF: Below-normal AR activity over the western US, except Southern California, Arizona, and New Mexico

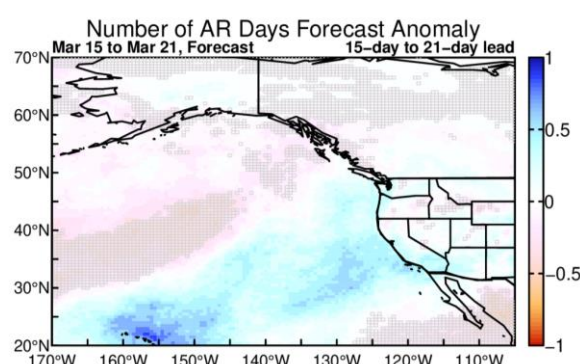


Valid: 15–21 Mar 2022

NCEP Experimental Forecast Initialized: Feb 28, 2022



ECMWF Experimental Forecast Initialized: Feb 28, 2022

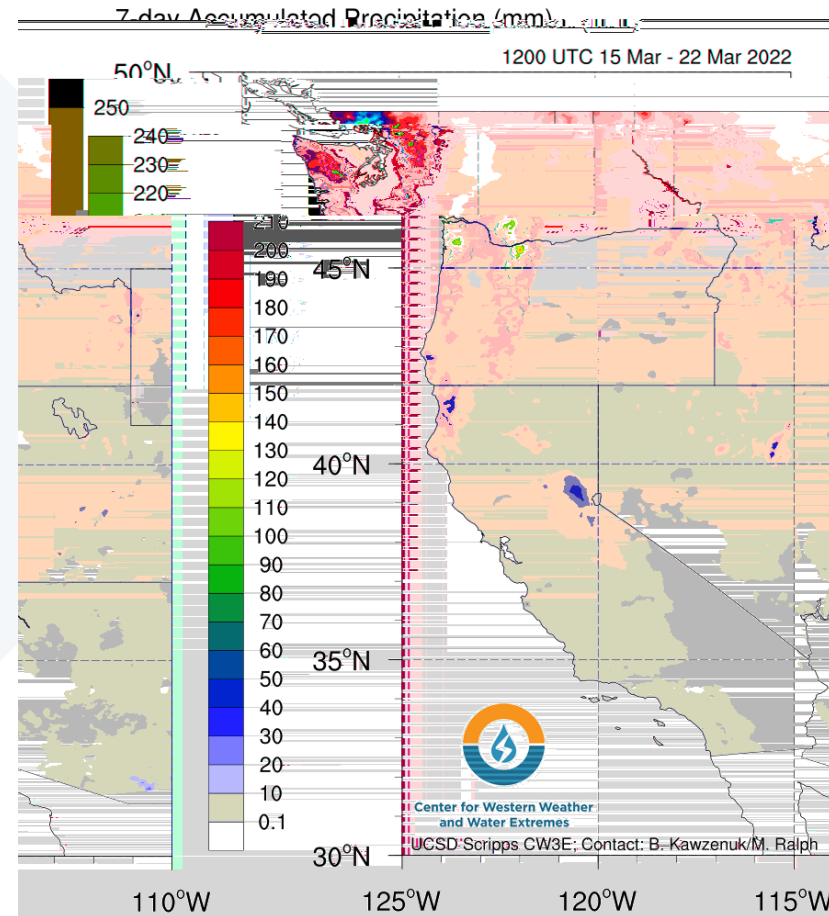
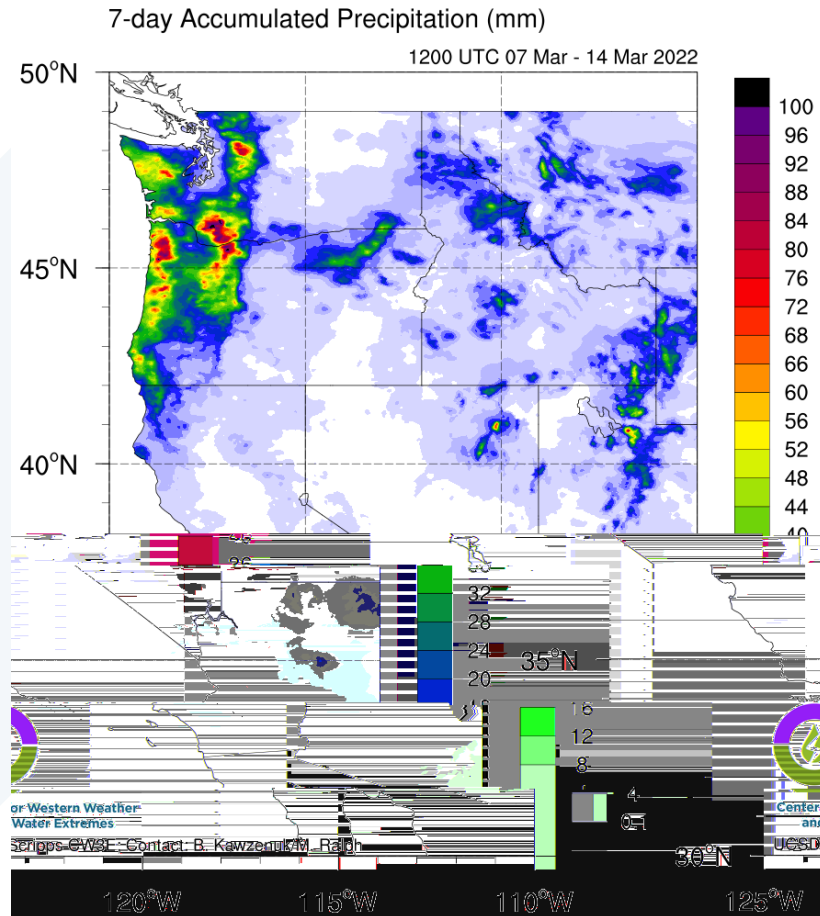


