

# Observing System Experiments for the 2023 AR Recon Season

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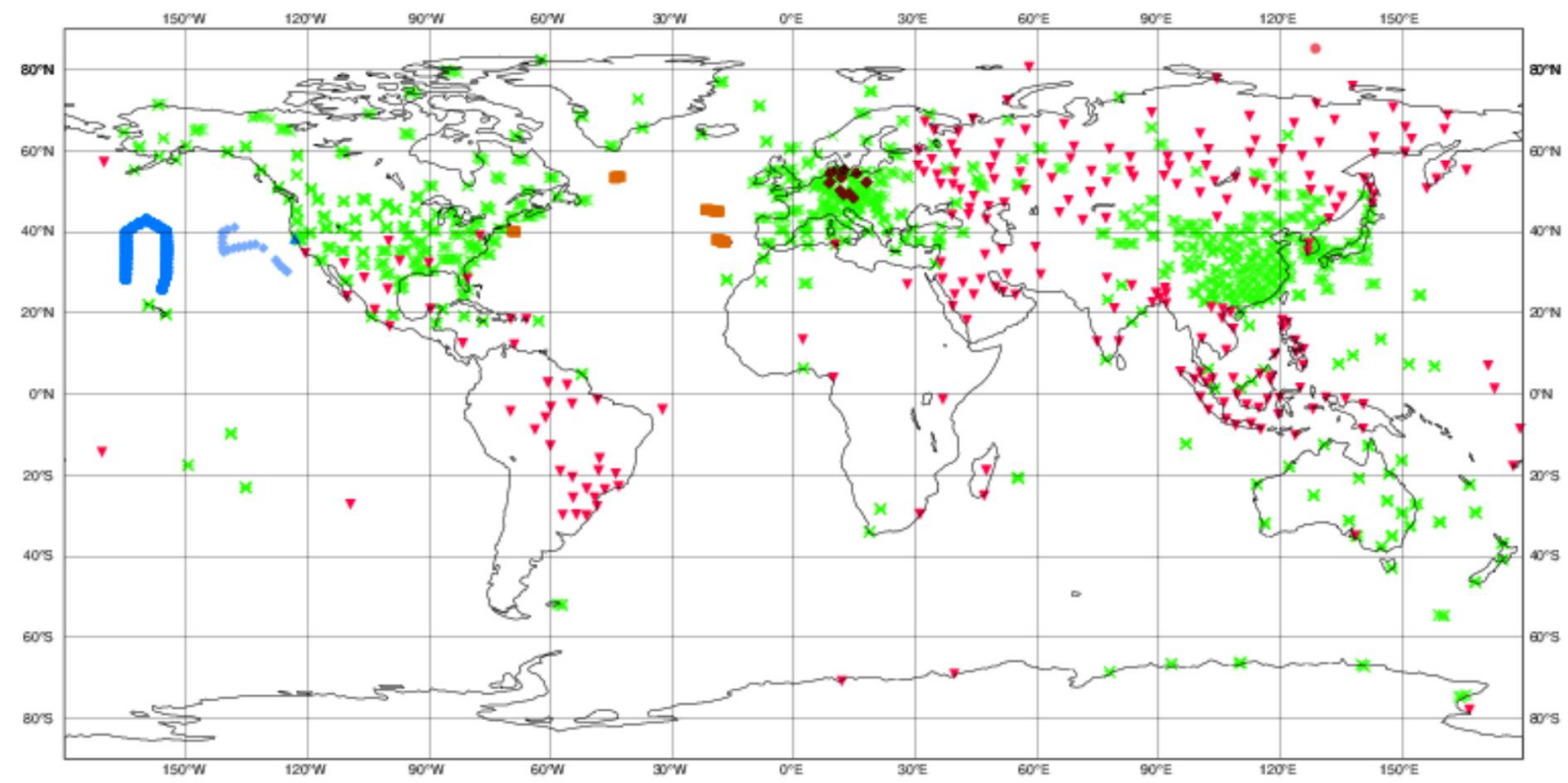
# Overview

- Observations assimilated during AR Reconnaissance 2022/2023
- Dropsondes, radiosondes, and ocean buoys
- Observing System Experiments (OSEs) for AR Recon Season 2023
- Evaluation of the impact of dropsondes and drifting buoys on precipitation across California

