A Customer Service Assessment of POP for Two Winter Storms

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Introduction

This TA-lite will compare and contrast two high-impact events, one when forecaster confidence was high and another for which it was low. The focus of this paper is on the service provided by probability of precipitation (POP) forecasts. A recommendation is for forecasters to transition their thinking about POP from a "plus or minus climatology" viewpoint in the longer term to a "plus or minus 50%" viewpoint in the shorter term.

A High Confidence Event

Forecaster confidence that a significant precipitation event for Deschutes County, Oregon (the Bend and Redmond area) would occur on January 8, 2008 was above average. The hazardous weather outlook began describing the storm 4 days prior and began calling for a significant precipitation event 3 days prior. Figure 1 shows POPs across the Pendleton CWA 3 days before the event ranging from around 60 to around 90. Figure 2 indicates that most of the area received measurable precipitation during the verifying 6-hour period; the Mesowest Internet site confirms this analysis. Figure 3 shows CWA averaged POPs above climatology (climatology is near 30 %) throughout the 7-day forecast period, rising to the likely category by 4 days before the event, and rising to the categorical category by 2 days before the event.

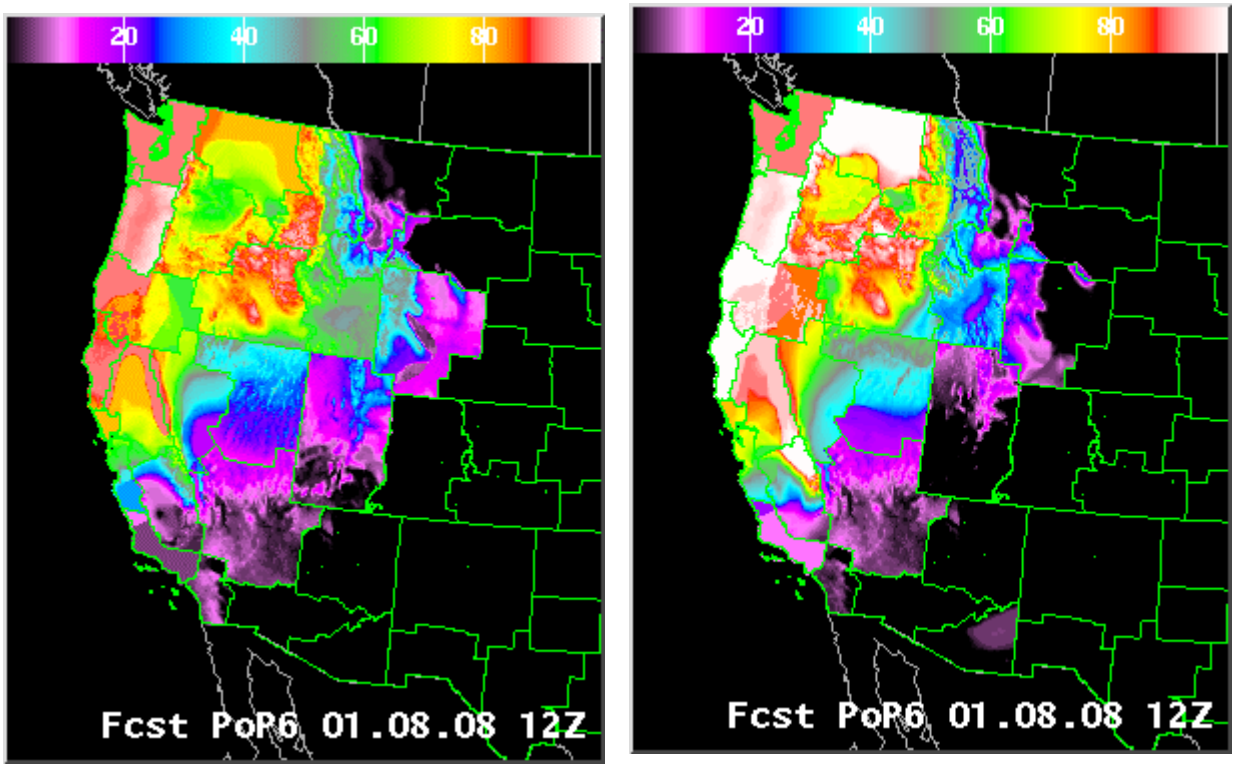

Figure 1. Probability of Precipitation for the 12z to 18z period on January 8, 2008 (72-hour forecast left panel and 36-hour forecast right).

