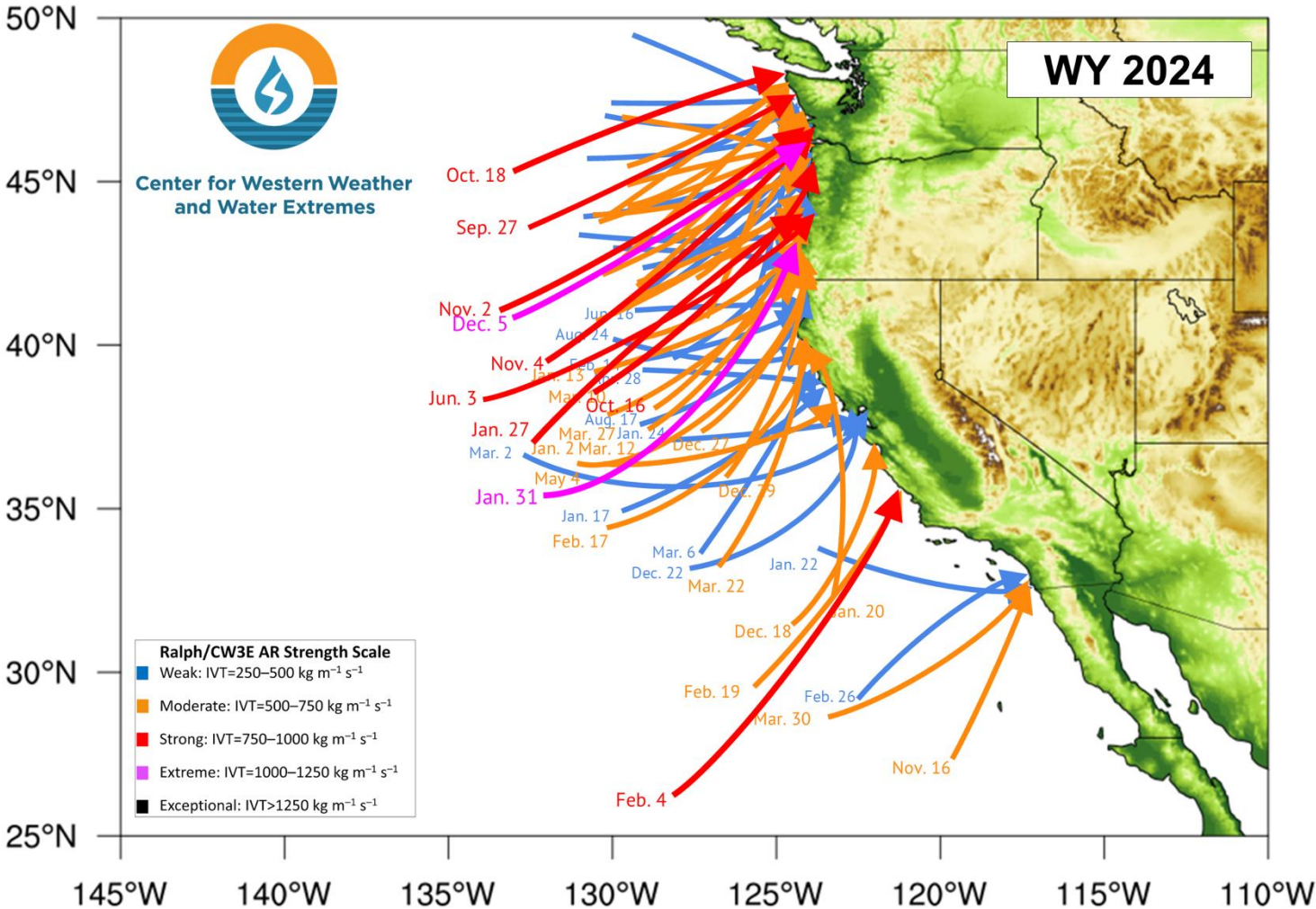


The Landfalling Atmospheric Rivers of Water Year (WY) 2024

AR Strength	AR Count
Weak	26
Moderate	31
Strong	8
Extreme	2
Exceptional	0

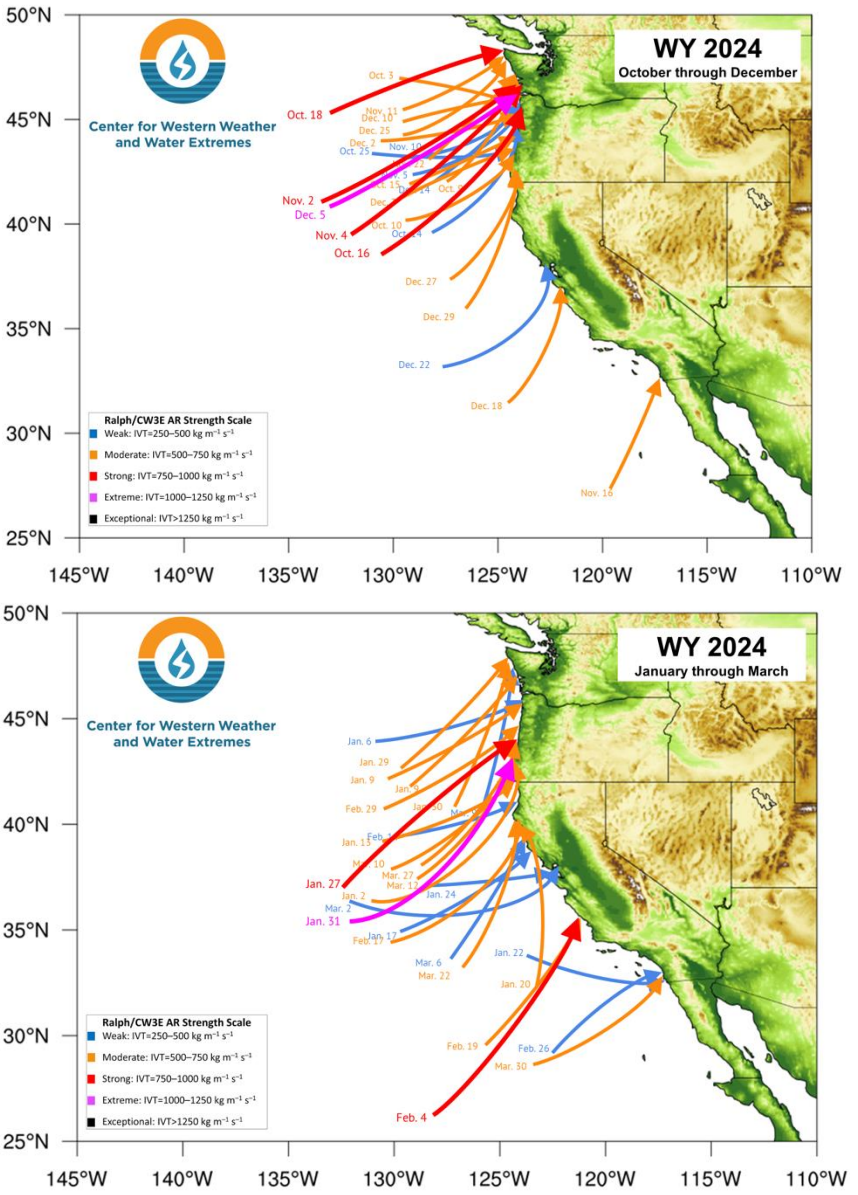
Regions Impacted by Each AR	
State/Region	ARs
Washington	52
Oregon	59
Northern CA	53
Central CA	28
Southern CA	17

67 atmospheric rivers made landfall over the U.S. West Coast during Water Year 2024