NCEP Week 3 Forecast Verified in PNW and Northern California

- NCEP: Above-normal AR activity over Washington, Oregon, and Northern California; below-normal AR activity over Southern California and British Columbia
- ECMWF: Above-normal AR activity over Southern California

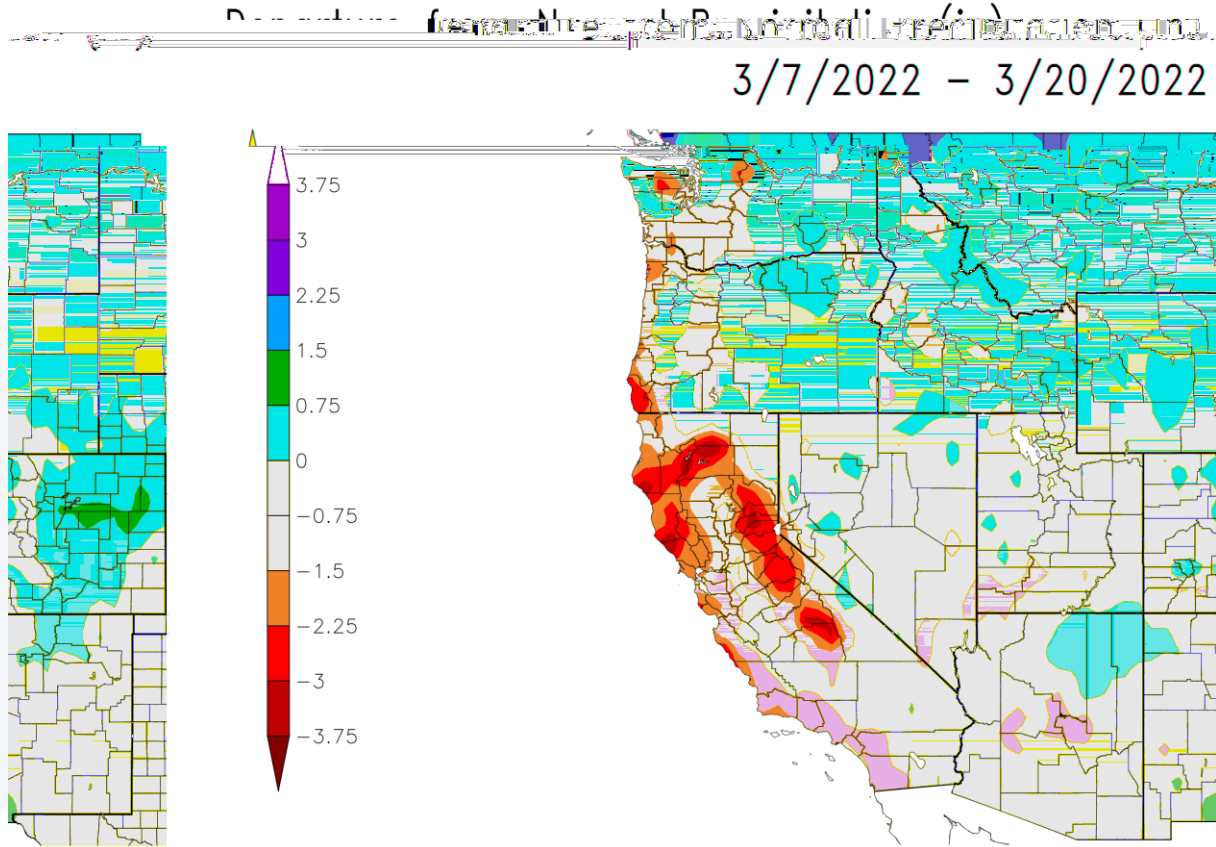


Looking Back: Accumulated Precipitation (7 Mar – 22 Mar)



- Multiple ARs brought precipitation (generally < 4 inches) to Western Washington, Oregon, and Northern California on 12–15 Mar
- A weak AR brought precipitation to Western Washington on 19 Mar
- Another AR brought precipitation to Western Washington, Oregon, and portions of Northern California on 21-22 Mar
- Observed precipitation during 7–14 (15-22) Mar is more consistent with the ECMWF (NCEP) Week 3 AR activity forecasts valid during the same period