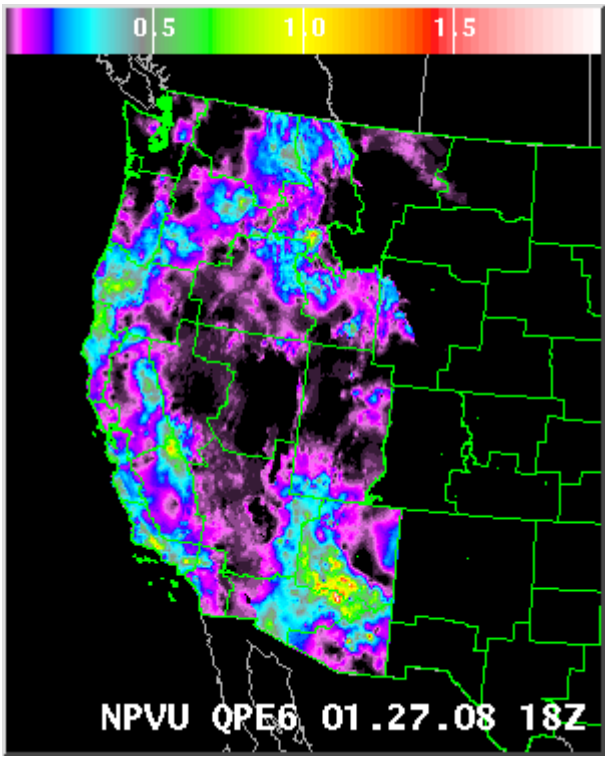

Figure 2 Quantitative Precipitation Estimates for the 12z to 18z period on January 8, 2008.

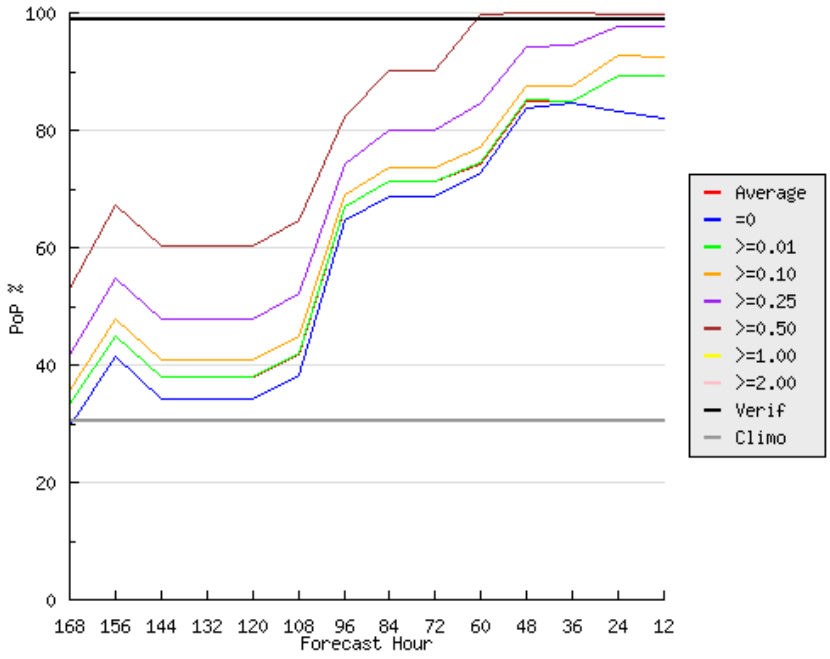

Figure 3 POP evolution for the WFO PDT CWA for the 12z to 18z period on January 8, 2008.

