

CW3E AR Outlook: 24 October 2025

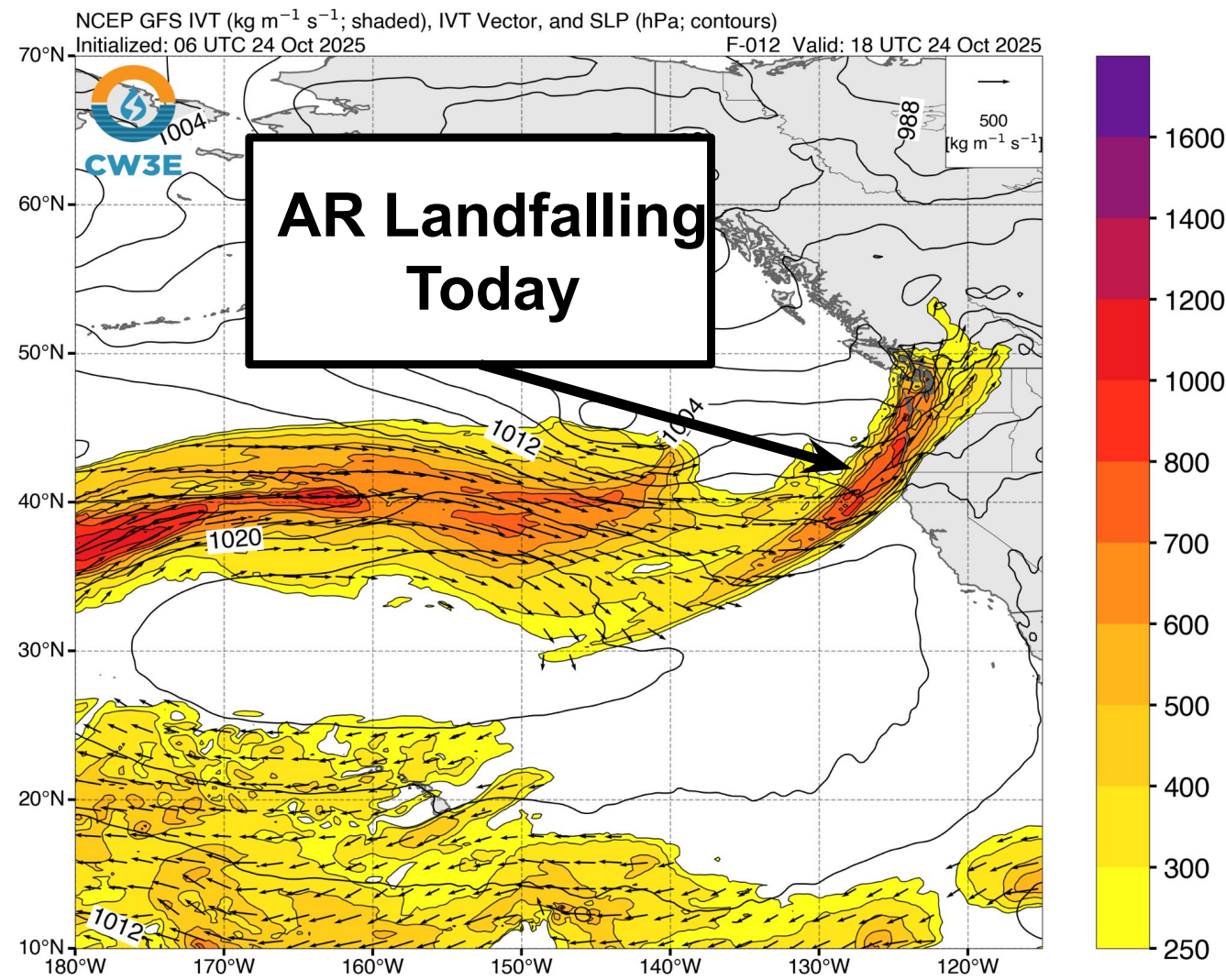
Pair of Atmospheric Rivers to Bring Precipitation to the Pacific Northwest and Northern California

- Two atmospheric rivers are forecast to make landfall over the Pacific Northwest and Northern California over the next week, bringing precipitation to the Pacific Northwest and Northern California.
- The first AR made landfall over the Pacific Northwest this morning (Fri 24 Oct) and is forecast to propagate down the coast through Sun 26 Oct. A secondary low is forecast to develop behind the AR later today and bring additional moisture to the PNW coast tomorrow, Sat 25 Oct.
- The EPS is forecasting stronger IVT over the PNW coast with both the initial AR and secondary low. The EPS is forecasting AR3 and AR1 (according the Ralph et al. 2019 AR Scale) conditions in Northern Oregon with the AR and secondary low respectively, whereas the GEFS is forecasting AR2 and AR0 conditions for the same period.
- The NWS Weather Prediction Center (WPC) 72-hour precipitation totals by 5 AM PT 27 Oct are forecast to be ~3-5 inches over the Washington, Oregon and Northern CA coasts as well as over the Cascades associated with the first AR and secondary low.
- The WPC issued **marginal risk** (level 1 of 4; $\geq 5\%$ probability of flooding) excessive rainfall outlooks (ERO) for western Washington and Oregon, northwestern California, and the Northern Sierra foothills for 5 AM PT Fri 24 Oct through Sun 26 Oct.
- There is model-to-model uncertainty regarding the strength of the second AR and associated surface low as well as the time of landfall. While both EPS and GEFS members contain significant uncertainty in the timing and intensity of the AR, ~65% of members in each ensemble are forecasting AR conditions over the Northern Oregon coast late on Tue 28 Oct.
- Precipitation is forecast to fall mostly over the Pacific Northwest with the second AR, with the WPC forecasting the highest precipitation totals (1–2 in.) over Washington and portions of Northern Oregon.
- The GEFS and ECMWF ensembles are in good agreement regarding the potential for a significant AR event in the Pacific Northwest late next week. This is an unusually strong signal given the long lead time (~8 days).

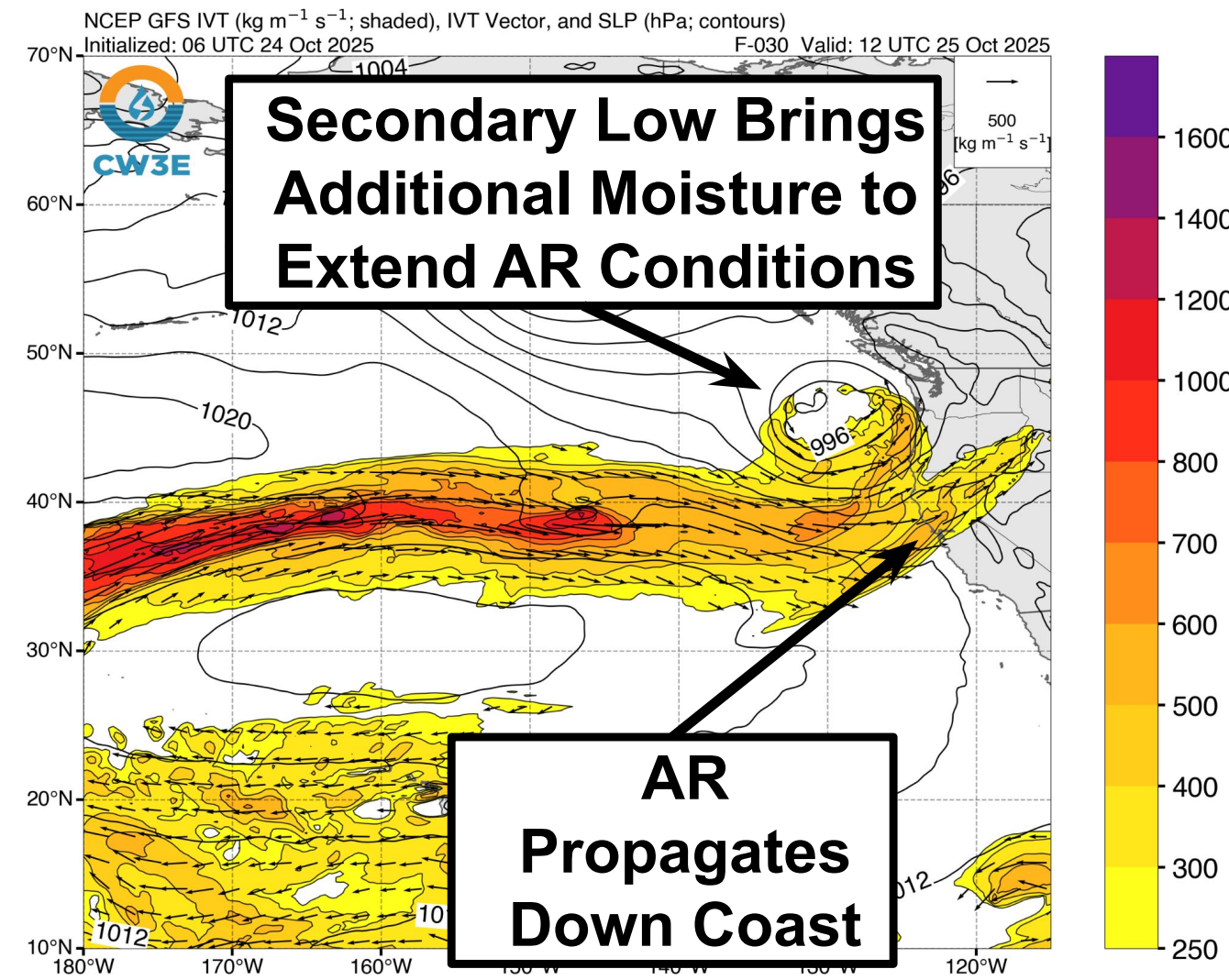
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GFS IVT Forecast: First AR

