Life on the Edge: Patterns and Probabilities of Heavy rainfall

By
Richard H. Grumm
National Weather Service
State College, PA 16803

Despite the emergence of high resolution models and regional scale ensembles, forecasting the area and amounts of precipitation is a daunting challenge. Due to uncertainties in initial conditions and model physics it is still not practical to get the precipitation right. This talk discusses the problems and a process to improve anticipating significant events from ordinary events and how to maximize the probabilities.

At times forecast guidance appears to quickly converge on a pattern conducive to producing heavy precipitation. When this occurs the guidance often focuses the precipitation over a specific area. Ensemble forecasts show this as a high probability outcome. But the transition zone from heavy precipitation to lighter amounts often produces a sharp gradient or edge. Forecasting along the edge of a sharp precipitation shield can be challenging.

The forecast methodology here is elegantly simple. The concept relies on patterns and probabilities. The patterns as identified by the large scale conditions and attendant anomalies are used to identify the potential for an event to produce a meteorologically or climatologically significant event. The probabilities leverage an ensemble of forecasts to identify the rainfall threat spectrum from high to low. A pattern favoring a meteorologically significant event with a high probability outcome is rather easy to deal with. But along the edges it can challenge.

Examples of life along the edges will be presented. Experience with such events indicates that time and patience are the keys to successfully dealing with life along transition zones of a significant precipitation event. Sometimes, life in the high probability zone is tough too as uncertainty is a function of lead time.