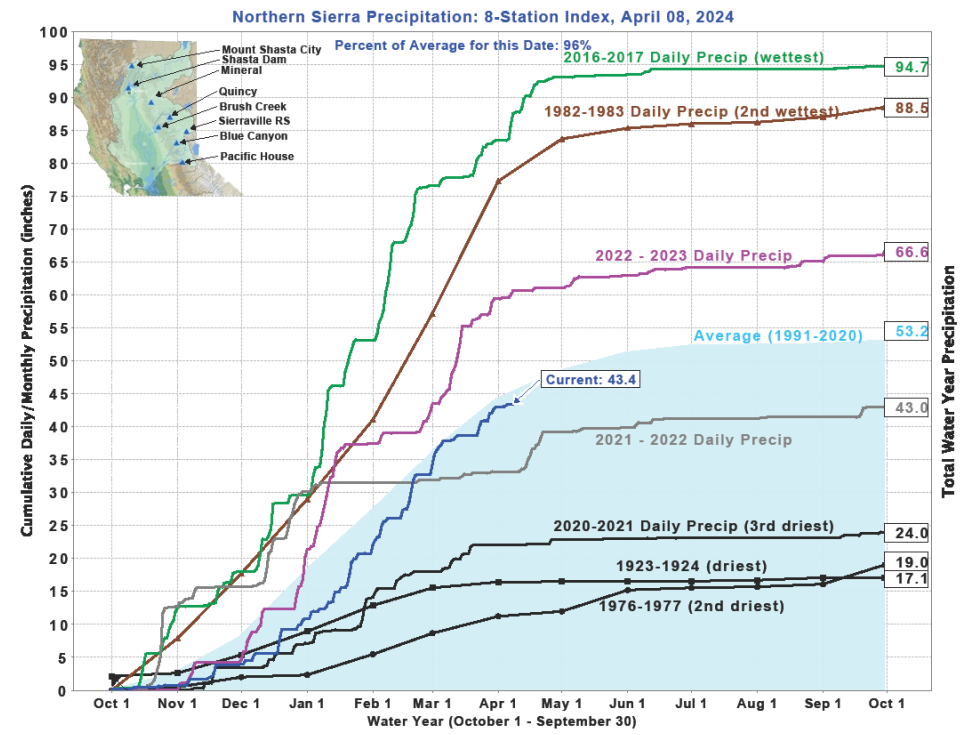


*Arrows are placed on the map where each AR was strongest over the coast

A Slow Start for California

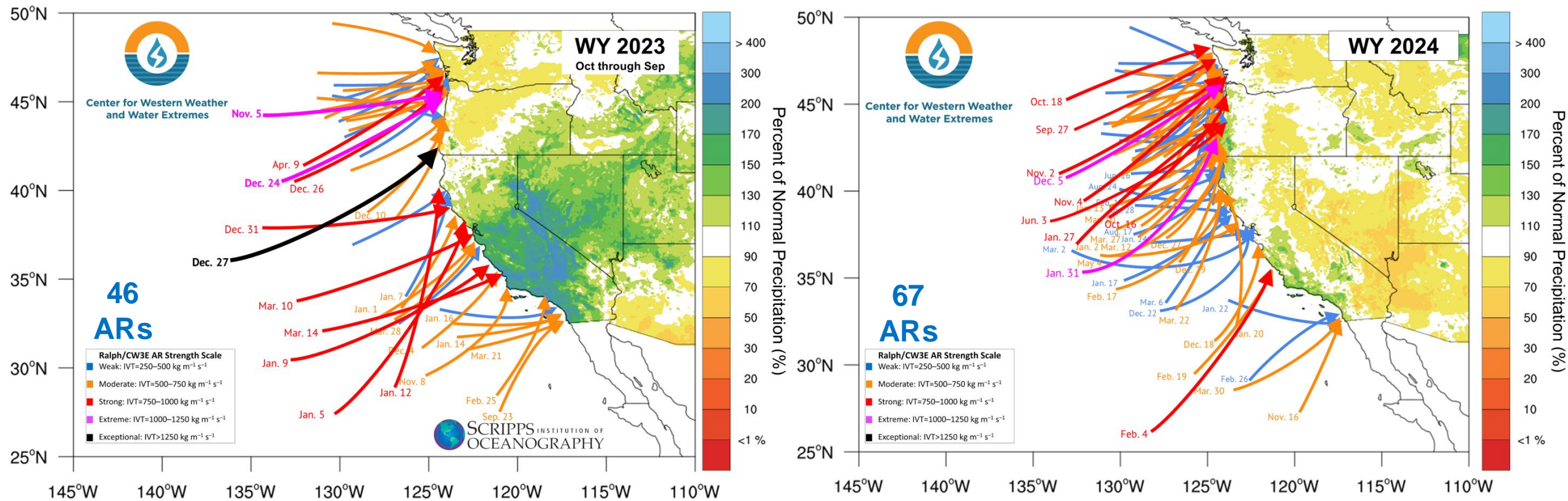


- In the first three months of the water year (October through December), Northern California experienced 18 atmospheric rivers (12 weak and 6 moderate)
- During the second three months of the water year (January through March), Northern California experienced 25 atmospheric rivers (14 weak, 9 moderate, and 2 strong)
- At the end of December, the Northern Sierra 8-Station index was ~6 inches below normal for the date, but the switch to more atmospheric river activity in the second half of the winter resulted in the index rising to near normal