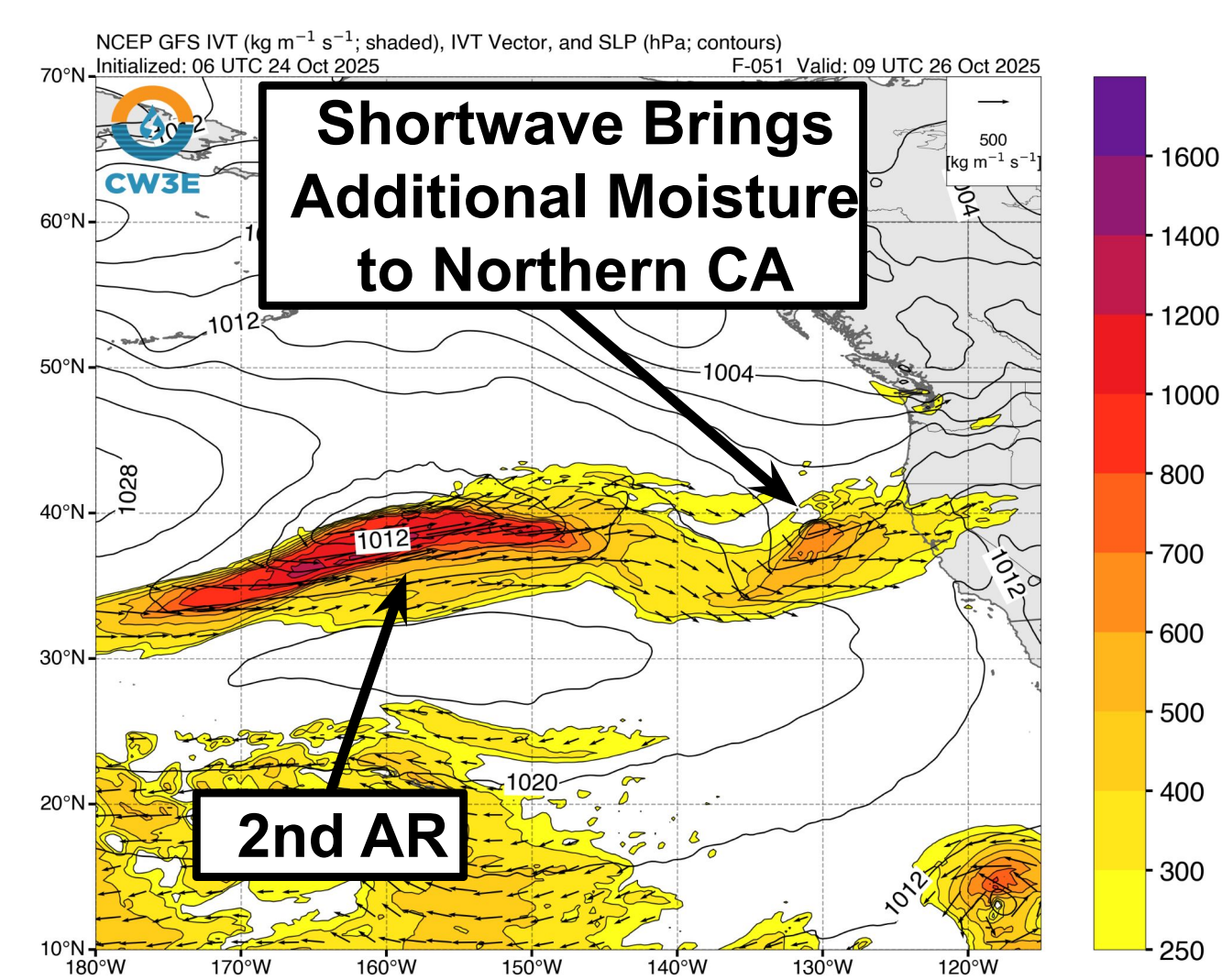
11 AM Fri 24 Oct



5 AM Sat 25 Oct



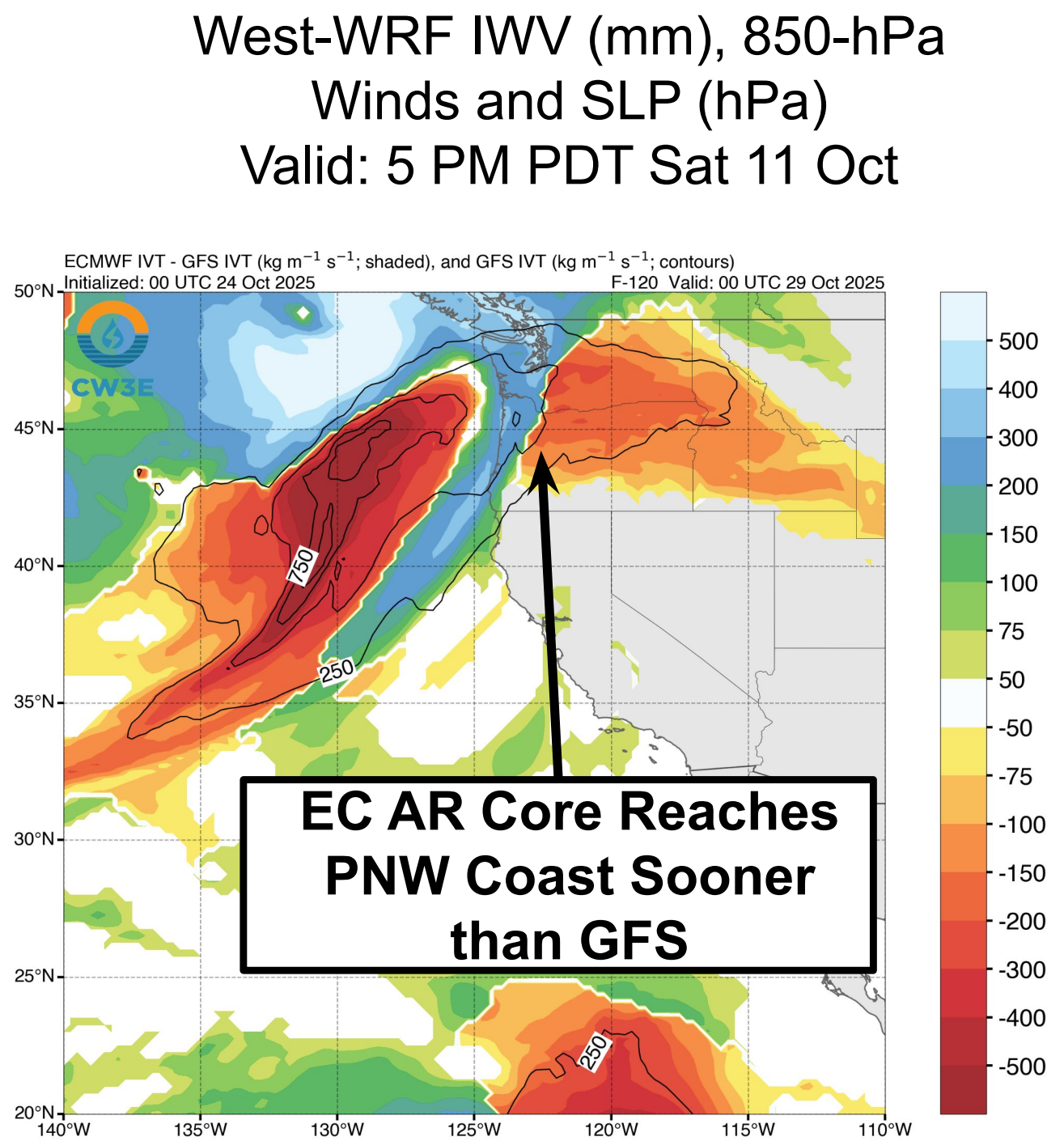
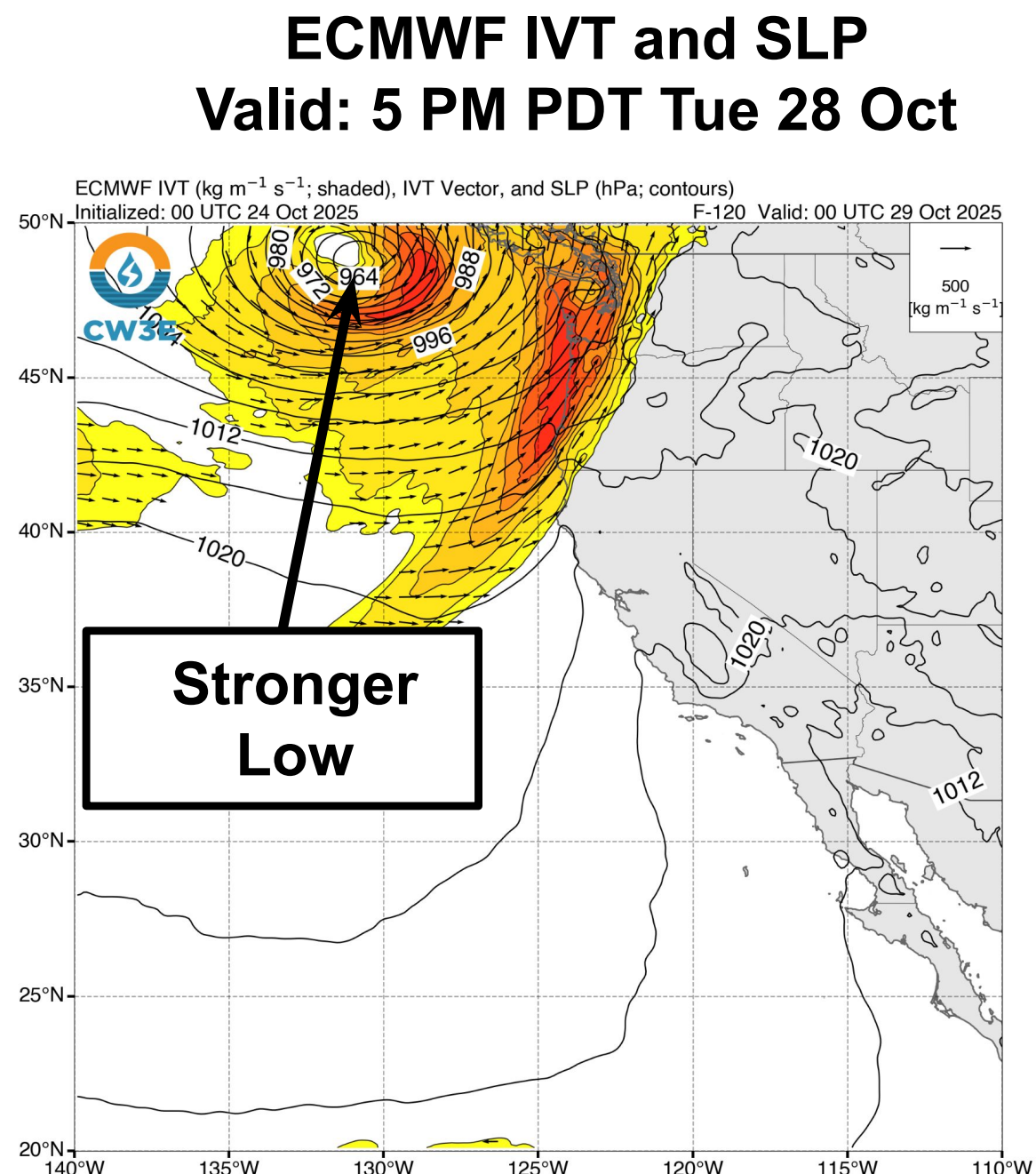
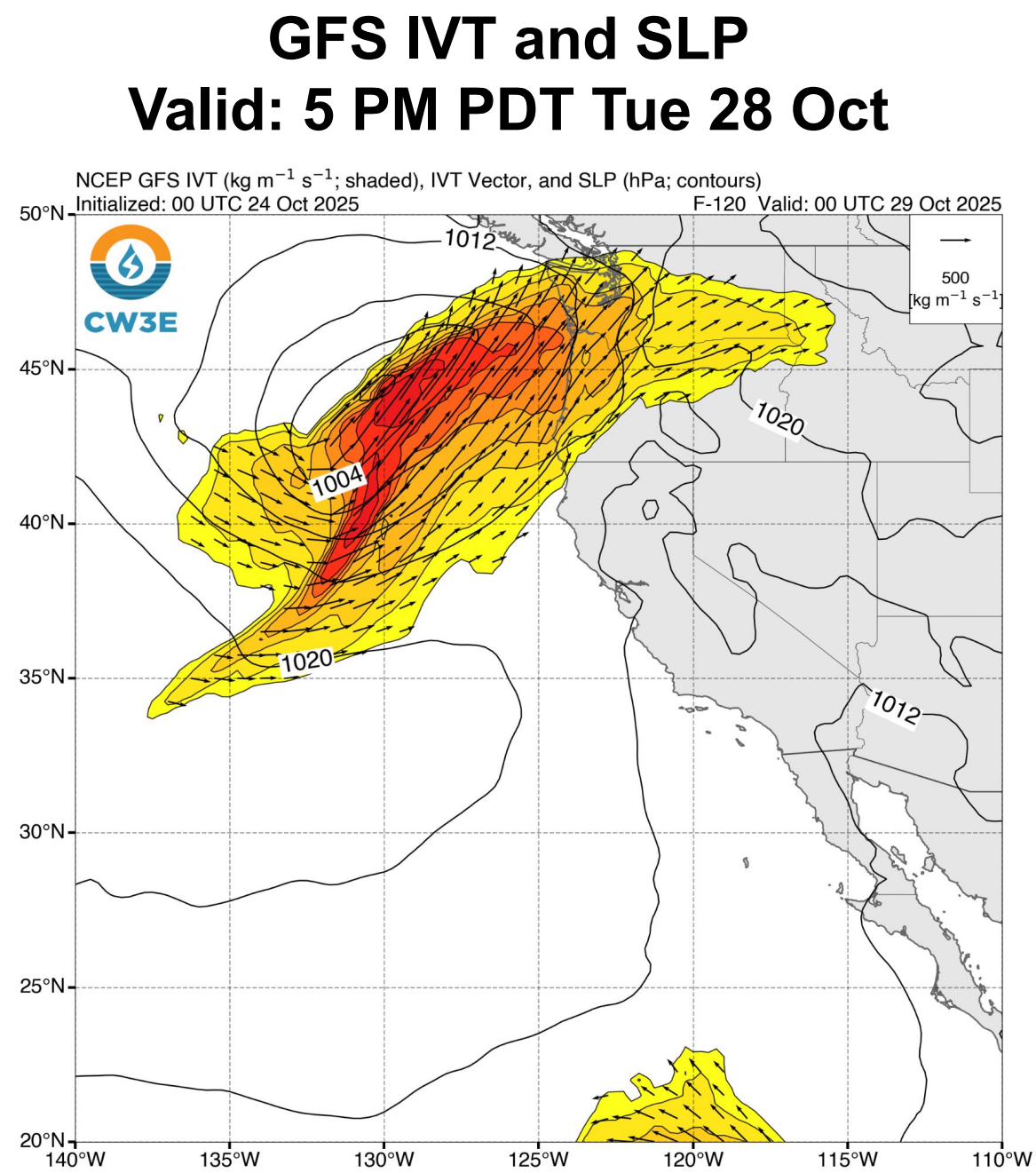
2 AM Sun 26 Oct



- An atmospheric river has made landfall over the Pacific Northwest coast today, Fri 24 Oct, and is forecast to propagate down the coast today into tomorrow, Sat 25 Oct.
- A secondary low is forecast to develop behind the AR as it moves down the coast tonight. The low will bring additional moisture to the Pacific Northwest and Northern California.
- A shortwave is forecast to form behind the secondary low late on Sat 25 Oct and propagate toward the coast into Sun 26 Oct. This shortwave will bring additional moisture to Northern California and extend AR conditions in the region.

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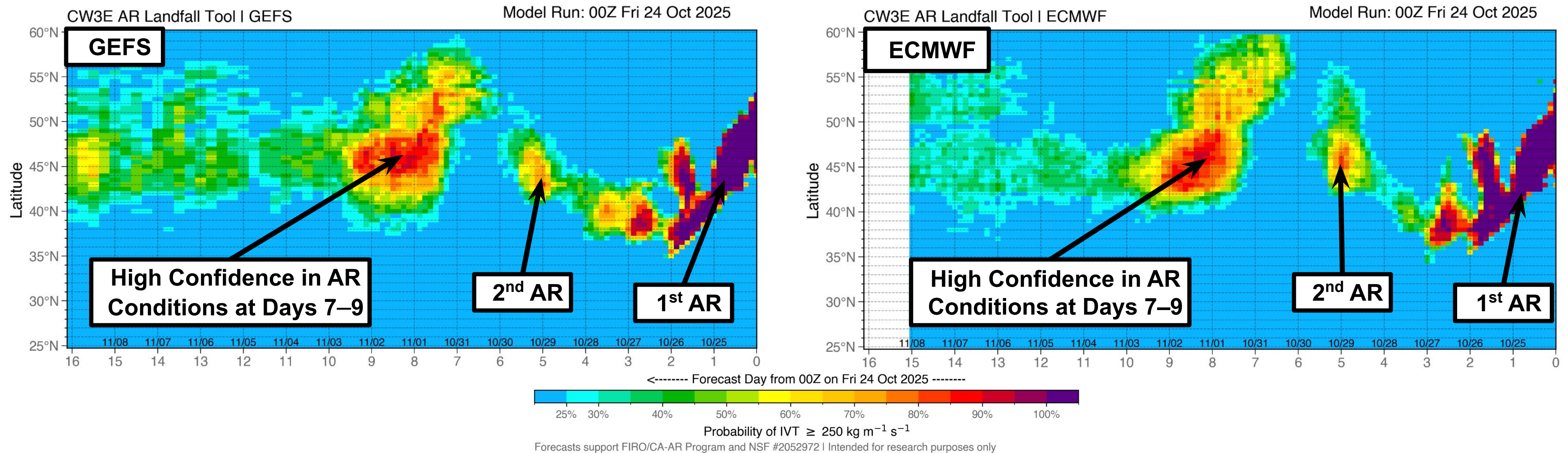
ECMWF and GFS IVT Forecast Comparison: Second AR



- Both the ECMWF and GFS are forecasting a second AR making landfall along the PNW coast late Tue 28 Oct into Wed 29 Oct, but there are differences in the forecast.
- The ECMWF is forecasting the associated low-pressure system to be stronger than the GFS and for the system to propagate faster toward the coast.

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GEFS vs. ECMWF Coastal AR Landfall Tool



- The 00Z GEFS and EPS are both showing very high confidence ($>90\%$ probability) in AR conditions ($\text{IVT} \geq 250 \text{ kg m}^{-1} \text{ s}^{-1}$) between Washington and northern California on 24–25 Oct in association with the first AR. Additionally, the GEFS and EPS are both showing high confidence in a continuation of AR conditions over Northern California with the mid-level shortwave.
- The GEFS and EPS also are showing moderate to high confidence ($>60\text{--}80\%$) in a second AR making landfall over the Pacific Northwest on 28–29 Oct. The EPS is showing higher confidence in AR conditions extending further north to $\sim 46^\circ \text{ N}$ as compared to the GEFS.
- Both ensembles are also indicating high confidence ($>75\%$ probability) in AR conditions over Washington and Oregon during 31 Oct - 1 Nov in association with a potentially significant AR event late next week.

