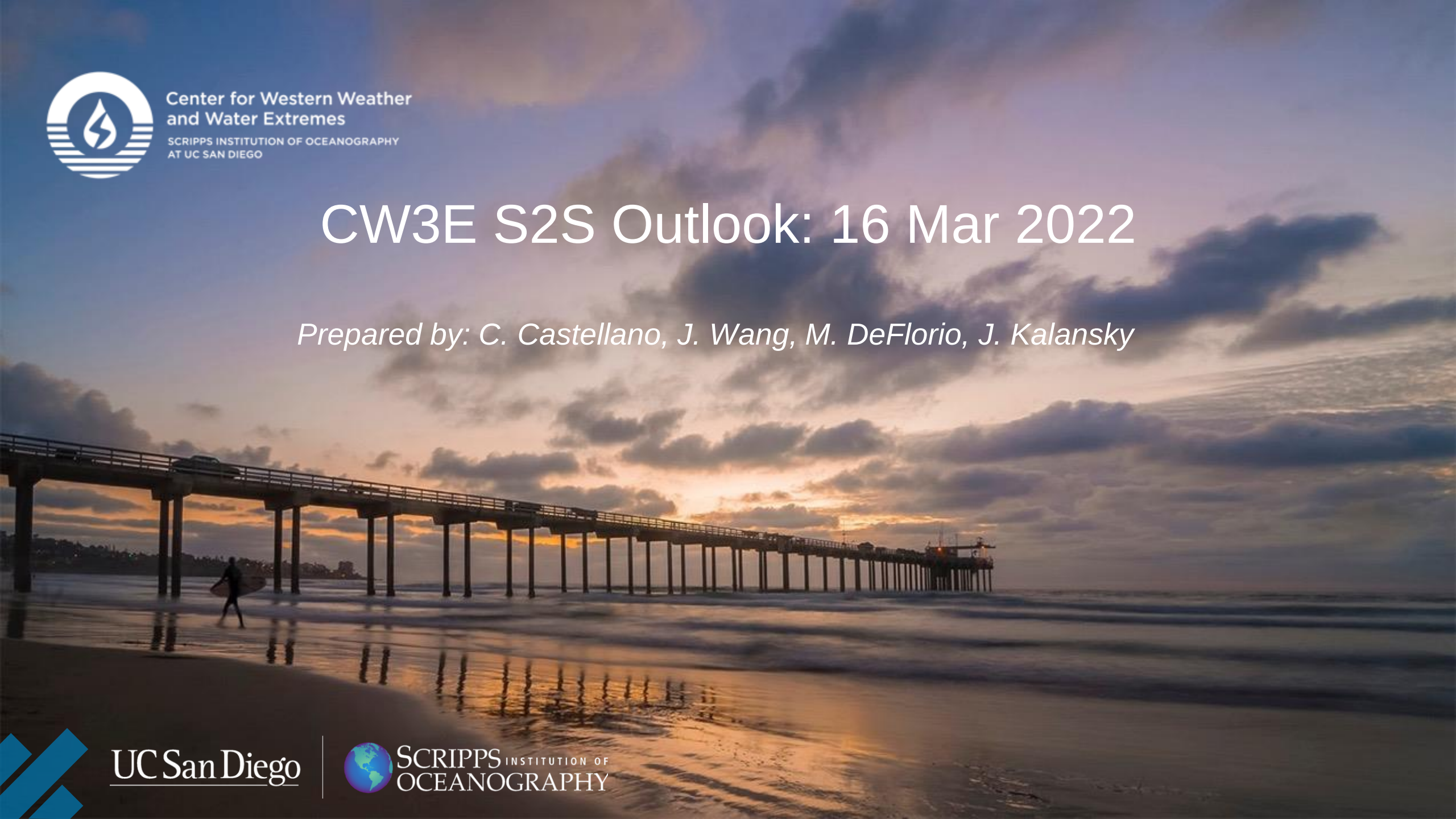

CW3E S2S Outlook: 16 Mar 2022

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

Summary

- **Forecast Verification (1–14 Mar):** NCEP and ECMWF Week 3 AR activity forecasts did not verify during 1–7 Mar; ECMWF Week 3 AR activity forecasts verified in the Pacific Northwest during 8–14 Mar
  - A long-duration AR event produced heavy precipitation in the Pacific Northwest during 26 Feb – 2 Mar
  - Generally little AR activity and precipitation were observed over the US West Coast during 8–14 Mar

- **Week 2 forecasts (22–28 Mar):** Both Models show moderate-to-high likelihood of landfalling AR activity over the western US on 22 Mar, but disagree on landfall location
  - ECMWF is showing higher probabilities of AR conditions in Northern California/Oregon and lower probabilities over Washington/British Columbia compared to NCEP

- NCEP GEFS model predicts the MJO will be in the Indian Ocean/Maritime Continent during the next two weeks, which is not climatologically favorable for AR activity in California

- **Week 3 forecasts (29 Mar – 4 Apr):** NCEP model shows the potential for above-normal AR activity in Northern California and Oregon

- NCEP model shows moderate-to-high confidence in the occurrence of the South- and West-Ridge types during the next several weeks, with the highest confidence in ridging activity during Weeks 1-2
  - 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

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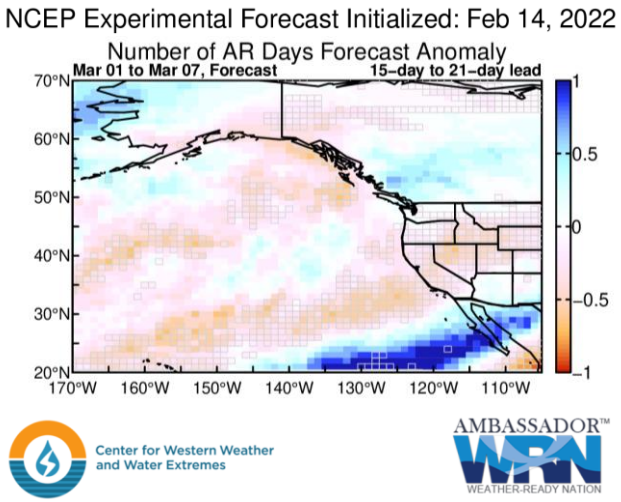
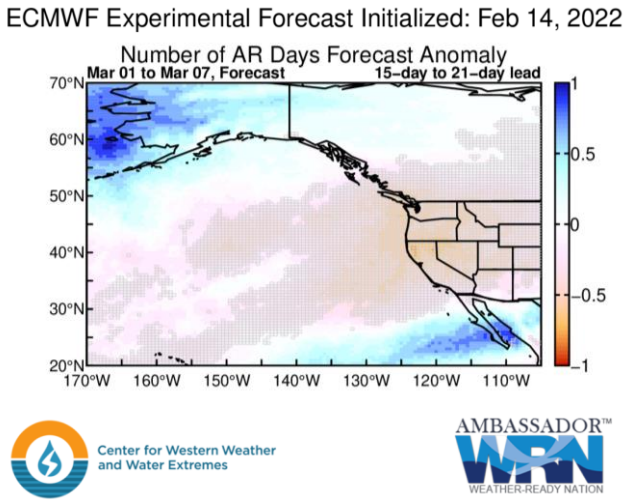
Looking Back: Week 3 AR Activity Forecasts