Figure 4 shows the official 156-hour POP forecast (blue line) mostly in the 30 to 45% range for Deschutes County above 3500 feet. These values are about 10 % above climatology. Figure 5 shows that the official 36-hour POP forecast for the same area was in the 80 to 95 % range. These high POP values are a necessary component of a forecast package informing customers that a significant precipitation event is coming. A watch was issued for Deschutes County with 40 hours lead time and a warning was issued with 20 hours lead time. The warning called for snow accumulation of 10 to 18 inches; spotter reports ranged from 9 to 16 inches with the storm, with an isolated report of 24 inches.

Forecast confidence was high in part because model forecasts were generally consistent (except for minor timing issues) showing warm-advection lift and abundant moisture during this event. With respect to timing, lead time, forecasting climatologically large snow amounts, watches, warnings, hazardous weather outlooks and routine products, the service provided for this event was excellent.

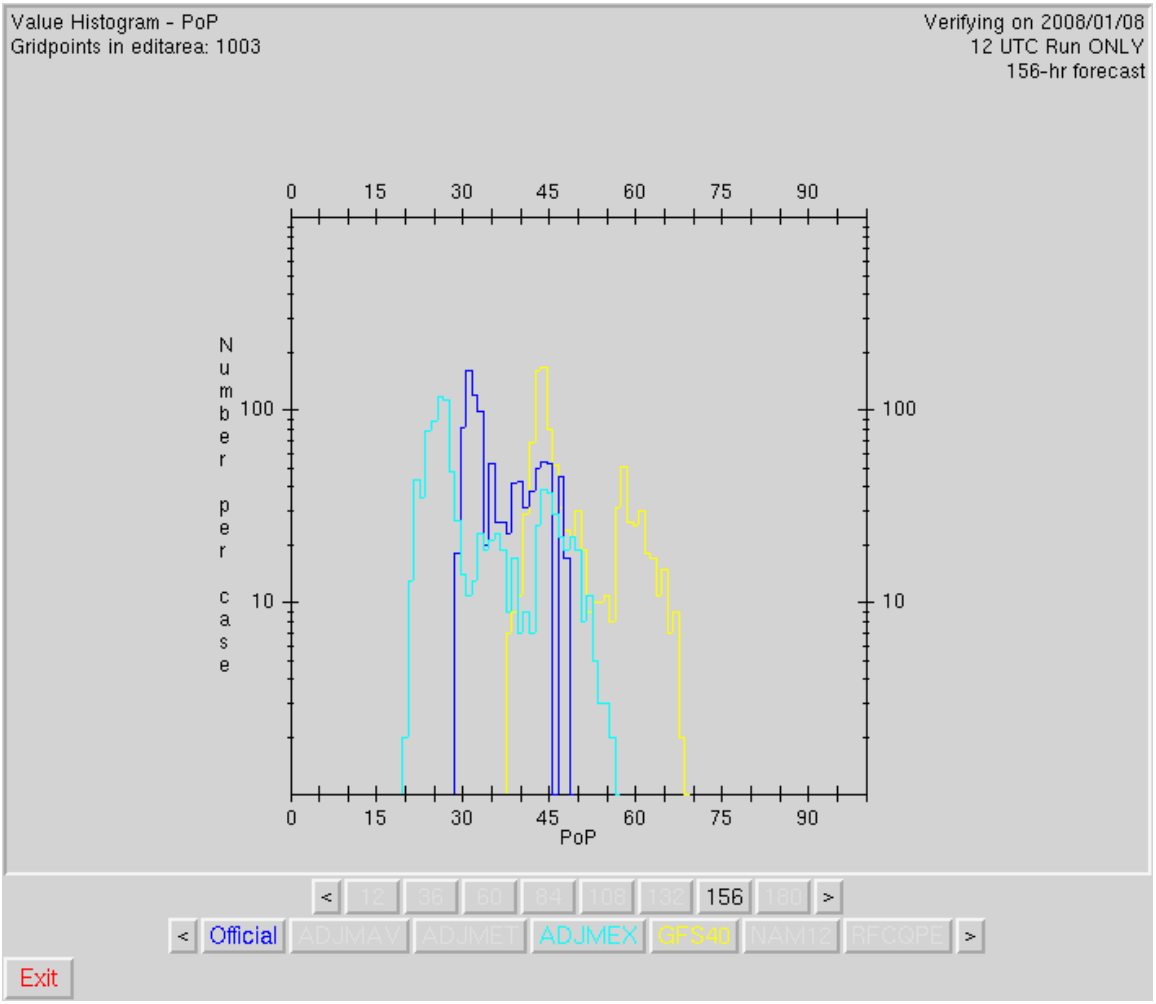

Figure 4 Distribution of POP values for the 156-hour forecast for Deschutes County grid points above 3500 feet for the period 12z to 18z on January 8, 2008.