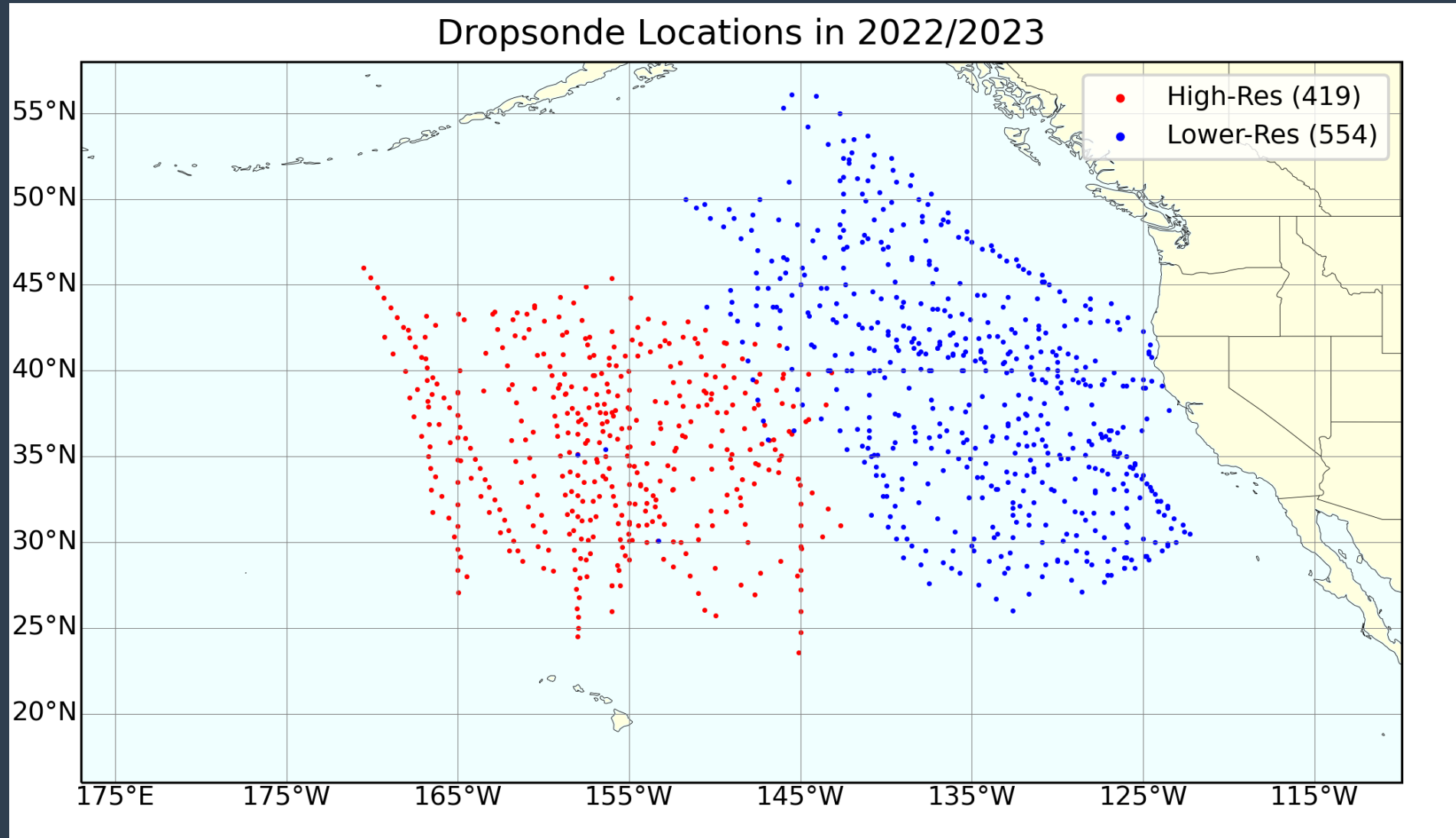
# Observation monitoring

ECMWF data coverage (used observations) - RADIOSONDE  
2023010721 to 2023010803  
Total number of obs = 662

- TEMP SHIP (1)
- ◆ DROP Sonde (18)
- ▲ Mobile TEMP (1)
- ▼ Land TEMP (230)
- ✕ High Reso land (396)
- High Reso sea (4)
- High res DROP (1)
- ◆ BUFR TEMP DESCENT (11)