Valid: 1–7 Mar 2022

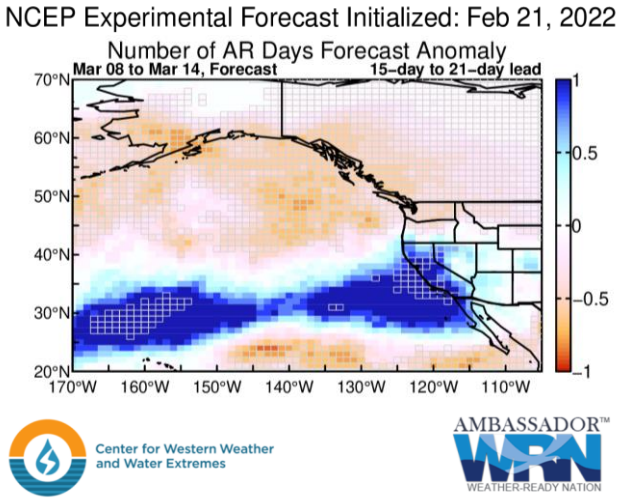


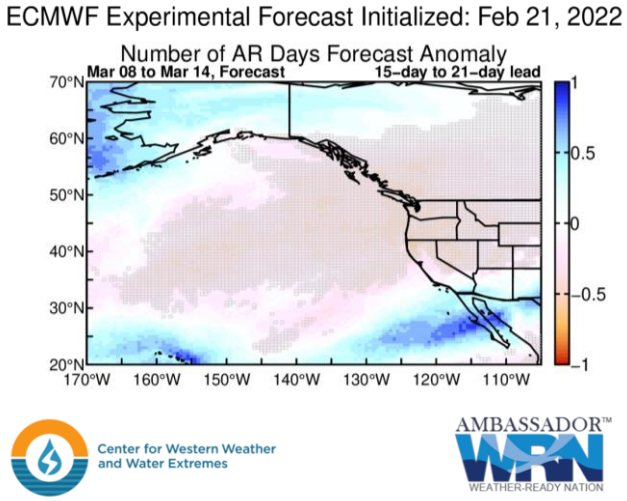


Neither Week 3 Forecast Verified

- 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: 8–14 Mar 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

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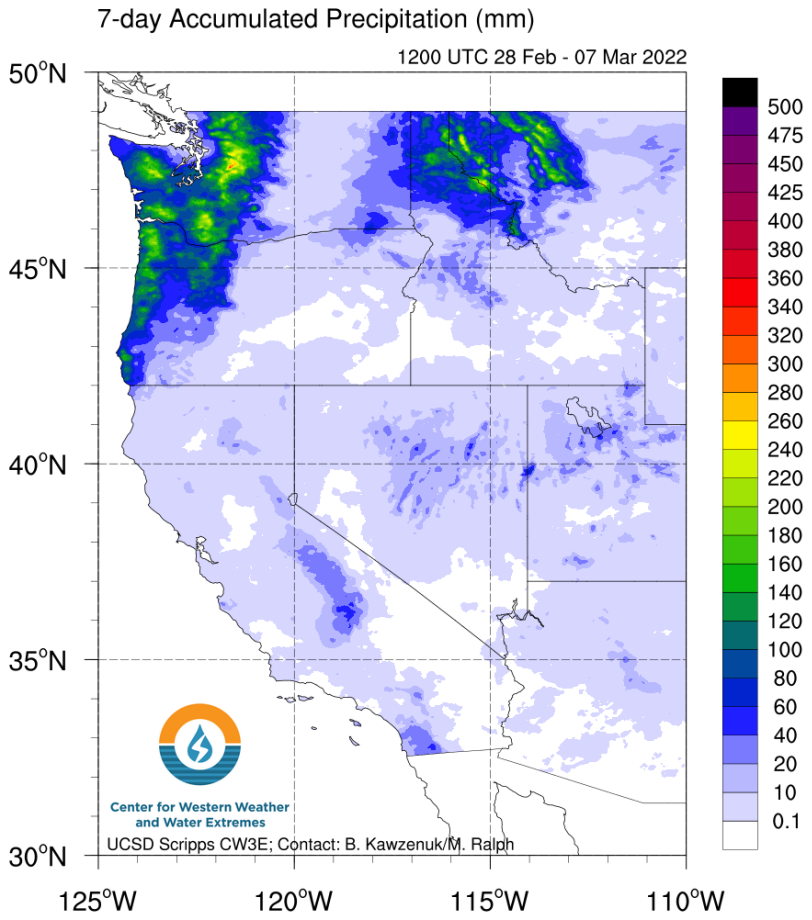
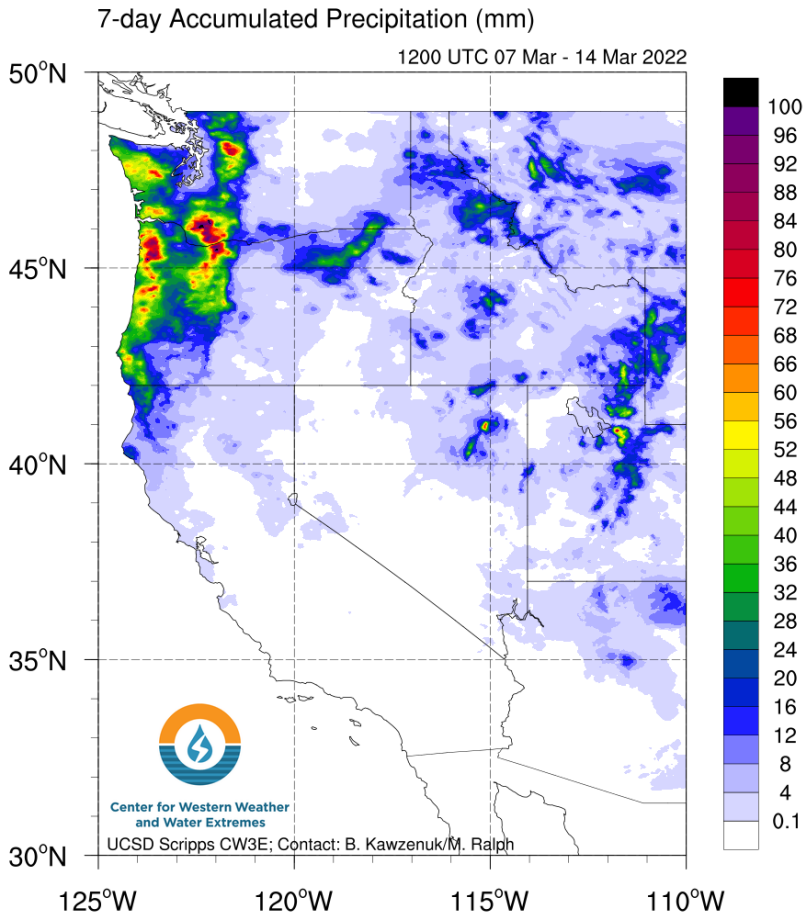
Looking Back: Accumulated Precipitation (28 Feb – 14 Mar)