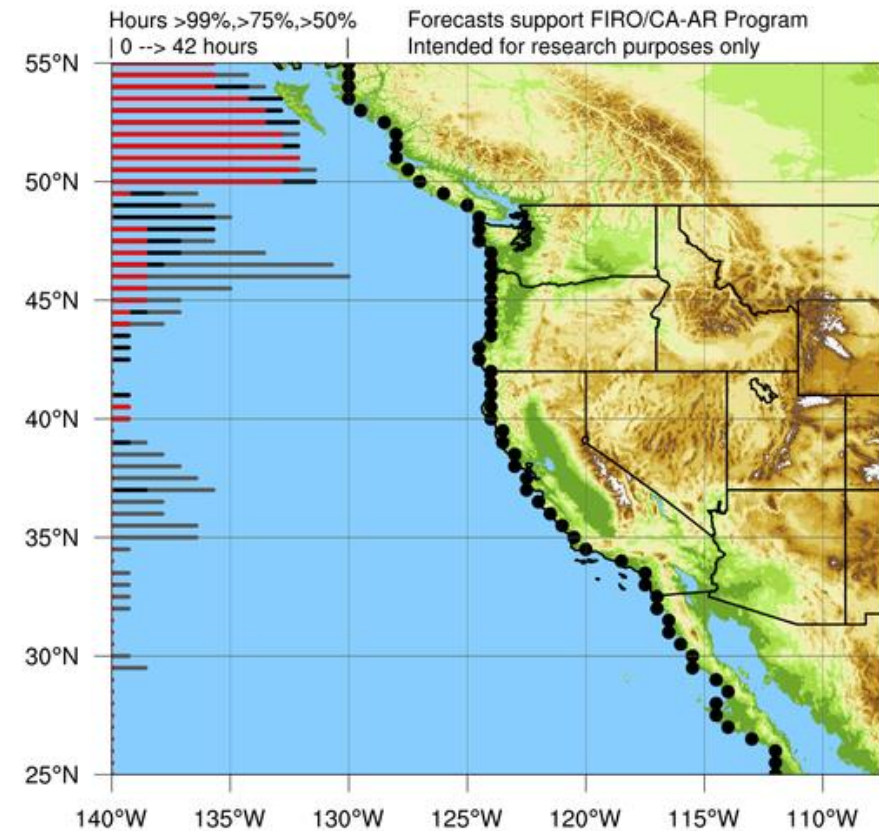
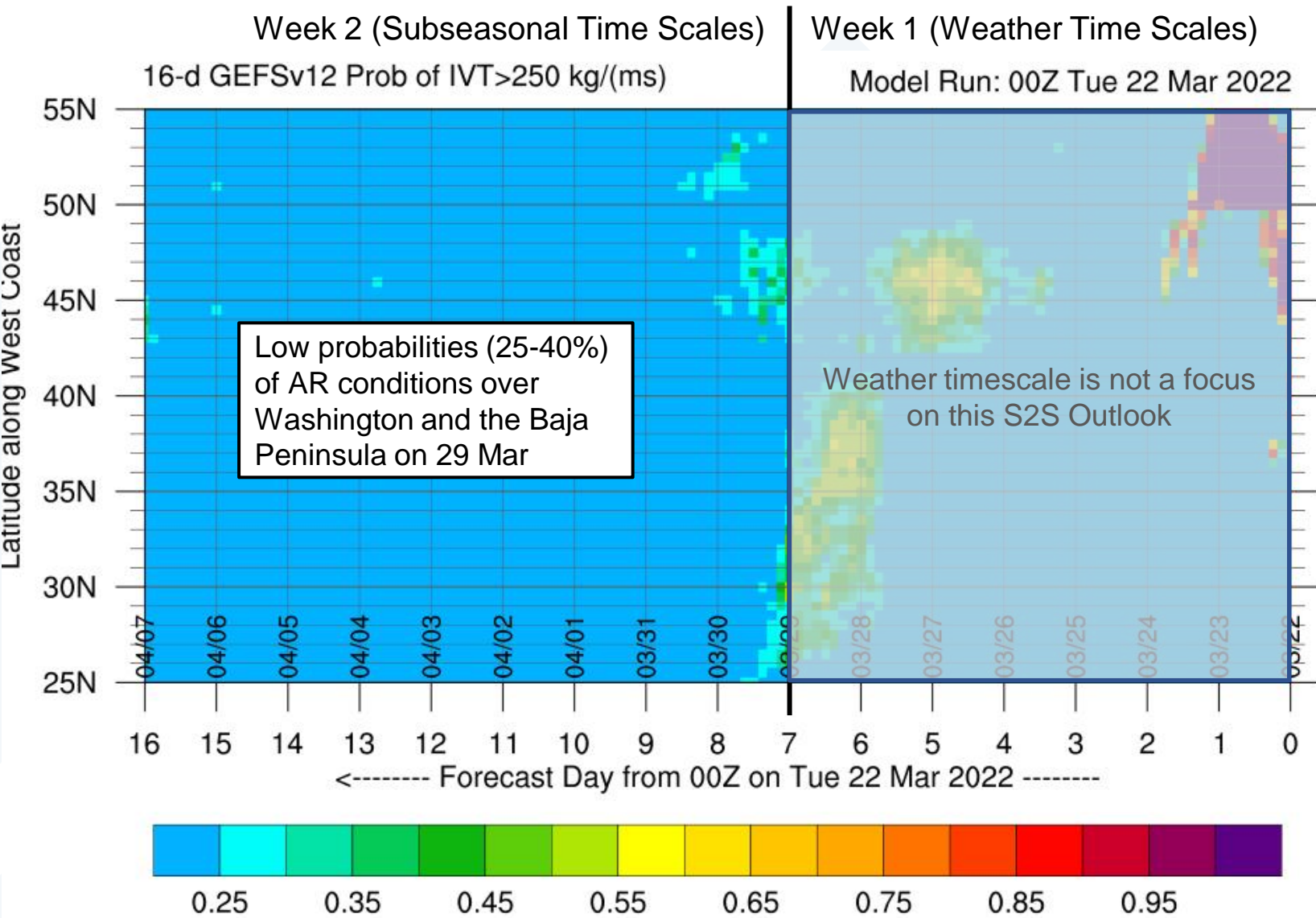
Looking Back: 14-day Precipitation Anomaly (7–20 Mar)