# Dropsonde locations in January and February 2023



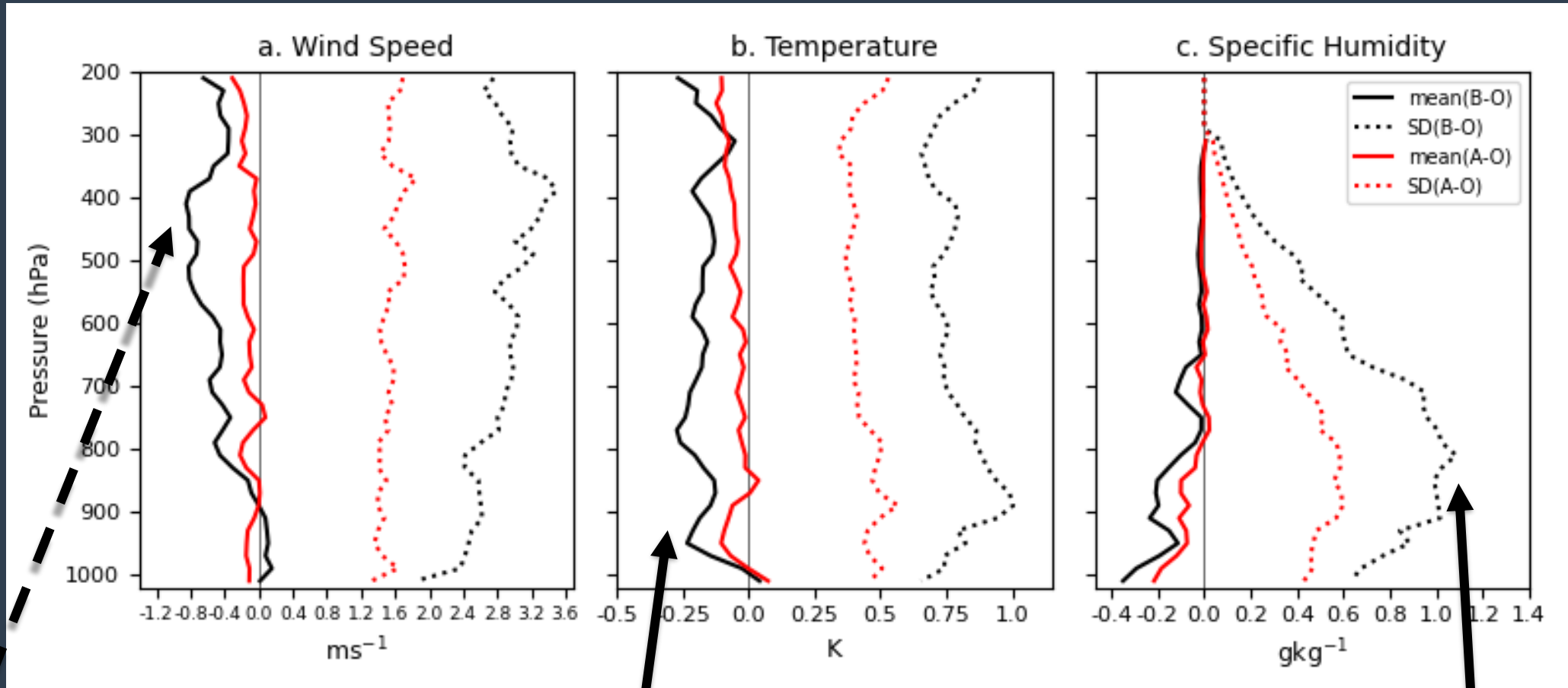
**High-Res:**  
NOAA G-IV

**Lower-Res:** mostly  
USAF C-130

**973 dropsondes**  
in total

# Background-Observation in 20-hPa layers

## Analysis-Observation in 20-hPa layers



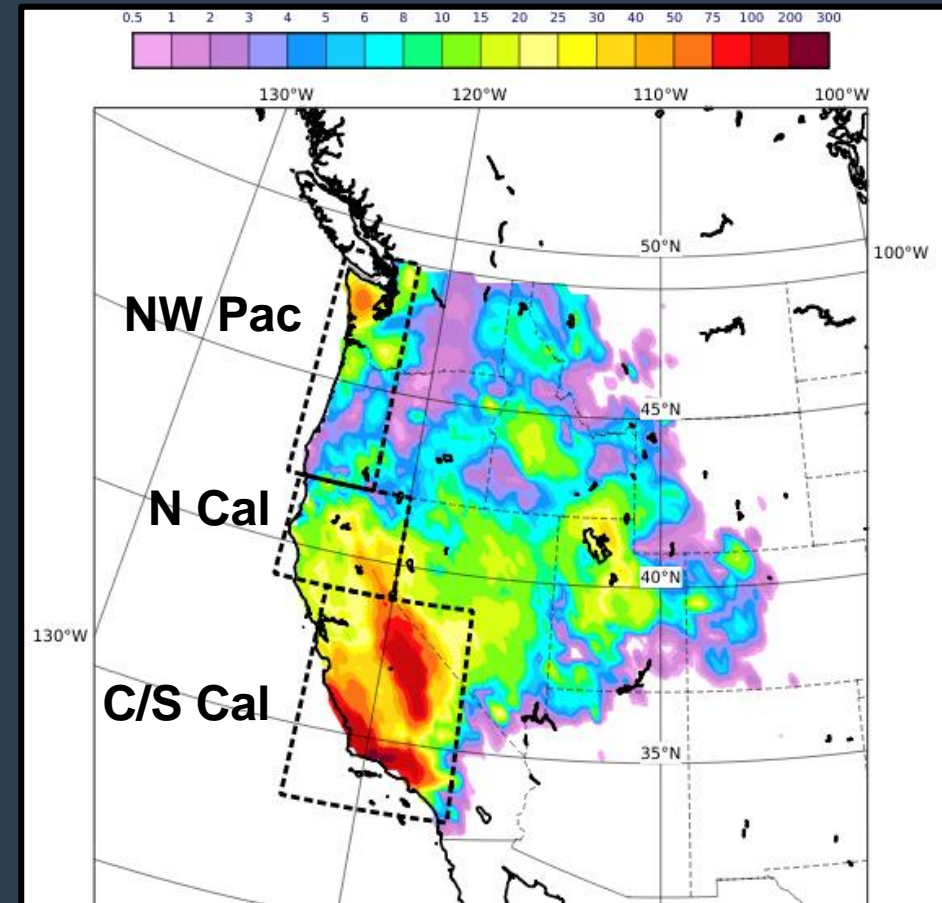
Model slow wind bias

Model cold bias

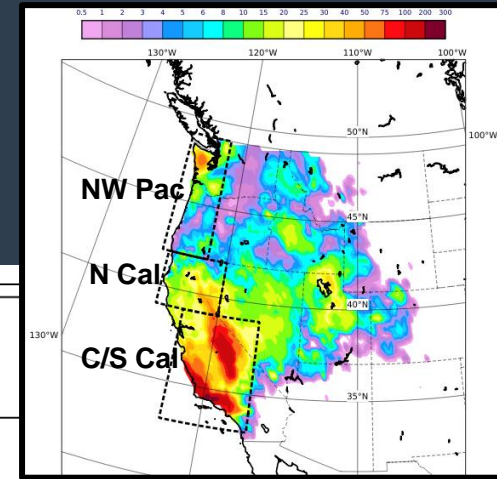