- A long-duration AR produced heavy precipitation (> 5 inches) in portions of western Washington, western Oregon, northern Idaho, and northwestern Montana on 28 Feb – 2 Mar
- Multiple upper-level shortwave troughs brought lighter precipitation (1–3 inches) to portions of the Sierra Nevada, Peninsular Ranges, and Great Basin on 4–6 Mar
- Multiple weak ARs brought additional precipitation (generally < 4 inches) to western Washington and Oregon on 12–14 Mar
- Observed precipitation during 7–14 Mar is consistent with the ECMWF Week 3 AR activity forecasts valid during the same period

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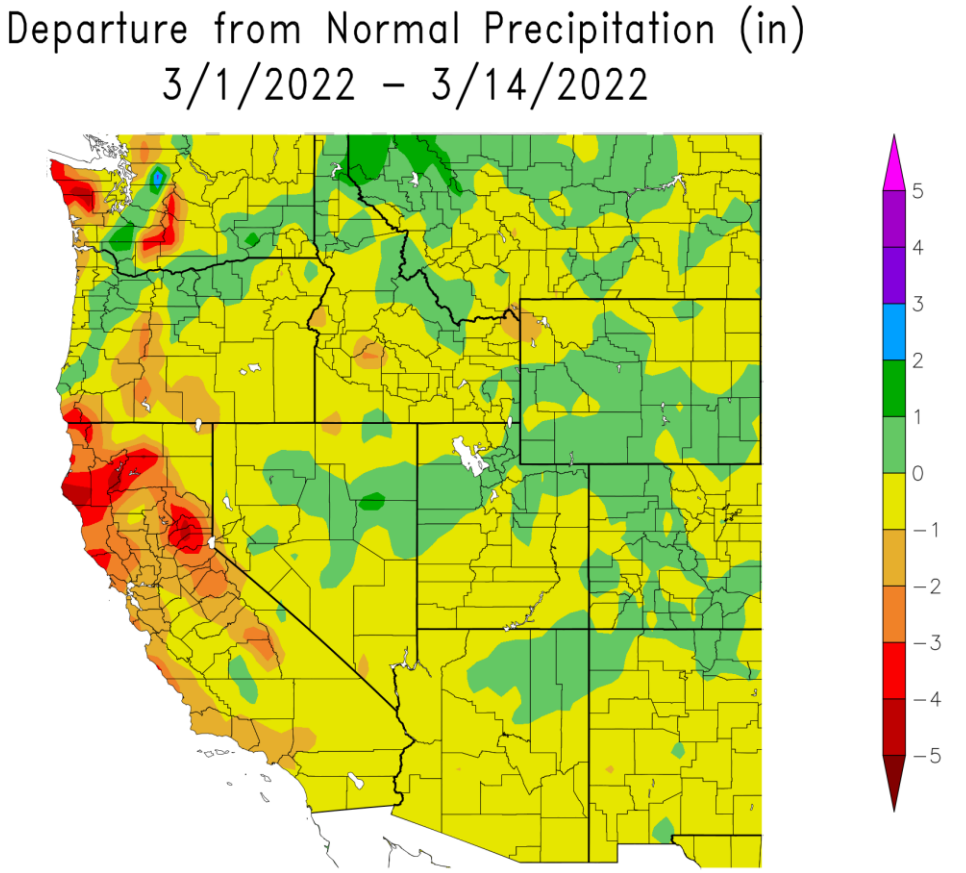
Looking Back: 14-day Precipitation Anomaly (1–14 Mar)



- Abnormally dry conditions were observed over the much of the US West Coast, especially the Olympic Peninsula, Cascades, Northern California Coast Ranges, and Northern Sierra Nevada
- Dry conditions in California are consistent with a lack of landfalling AR activity during this period

