

# THE ATMOSPHERIC RESERVOIR

*Examining the Atmosphere and Atmospheric Resource Management*

## PROBABILITY OF PRECIPITATION EXPLAINED

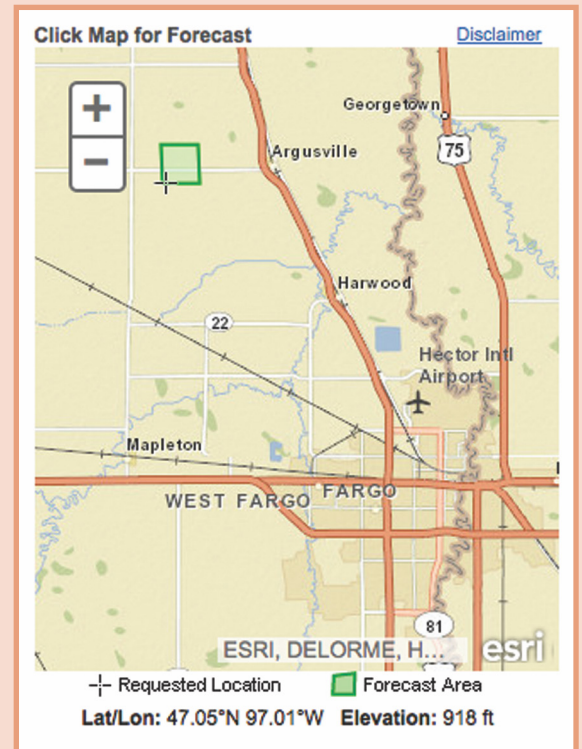
By Mark D. Schneider

Have you ever wondered why it rained more on a day when the National Weather Service (NWS) forecasted a 30 percent chance of rain, than on one with a 90 percent chance?

To understand these percentages, let's first look at the NWS definition for *Probability of Precipitation* or (PoP): The chance or likelihood of an event occurring at some point in the forecast area, over a certain period of time. When NWS forecasters multiply the probability that precipitation will occur somewhere in the forecast area by the percent of area that will receive measurable precipitation (one one-hundredth of an inch or greater), the result is the percentage used in their forecast products for the public. For example, on a particular day a forecaster thinks that there will be a 60 percent chance that it will rain and that about 70 percent of the forecast area will receive at least one one-hundredth of an inch of precipitation. Multiplied out,  $0.60 \times 0.70$  is equal to 0.42, which would be rounded to 0.40 or 40 percent. The overall chance of precipitation would be 40 percent.

Because North Dakota has 53 counties and Walsh County is split into east and west areas, there are 54 "zones" that the Bismarck and Grand Forks NWS offices use in their forecast products. Within each zone there are now 2.5-kilometer grids that are used for site-specific forecasts and for automatic forecast verification. Rain and snow measurements collected by rain gauges and radar-estimated precipitation amounts are compared to each 2.5-kilometer grid box to determine the accuracy of forecasts. Gone are the days when a forecaster could make a general forecast for a large area of the state.

According to Chauncy Schultz, Science Operations Officer for the NWS Forecast Office (WFO) Bismarck, "One of our goals in becoming more accurate with our PoP forecasts is to ensure they are *calibrated*. In a perfectly calibrated PoP forecast, that would mean that at your location, if there is a 70% chance of precipitation, it would occur 7 out of 10 times when that probability was forecast. Similarly, a perfectly calibrated 30% chance of precipitation would mean that moisture is received at a location 3 out of 10 times when a similar weather pattern occurs. We're making good progress on achieving that, but forecasters at the NWS offices are always striving to do better by reviewing past forecasts, weather patterns, and harnessing all of the latest and greatest weather modeling data to improve the precipitation probability forecasts."



The image used in this article illustrates a specific forecast grid located northwest of Fargo (green shaded box) that may have a completely different probability of precipitation on a given day than the City of Fargo. Schultz summarized that, "We're constantly striving to improve forecasts, and that includes adding more specificity and accuracy to the PoP forecasts. In fact, you can find site-specific information for the next seven days, and even hourly PoP forecasts for the next 24 hours, on the NWS websites at [weather.gov/bis](http://weather.gov/bis) and [weather.gov/fgf](http://weather.gov/fgf)."