- Abnormally dry conditions were observed over the western US, especially the Northern California Coast Ranges and Northern Sierra Nevada

NOAA Regional Climate Centers Generated 3/21/2022 at HPRCC using provisional data.

GEFS AR Landfall Tool: Valid 00Z 22 Mar–7 Apr



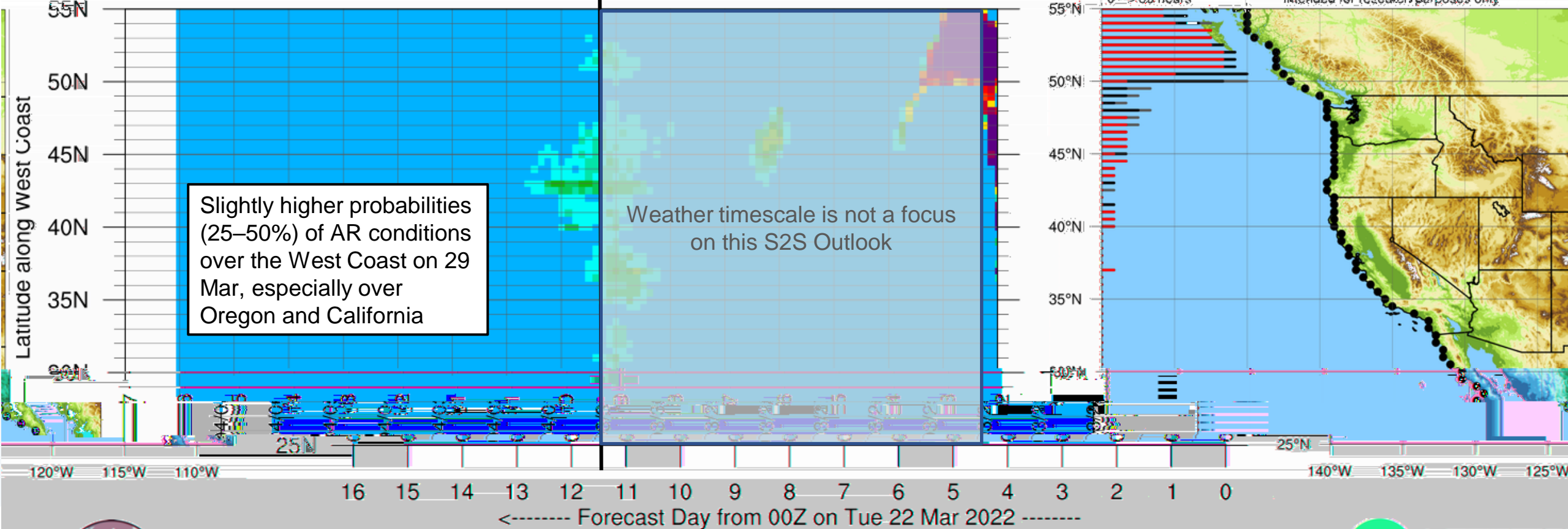
ECMWF EPS AR Landfall Tool: Valid 00Z 22 Mar–6 Apr

Week 2 (Subseasonal Time Scales)