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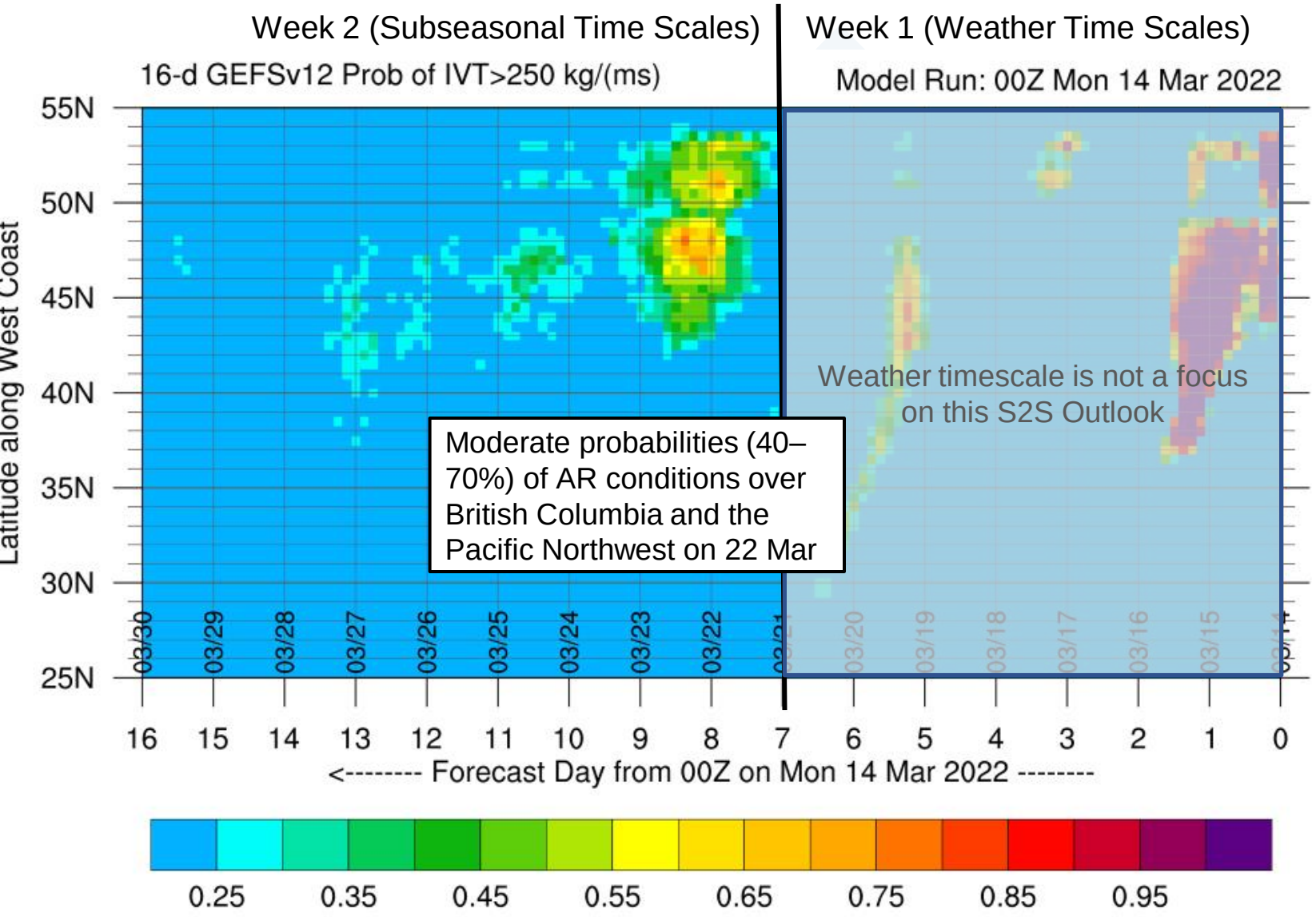
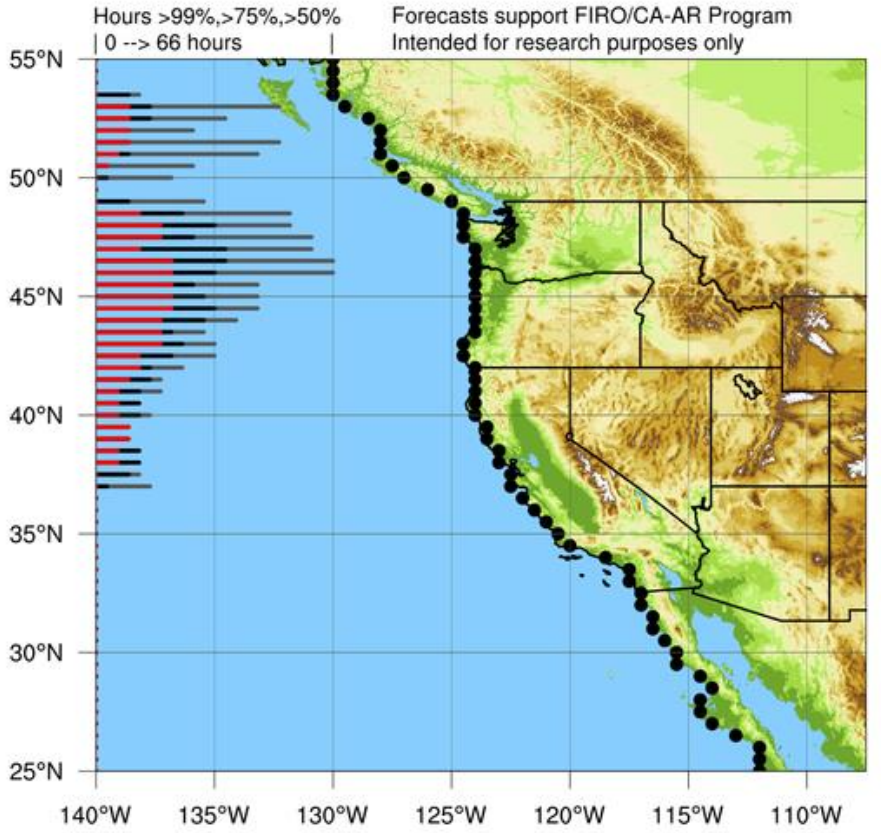
GEFS AR Landfall Tool: Valid 00Z 14–30 Mar





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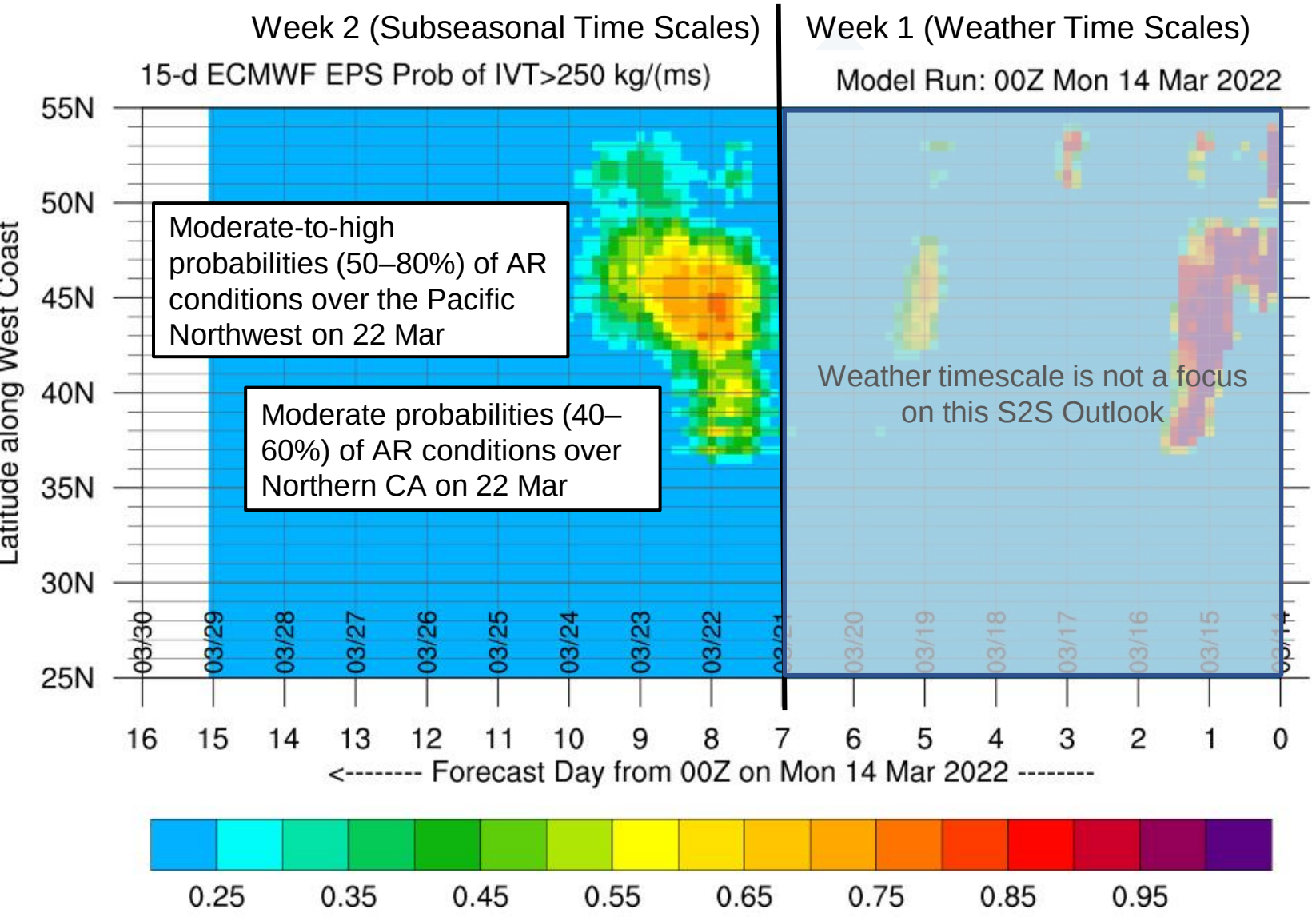
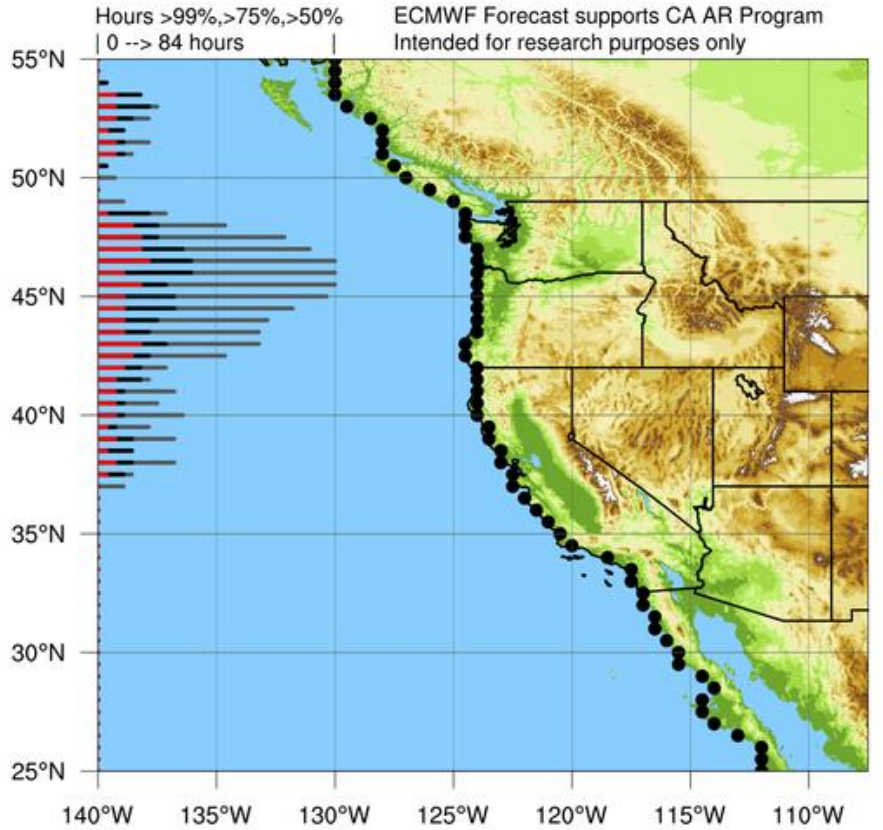
PLYMOUTH STATE METEOROLOGY