Source: https://cdec.water.ca.gov/cgi-progs/products/PLOT_ESI.pdf

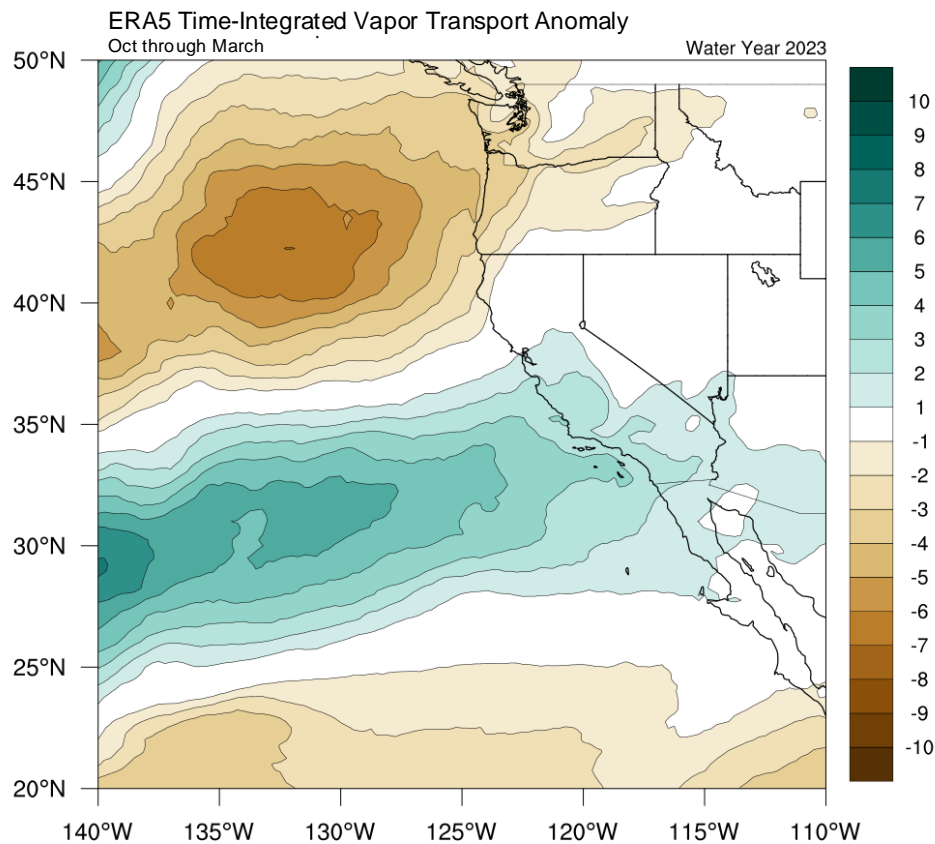
Water Year 2024 Compared to Water Year 2023