15-d ECMWF EPS Prob. of IVT > 250 $ka/(ms)$

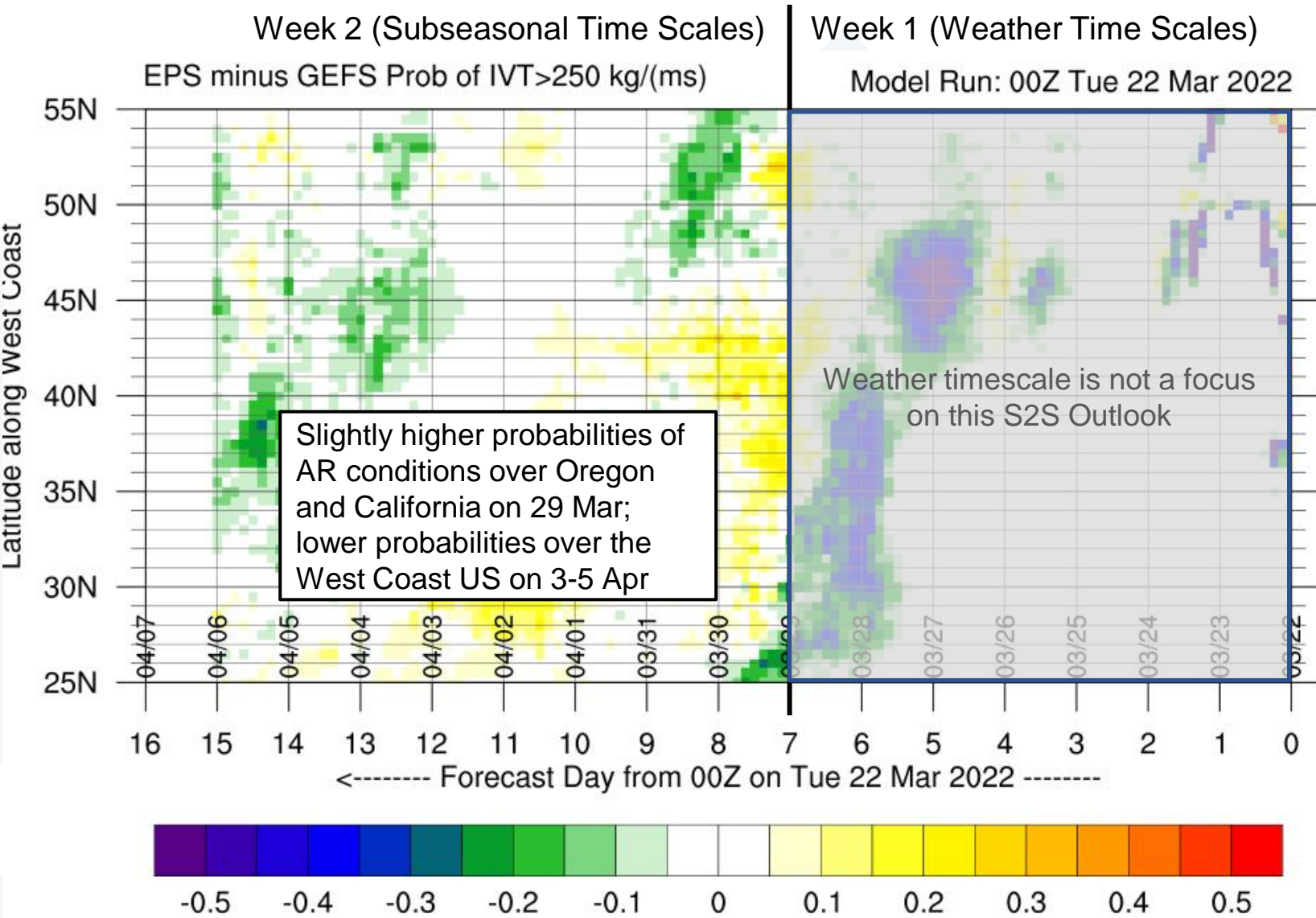
Week 1 (Weather Time Scales)

Model Run: 00Z Tue 22 Mar 2022

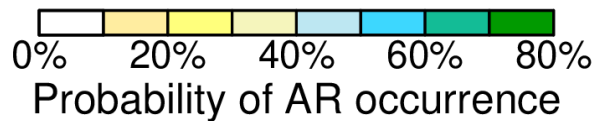
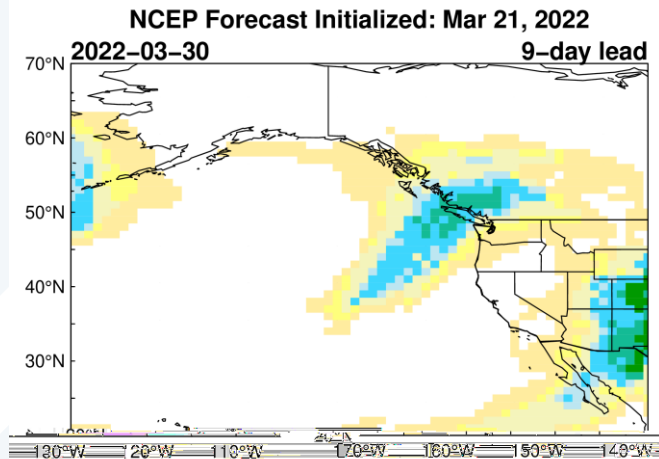
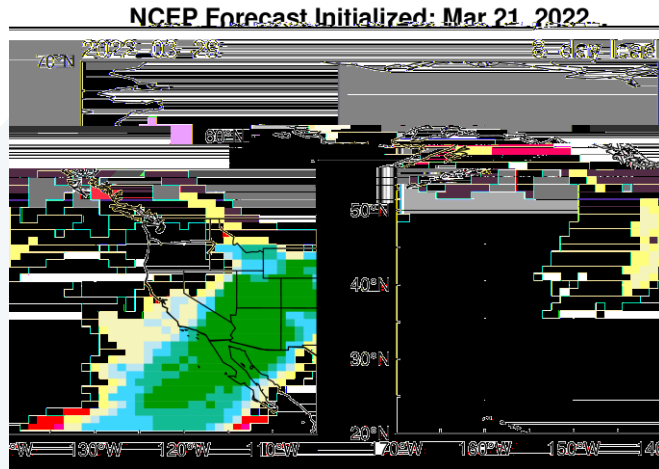