Model issue in the lower troposphere

# Observing System Experiments (OSEs)

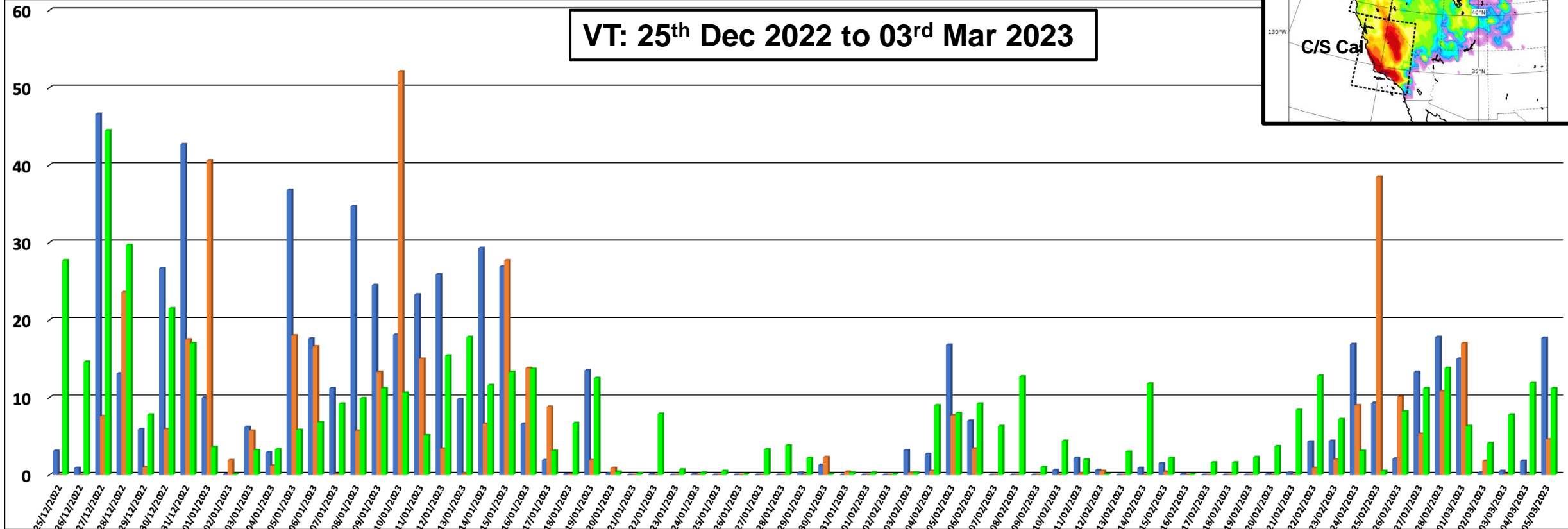
- TCo1279 (~9km horizontal resolution)
- New model set-up (cycle 48r1)
- “Control run” and two “denial runs” (no dropsondes; no AR Recon drifting buoys)
- Three regions: **Pacific Northwest**, **northern** and **central/southern** California
- Evaluation using precipitation estimates from PRISM