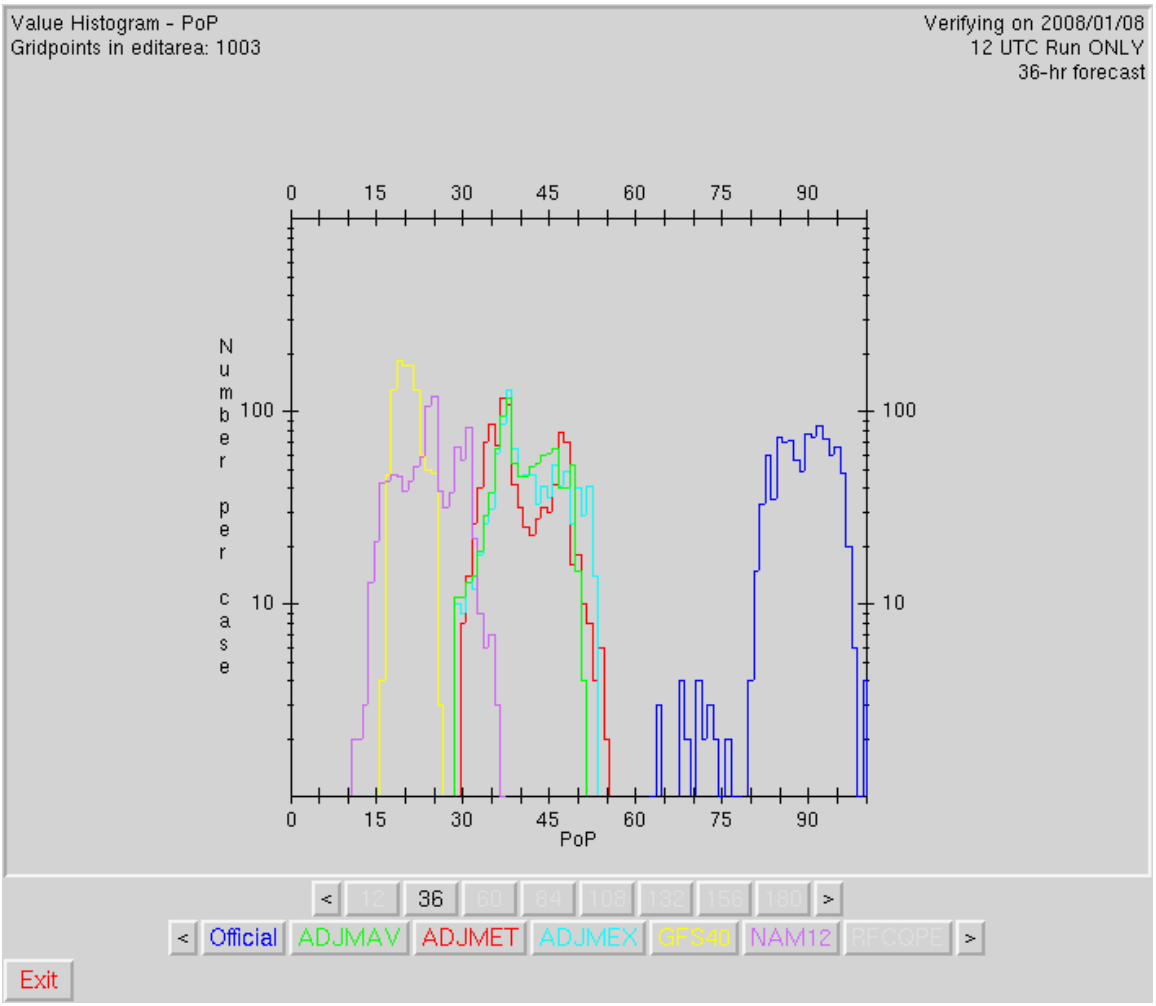

Figure 5 Distribution of POP values for the 36-hour forecast valid for Deschutes County grid points above 3500 feet for the period 12z to 18z on January 8, 2008.

This event provides an example of excellent service provided by POPs that began somewhat above climatology 7 days before, and then moved above 80% by 2 days before the event. Of course, for dry periods, when confidence increases that there will not be measurable precipitation, POPs close to 0% also provides excellent service.

The Low Confidence Event

Probability of precipitation forecasts for the lower Columbia Basin for January 27, 2008 remained slightly above climatology from day 7 until day 2. Climatological POPs for that time of year are in the 15 to 25 % range for the lower Columbia Basin. Figure 6 shows POP forecasts in the 20 to 30 % range for the 72-hour forecast for grid points in the Columbia Basin below 900 feet. Figure 7 shows that by the time of the 24-hour forecast POPs for the same area had risen only slightly, generally only about 5 %.

