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DO TRACE EVENTS AFFECT PRECIPITATION VERIFICATION SCORES?

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Has this ever happened to you? It's time to issue the afternoon Coded Cities Forecast (CCCCFNNN) and a weakening cold front is moving towards your area of responsibility. There's enough moisture, upper level support, and cold air to justify, at least, a scattered probability of precipitation (PoP) forecast at a specific city. You look at the MOS guidance for that city - 10 percent. How about the NGM guidance - 40 percent. You decide on 30 percent, knowing that the National Verification System judges your performance against MOS. You look confident as you leave the office. Just 100 miles upstream from the site it had already started to lightly snow.

You return the next morning and, yes, it did snow at the site for three hours with visibilities between three and five miles. To your horror, however, the observer carried the dreaded "double zero" on the six-hourly observation. That's right, a trace, and you lose.

The same can be said for the mid-shift forecaster when widely scattered to scattered (20-40% PoP range) convection is a good bet. You increase the guidance PoPs. Later in the day, thunder wakes you from your restful daytime sleep, and you smile knowing you "beat the computer." That night you return to find that the airport observer did indeed carry thunder and a light rain shower. Unfortunately for you, however, he also carried a trace amount.

Since February 1, 1986, the staff at WSFO Cheyenne has used an internal verification program with five stations in Wyoming - Cheyenne, Casper, Lander, Sheridan, and Rock Springs. These are the five stations in the state with MOS guidance forecasts. Although we had only a year and a half of data, we reviewed the trace dilemma and feel we have some preliminary findings that may be of interest.

Each day's forecast was sorted, and this included four periods on the day shift (three on the midnight shift), for each of the five stations. All forecasts when no precipitation or measurable precipitation occurred were discarded. Also, forecasts were discarded when trace amounts occurred but forecasts did not deviate from the MOS guidance.

This left 904 events where trace amounts did occur and the local forecasts deviated from MOS. A breakdown of those events is shown in Tables 1 and 2.

Table 1  
Number of Times That Trace Events Helped Forecasters  
Beat Guidance

Station	1st	2nd	3rd	4th	Total
Cheyenne	49	40	35	21	145
Casper	37	31	24	16	108
Lander	16	13	21	9	59
Sheridan	21	22	24	12	79
Rock Springs	26	20	18	8	72
Total	149	126	122	66	463

Table 2  
Number of Times That Trace Events Allowed Guidance to  
Beat Forecasters

Station	1st	2nd	3rd	4th	Total
Cheyenne	25	21	21	13	80
Casper	15	20	20	8	63
Lander	23	29	13	12	77
Sheridan	27	30	27	19	103
Rock Springs	34	41	32	11	118
Total	124	141	113	63	441

Percentage of times forecasters won  $463/904 = 51.2\%$   
Percentage of times guidance won  $441/904 = 48.8\%$

Therefore, forecasters improved upon MOS about 51 percent of the time when trace events occurred. In other words, the trace events really did not, overall, affect the statistics. The number of times a forecaster was beaten due to a trace event (usually raising PoPs) was just about equal to the number of times he was saved by a trace event (cutting PoPs).

It is also interesting to look closely at the specific numbers in the above tables for each station. Note how Cheyenne has the highest number of trace events that helped the forecasters. Also note that Rock Springs was the station that hurt the forecasters the most with trace events (no weighing/recording rain gauge). Forecasters would be wise to know which stations, if any, are notorious for not measuring precipitation during certain events, due to observational techniques or local terrain effects.

What can be learned from this look at trace events and precipitation verification results? The main conclusion is that forecasters (at least in Wyoming) can be assured that trace events will average out in the long run. A trace event that haunts you now may be the one that saves you later.

Also, as a final note, the narrative forecasts (SFP and ZFP) don't necessarily have to resemble the site specific PoPs, especially in mountainous states like Wyoming. If widespread light snow is expected, it should be forecasted without regard to the specific PoP. The public, for the most part, does not care whether precipitation measured or not, must whether the precipitation itself occurred.