ECMWF EPS AR Landfall Tool: Valid 00Z 14–29 Mar





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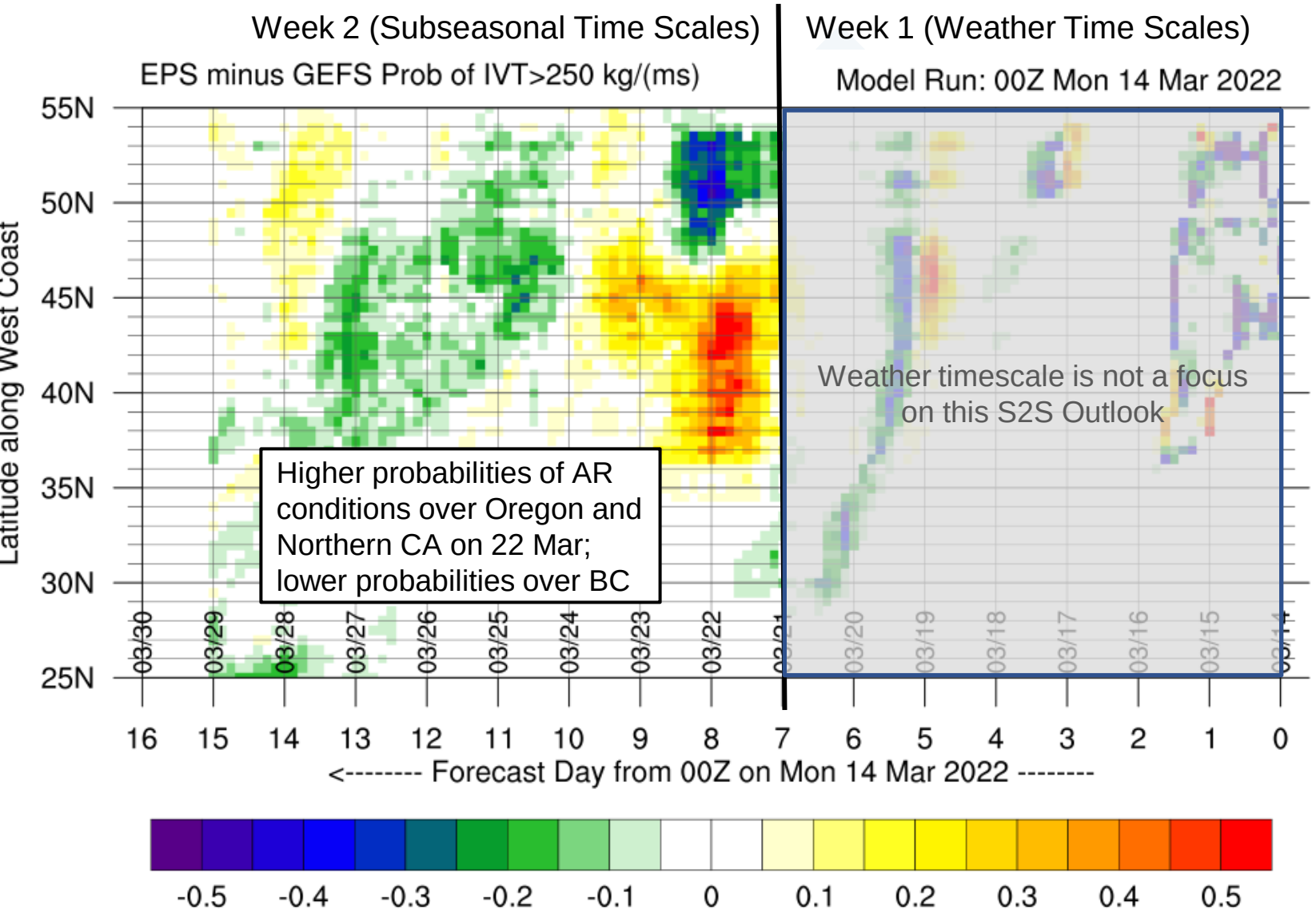
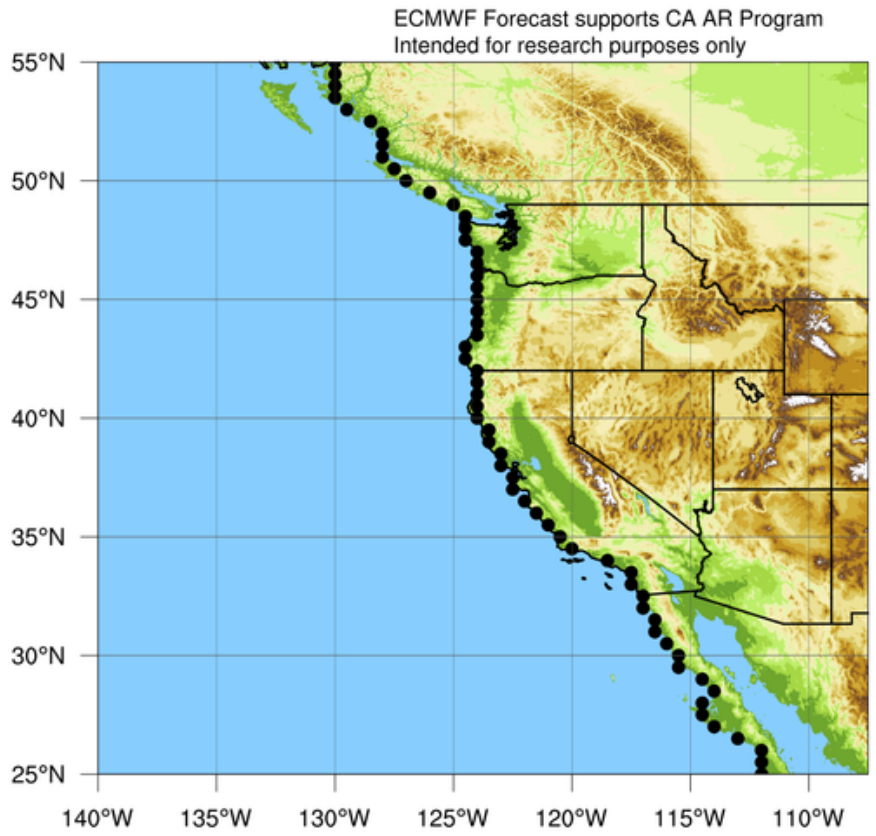
PLYMOUTH STATE METEOROLOGY