# Area average daily precipitation PRISM (12Z)

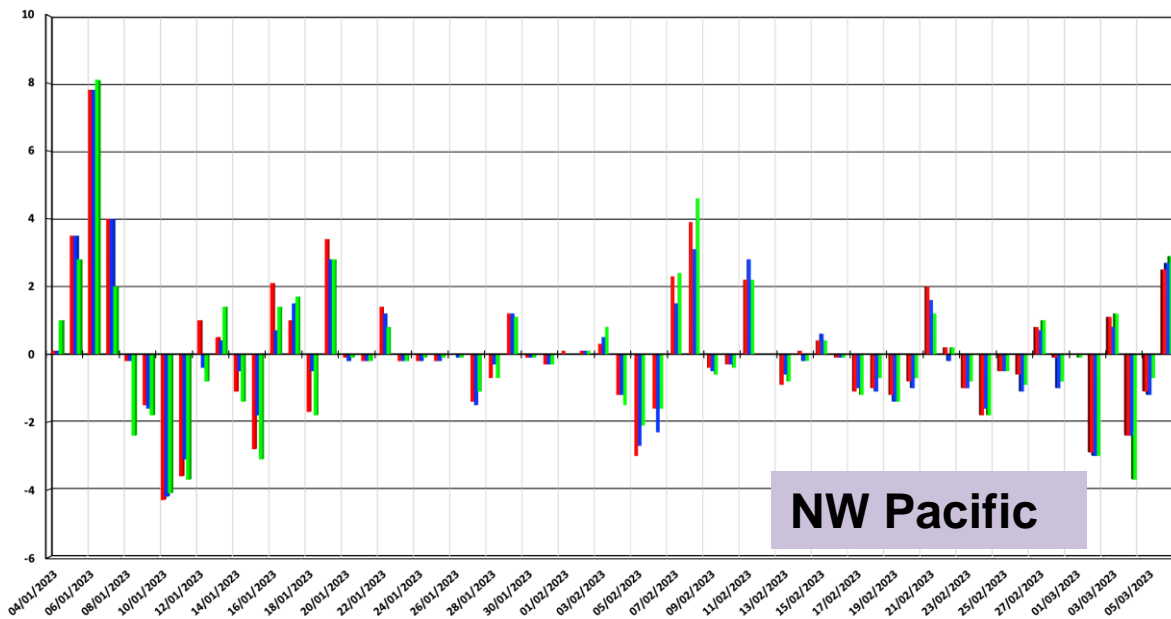


VT: 25<sup>th</sup> Dec 2022 to 03<sup>rd</sup> Mar 2023



# Area average 24h precipitation forecast error +72h

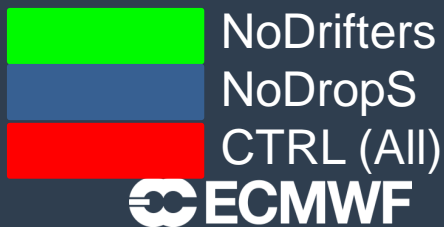
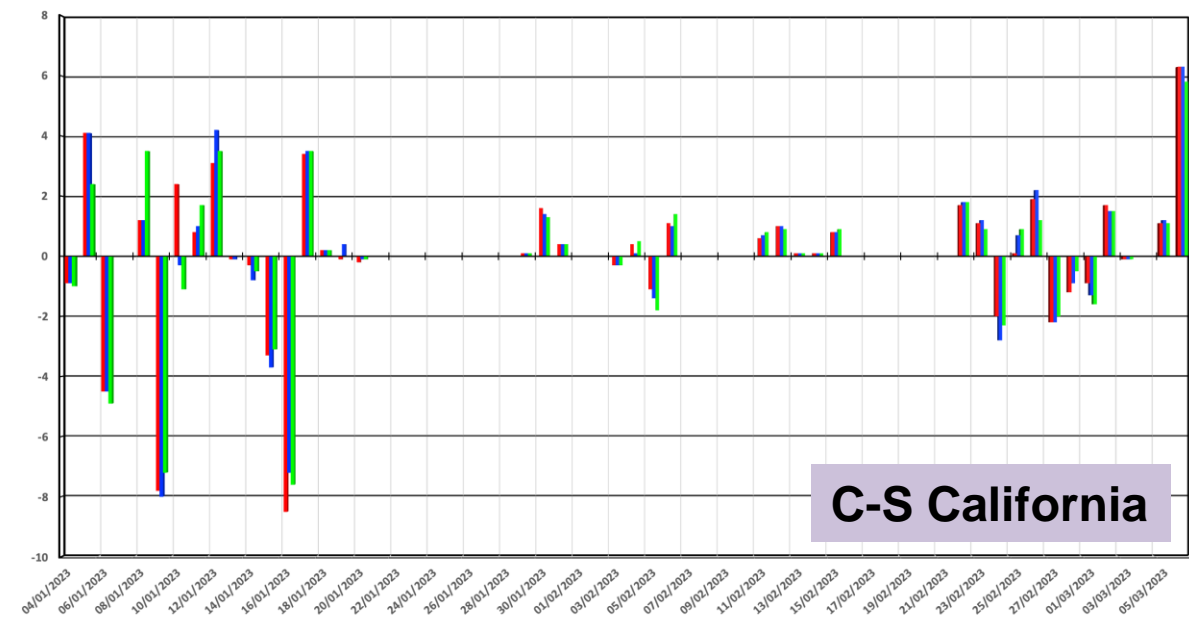
Pacific NW Coast (Oregon & Washington) Forecast +72h Area average errors