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GEFS AR Scale and IVT Forecasts

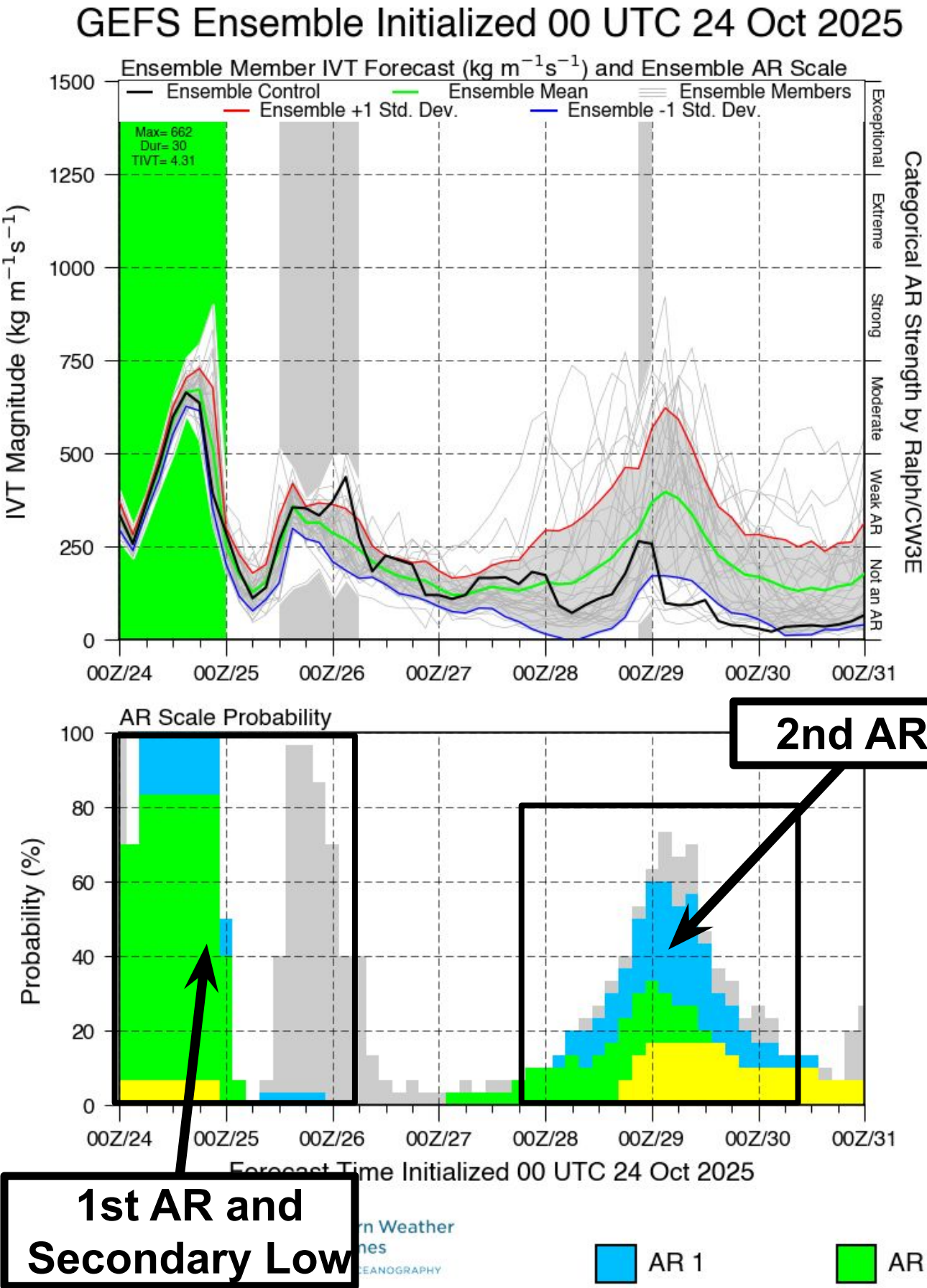
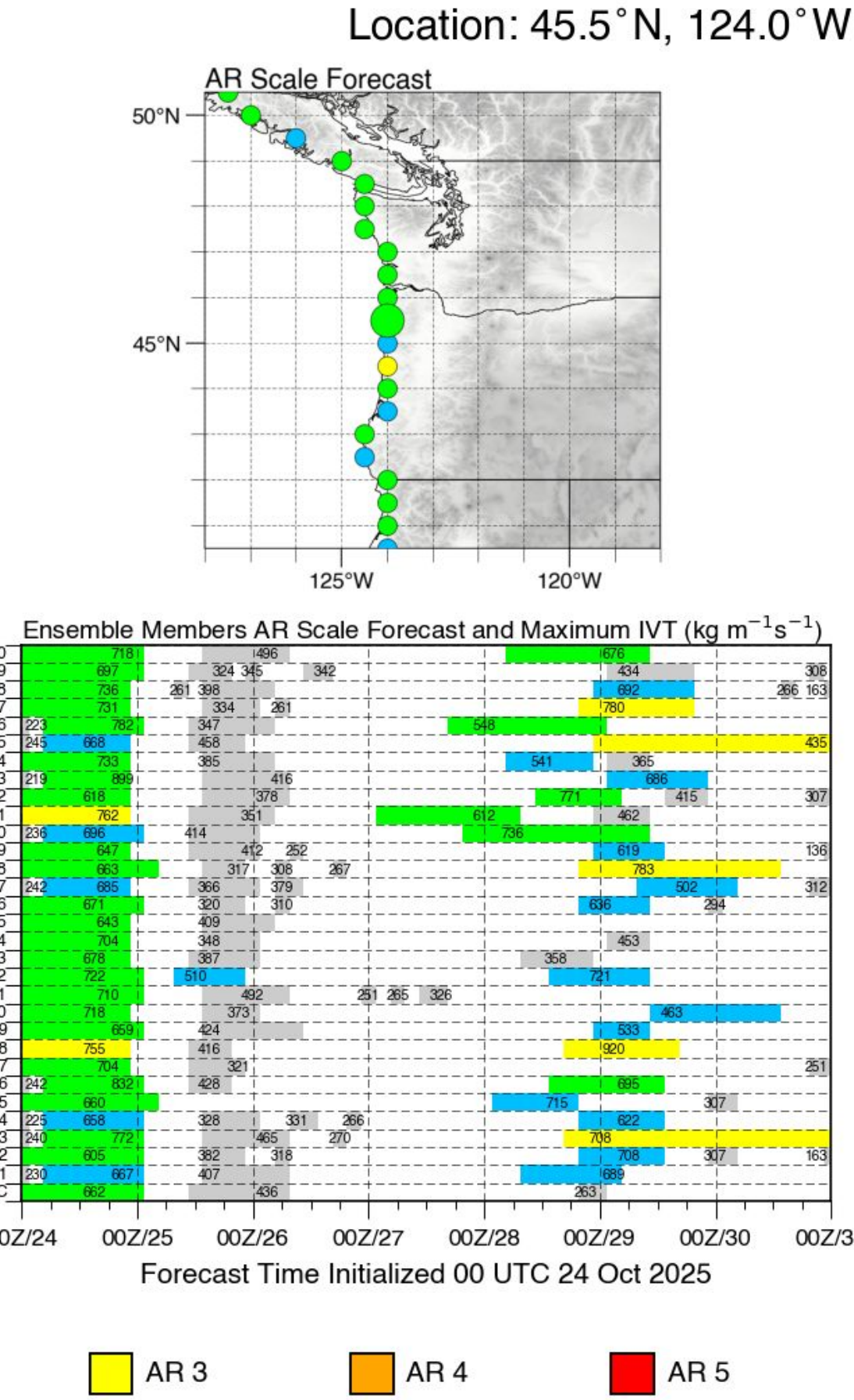


Image created 05 UTC 24 Oct 2025



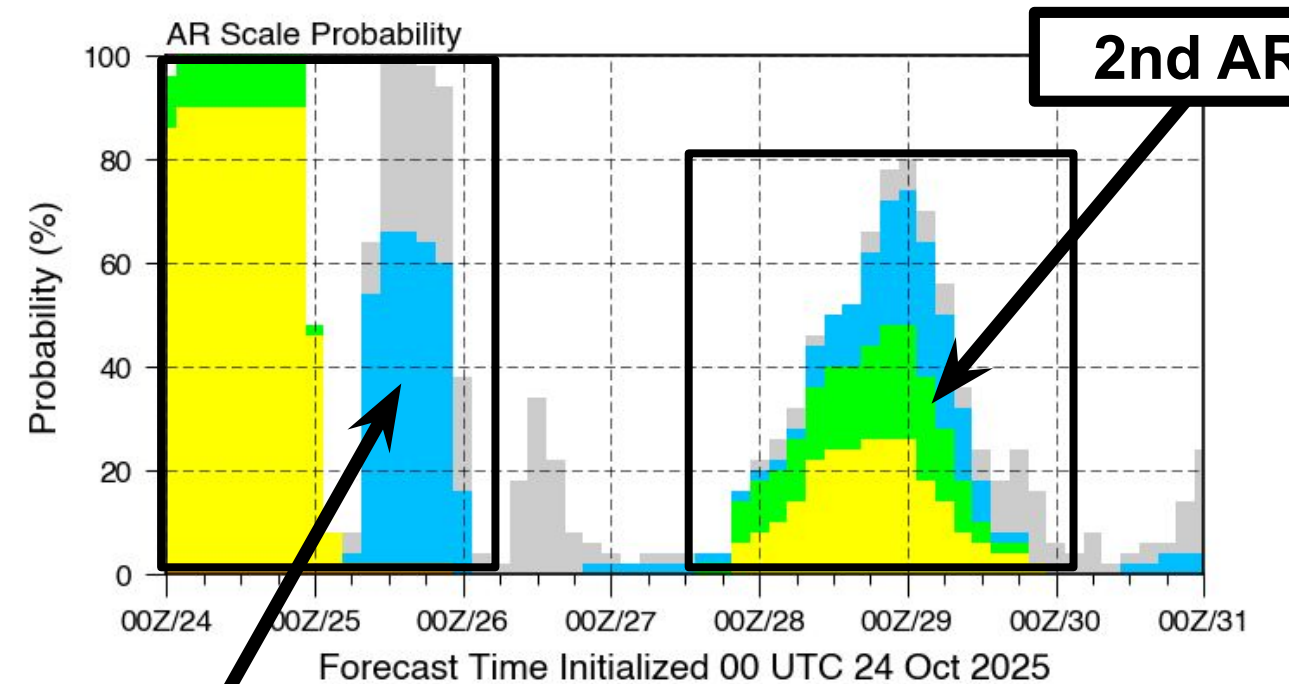
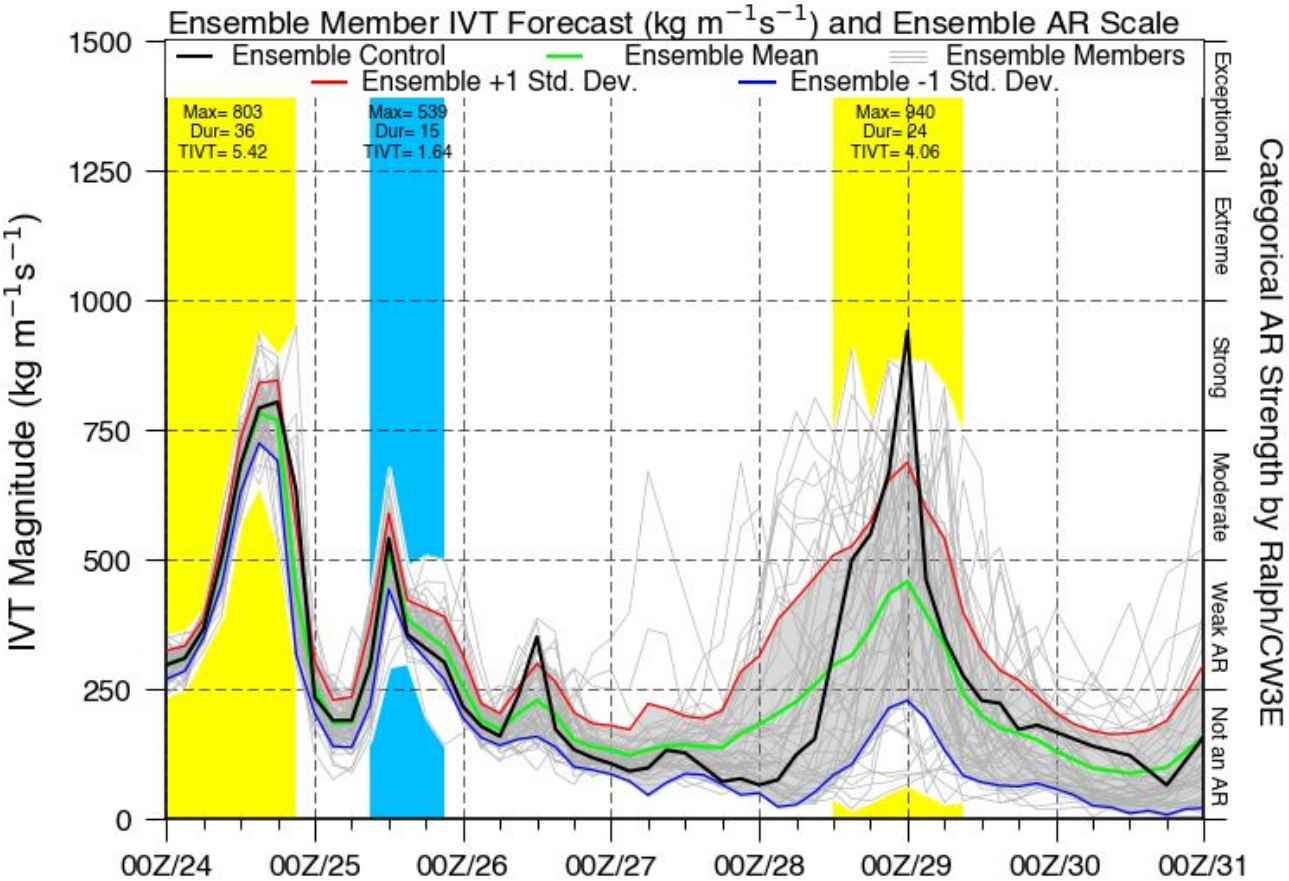
More information: <https://cw3e.ucsd.edu> AR Scale based on Ralph et al. (2019; BAMS)

- The GEFS control member is forecasting multiple moisture pulses making landfall for a point 45.5°N, 124°W (near Tillamook County, OR).
- ~80% of GEFS members are forecasting at least AR2 conditions for this coastal point through today Fri 24 Oct.
- A break in AR conditions is forecast prior to the secondary low bringing another moisture pulse to the region late Sat 25 Oct into early Sun 26 Oct. Most ensemble members are forecasting the duration of this pulse to be too short to reach AR1 conditions.
- ~60% of GEFS members are currently indicating AR conditions at this location on ~29 Oct with the second AR, but there is significant uncertainty in the timing and duration of AR conditions.