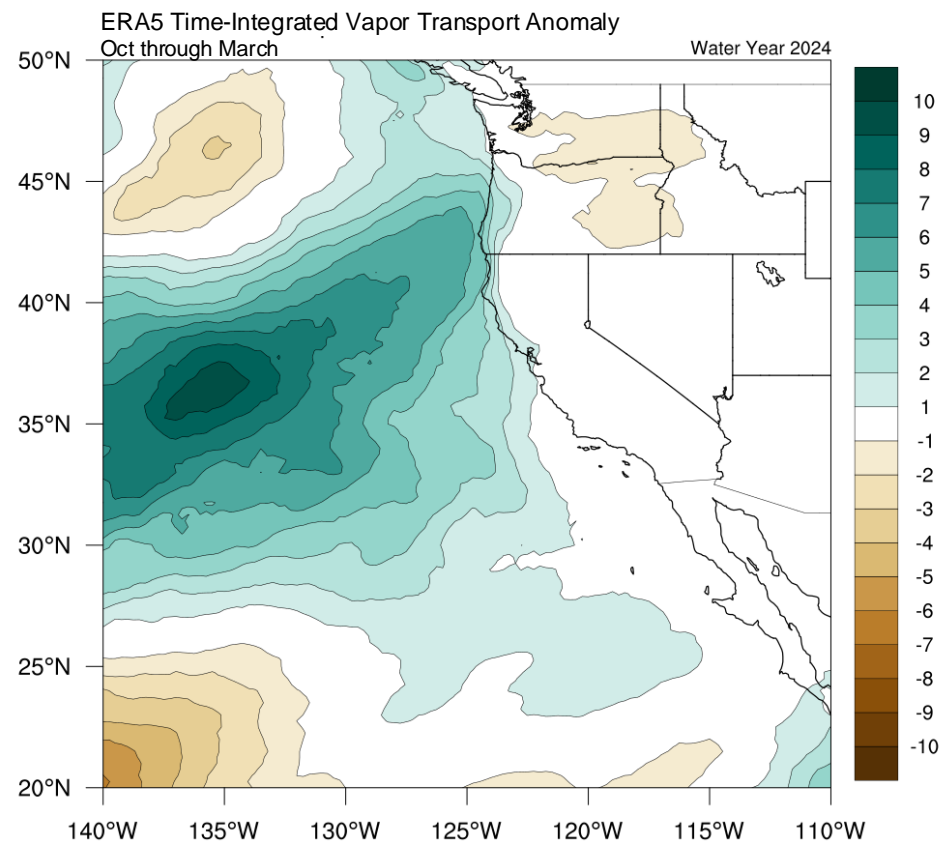
- Water Year 2023 experienced a total of **46 landfalling ARs** over the U.S. West Coast, 21 fewer than Water Year 2024
- While WY 2024 experienced more ARs, a much larger majority, especially the stronger storms, only impacted the Pac. Northwest
- Water Year 2023 was dominated by a more southerly storm track, bringing stronger and more frequent ARs to California compared to the WY 2024
- This variation in storm track and storm strength during WY 2024 resulted in more widespread normal to near normal conditions across the West instead of the dipole and near record breaking precipitation in California in WY 2023.

The Composition of a Water Year

Water Year 2023



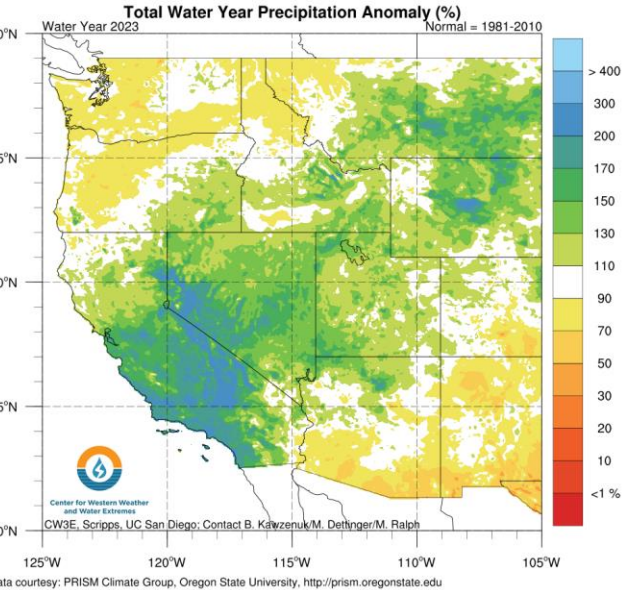
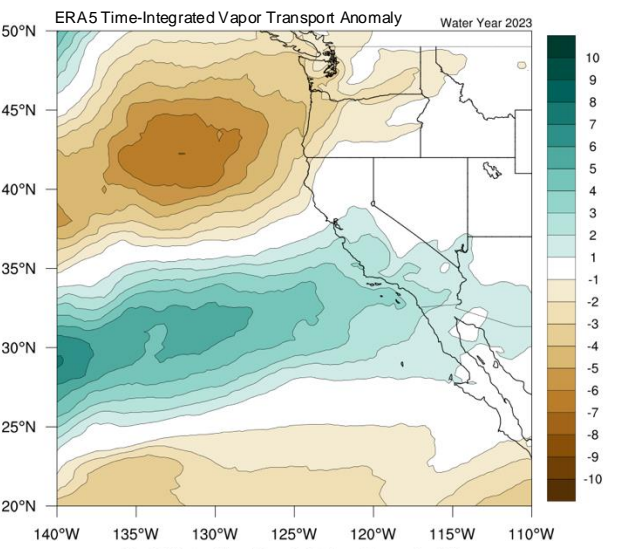
Water Year 2024



