

CW3E Atmospheric River Outlook: 16 March 2026

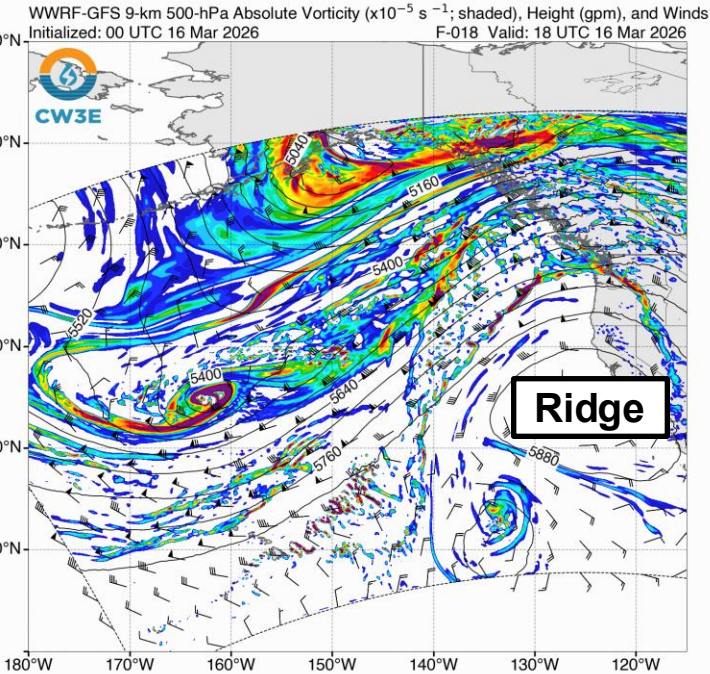
Long-Duration Atmospheric River to Impact Washington This Week

- An atmospheric river (AR) currently centered over British Columbia is forecast to drift southward tonight and stall over Washington and northern Oregon through Fri 20 Mar.
- CW3E's West-WRF ensemble is showing $\geq 60\%$ likelihood of an AR 4 (based on the Ralph et al. 2019 AR Scale) over coastal Washington and $\geq 80\%$ likelihood of an AR 3 over the Washington Cascade foothills.
- There is still considerable uncertainty in the timing and magnitude of peak IVT due to forecast uncertainty in multiple possible pulses of moisture transport over the duration of the event.
- Compared to the West-WRF initialized with GFS, the West-WRF initialized with ECMWF is forecasting a stronger final pulse of moisture transport on Fri 20 Mar, as well as longer persistence of AR conditions over the Pacific Northwest into early Sat 21 Mar.
- This AR is forecast to produce 5–10 inches of additional precipitation over the Olympic Peninsula and North Cascades this week.
- **Marginal risk** excessive rainfall outlooks (EROs) have been issued for the Olympic Peninsula and the North Cascades from Tue 17 Mar through early Fri 20 Mar due to the combination of high snow levels, melting snowpack, and multiple days of moderate rainfall.
- Freezing levels in western Washington are forecast to remain above 7,000 feet throughout the duration of the AR, resulting in nearly all the precipitation falling as rain and facilitating rain-on-snow in areas that received heavy snowfall last week.
- Rivers/streams in western and central Washington are forecast to rise this week due to the combination of snowmelt and rainfall. Four stream gages are currently forecast to rise above flood stage, with many others forecast to rise above action/bankfull stage.

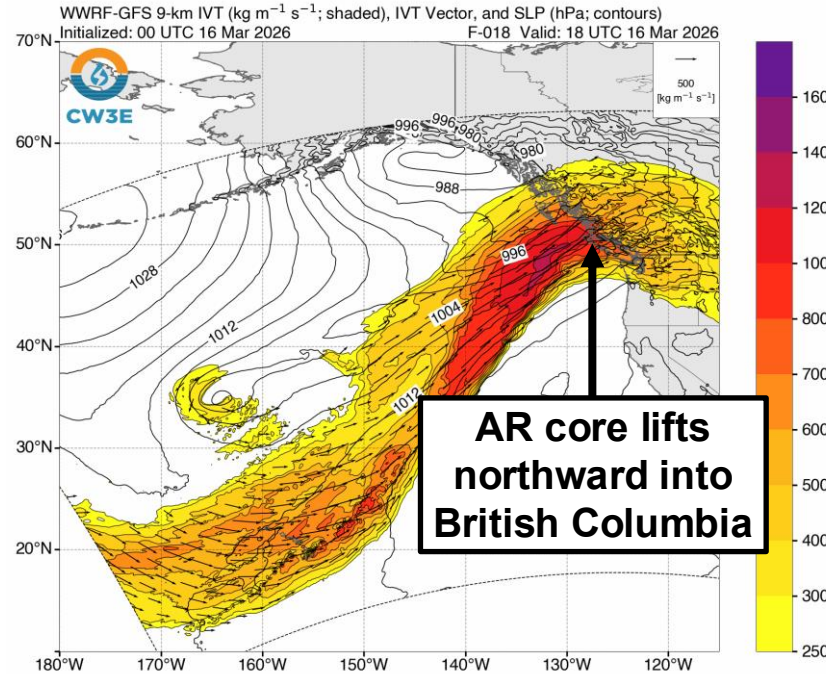
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West-WRF GFS Forecasts: Valid 11 AM PDT 16 Mar (F-018)