EPS Minus GEFS AR Landfall Tool: Valid 00Z 14–29 Mar





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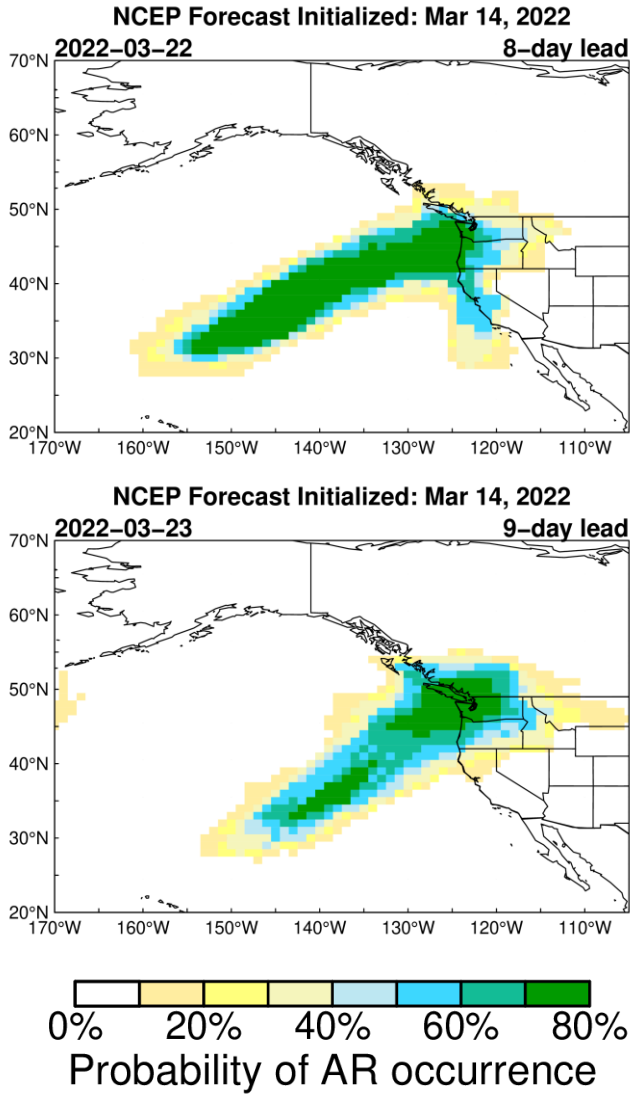
PLYMOUTH STATE METEOROLOGY

Subseasonal Outlooks: Week 2 AR Activity (NCEP)



- NCEP is showing moderate-to-high probabilities (60–80%) of landfalling AR activity over Washington, Oregon, and Northern California on 22 Mar
- AR activity is forecasted to continue over Washington on 23 Mar
- NCEP is showing low probabilities of AR activity along the US West Coast during the remainder of Week 2 (22–28 Mar)

Note: ECMWF Week 2 AR activity forecasts are unavailable at this time

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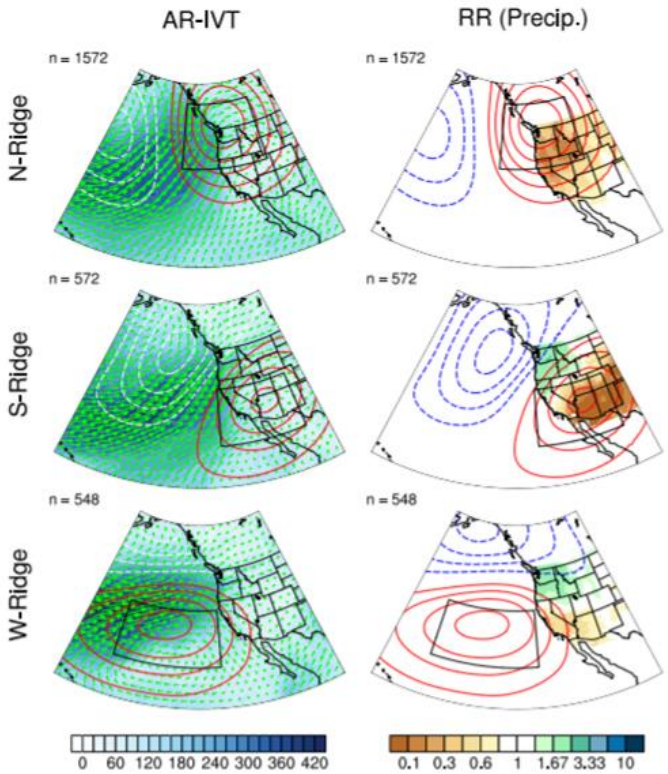
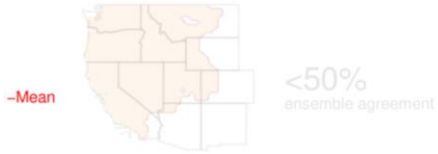
Subseasonal Outlooks: Weeks 1–2 Ridging Forecasts (NCEP)