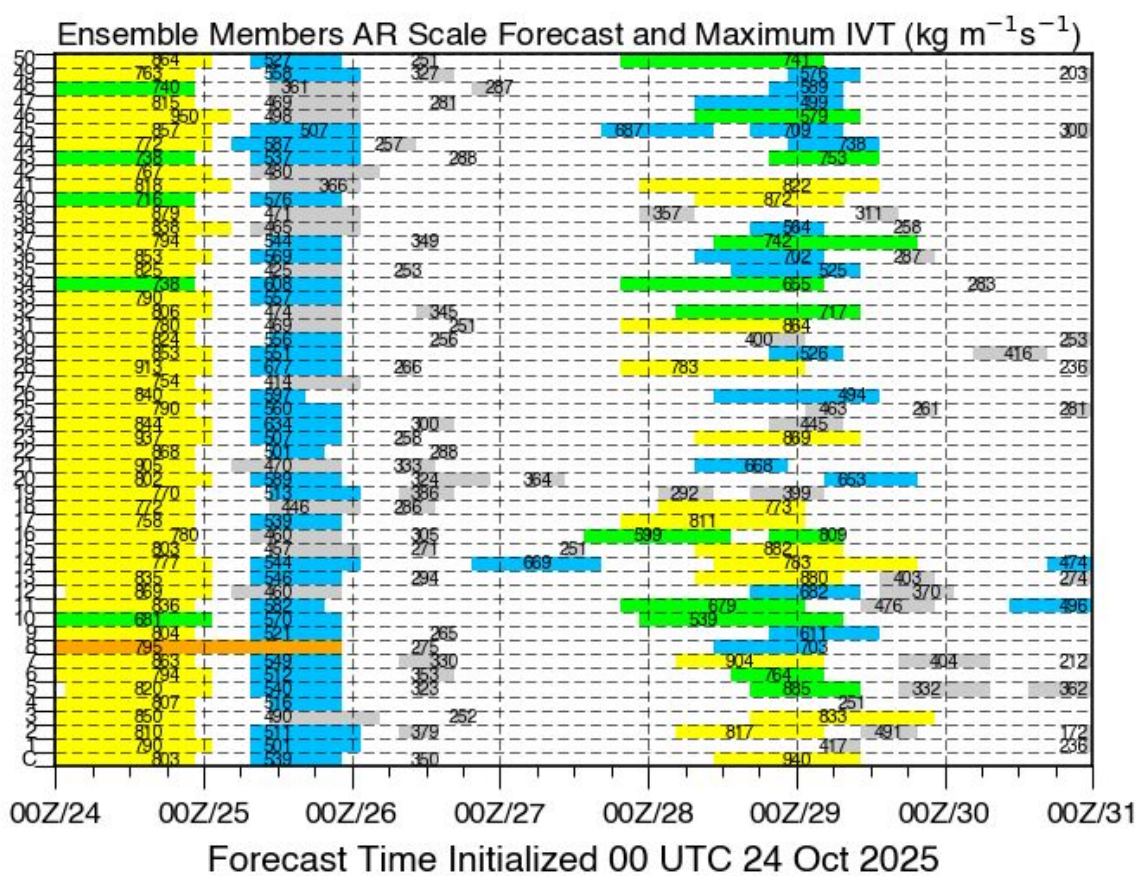
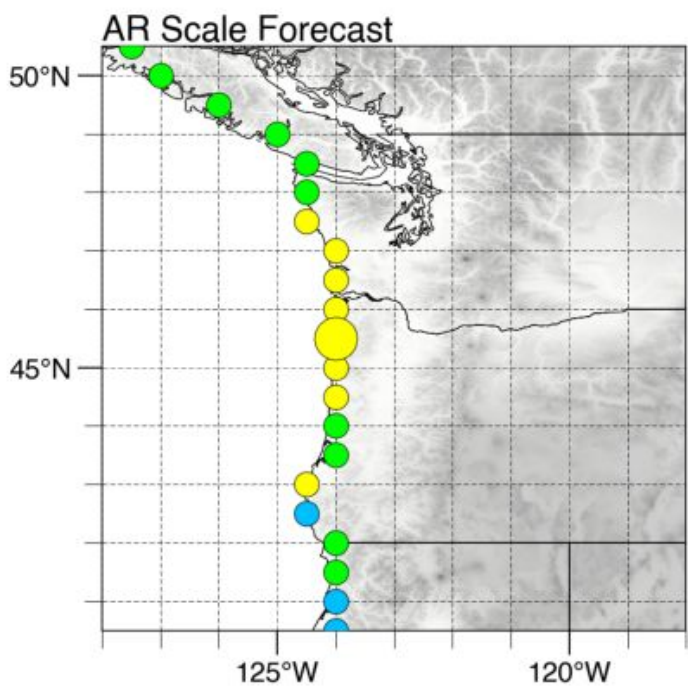
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EPS AR Scale and IVT Forecasts

ECMWF Ensemble Initialized 00 UTC 24 Oct 2025



Location: 45.5°N, 124.0°W



- The EPS control member is also forecasting multiple moisture pulses making landfall for a point 45.5°N, 124°W (near Tillamook County, OR).
- ~90% of GEFS members are forecasting at least AR3 conditions for this coastal point through today Fri 24 Oct.
- The EPS is forecasting higher IVT into Northern Oregon with the secondary low as ~60% of EPS members are forecasting AR1 conditions on Sat 25 Oct.
- EPS members also feature significant uncertainty in the timing and duration of AR conditions with the second AR around ~29 Oct but a higher percentage of members (~70%) are indicating AR conditions than the GEFS (~60%).

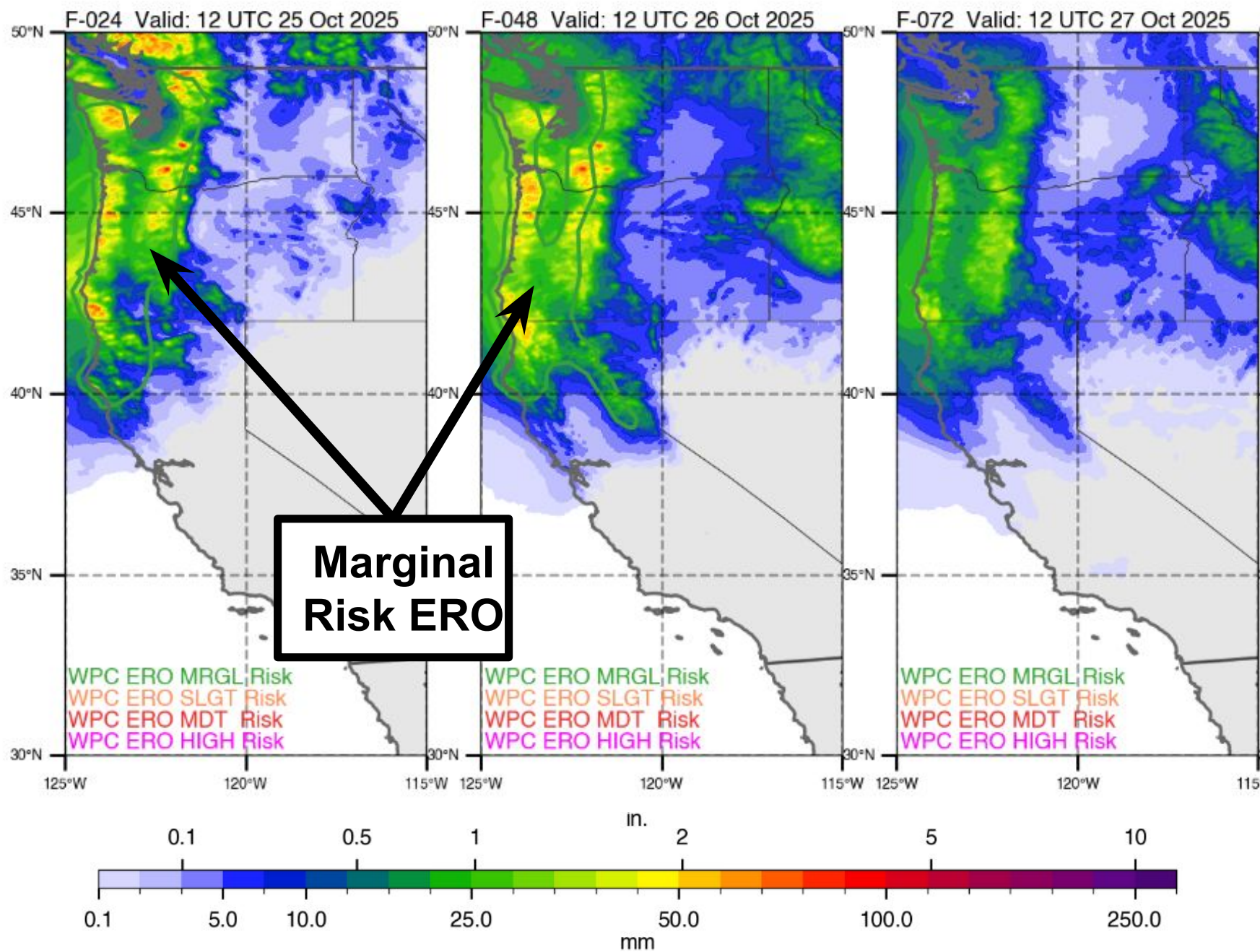
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More information: <https://cw3e.ucsd.edu> AR Scale based on Ralph et al. (2019; BAMS)

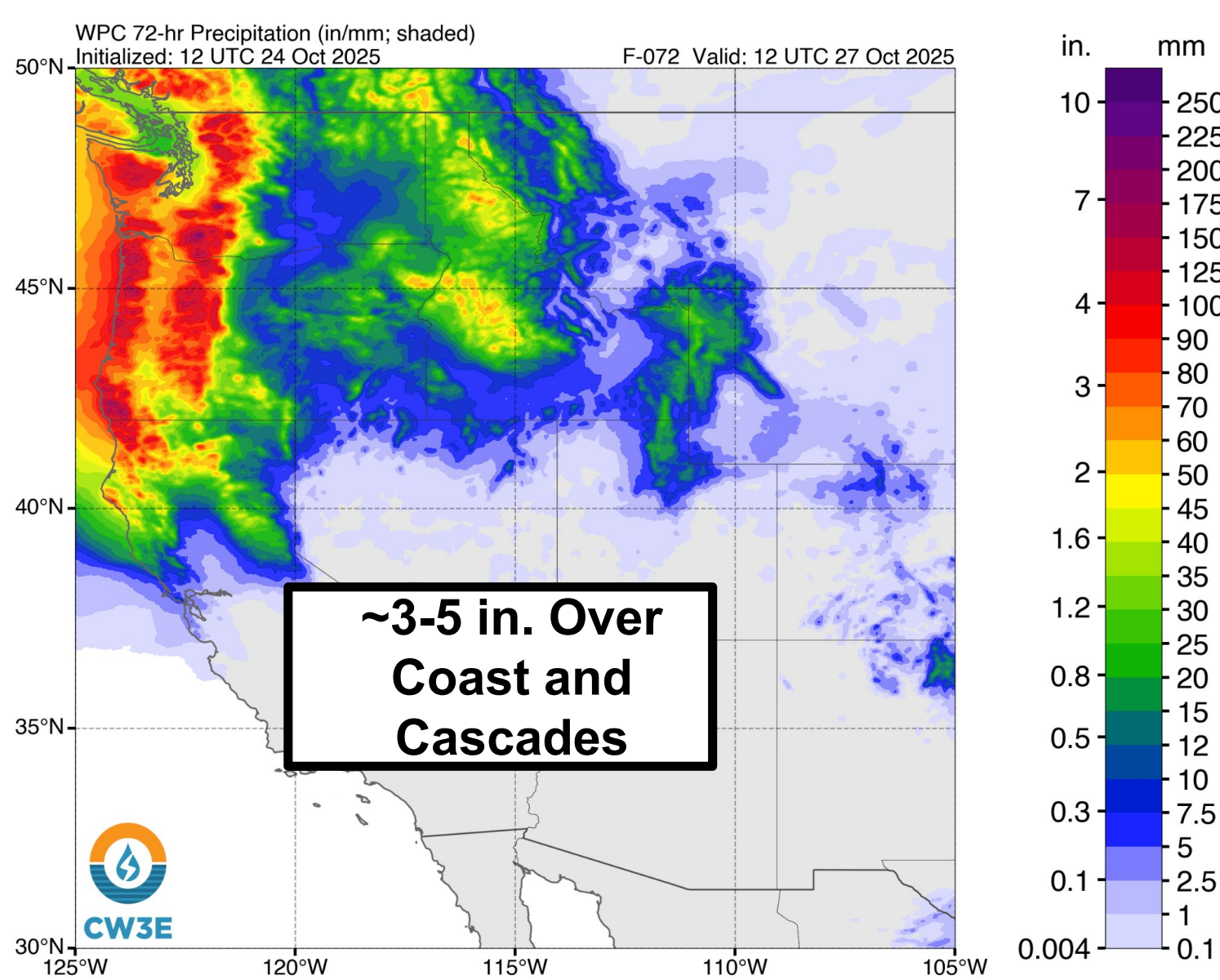
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WPC Precipitation Forecast: First AR and Shortwave

WPC Days 1–3 24-h QPF
Valid: 5 AM PT 25–27 Oct



WPC 72-h Total QPF
Valid: 5 AM PT 27 Oct

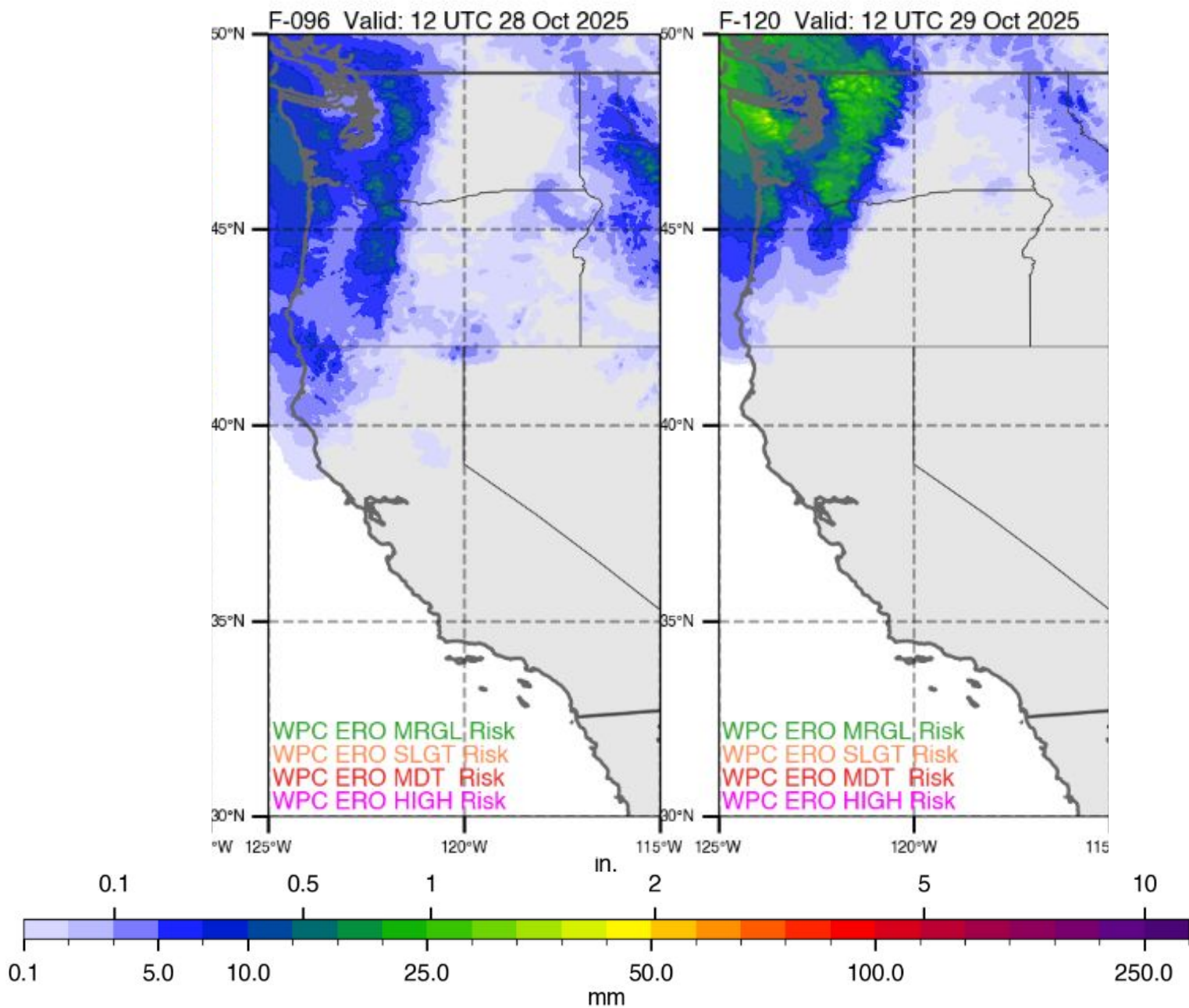


- The Weather Prediction Center (WPC) is forecasting the first AR and shortwave to bring 3-5 inches of total precipitation to coastal Washington, Oregon, and far Northern California and the Cascades.
- The WPC issued **marginal risk** (level 1 of 4; $\geq 5\%$ probability of flooding) excessive rainfall outlooks (ERO) for the western Washington and Oregon, northwestern California, and the Northern Sierra foothills for 5 AM PT Fri 24 Oct through Sun 26 Oct.