0.25 0.35 0.45 0.55 0.65 0.75 0.85 0.95

EPS Minus GEFS AR Landfall Tool: Valid 00Z 22 Mar–6 Apr

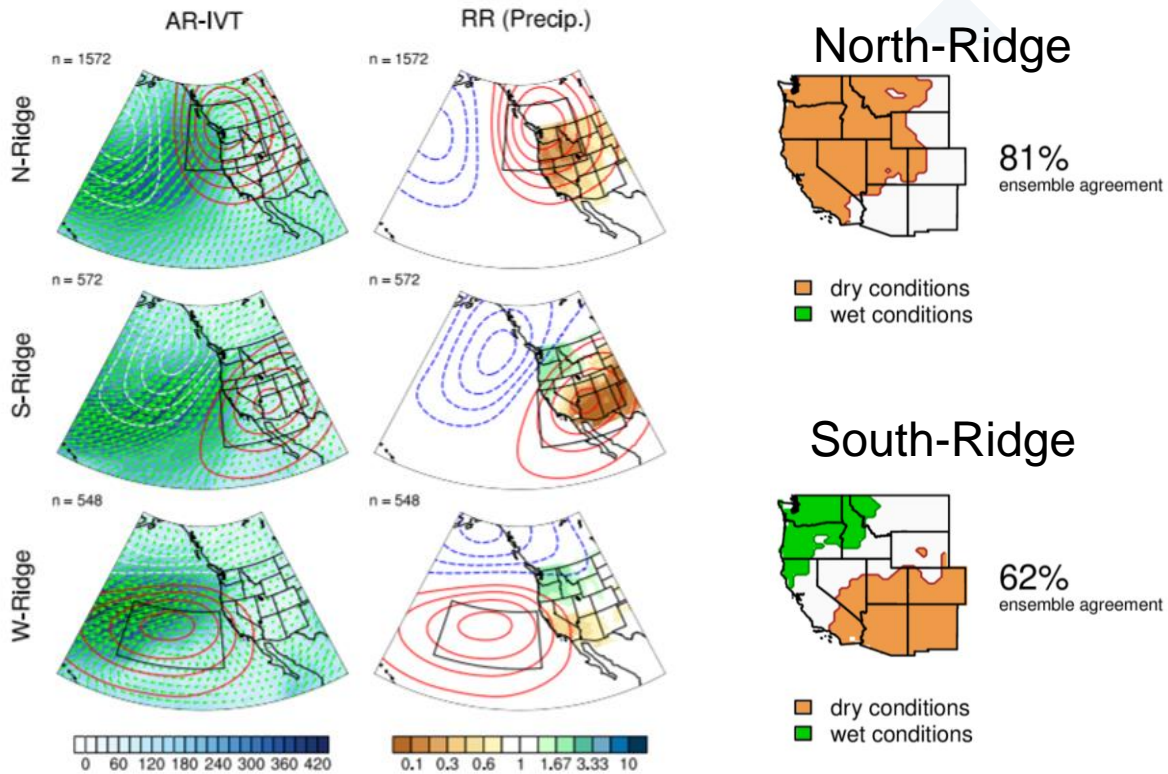


Subseasonal Outlooks: Week 2 AR Activity (NCEP)



- NCEP is showing moderate-to-high probabilities (60–80%) of landfalling AR activity over Southern California and Baja California on 29 Mar
- AR activity is forecasted to weaken over the above regions on 30 Mar while becoming stronger in British Columbia

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

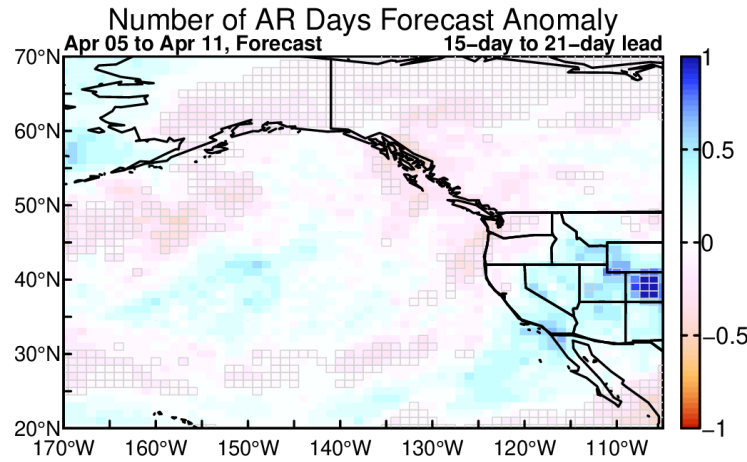
Right: Maps showing the 'Relative Risk' (RR) of precipitation under each ridge type. Brown shading indicates a reduced chance of precipitation when ridging occurs. For example, a RR value of 0.2 indicates a 5-fold reduction in the likelihood of precipitation

- NCEP is showing high confidence (81% ensemble agreement) in the occurrence of the North-Ridge type and moderate confidence (62% ensemble agreement) in the occurrence of the South-Ridge type during Weeks 1–2 (21 Mar–4 Apr)
- The North-ridge type is typically associated with widespread dry conditions across the entire US West
- The South-Ridge type is typically associated with wet conditions over the Pacific Northwest and widespread dry conditions across the southwestern US

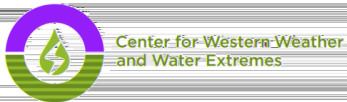
Note: ECMWF Weeks 1–2 ridging forecasts are unavailable at this time

Subseasonal Outlooks: Week 3 AR Activity (NCEP)