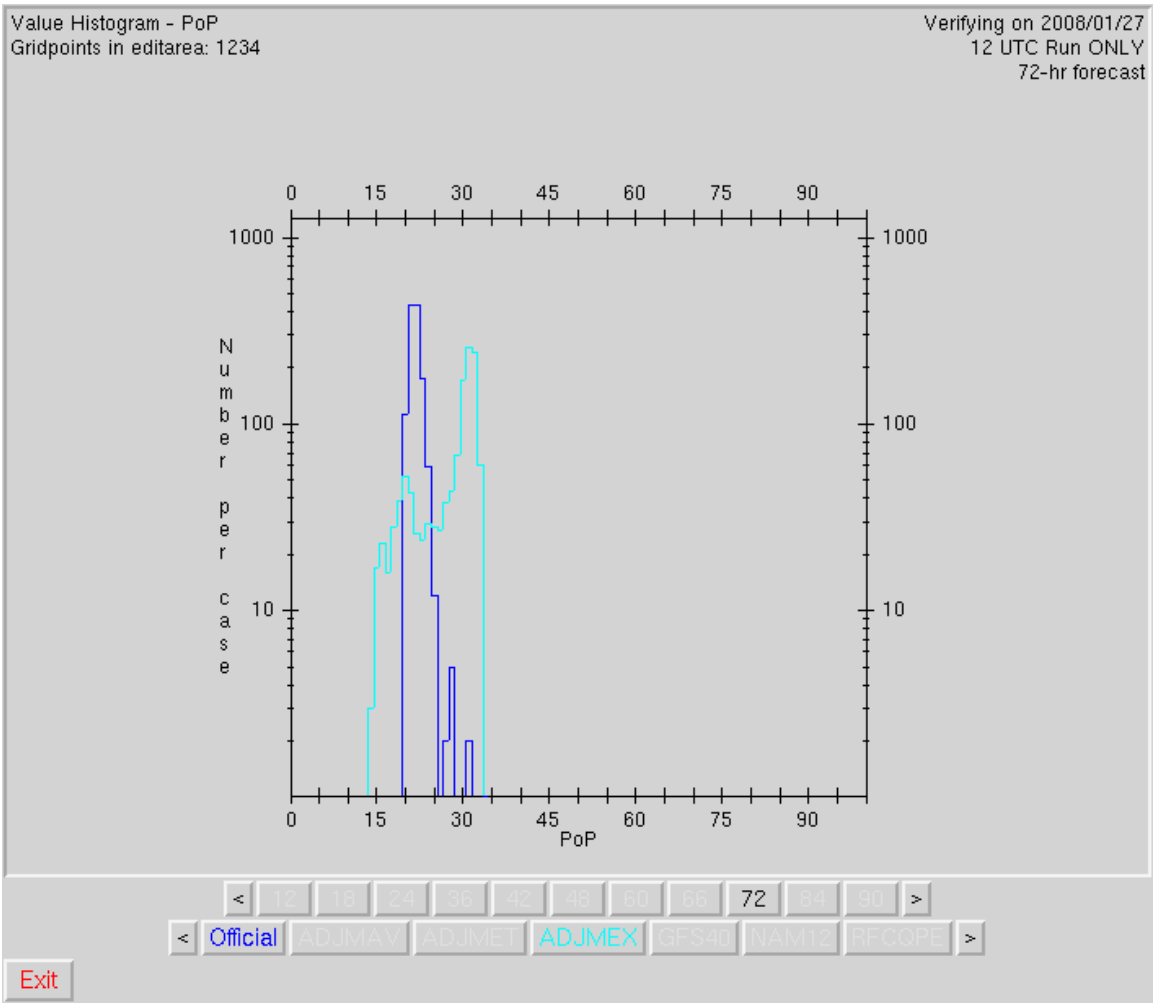

Figure 6 Distribution of POP values for the Columbia Basin below 900 feet for 72-hour forecast valid on January 27, 2008.