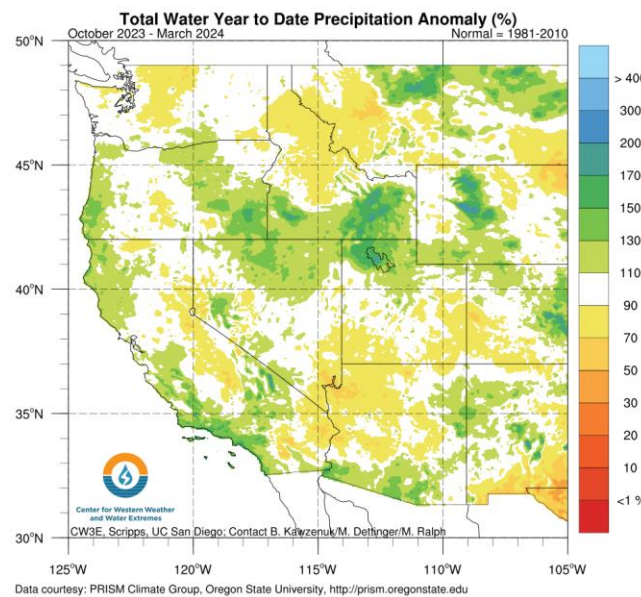
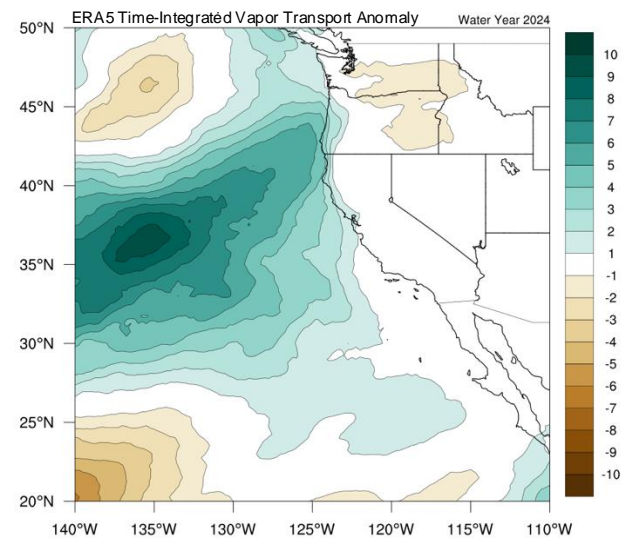
- Another way of summarizing the atmospheric river activity during a water year is to compare the seasonal time-integrated vapor transport (TIVT; an accumulation of moisture transport over time) to climatological averages (departure from normal)
- Water year 2024 experienced above normal atmospheric river activity across the coastal regions of Oregon and Northern California with a majority of west experiencing near normal activity
- The only region to experience below normal activity during water year 2024 was the inland regions of the Pacific Northwest