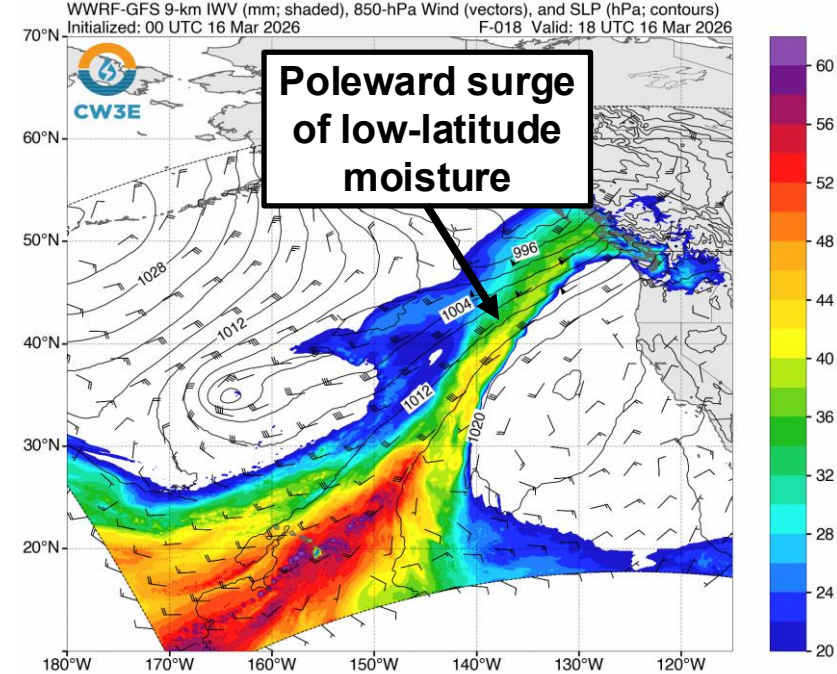
500-hPa Height & Vorticity



IVT & SLP



IWV, SLP & 850-hPa Wind

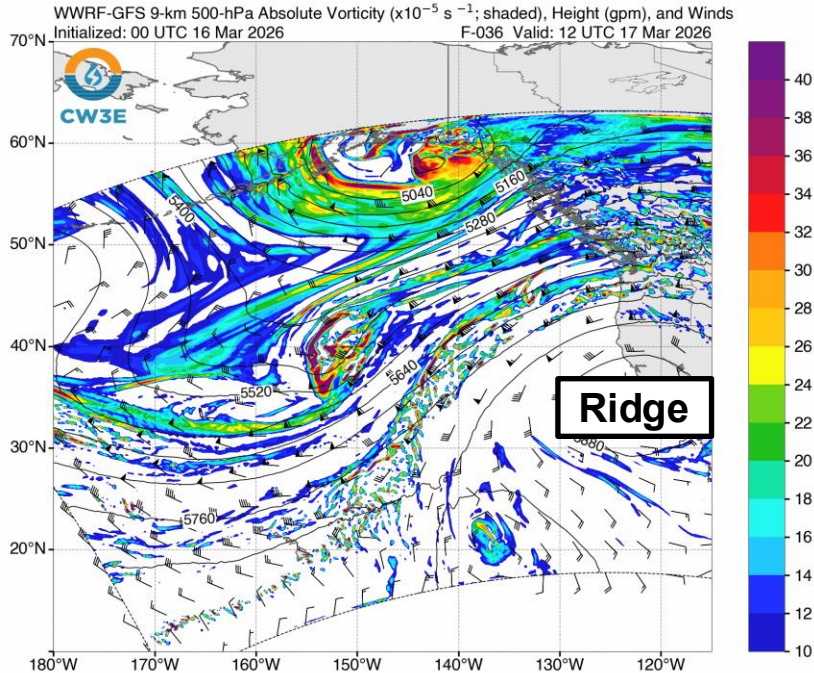


- An atmospheric river (AR) associated with a poleward surge of low-latitude moisture made landfall over the Pacific Northwest and British Columbia on Sun 15 Mar.
- The core of the AR will lift northward into British Columbia today due to the presence of a mid-level ridge along the US West Coast, resulting in a brief lull in precipitation across Washington.

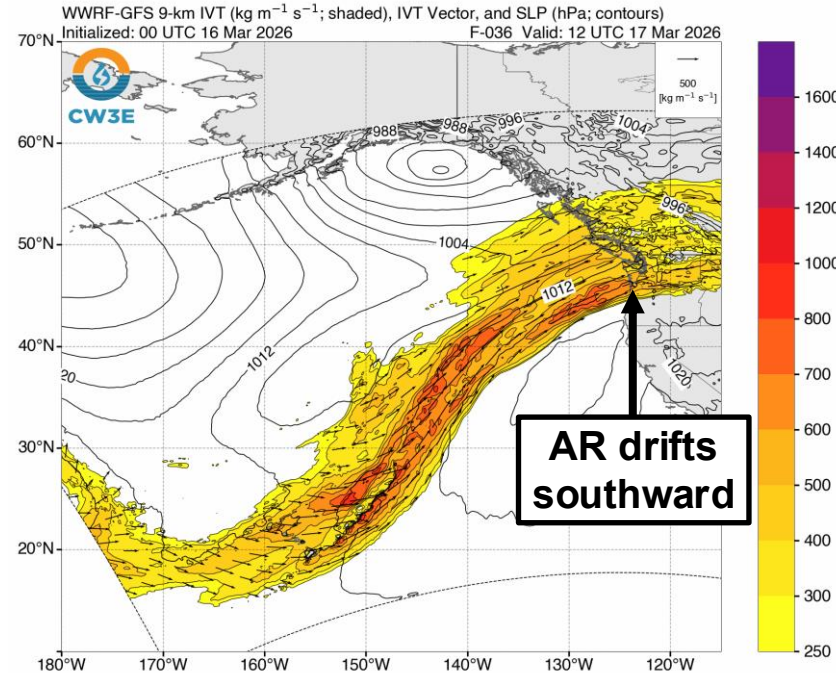
AR Outlook: 16 March 2026

West-WRF GFS Forecasts: Valid 5 AM PDT 17 Mar (F-036)