North California: Area average forecast error +72h

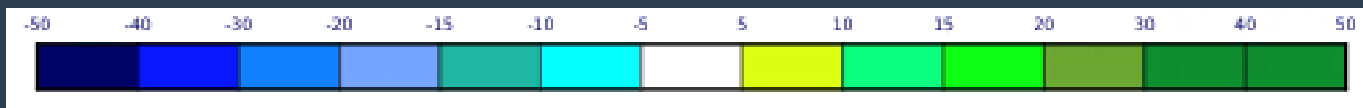


Central/South California Forecast +72h Area average errors

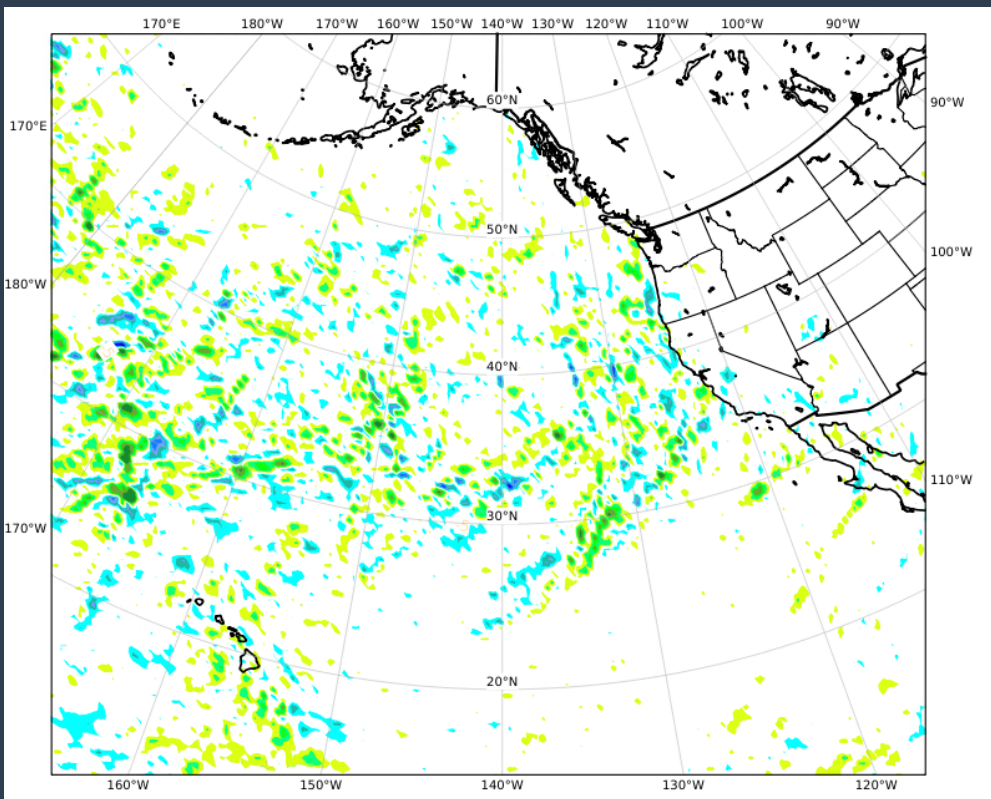




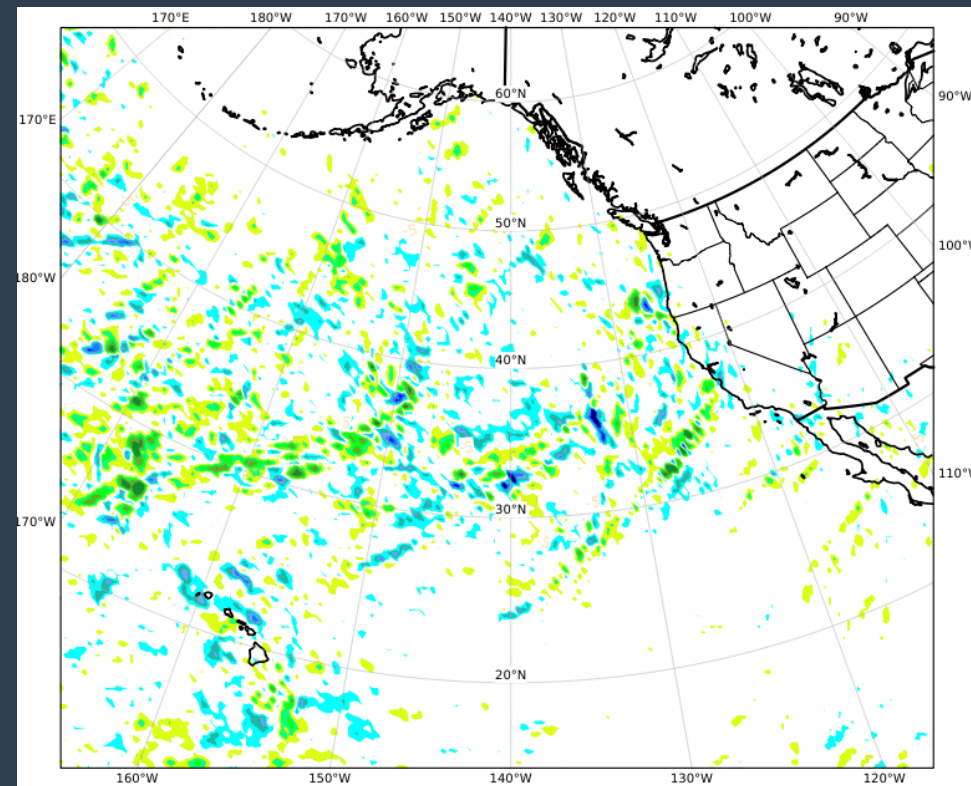
# Difference of the RMS analyses increments



$\text{kg m}^{-1} \text{s}^{-1}$



Jan & Feb 2023  
campaign dates only

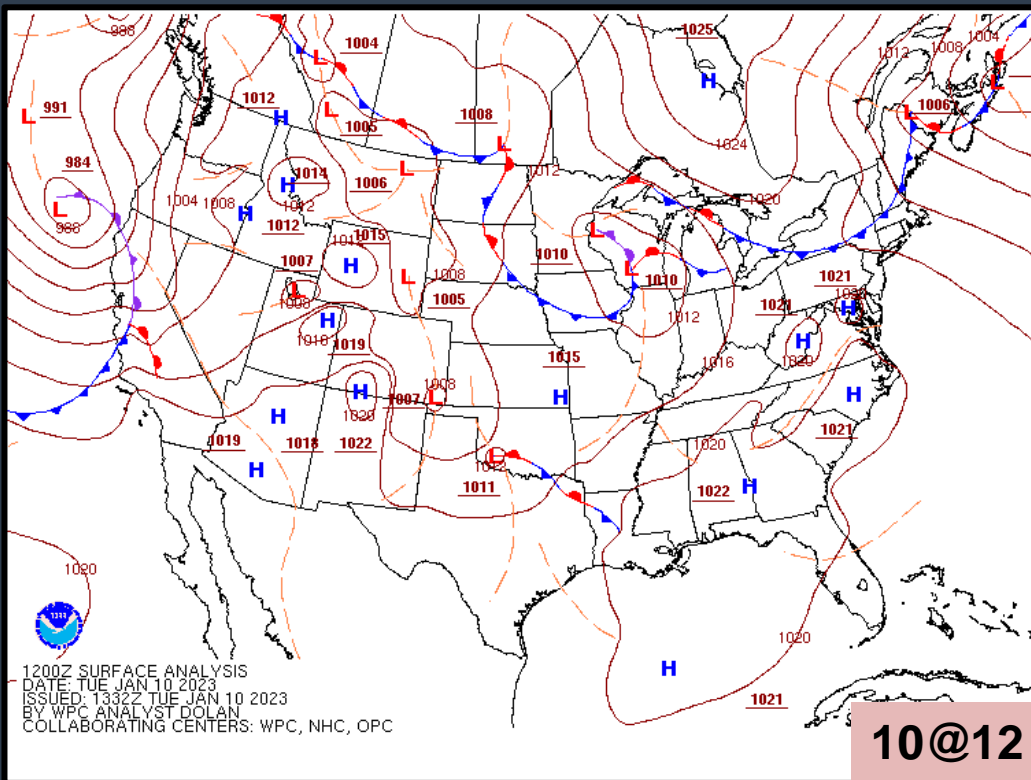
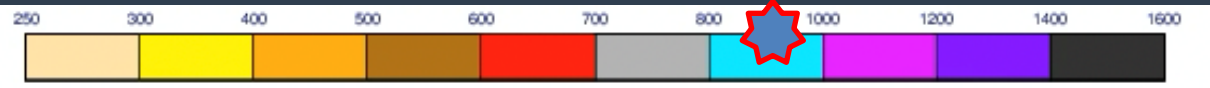