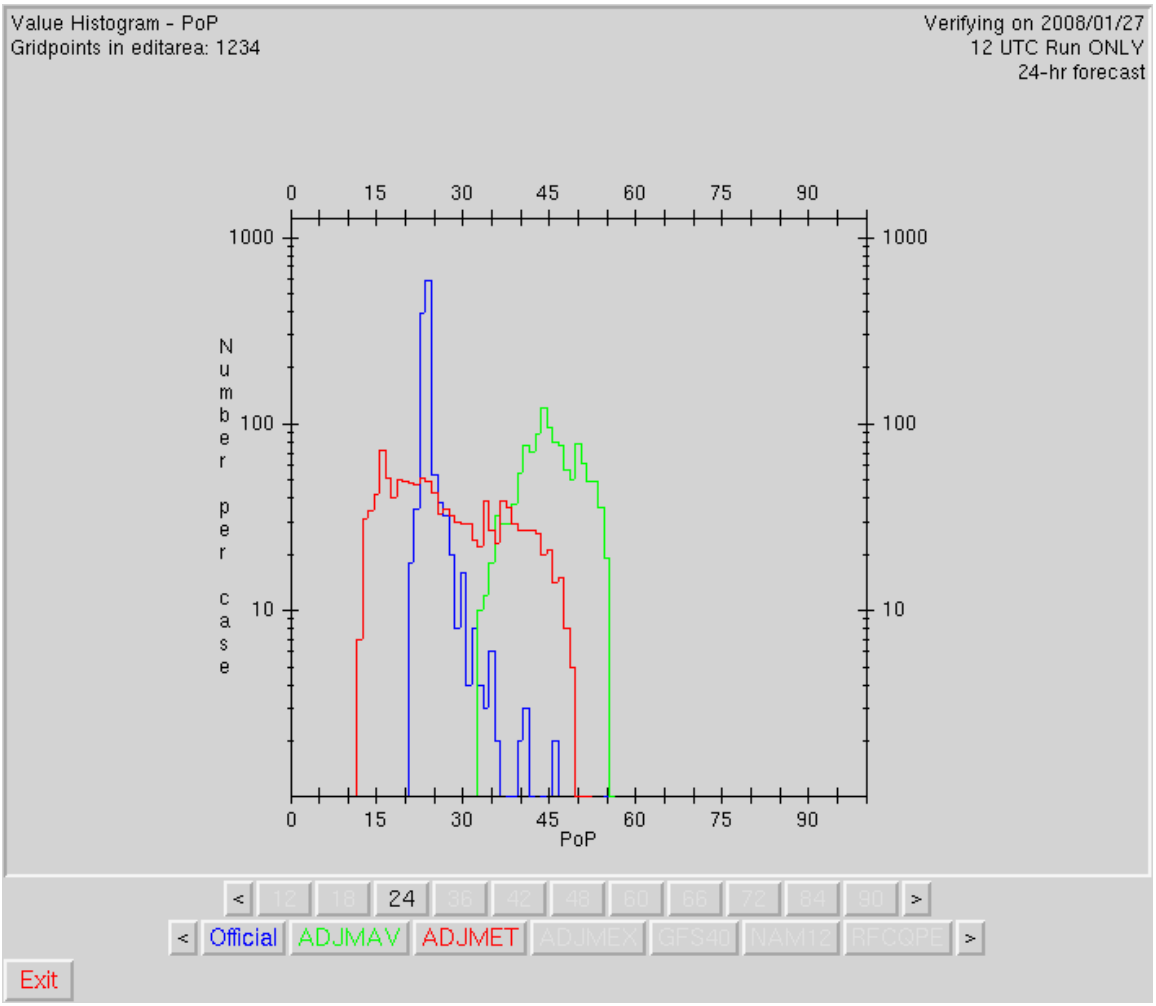

Figure 7 Distribution of POP values for the Columbia Basin for the 24-hour forecast valid on January 27, 2008.

The forecast was complicated: a closed low-pressure circulation was located off the northern California coast and was forecast to move inland and join into phase with a shortwave in the northern branch of the jet stream crossing the Pacific Northwest. Operational model forecast run-to-run consistency was poor regarding the timing and location of the strongest lift and in particular how far north the deepest moisture would be advected. Model forecasts about 3 days before the event showed a surface convergence boundary stalling 100 miles too far south – in reality the convergence boundary stalled over the lower Columbia Basin. There was somewhat of a trend in model forecasts from day 3 up until the event in placing the stalled boundary farther northwestward, although this trend also exhibited some flip-flopping from run to run.

Other zones in the WFO PDT had warnings or advisories issued with good lead time, but the lower Columbia Basin had POP forecasts around 30% (see Fig. 8) for a high-impact event that included near record snow accumulations. Winter weather advisories for the lower Columbia Basin were set to expire at 10 pm on January 26. At around 6 pm, after it became apparent that the front was not progressing as fast as expected, the advisories were upgraded to warnings set to expire at 4 am on January 27. The warnings for the Columbia Basin were later extended to noon, then to 4 pm, and finally to 11 pm on

January 27. One lesson learned is that if you are not certain of the ending time for a warning, err on the side of a later expiration time; it is easier (and provides better service in general) to cancel a warning early, rather than to extend one. A second lesson learned for locations with low climatological POPs: when uncertainty remains high in the short-term forecast but there is potential for a high-impact precipitation event, POPs near 50% will provide better service than low climatological POPs.