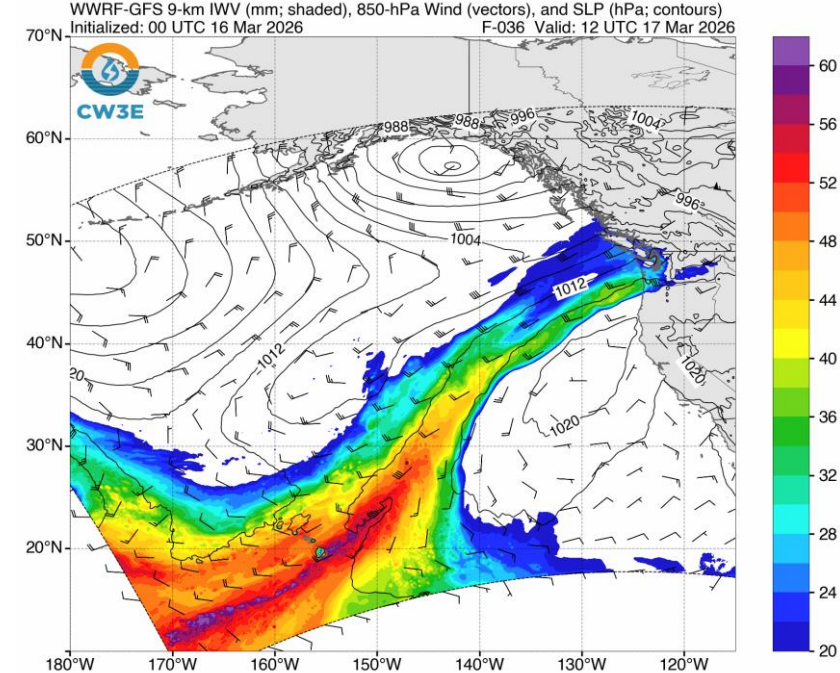
500-hPa Height & Vorticity



IVT & SLP



IWV, SLP & 850-hPa Wind



- Over the next 12–24 hours, the ridge is forecast to slightly weaken, while a large closed low is forecast to move into the Gulf of Alaska, facilitating a southward shift of the AR and heavier precipitation into Washington and northern Oregon.
- The closed low and ridge are forecast to remain nearly stationary for several days, which will allow the AR to stall over the Pacific Northwest through Thu 19 Mar.

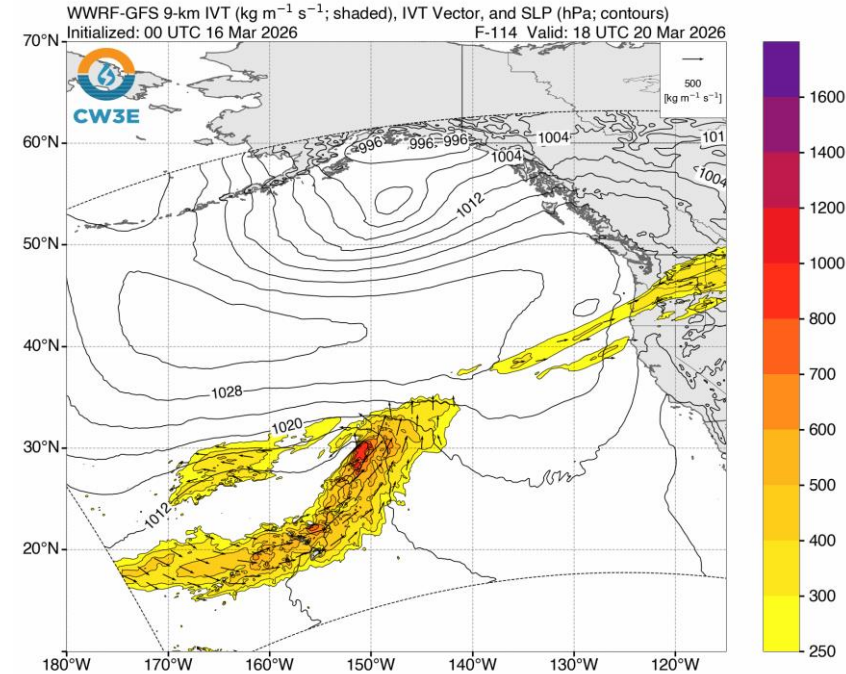
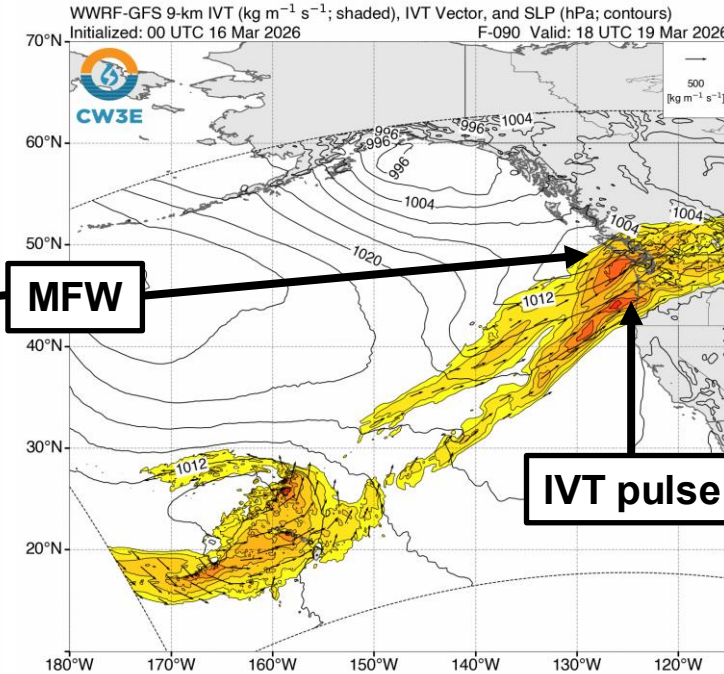
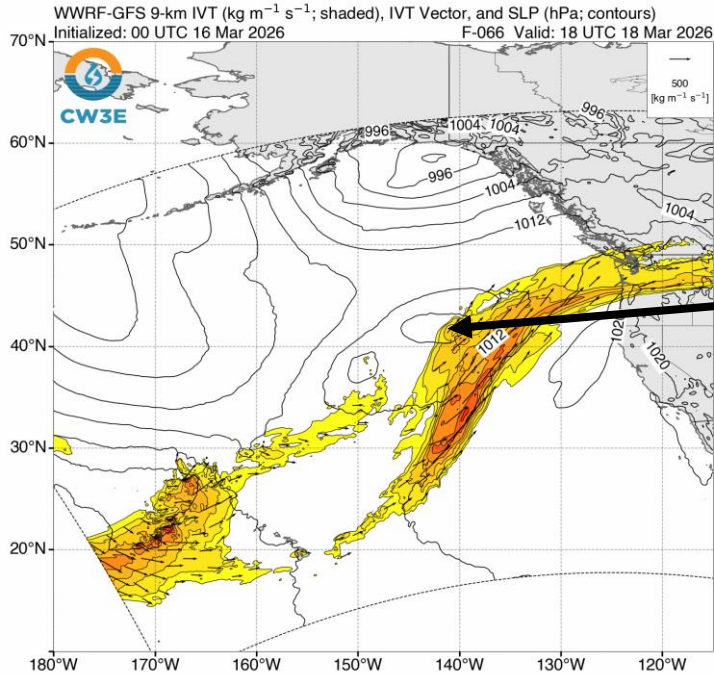
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West-WRF GFS IVT & SLP Forecasts