NCEP Experimental Forecast Initialized: Mar 21, 2022



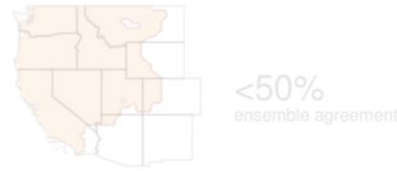
- NCEP is forecasting above-normal AR activity over Southern California, Nevada, Arizona, and other regions of the interior southwestern US, and below-normal AR activity over Northern California, Oregon, and Washington during Week 3 (5 – 11 Apr)



Note: ECMWF Week 3 AR activity forecasts are unavailable at this time

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

North-Ridge



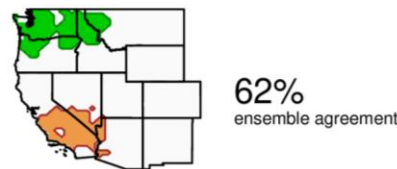
north-ridge signal, <50% agreement]

South-Ridge

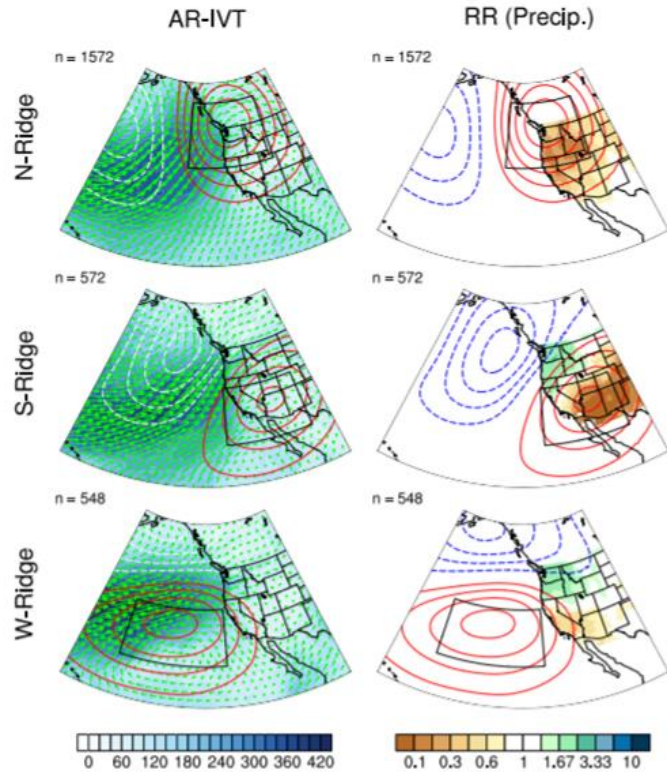


dry conditions
wet conditions

West-Ridge



dry conditions
wet conditions



How each ridge type typically influences precipitation

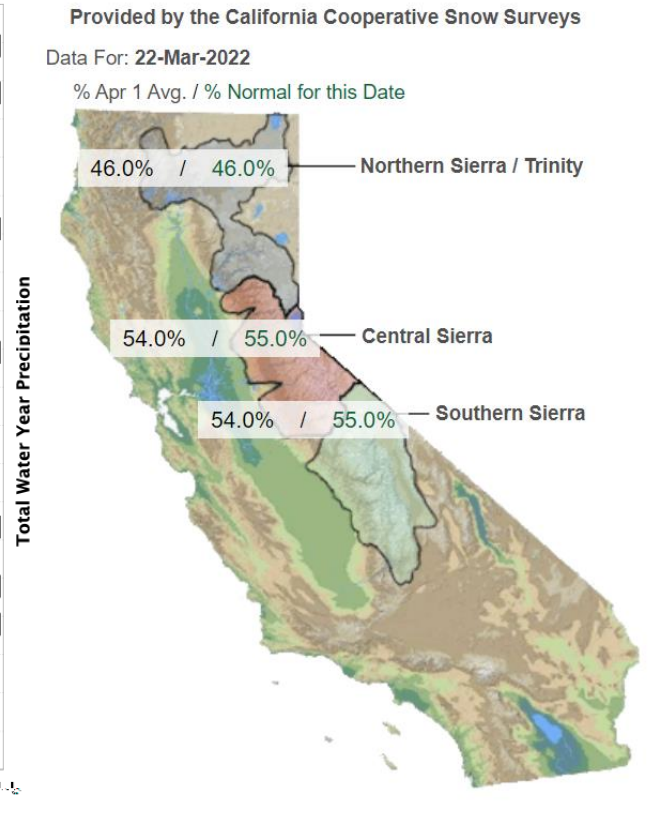
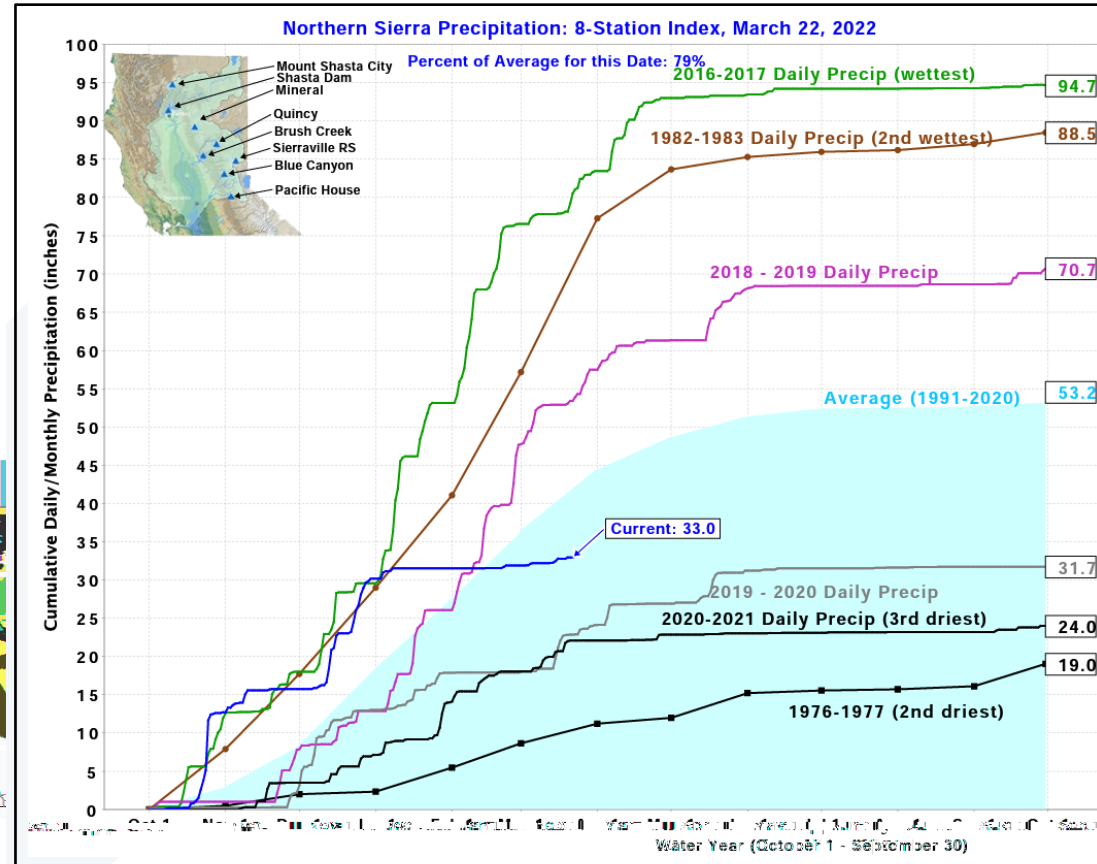
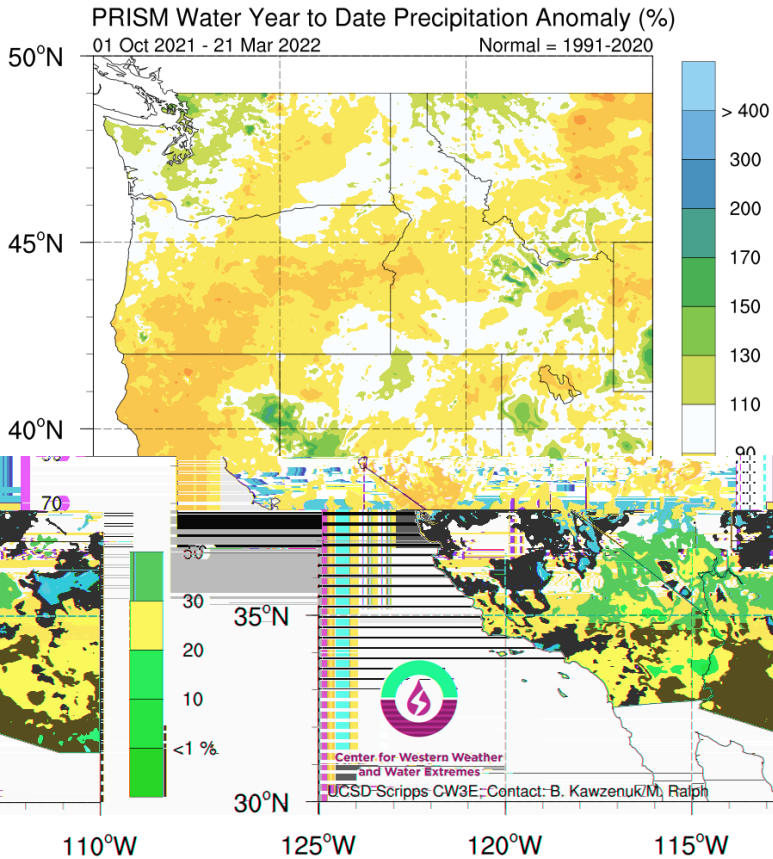
Left: Maps showing the average influence of each ridge type (red contours) on integrated vapor transport (IVT, blue shading indicates greater moisture transport, arrows indicate direction) during atmospheric river events

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 is showing moderate confidence (62% ensemble agreement) in the occurrence of the South- and West-Ridge types during Weeks 3–4 (4 – 18 Apr)
- 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)

Note: ECMWF Weeks 3–4 ridging forecasts are unavailable at this time

Water Year Precipitation Summary



Source: California Department of Water Resources

- As of 21 Mar, water-year-to-date precipitation is below normal across much of the western US, especially Southern California, Southern Nevada, and Arizona
- Water-year-to-date precipitation is above normal across portions of Western Washington and Western Nevada
- Total water year precipitation in the Northern Sierra Nevada is 79% of normal for this date (22 Mar)
- Northern Sierra Nevada snowpack is only 46% of normal for this date (22 Mar)