National Weather Service Meteorological Development Laboratory

The Decision Support Branch (DSB) of the NWS MDL develops and implements techniques to synthesize, display, and manipulate data and guidance from various sources to aid the Weather Forecast Offices (WFO), River Forecast Centers, and National Centers forecasters and other users to aid in forecast and warning decision making, especially for dangerous weather. Such advanced interpretation and display techniques are integrated onto NWS operational workstations. Prototyping of promising techniques in an operational setting is done to identify those best suited for implementation.

The DSB supports one CIMMS scientist who acts as the liaison for the transfer of research and techniques developed at the National Severe Storms Laboratory to WFO severe convective warning operations. The primary activity is within the Forecasting A Continuum of Environmental Threats (FACETs) initiative, developing techniques to provide Probabilistic Hazard Information (PHI) to improve the nation's severe convective weather warning and forecast services and collaborating with the NOAA Hazardous Weather Testbed - Experimental Warning Program at the National Weather Center in Norman. The EWP is a proving ground for evaluating new applications, technology, and services designed to improve NWS short-fused (0-2 hour) hazardous convective weather warning decisions.

Collaborating with NOAA/ESRL/Global Systems Division (GSD) software developers, we are transferring the technology of the NSSL-developed Probabilistic Hazard Information (PHI) Prototype tool into AWIPS2 Hazard Services, a new application platform from which all NWS watches, warnings, and advisories will be issued in the new future. Experiments are conducted in the NOAA HWT experiment each year, using visiting NWS forecasters to test this new Hazard Services – PHI (HS-PHI) application (Fig. 1). Innovative warning verification techniques are also under development, which include new measures such as False Alarm Area and False Alarm Time in verified warnings as well as location-specific lead- and departure-time. These new techniques are well-suited for verifying continuously-updating probabilistic hazard information for severe convective weather (Fig. 2).

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Figure 1: Images from the Hazard Services – Probabilistic Hazard Information (HS-PHI) 2018 spring experiment in the NOAA Hazardous Weather Testbed, including various forecaster and researcher interactions with the software and during group discussions. Also shown is screen capture of the HS-PHI application, showing probabilistic severe thunderstorm and tornado "plumes" (outlined in yellow and red respectively) for a system of severe storms in central Texas.

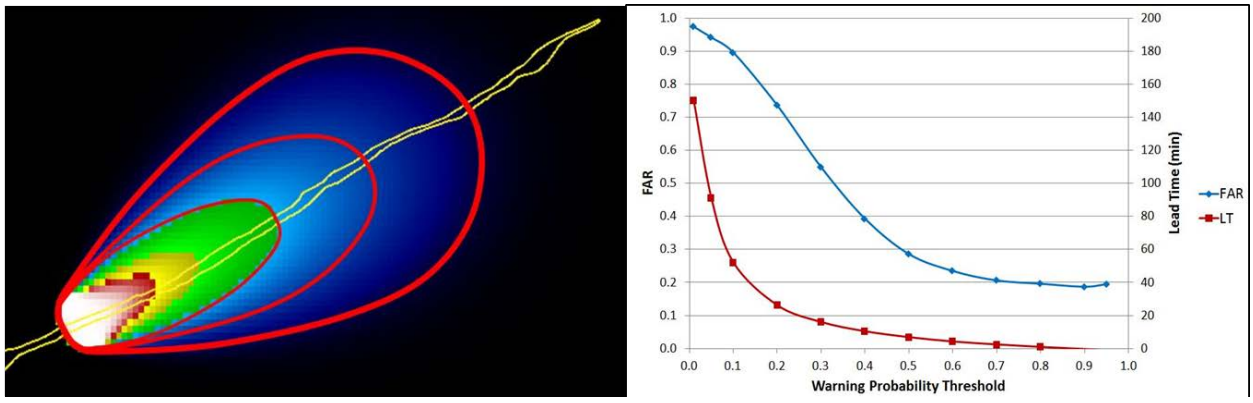

Figure 2: a) left: A storm-scale probabilistic plume at one time during a tornadic storm. The thin yellow contour is the outline of the tornado damage survey. The red contours are three arbitrary warning "polygons", thick, normal, and thin, corresponding to low, middle, and high probability values, respectively, b) right: Variation of lead time (red) and false alarm ratio (blue) for different warning probability thresholds using innovative geospatial warning verification techniues.