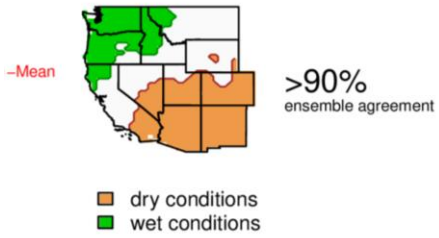
How each ridge type typically influences precipitation
Left: Maps showing the average influence of each ridge type (red contours) on integrated vapor transport (IVT, blue shading indicates greater moisture transport, arrows indicate direction) during atmospheric river events
Right: Maps showing the 'Relative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

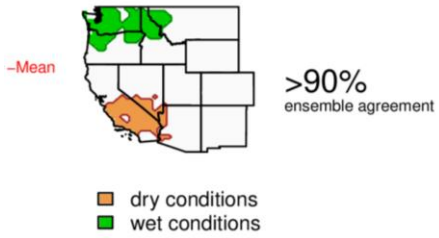


[weak north–ridge signal, <50% agreement]

South-Ridge



West-Ridge



- NCEP is showing high confidence (> 90% ensemble agreement) in the occurrence of the South-Ridge and West-Ridge types during Weeks 1–2 (14–28 Mar)
- The South-Ridge type is typically associated with wet conditions over the Pacific Northwest and widespread dry conditions across the southwestern US
- The West-Ridge type is typically associated with wet conditions over the Pacific Northwest and dry conditions over Central and Southern California

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

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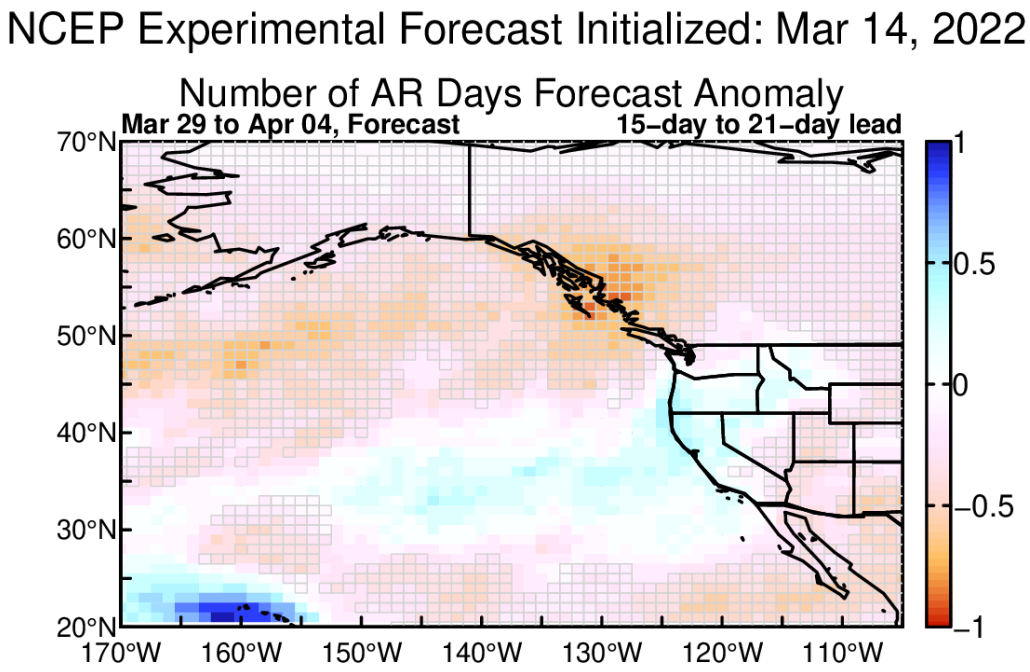
Subseasonal Outlooks: Week 3 AR Activity (NCEP)



- NCEP is forecasting above-normal AR activity over Northern California and Oregon, with below-normal AR activity over the interior southwestern US and British Columbia during Week 3 (29 Mar – 4 Apr)

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

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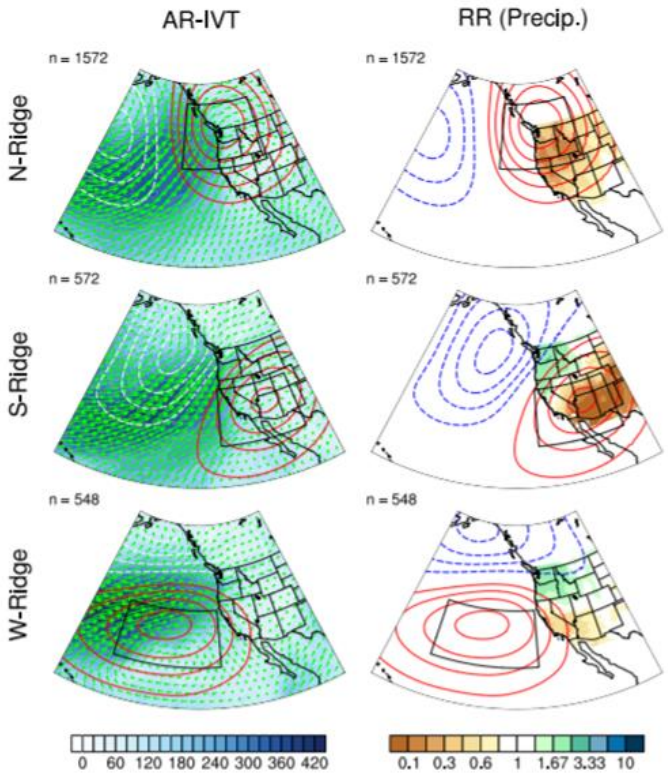
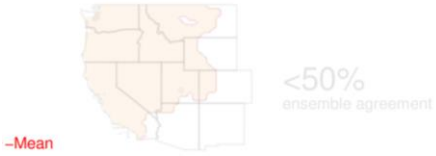
Subseasonal Outlooks: Weeks 3–4 Ridging Forecasts (NCEP)



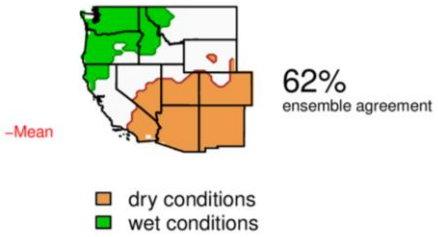
How each ridge type typically influences precipitation
Left: Maps showing the average influence of each ridge type (red contours) on integrated vapor transport (IVT, blue shading indicates greater moisture transport, arrows indicate direction) during atmospheric river events
Right: Maps showing the 'Relative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