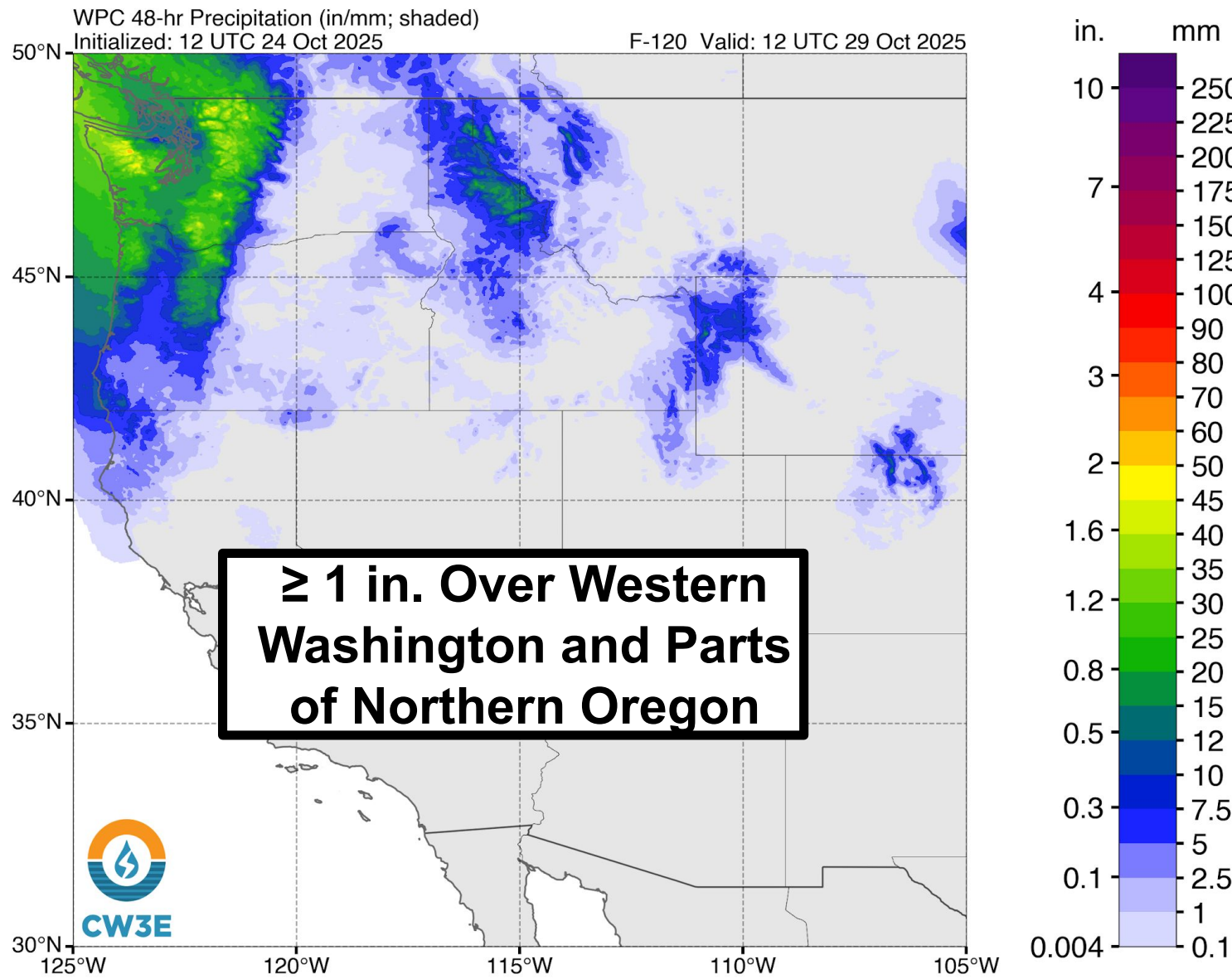
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WPC Precipitation Forecast: Second AR

WPC Days 4–5 24-h QPF
Valid: 5 AM PT 28–29 Oct

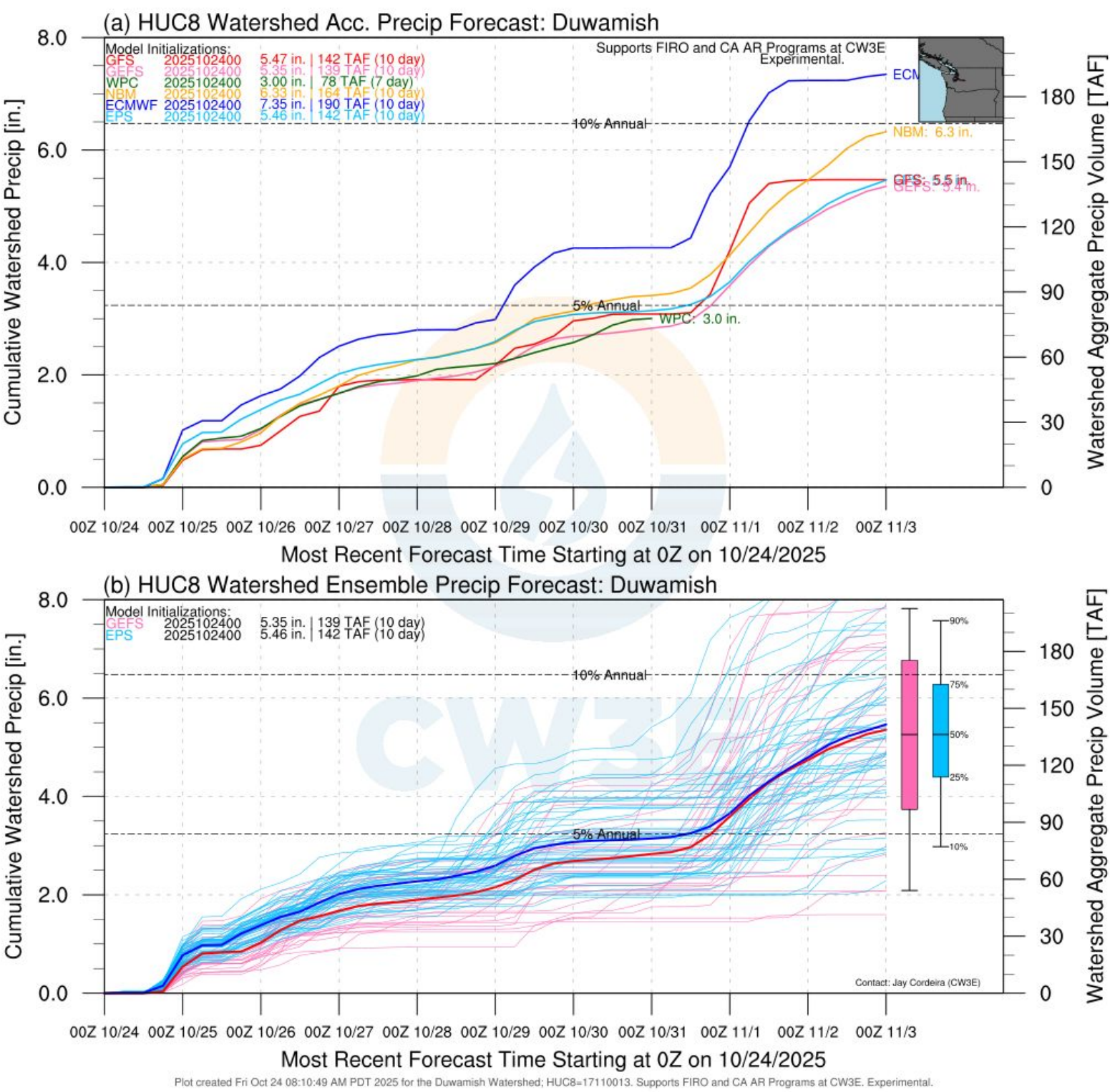
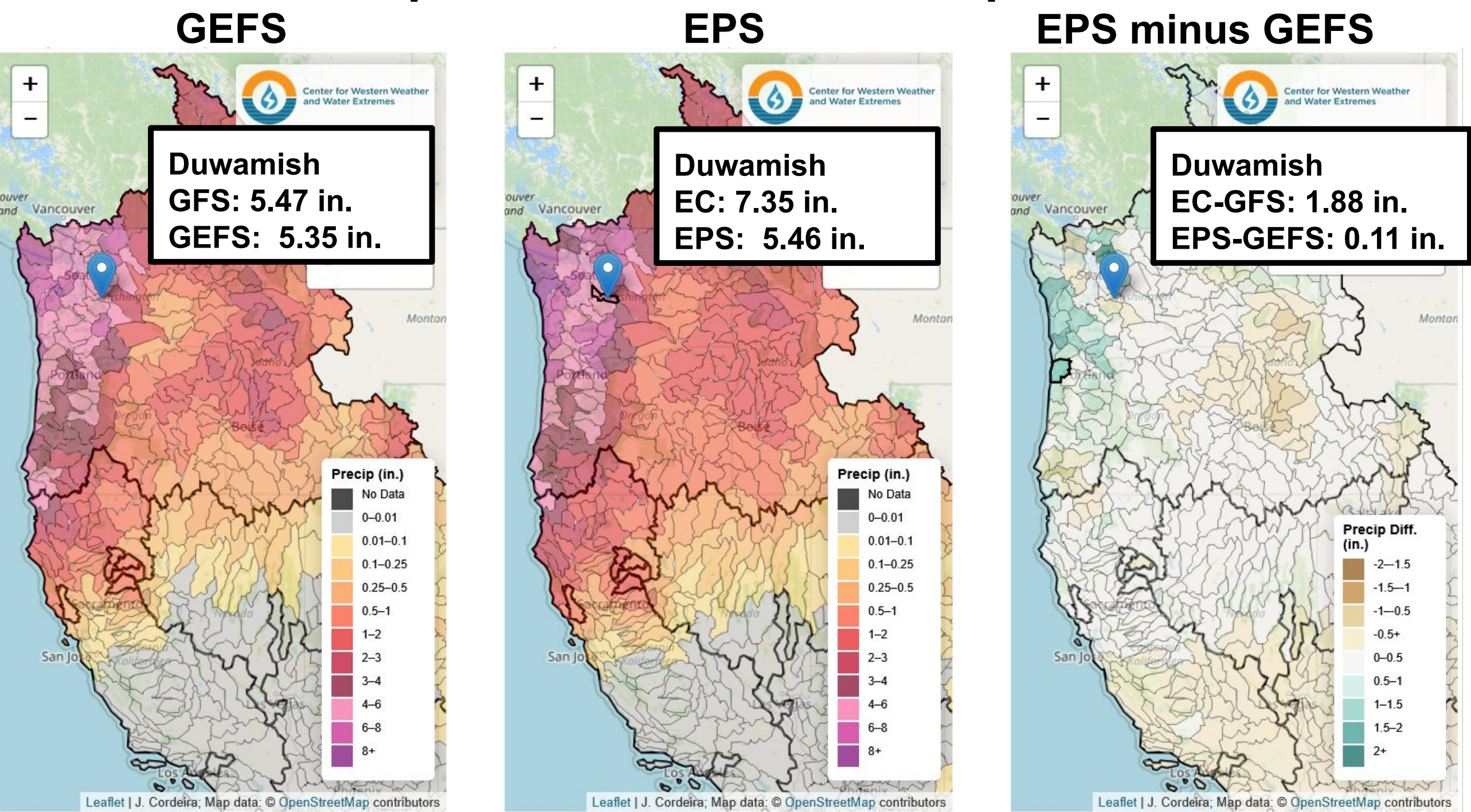


WPC 48-h Total QPF
Valid: 5 AM PT 29 Oct



- Precipitation is forecast to fall mostly over the Pacific Northwest with the second AR, with the WPC forecasting the highest precipitation totals (1–2 in.) over Washington and portions of Northern Oregon.

