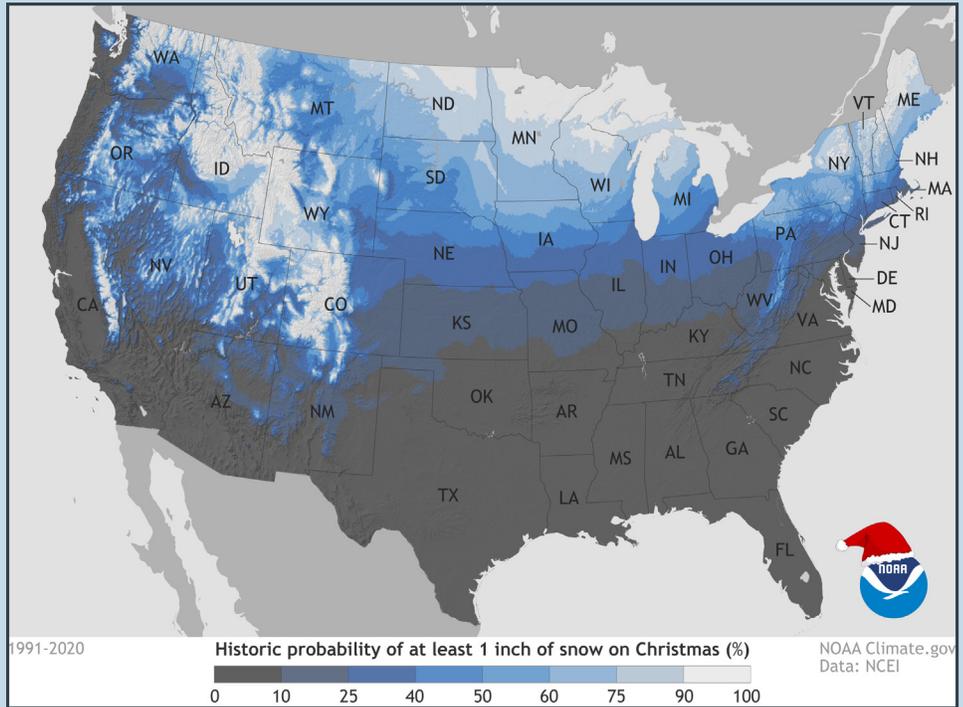# THE ATMOSPHERICRESERVOIR

Examining the Atmosphere and Atmospheric Resource Management

WEATHER CONDITIONS YOU CAN BET ON

By Mark D. Schneider

If you were given a hundred dollars to bet that Las Vegas wouldn't have a white Christmas, the odds would be in your favor to win. On a much broader scale, imagine that all weather forecasts are betting with odds, only they use percentages to express the chance that a certain condition will occur. This is essentially what numerical models are providing meteorologists.

Weather doesn't occur randomly, so numerical weather models must ingest enormous amounts of data (both current conditions and past climate data) in order to predict what will happen in the future. Your phone might have an App that forecasts the long-range weather conditions out to 30, 60, or even 90 days; however, predicting weather conditions this far in advance is inaccurate, and your weather App has to use climatology (the most recent 30-year dataset) to make a "best guess" at what conditions will be like. For example, the average daily high and low temperatures (based on the 1991-2020 climate record) for Bismarck on February 12

1991-2020   **Historic probability of at least 1 inch of snow on Christmas (%)**   NOAA Climate.gov / Data: NCEI

| 0 | 10 | 25 | 40 | 50 | 60 | 75 | 90 | 100 |

are 27°F and 6°F. The average daily precipitation for February 12 is 0.02 inches. An educated prediction for a future February 12 long-range forecast would look eerily similar to those conditions, and might just include a slight chance for snow showers due to the small average precipitation normally received on that day.

When we look at weather forecasts with shorter timescales of seven to ten days, accuracy improves tremendously. Meteorologists are now able to view multiple numerical models and compare them to each other. Graphically, this is done by overlaying the models on the same screen so that general trends and patterns are distinguishable. These groupings of models are appropriately called *ensembles*.

The overall accuracy of weather forecasts has improved significantly in the last 10 to 20 years due to advancements in computer processing, increased data storage including cloud computing, and simply just more data being collected. I hope this helps you better understand the monumental task of forecasting the weather with 100 percent accuracy. If a meteorologist's forecasts are right 75 to 80 percent of the time, I would gladly take those odds.