Valid: 11 AM PDT 18 Mar (F-066)

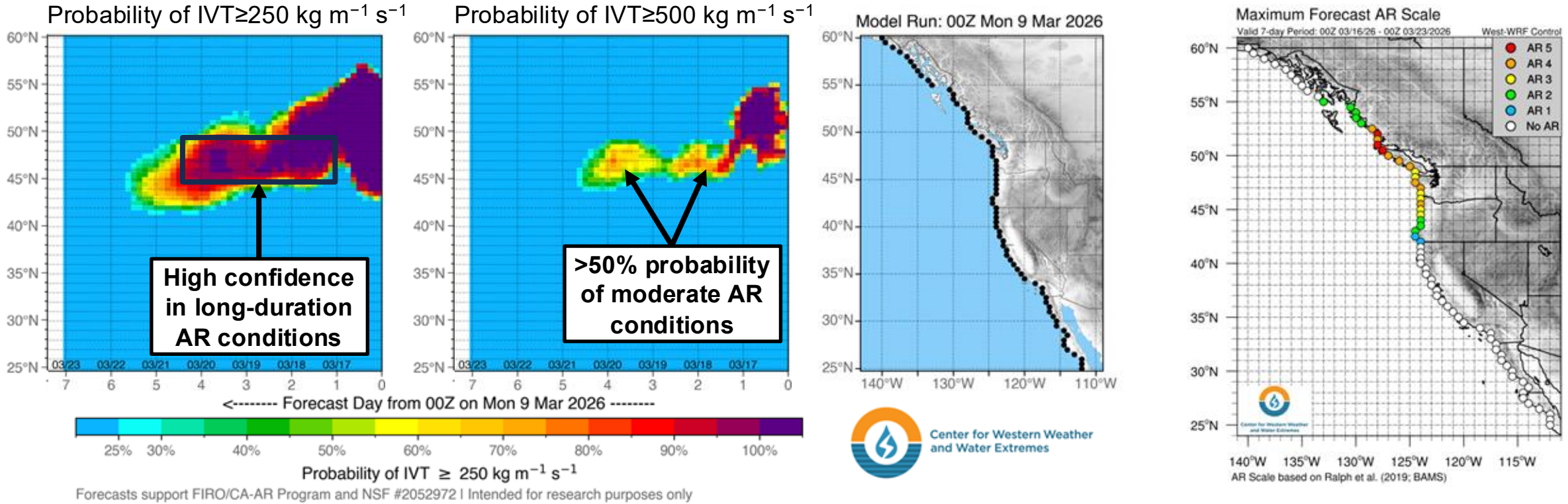
Valid: 11 AM PDT 19 Mar (F-090)

Valid: 11 AM PDT 20 Mar (F-114)



- As time progresses, one or more mesoscale frontal waves (MFWs) are forecast to develop along the AR and propagate northeastward, potentially driving multiple pulses of moderate-strength ($\text{IVT} \geq 500 \text{ kg m}^{-1} \text{ s}^{-1}$) moisture transport into Washington and northern Oregon.
- The 00Z West-WRF GFS deterministic model is forecasting the AR to dissipate on Fri 20 Mar, but there is still some uncertainty in how long AR conditions will persist over the region.

West-WRF Coastal AR Landfall Tool & Control AR Scale



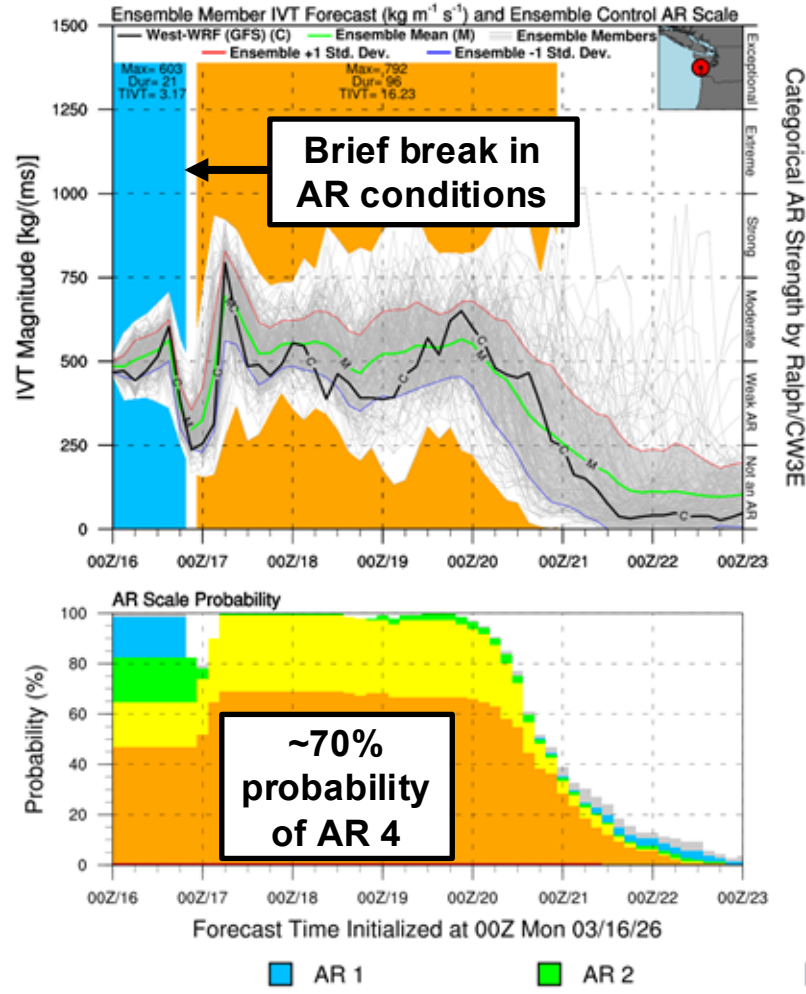
- CW3E's AR landfall tool based on West-WRF is showing high confidence (>90% probability) in AR conditions ($IVT \geq 250 \text{ kg m}^{-1} \text{ s}^{-1}$) over coastal Washington and far northern coastal Oregon from tonight through late Thu 19 Mar.
- There is also a moderate-to-high likelihood (>50% probability) of moderate AR conditions ($IVT \geq 500 \text{ kg m}^{-1} \text{ s}^{-1}$) over southern coastal Washington in association with the initial southward movement of the AR tonight and the final IVT pulse on Thu 19 Mar.
- The West-WRF control member is forecasting an AR 3/AR 4 (based on the Ralph et al. 2019 AR Scale) over coastal Washington and northern coastal Oregon, with an AR 4/5 forecast over coastal British Columbia.