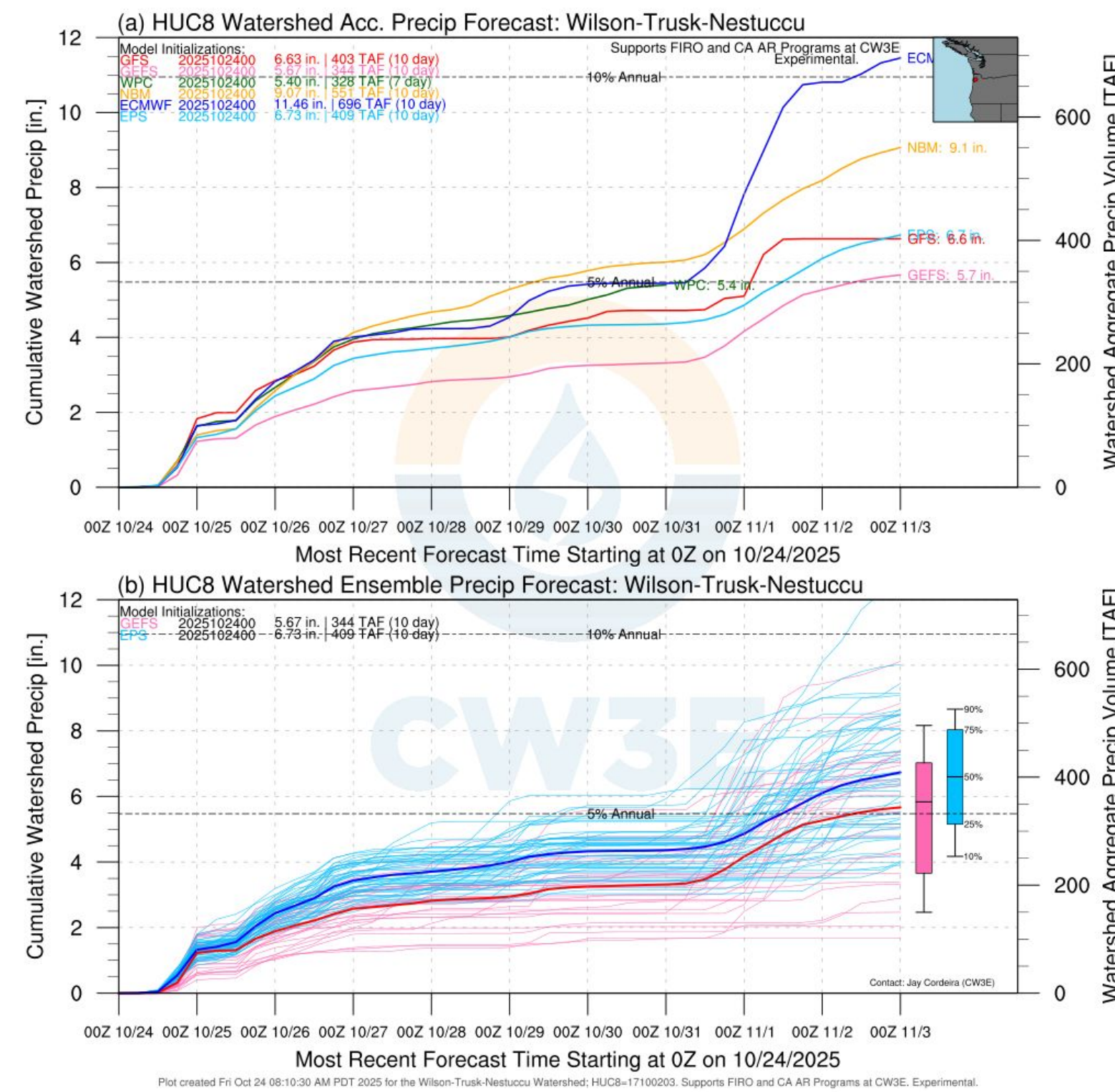
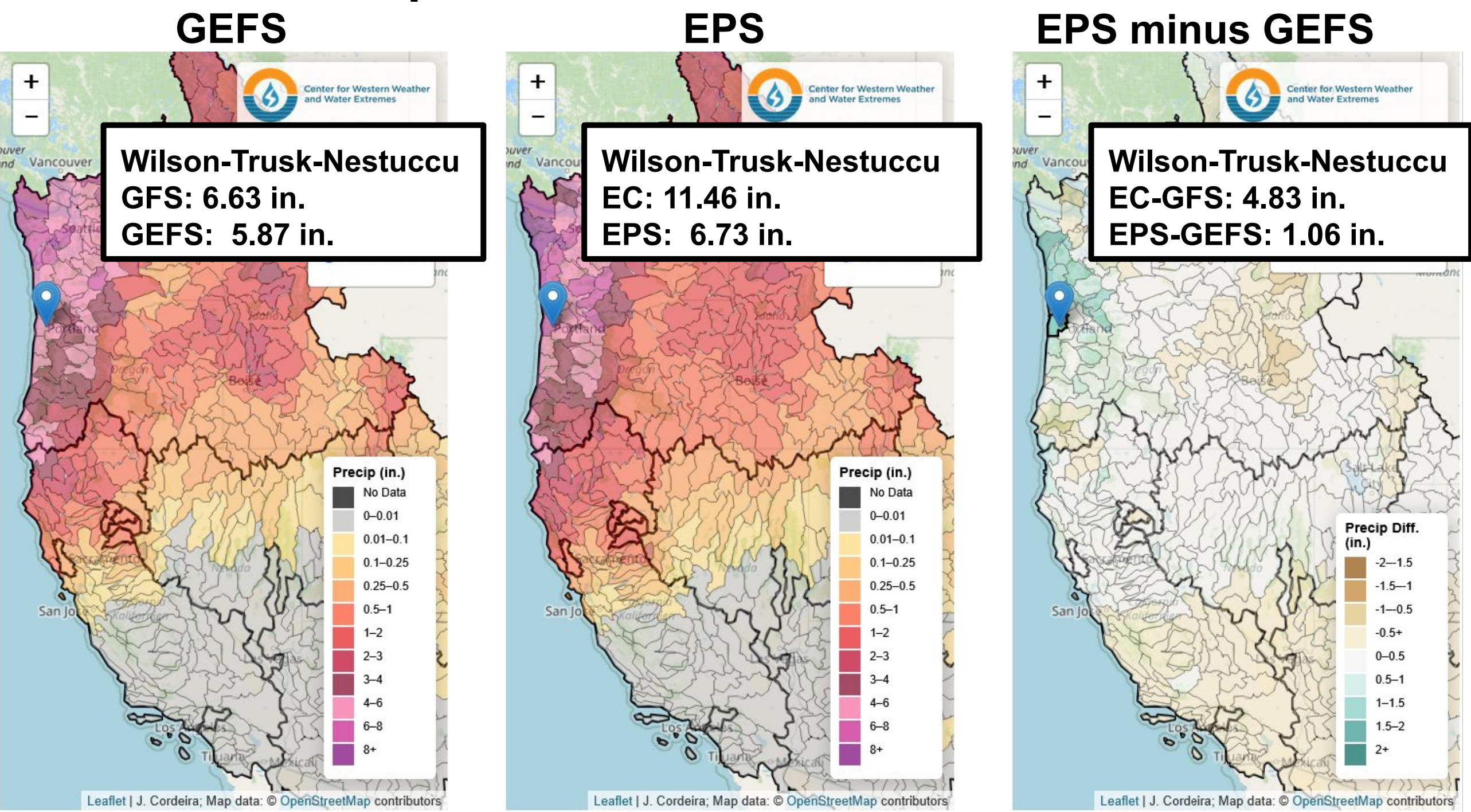
Watershed Precipitation Forecasts: Snoqualmie



- >75% of EPS and GEFS members are forecasting 10-day precipitation totals exceeding 5% normal annual precipitation (~3.3 in.) and ~25% of GEFS members and ~20% of EPS member forecasts exceed 10% normal annual precipitation (~6.5 in.)
- Both ensembles are showing high spread in the 10-day precipitation totals over the Duwamish with both ensembles having members forecasting totals <3 inches and > 6 inches for the period.

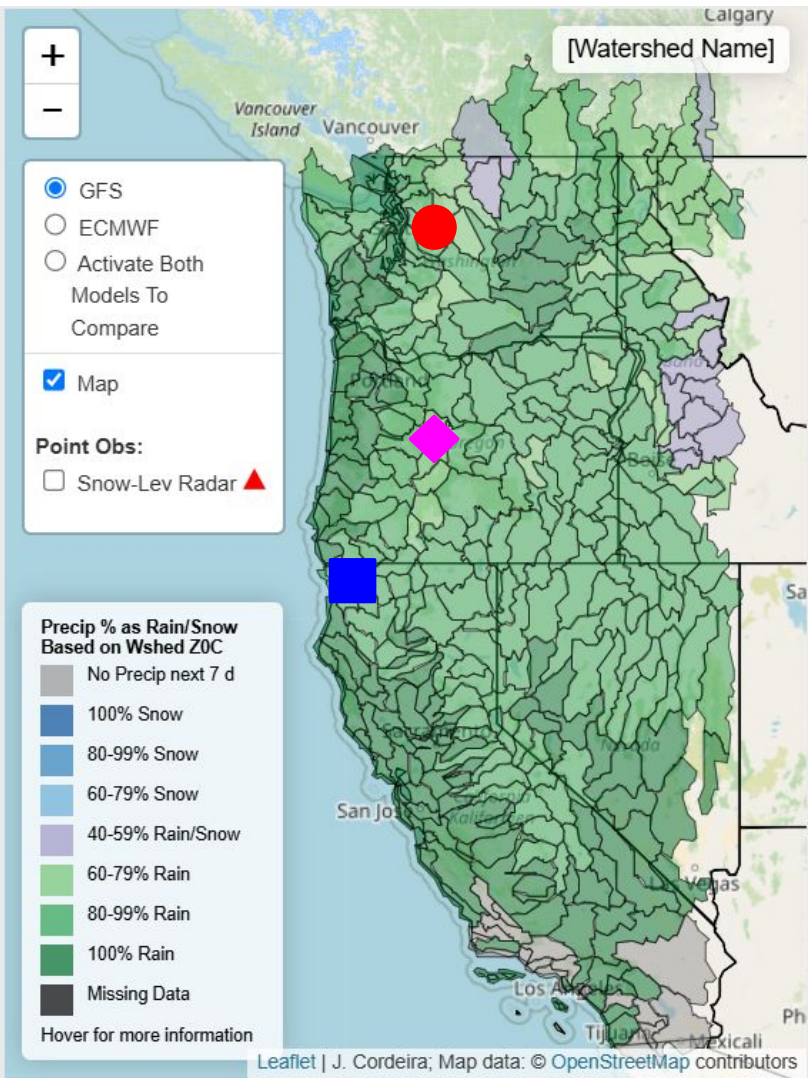
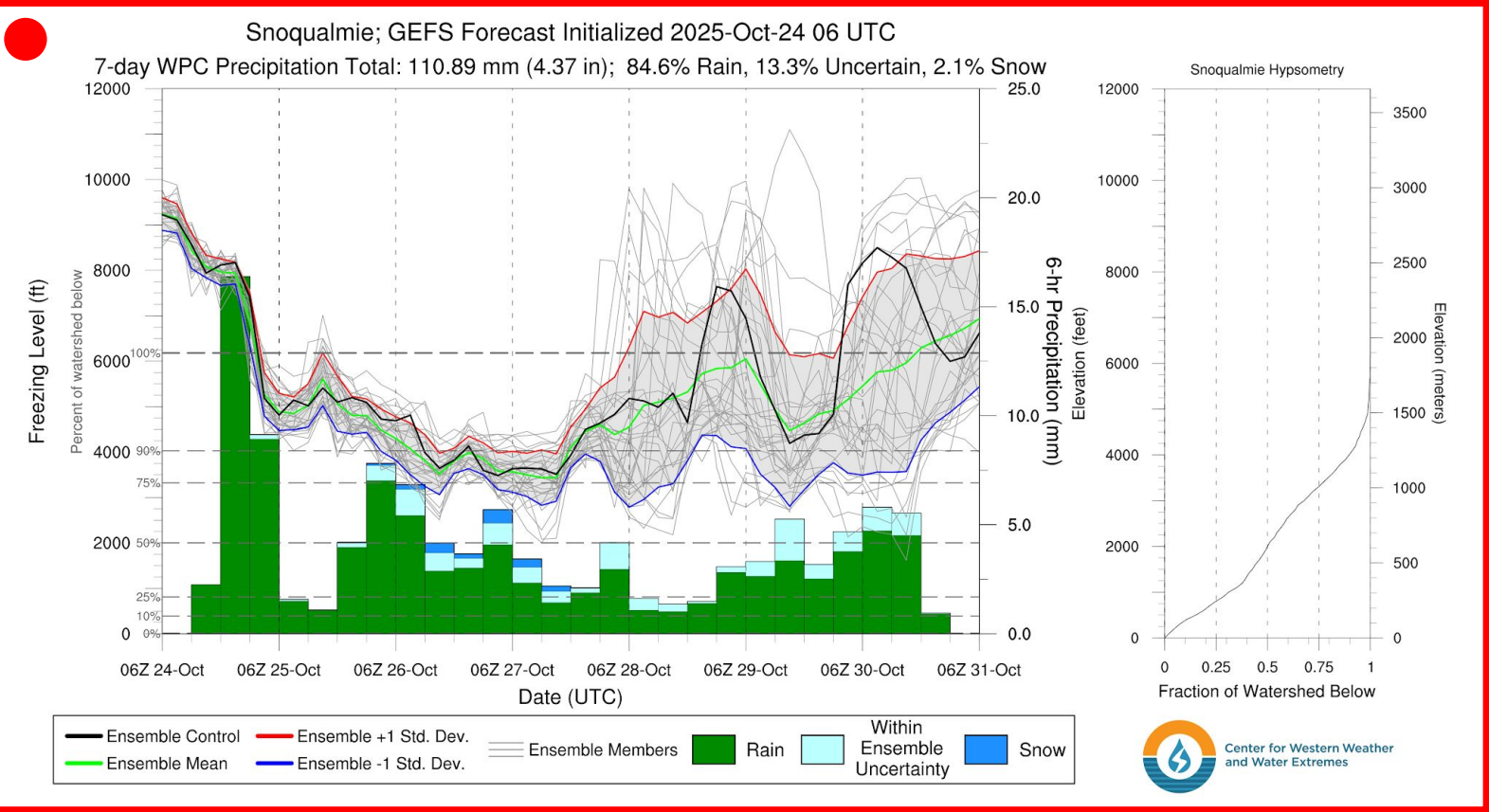
AR Outlook: 22 October 2025

Watershed Precipitation Forecasts: Wilson-Trusk-Nestuccu



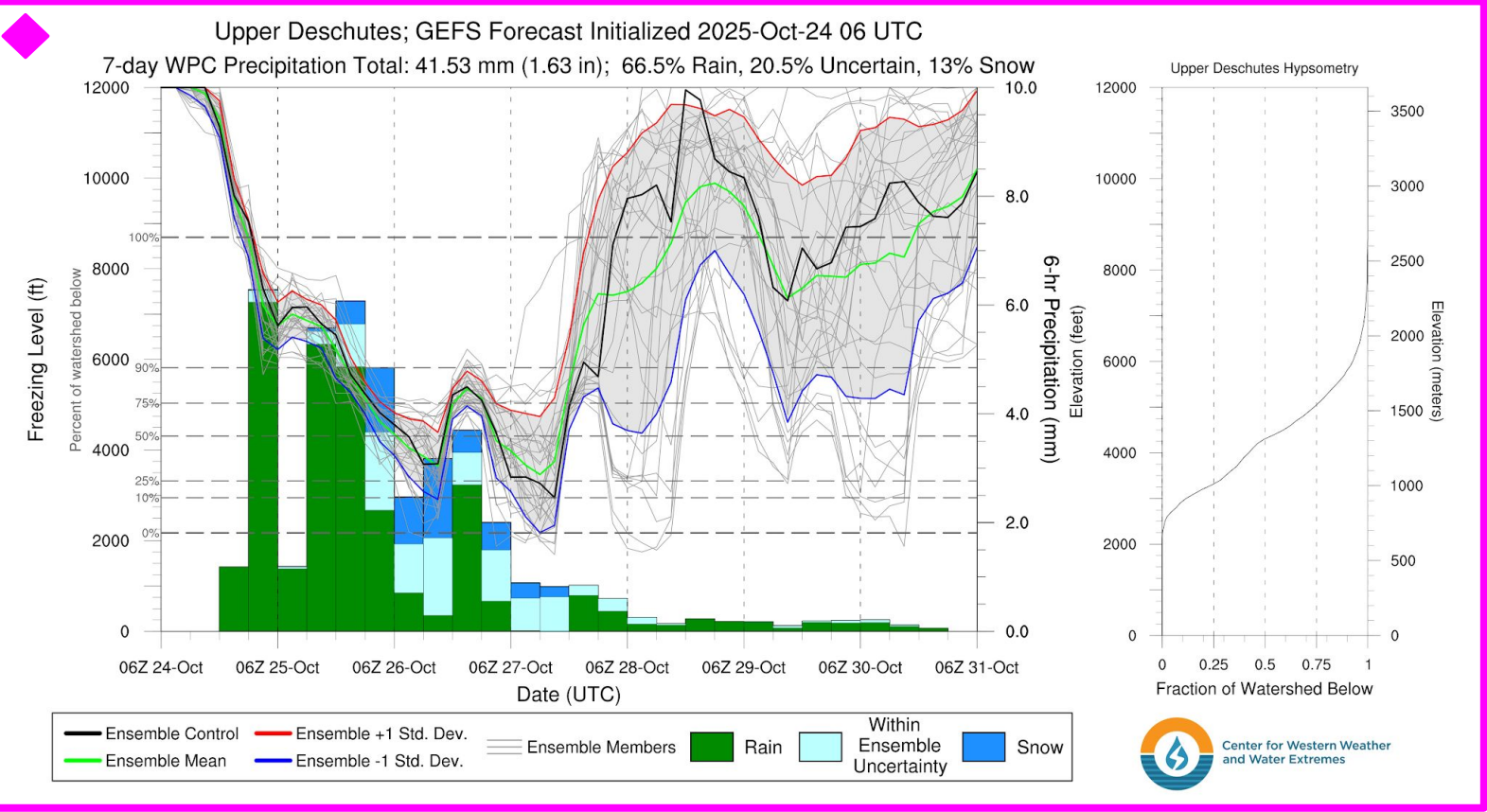
- The 00Z EPS is forecasting greater precipitation totals over coastal Washington and Northern Oregon in the next seven days compared to GEFS in association with the stronger IVT forecast with the secondary low and the second AR.
- Both the GEFS and EPS ensemble mean 10-day precipitation totals are forecast to exceed 5% normal annual precipitation (5.5 in.) over the Wilson-Trusk-Netsuccu watershed in coastal Northern Oregon.
- The GEFS and EPS members show significant spread in 10-day precipitation totals (2 to 10+ inches of precipitation).