The Composition of a Water Year

Water Year 2023



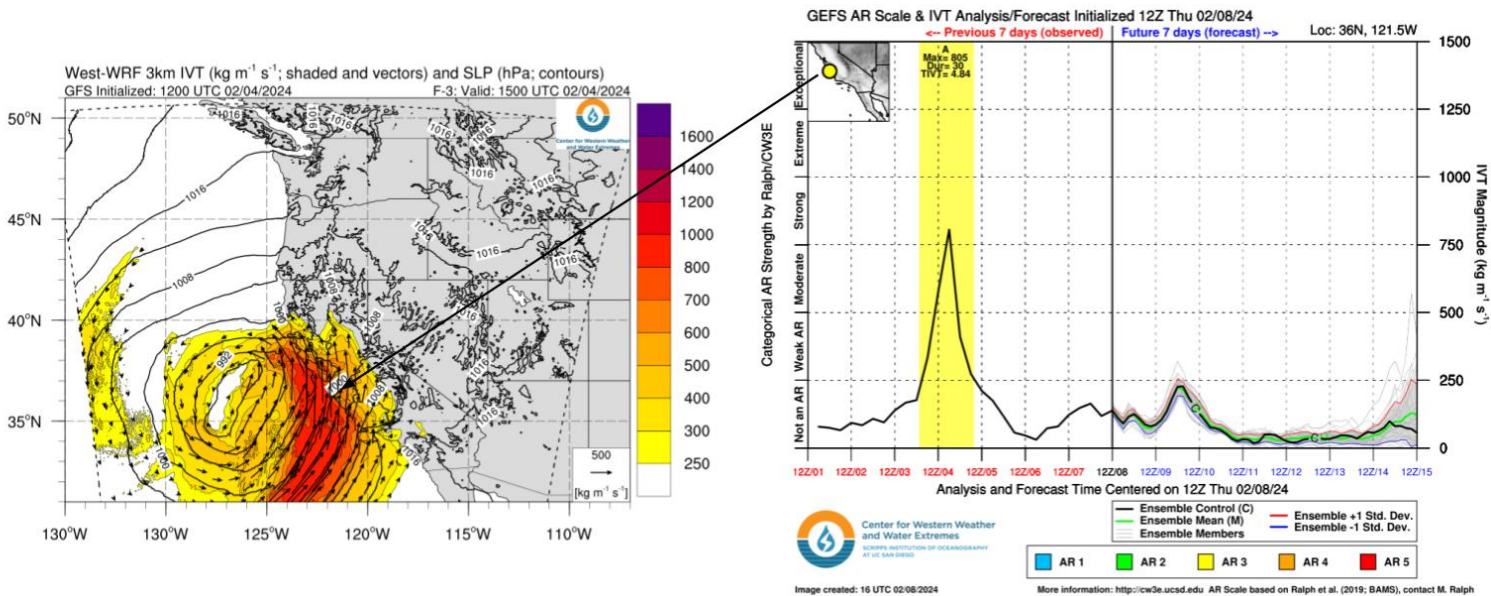
Water Year 2024



- Comparisons between TIVT and Precipitation anomalies show how AR activity relates to precipitation accumulations
- During water year 2023, the highest AR activity occurred across the central coast of California into the southern Sierra where precipitation anomalies were also highest and led to one of the wettest/snowiest years on record for the Southern Sierra
- The Pacific Northwest experienced below normal AR activity during water year 2023 and saw below normal precipitation
- In water year 2024, the most anomalous AR activity occurred over coastal regions from Oregon to Northern California which experienced above normal precipitation accumulations as well
- The above normal precipitation over southern California during WY 2024 was driven by the productive strong atmospheric river that impacted the region in early February, which saw near record breaking precipitation over a short period of time (<math>< 48</math> hours; summarized on next slide)

*Arrows are placed on the map where each AR was strongest over the coast

Water Year 2024 Highlights



Street Flooding in Santa Barbara

Source: Ethan Swope, AP Photos: <https://weather.com/photos/news/2024-02-04-california-flood-images-slideshow>



High Flow through the Los Angeles River

Source: The Guardian
<https://www.theguardian.com/us-news/2024/feb/06/los-angeles-river-pictures-rain-storms-flooding>

- The strongest atmospheric river to impact Central and Southern California occurred on 4–6 February and brought efficient southerly IVT, heavy precipitation, and strong winds to much of the Southern California Bight from Santa Barbara to the Los Angeles Basin.
- Downtown Los Angeles received 8.51 inches of rain from 4 to 6 February, which was the second wettest 3-day stretch on record.
- Additionally, snowfall in the Sierra Nevada increased the year-to-date snowpack by 10 to 20%.
- This event was a great example how only a few strong storms over Southern California can make or break a water year.