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West-WRF AR Scale and IVT Forecasts: Coastal Washington

West-WRF Ensemble Initialized: 00Z Mon 03/16/26

Location: 47°N 124°W



- The West-WRF ensemble control member is forecasting an AR 4 at 47°N, 124°W (Grays Harbor County, WA), with a brief break in AR conditions before the AR drifts southward later today.
- About 70% of ensemble members are forecasting at least an AR 4 at this location.
- While >90% of ensemble members are forecasting at least 72 hours of continuous AR conditions, there is uncertainty in how long AR conditions will last, with several members showing AR conditions lasting into Sat 21 Mar.
- There is also considerable uncertainty in the timing and magnitude of peak IVT due to forecast uncertainty in the individual IVT pulses.

Image created: 13 UTC 03/16/2026 (140/200 members completed)

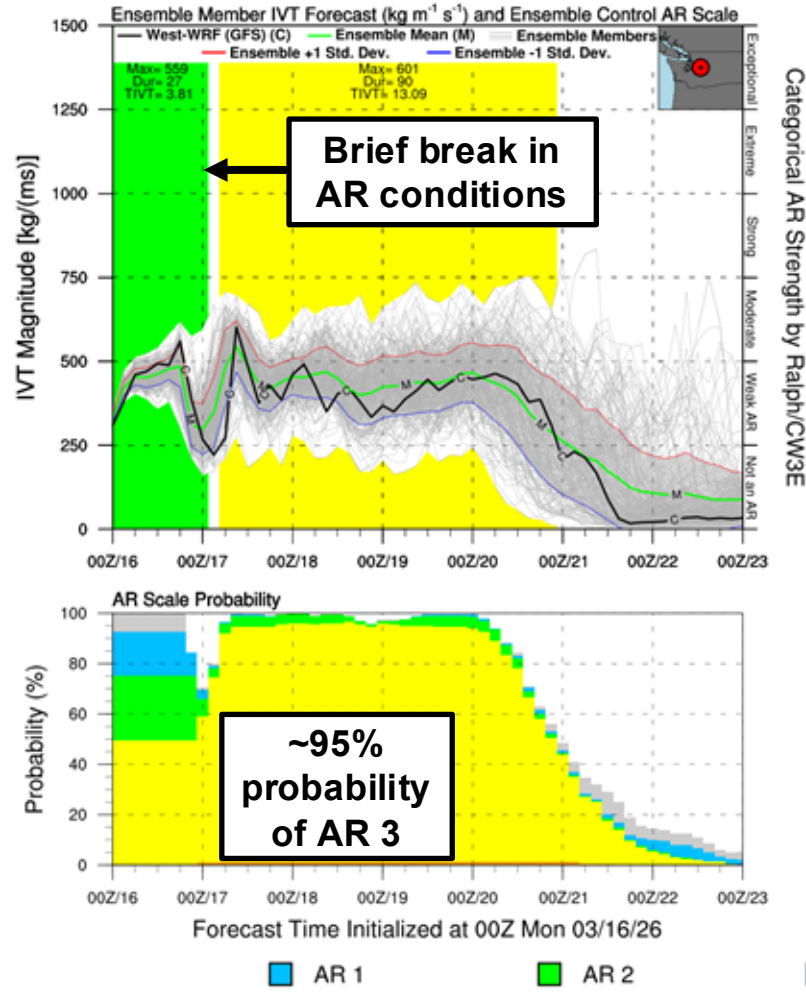
More information: <http://cw3e.ucsd.edu> AR Scale based on Ralph et al. (2019; BAMS), contact M. Ralph

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West-WRF AR Scale and IVT Forecasts: Washington Cascade Foothills