Watershed Freezing Level Forecast Comparison Snoqualmie

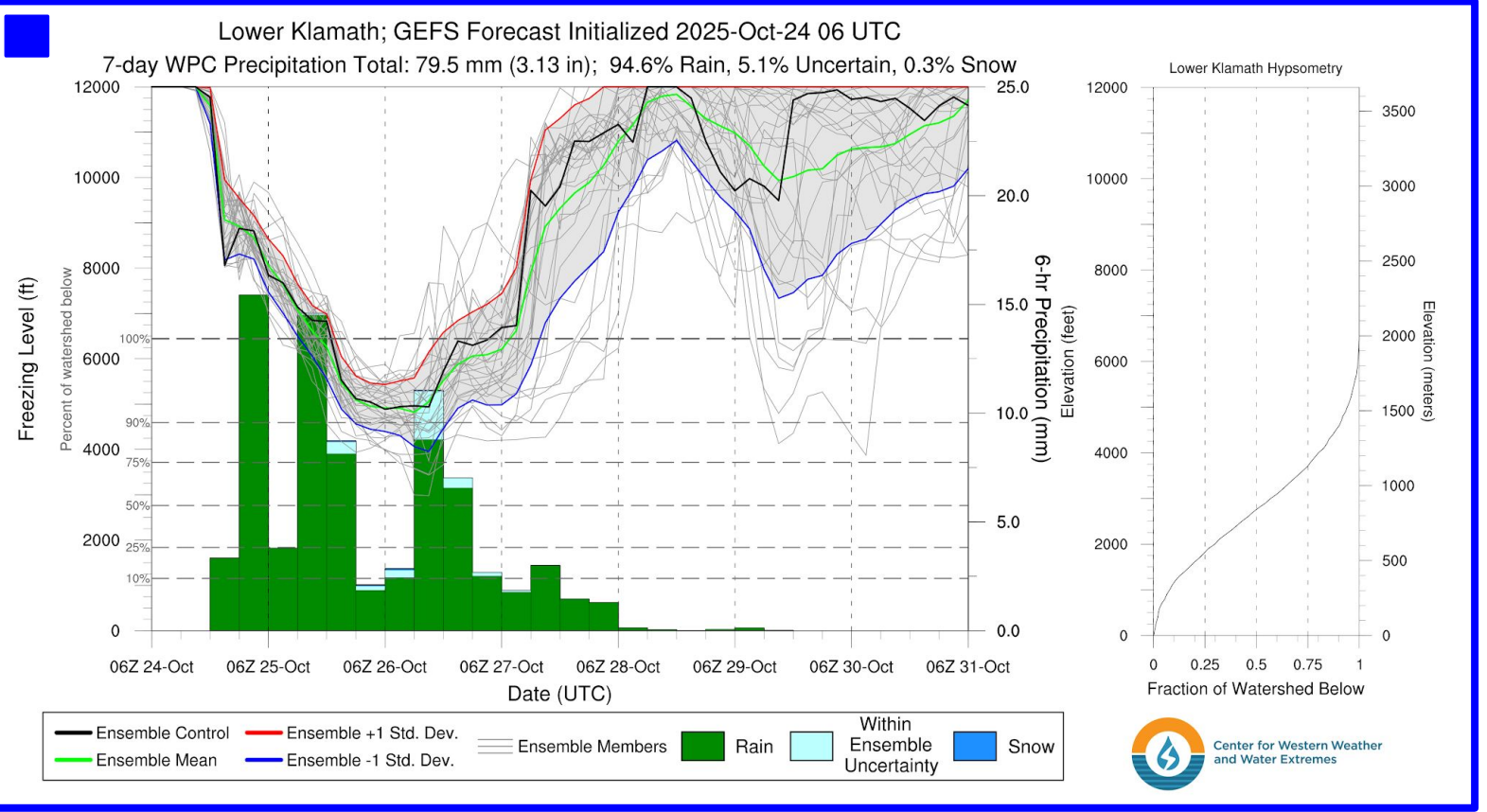


- Freezing levels over the Pacific Northwest are initially forecast to be above 8,000 feet, but will fall as this system moves through the region
- In the Cascades, freezing levels are forecast to fall below 4,000 feet on Sun 26 Oct, leading to the chance for significant snowfall at high elevations
- Higher freezing levels are forecast for watersheds in Northern California, where precipitation is expected to fall primarily as rain.

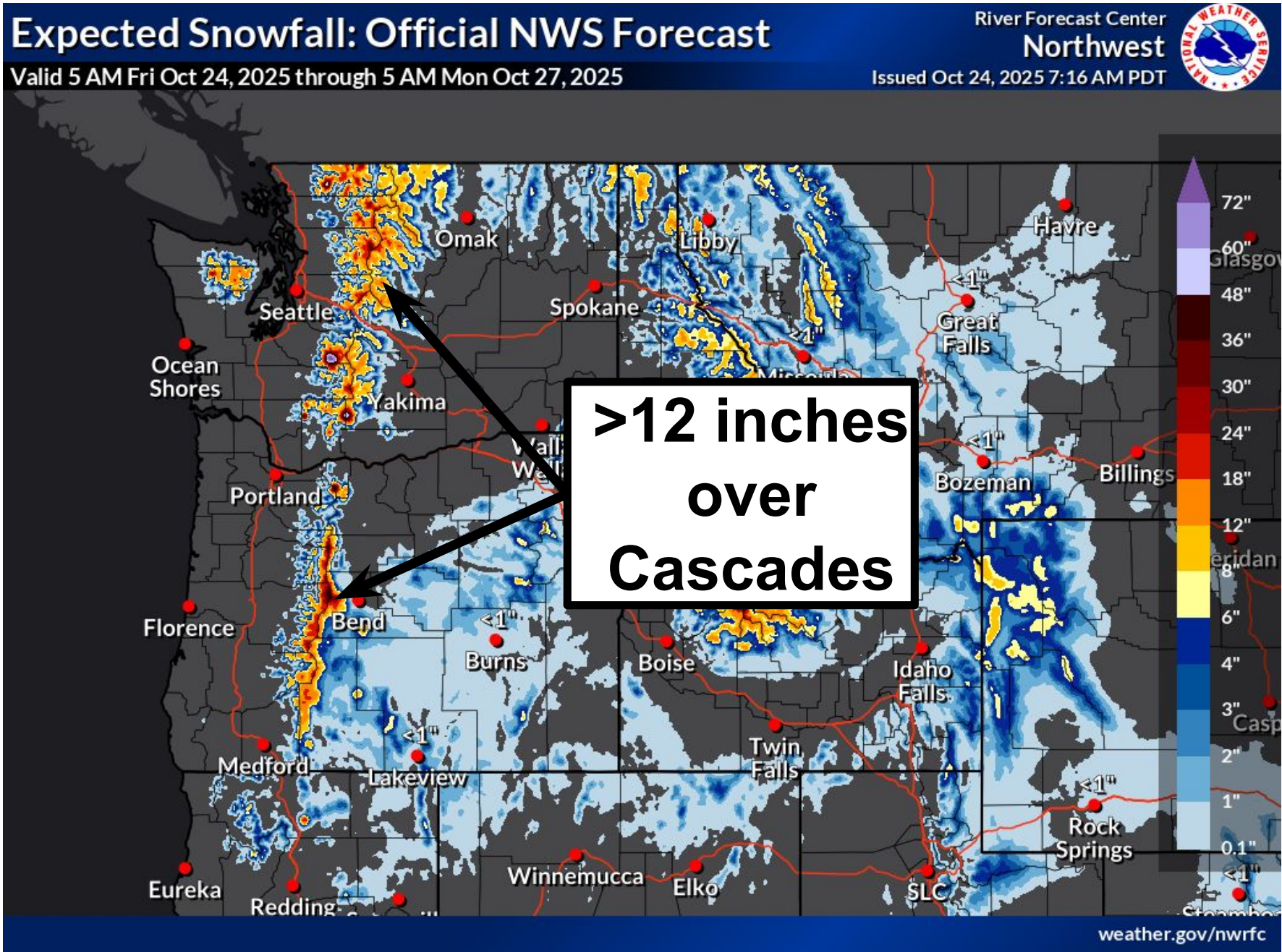
Upper Deschutes



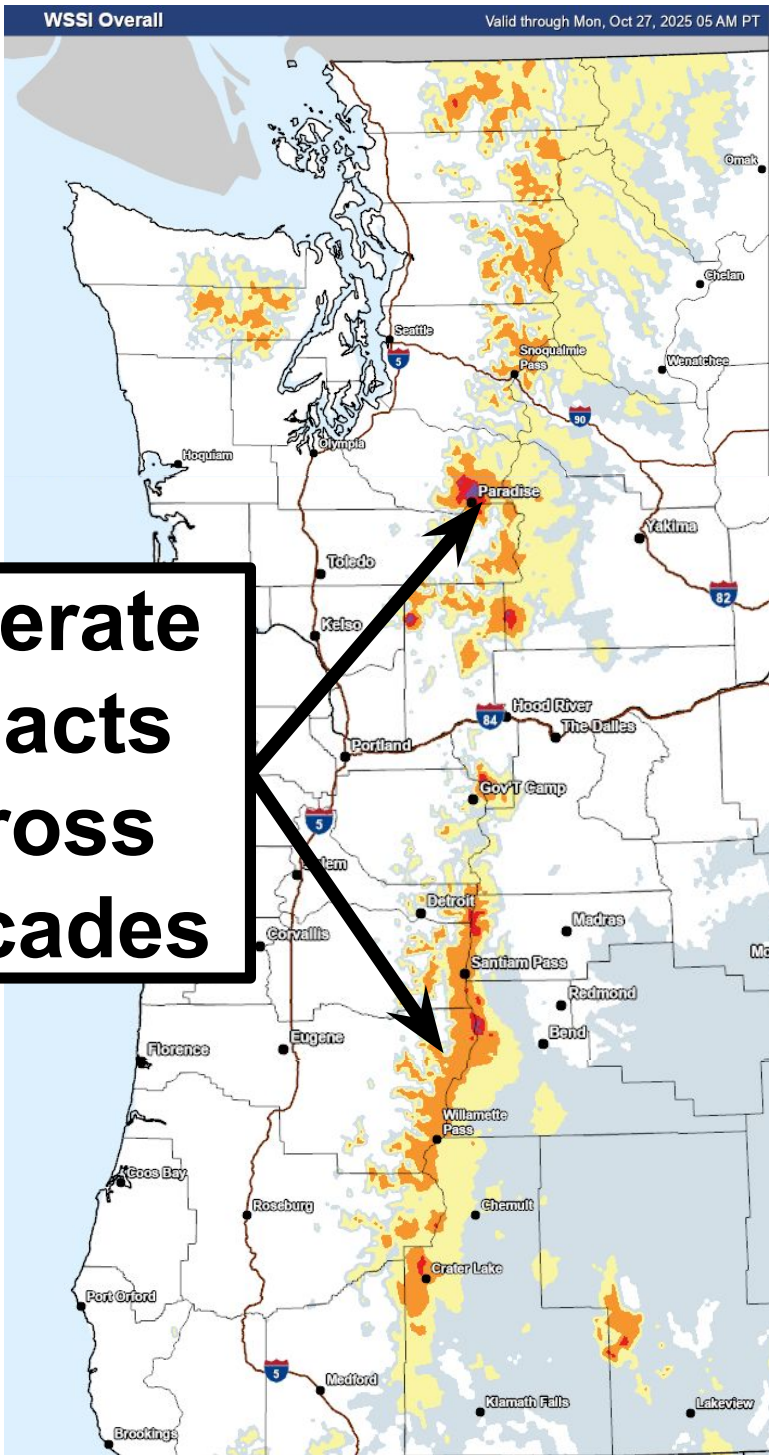
Lower Klamath



NWS Snowfall Forecast and Winter Storm Severity Index



Moderate Impacts Across Cascades



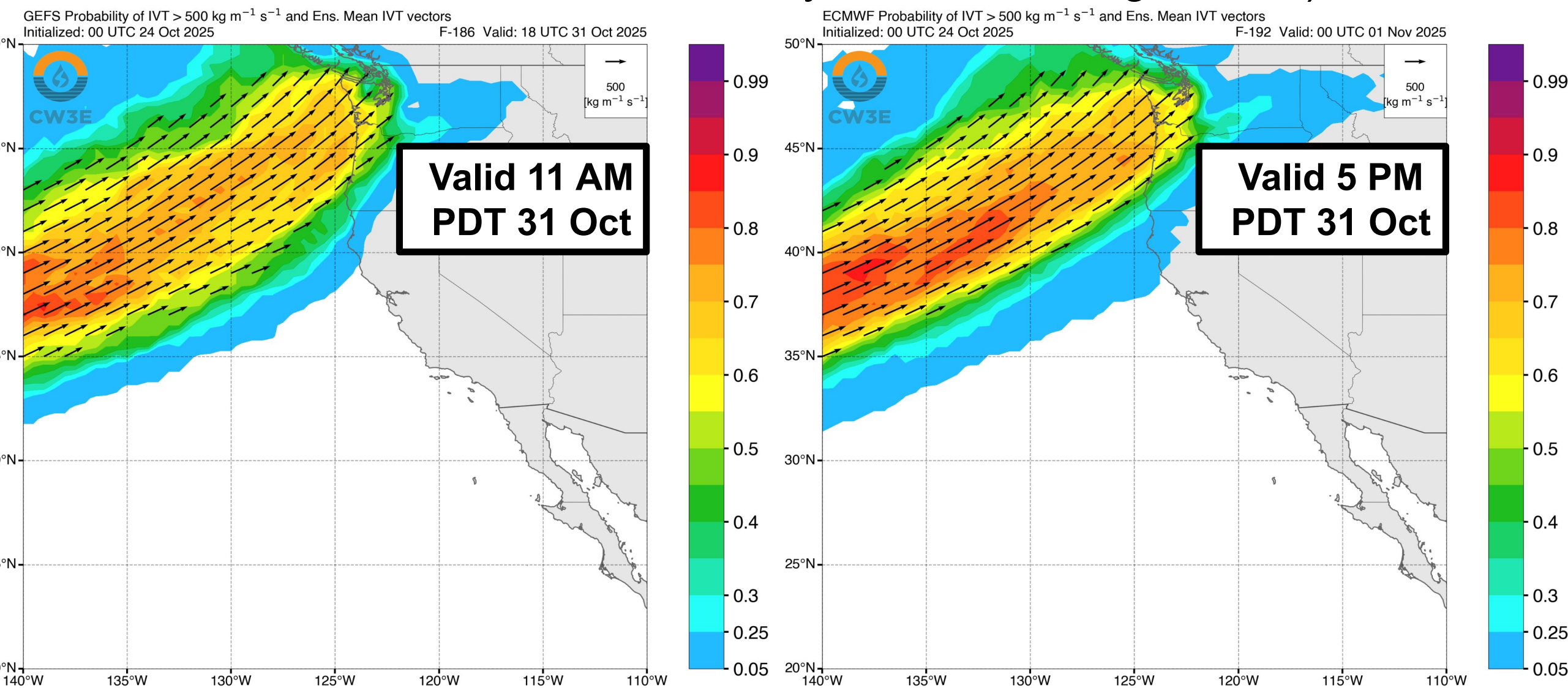
Potential Winter Storm Impacts	
	Winter Weather Area Expect Winter Weather. • Winter driving conditions. Drive carefully.
	Minor Impacts Expect a few inconveniences to daily life. • Winter driving conditions. Use caution while driving.
	Moderate Impacts Expect disruptions to daily life. • Hazardous driving conditions. Use extra caution while driving. • Closures and disruptions to infrastructure may occur.
	Major Impacts Expect considerable disruptions to daily life. • Dangerous or impossible driving conditions. Avoid travel if possible. • Widespread closures and disruptions to infrastructure may occur.
	Extreme Impacts Expect substantial disruptions to daily life. • Extremely dangerous or impossible driving conditions. Travel is not advised. • Extensive and widespread closures and disruptions to infrastructure may occur. • Life-saving actions may be needed.