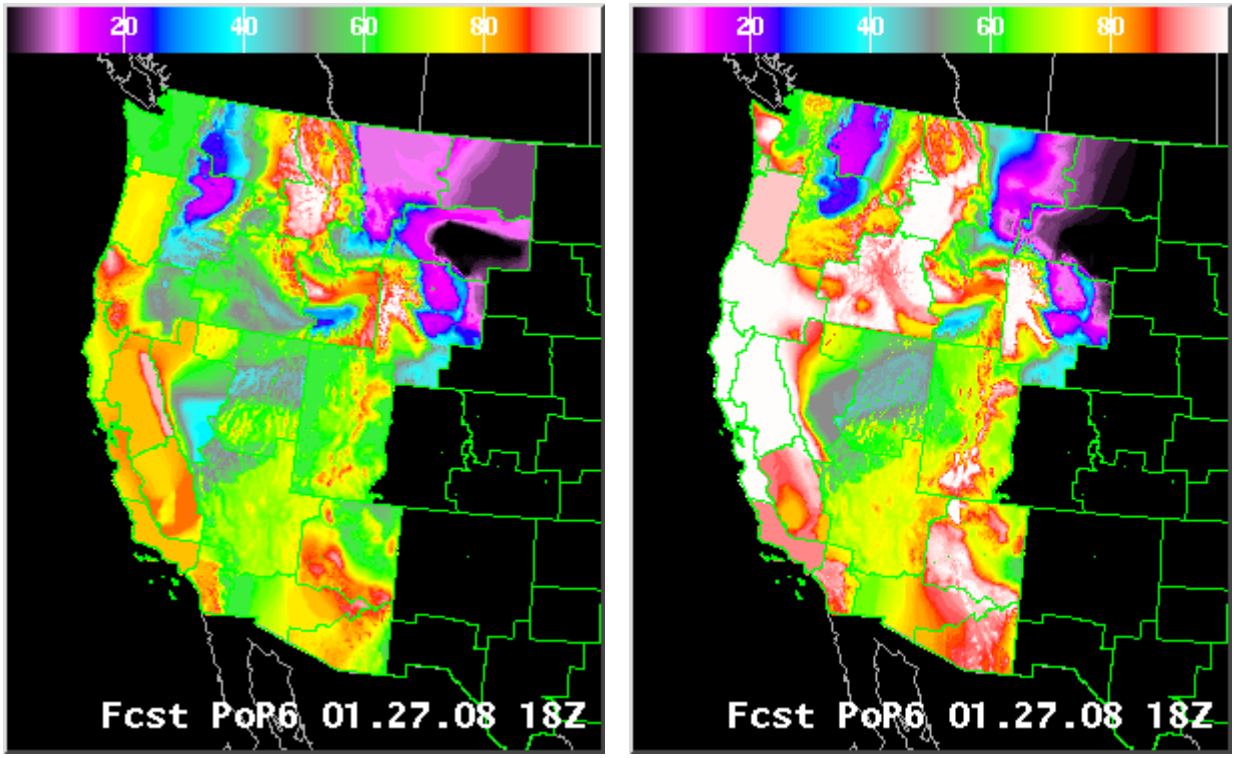

Figure 8 Gridded POP forecasts (66-hour left panel and 30-hour right) for the 6-hour period beginning 18z on January 27, 2008.

Discussion and Conclusion

In areas with low climatological POPs, there is a risk of poor customer service if POPs remain near climatology when there is some potential for a high-impact precipitation event. Of course, there are scenarios when low POPs are appropriate in the short term, for example a trough passage without strong dynamics or abundant moisture. However, one lesson learned from a low-confidence event on January 27 is: **As lead time shortens, forecasters should transition their focus away from climatological POPs and should instead consider how far the POP deviates above or below 50%**. A long-term forecaster should answer the question, "How much should my forecast depart from climatology?", while a short term forecaster should answer, "How much should my forecast depart above or below 50%?". In high confidence situations, POPs should trend away from 50% towards either 0% or 100%.