West-WRF Ensemble Initialized: 00Z Mon 03/16/26

Location: 47.5°N 121.5°W

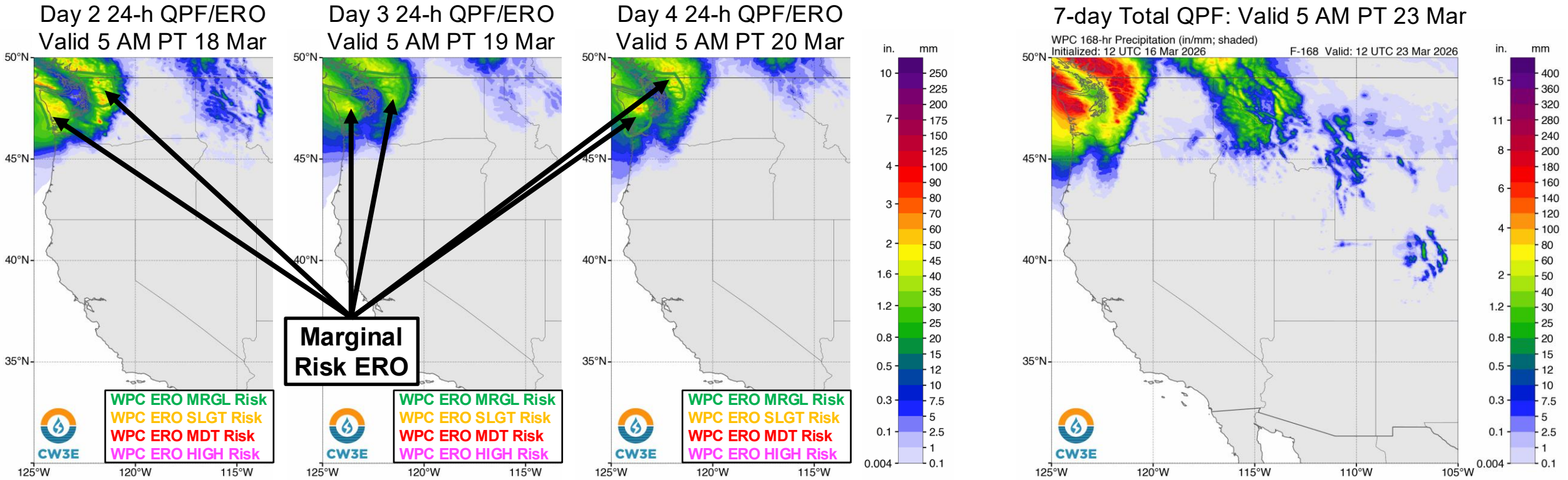


- The West-WRF ensemble control member is forecasting an AR 3 at 47.5°N, 121.5°W (near Snoqualmie Pass, WA), with a brief break in AR conditions before the AR drifts southward later today.
- About 95% of ensemble members are forecasting at least an AR 3 at this location.
- Similar to coastal Washington, most ensemble members are forecasting at least 72 hours of continuous AR conditions over the Cascade foothills, but there is uncertainty in the timing and magnitude of peak IVT due to forecast uncertainty in the individual IVT pulses.

Image created: 16 UTC 03/16/2026 (199/200 members completed)

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

WPC Precipitation Forecasts

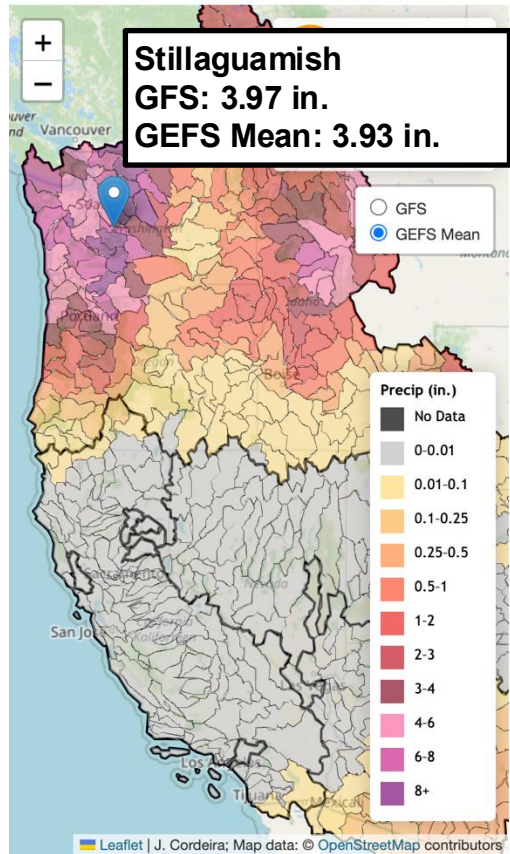


- The NWS Weather Prediction Center (WPC) has issued **marginal risk** (level 1 of 4; $\geq 5\%$ probability of flash flooding) excessive rainfall outlooks (EROs) for the Olympic Peninsula and North Cascades from Tue 17 Mar into early Fri 20 Mar due to the combination of high snow levels, melting snowpack, and multiple days of moderate rainfall.
- This AR is forecast to produce an additional 5–10 inches of total precipitation over the Olympic Peninsula and North Cascades, with 2–5 inches forecast over southern coastal Washington, the southern half of the Washington Cascades, and the Cascade foothills.

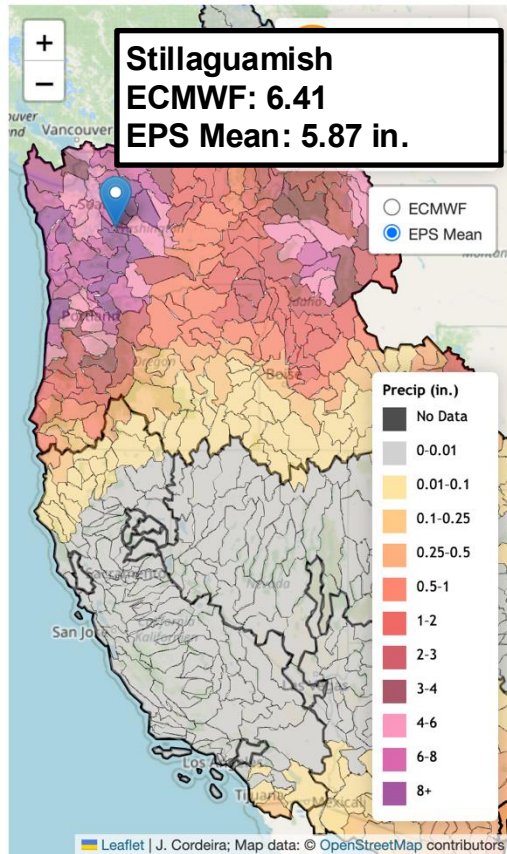
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Watershed Precipitation Forecasts