CTRL - No drifter buoy

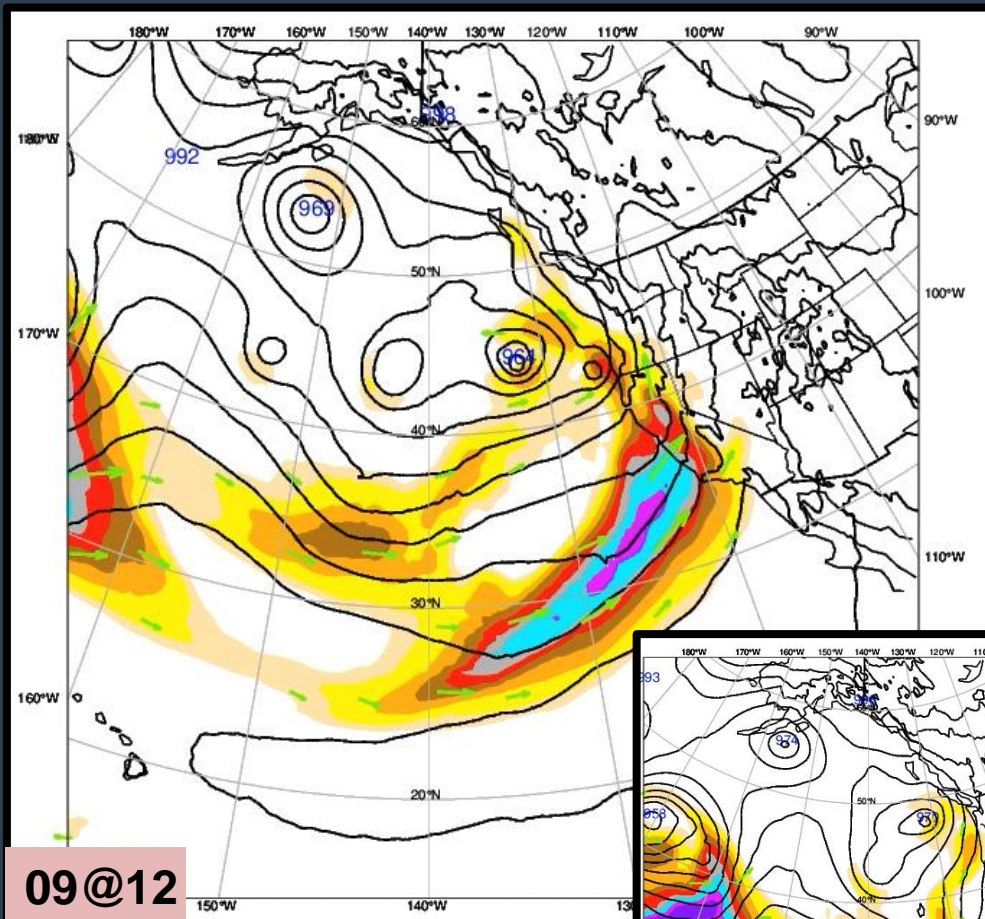
CTRL - No Dropsondes

# Case #2 : 10<sup>th</sup> Jan 2023

units:  
kg m<sup>-1</sup> s<sup>-1</sup>

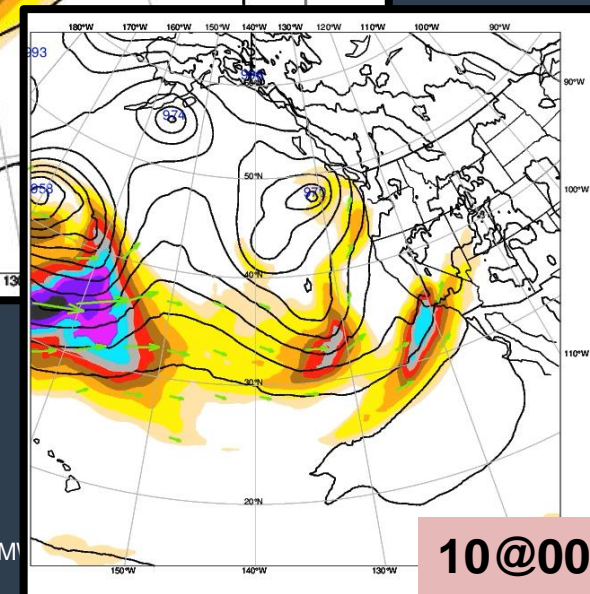


10@12

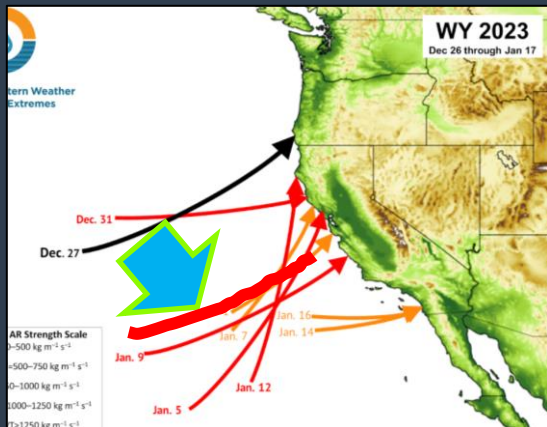


09@12

$\vec{Q} \leftrightarrow$  Aerial Runoff



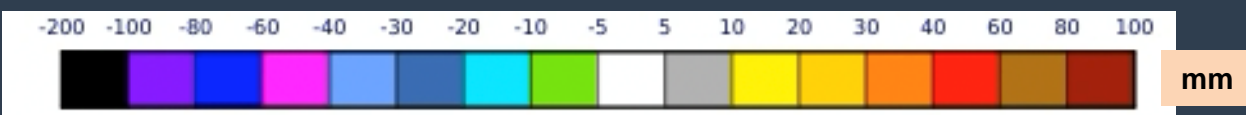
10@00



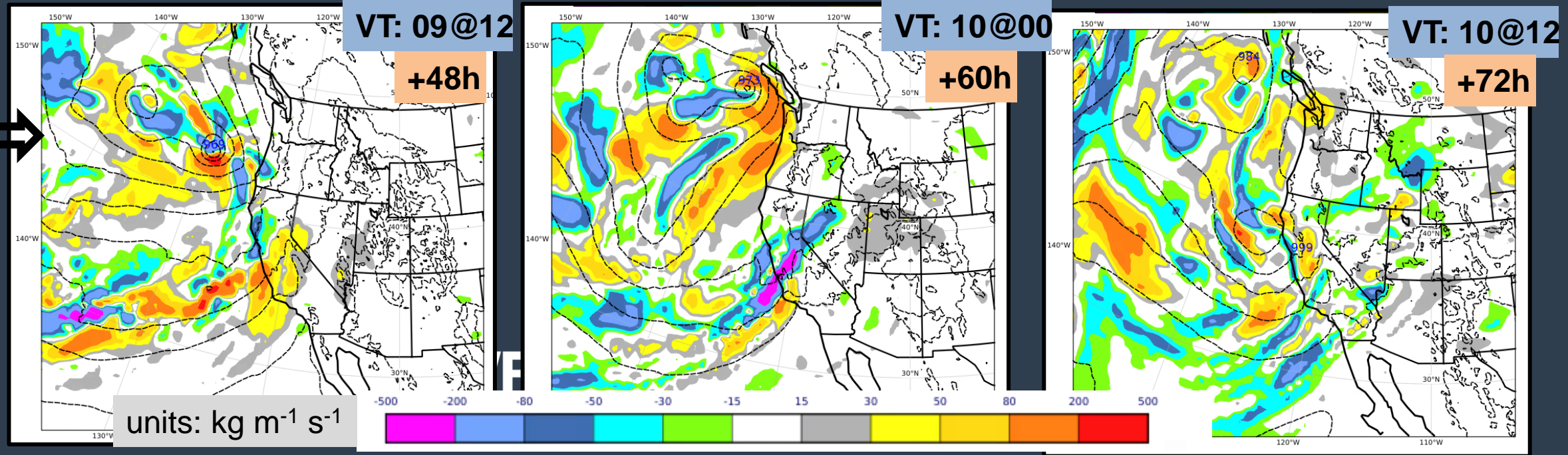
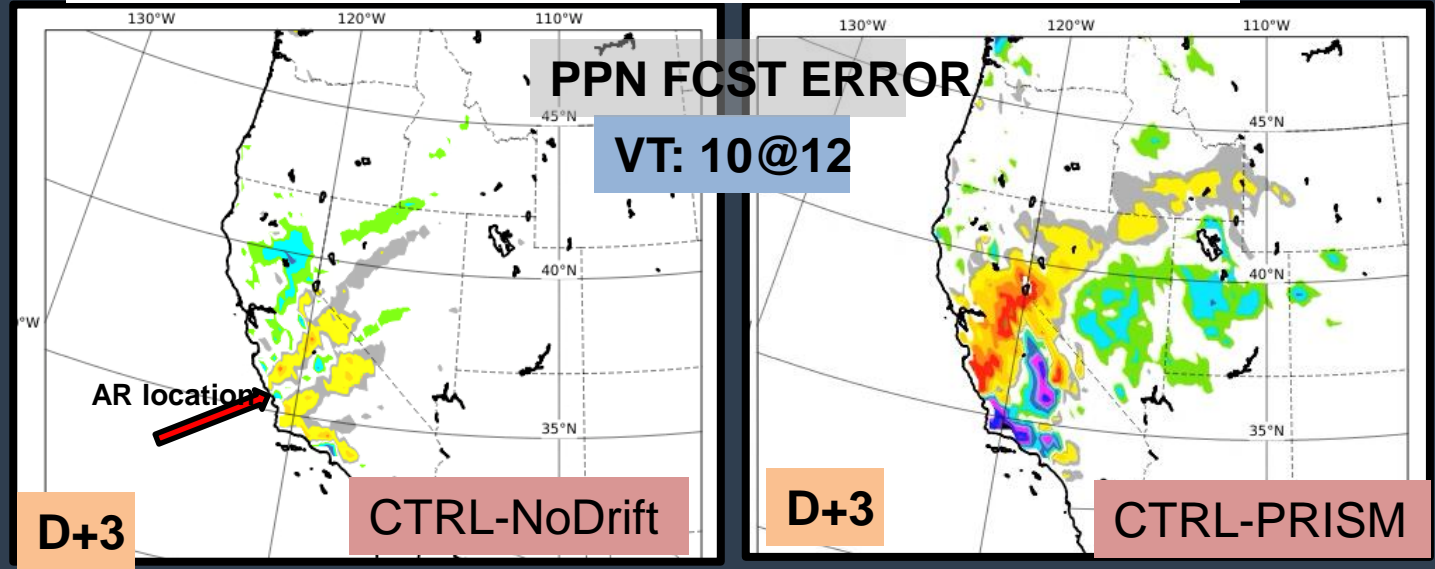
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# Case: 10<sup>th</sup> Jan 2023



Difference CTRL-NoDrift  
(water vapour flux)



# Summary

- AR Recon observations were routinely monitored
- Observing System Experiments were run for AR Recon Season 2023
- Preliminary results do not have conclusive evidence of the extra dropsondes and drifting buoys reducing the precipitation error
- There is a suggestion that the AR in the 10<sup>th</sup> January event was shifted between the runs
- Further diagnostics and evaluation are required