- The National Weather Service is indicating the potential for snowfall over the Cascades associated with the first AR and the shortwave to follow
- 72-hour snowfall forecasts for 5 AM PT Fri 24 Oct through 5 AM PT Mon 27 Oct show widespread totals ≥ 12 inches across the Cascades, with the highest peaks having the potential to receive ≥ 36 inches.
- The Winter Storm Severity Index (WSSI) is showing Moderate Impacts across the Cascades through 5 AM PT Mon 27 Oct.

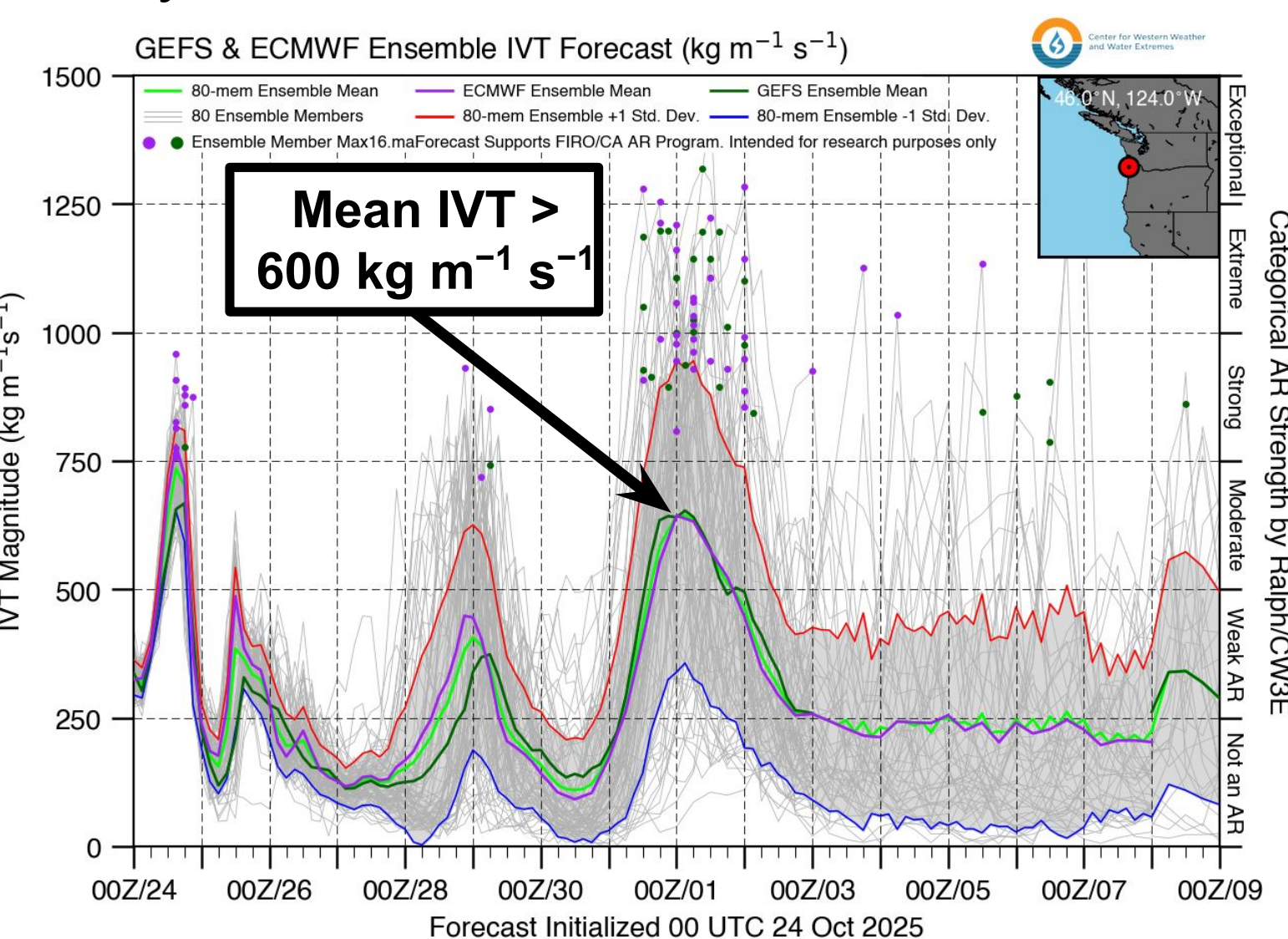
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Potential for Strong AR in Pacific Northwest Late Next Week

GEFS vs ECMWF Probability of $IVT > 500 \text{ kg m}^{-1} \text{ s}^{-1}$

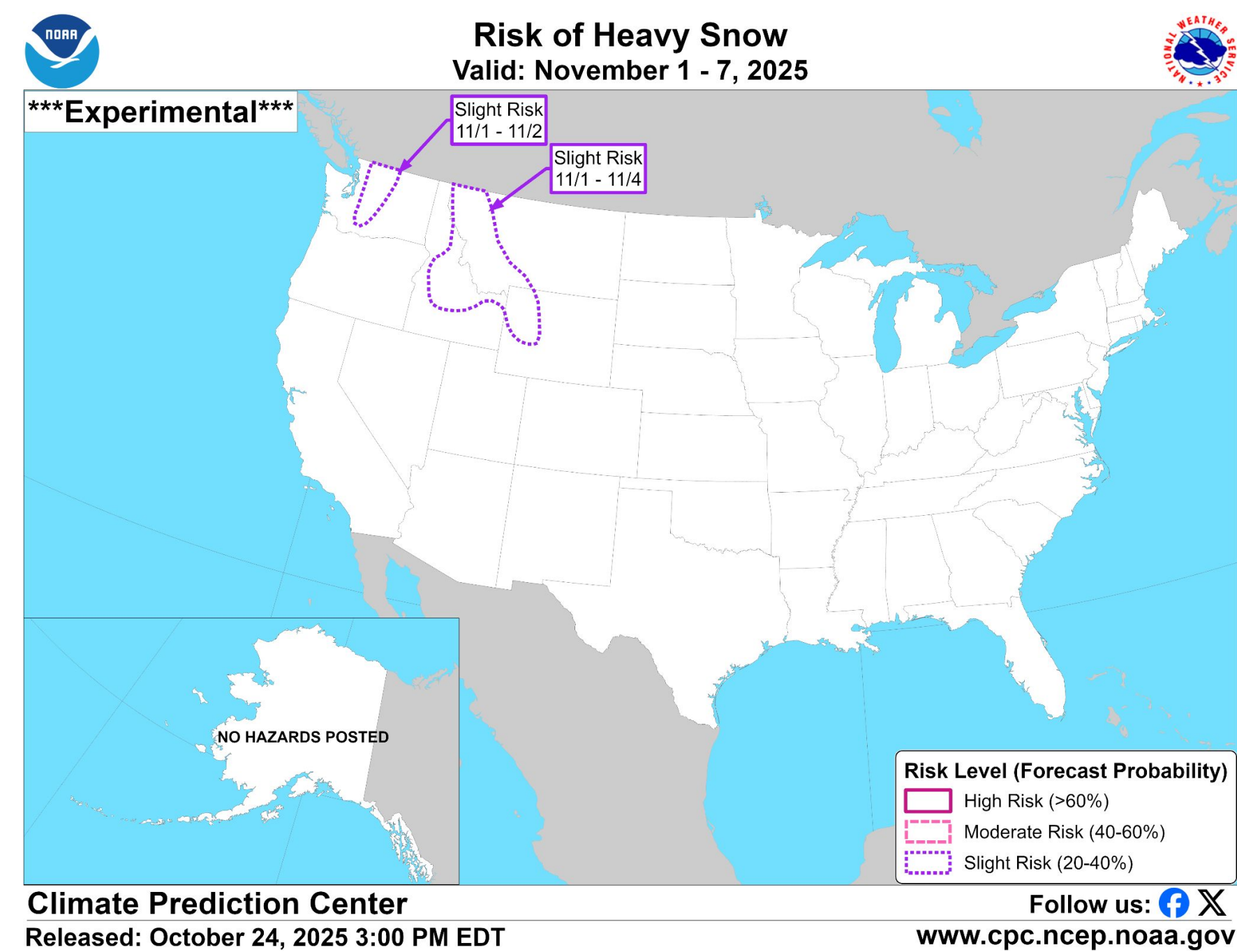
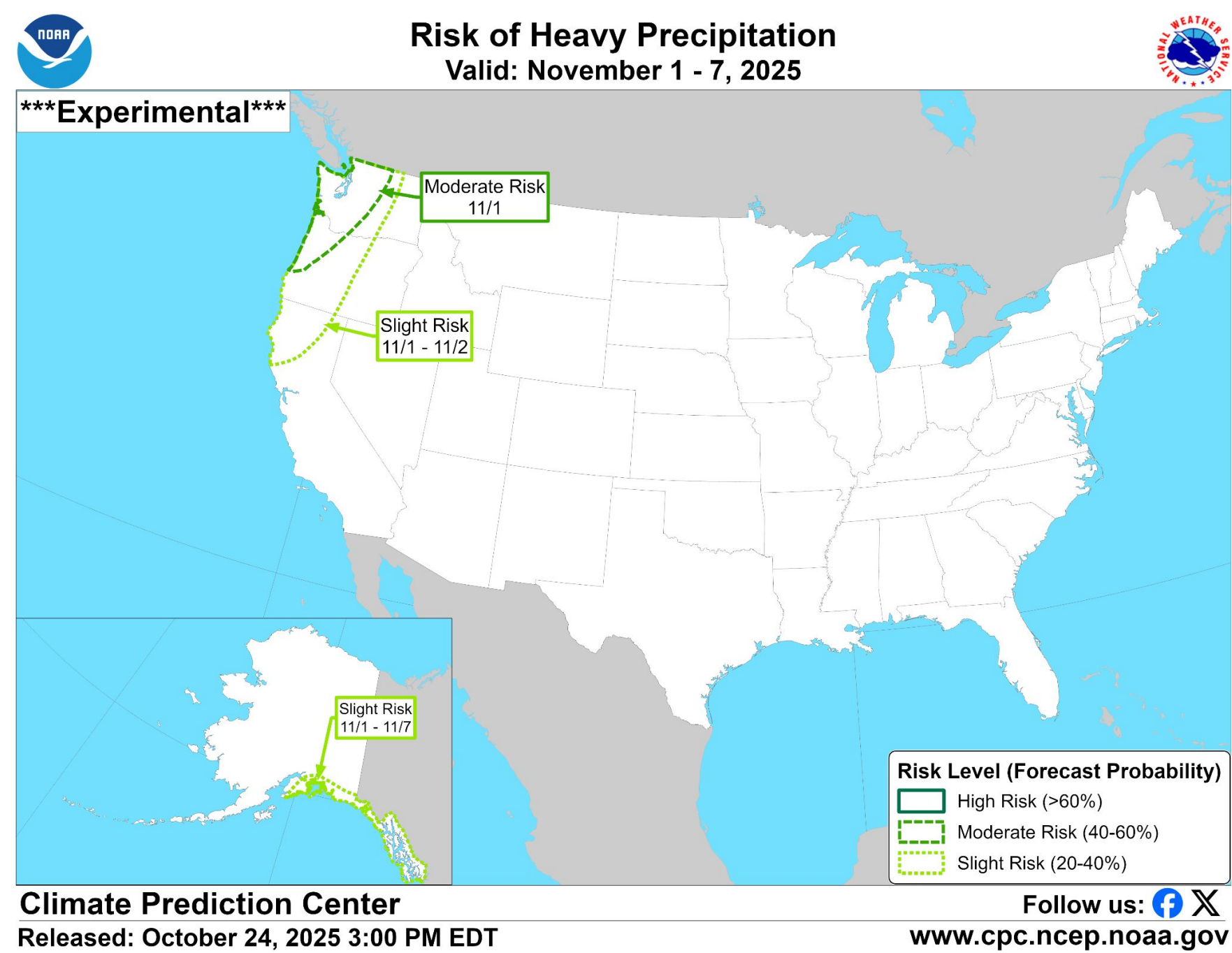


10-day GEFS & ECMWF IVT Forecast Plumes



- The GEFS and ECMWF ensembles are in good agreement regarding the potential for a significant AR event in the Pacific Northwest late next week.
- Both ensembles are showing a 50–70% likelihood of moderate AR conditions ($IVT \geq 500 \text{ kg m}^{-1} \text{ s}^{-1}$) over coastal Washington and northern coastal Oregon on Fri 31 Oct. This is an unusually strong signal given the long lead time (~8 days).
- While there is still considerable uncertainty in the exact timing, location, and intensity of this AR, the ensemble mean IVT magnitude in both models peaks above $600 \text{ kg m}^{-1} \text{ s}^{-1}$ in northern coastal Oregon.
- Several GEFS and ECMWF members are even forecasting an event maximum $IVT > 1000 \text{ kg m}^{-1} \text{ s}^{-1}$.

NWS CPC Days 8–14 Hazards Outlook



- The Climate Prediction Center (CPC) is indicating potential for hazardous weather in association with the AR late next week.
- A moderate risk (40–60% probability) of heavy precipitation has been issued for western Washington and northwestern Oregon on 1 Nov, with a slight risk (20–40% probability) over the remainder of western Oregon and northwestern California on 1–2 Nov.
- A slight risk of heavy snow has been issued for the Washington Cascades on 1–2 Nov