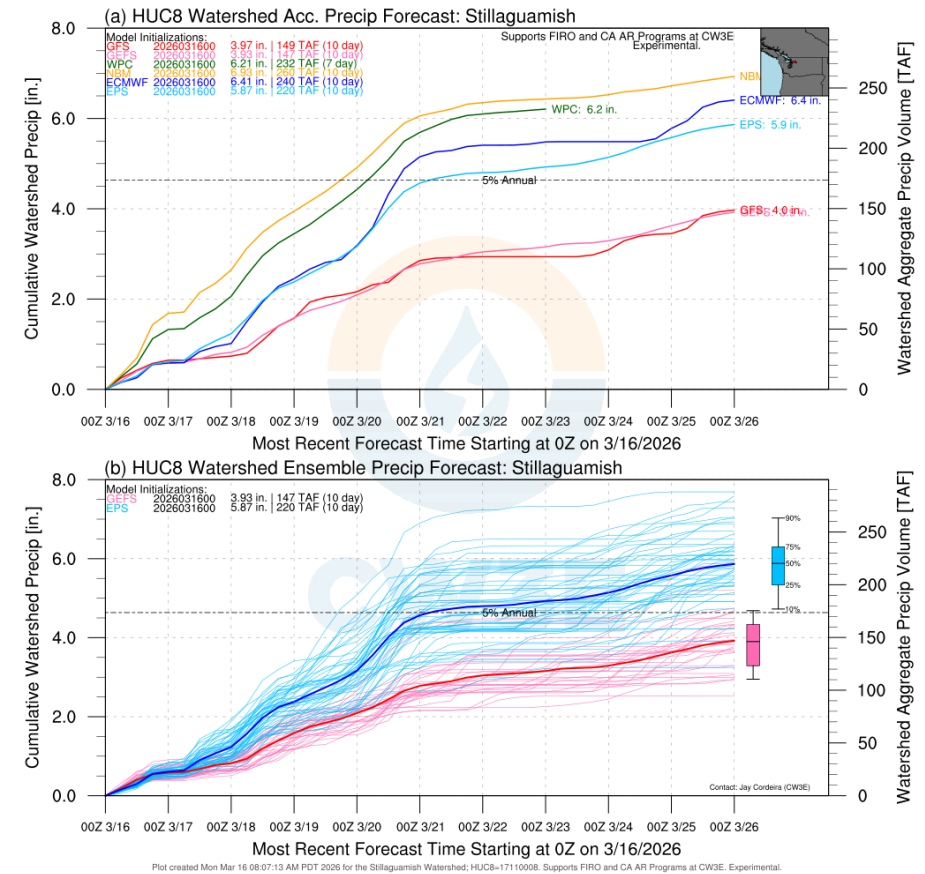
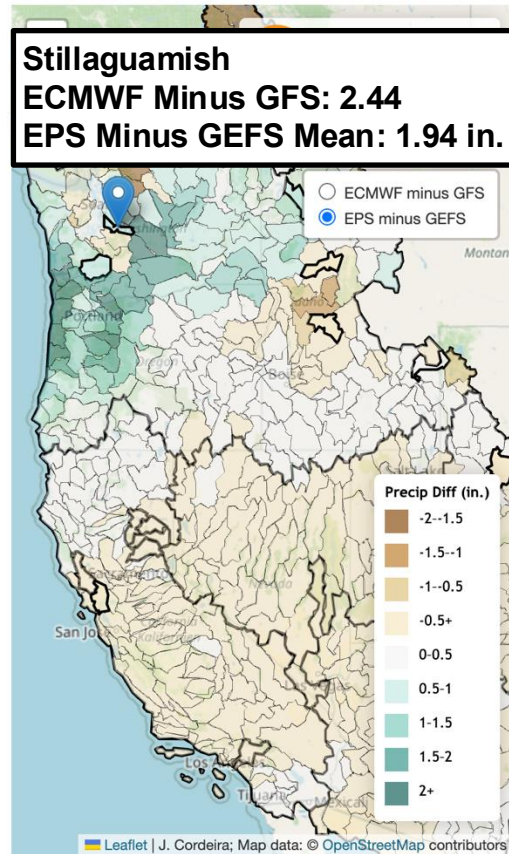
10-day GFS/GEFS Precipitation Forecasts



10-day ECMWF/EFS Precipitation Forecast

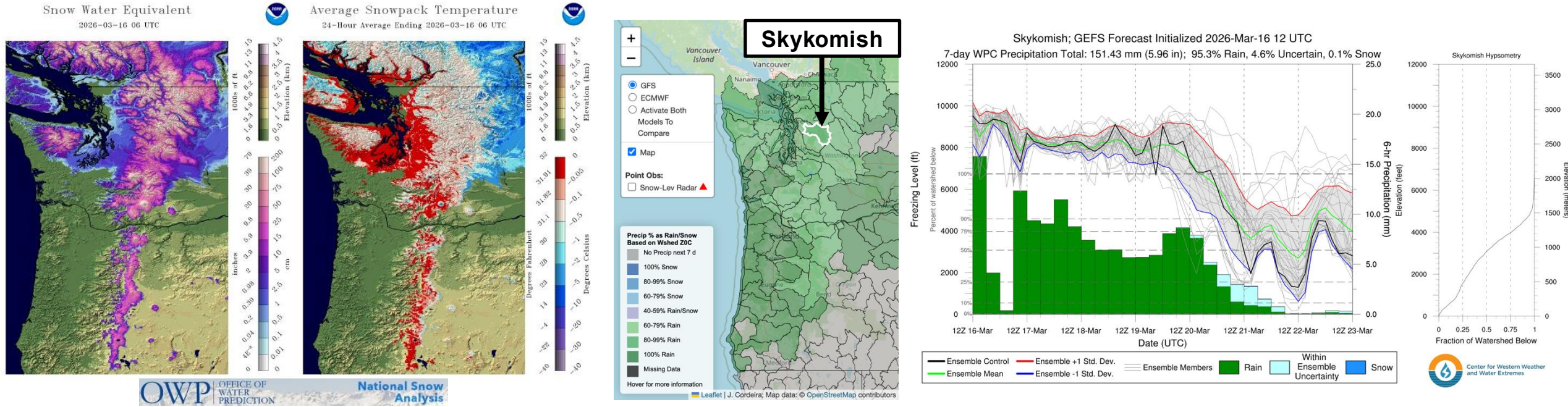


10-day Difference Precipitation Forecast



- There are still some model-to-model differences in forecast precipitation this week over portions of western Washington.
- In the Stillaguamish watershed, the NBM, ECMWF deterministic, and ECMWF ensemble (EPS) are forecasting higher precipitation amounts compared to the GFS deterministic and GEFS ensemble. About 90% of EPS members and only ~10% of GEFS members are forecasting >5% of normal annual precipitation (~4.7 inches) over the next 10 days.