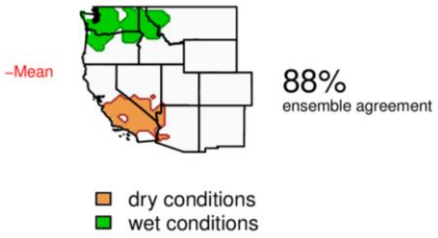


[weak north–ridge signal, <50% agreement]

South-Ridge



West-Ridge



- NCEP is showing high confidence (88% ensemble agreement) in the occurrence of the West-Ridge type during Weeks 3–4 (28 Mar – 11 Apr)
- NCEP also shows moderate confidence (62% ensemble agreement) in the occurrence of the South-Ridge type during Weeks 3–4

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

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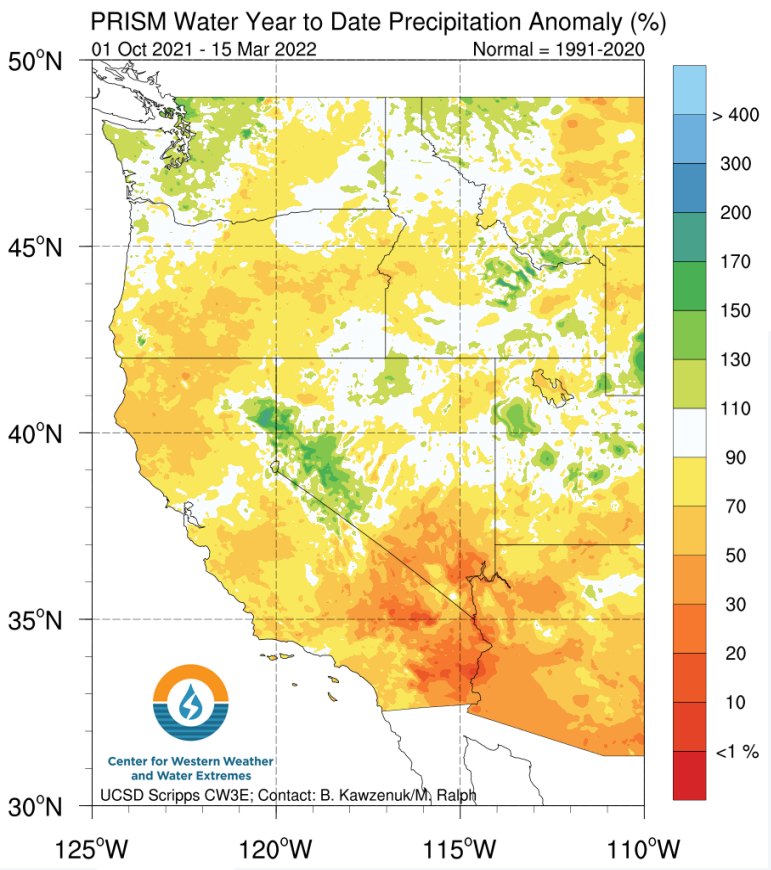
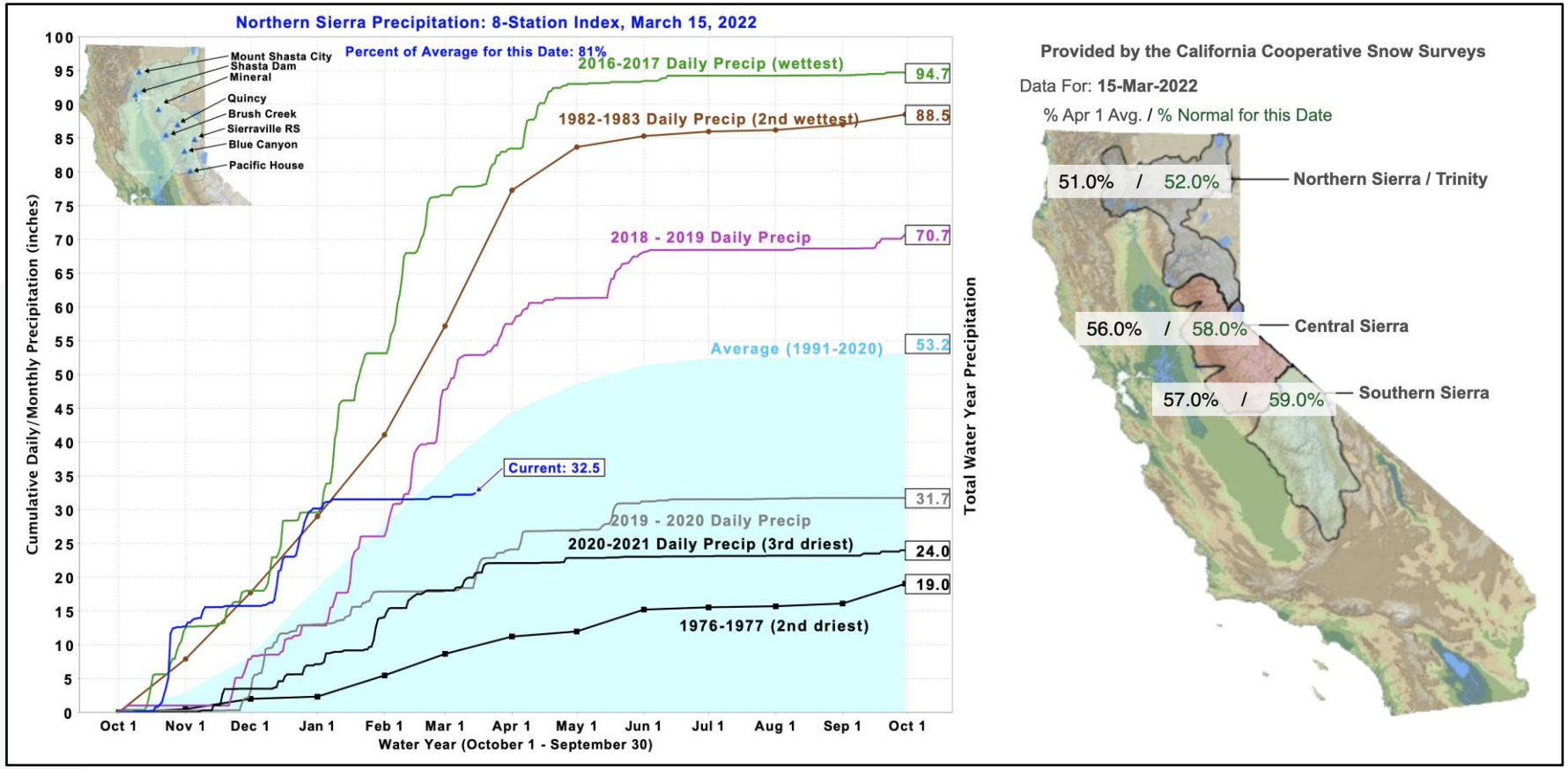
Water Year Precipitation Summary





Source: California Department of Water Resources

- As of 15 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 western Washington and western Nevada
- Total water year precipitation in the Northern Sierra Nevada is 81% of normal for this date (15 Mar)
- Northern Sierra Nevada snowpack is only 52% of normal for this date (15 Mar)

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