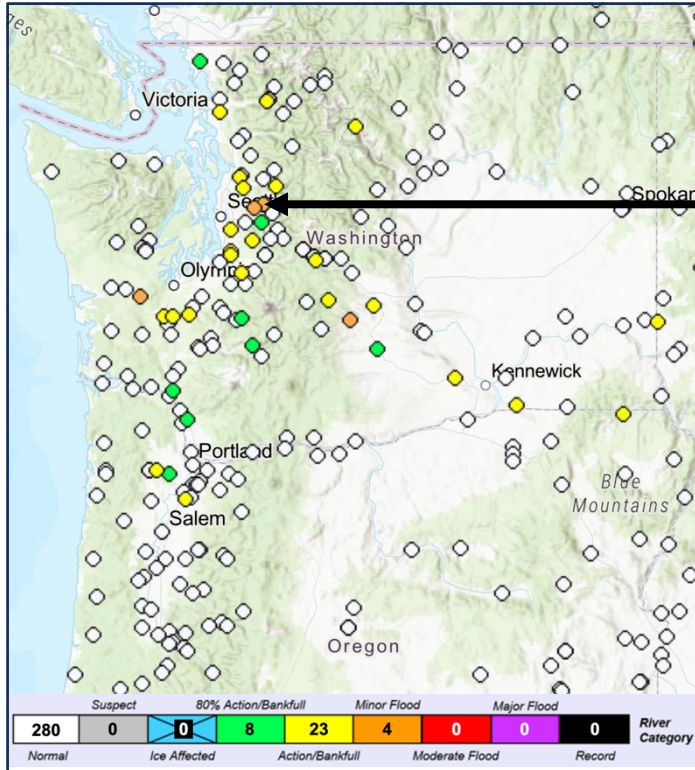
Current Snowpack Conditions & Watershed Freezing Level Forecasts (GEFS)



- Freezing levels in the Olympic Mountains and Washington Cascades rapidly increased to 9,000–11,000 feet this morning as the core of the AR pushed northward into British Columbia.
- Freezing levels are forecast to remain above 7,000 feet throughout the duration of the AR, then steadily fall as the AR begins to dissipate on Fri 20 Mar.
- Due to the high freezing levels, nearly all the precipitation from this AR is forecast to fall as rain.
- Warm temperatures and rainfall at high elevations will result in snowmelt and rain-on-snow in areas that received heavy snow last week, thereby increasing the potential for riverine flooding in western Washington.

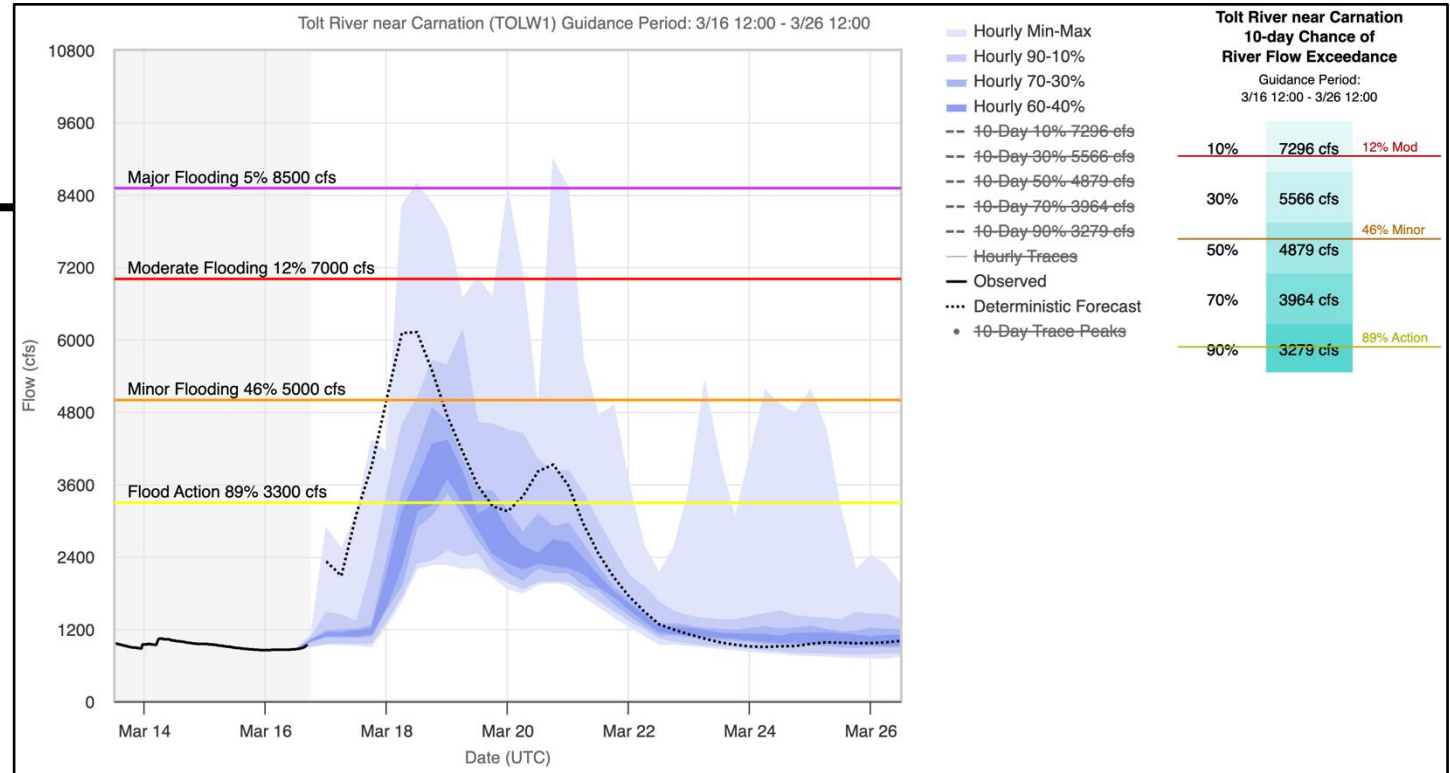
Hydrologic Forecasts

NWRFC 10-day Deterministic River Forecasts



Credit: NOAA/NWS Northwest River Forecast Center

HEFS 10-day Ensemble River Forecasts



Credit: NOAA/NWS Colorado Basin River Forecast Center

- Rivers/streams in western and central Washington are forecast to rise this week due to the combination of snowmelt and rainfall.
- The Northwest River Forecast Center (NWRFC) is currently forecasting 4 stream gages in western and central Washington to exceed flood stage over the next 10 days, with many others forecast to exceed action/bankfull stage.
- Ensemble streamflow forecasts are showing a 46% probability of Tolt River near Carnation exceeding **minor flood stage**. Flooding is most likely to occur Wed 18 Mar, with additional streamflow peaks possible in association with subsequent IVT pulses later this week.