

**Product Name:** NOAA/CIMSS ProbSevere v3 (ProbSevere) with associated hazard models (probSevere, ProbHail, ProbWind, and ProbTor)

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**Hazardous Weather Testbed, Experimental Warning Program Relevance:**

- Assists forecasters in severe weather situations by highlighting storms that are more or less likely to become severe/tornadic in the near future.
- Products will be evaluated on their ability to increase forecaster confidence and skillfully extend lead-time to severe hazards for NWS warnings during potential severe weather situations.

**Product Overview:**

- Statistical models provide probabilistic guidance to forecasters on the likelihood of severe weather occurrence for convection in the near term [0-60 min].
- Algorithms incorporate multiple datasets from satellite, radar, total lightning, and NWP into easy-to-interpret products, helping to distill data during busy weather situations.
- ProbSevere guidance is CONUS-wide and day/night independent.
- Time series AWIPSII tool
  - Double-clicking a ProbSevere object displays a window of time series of ProbSevere products.

**Product Methodology:**

- Spatial and temporal features are extracted and computed from satellite and radar storm objects.
  - For 2021 experiment: enhanced satellite-derived storm-top information from a convolutional neural network is an input into ProbSevere.
- Trained gradient-boosted decision trees (statistical models) compute the probability that a storm will produce severe weather in the near-term, using GOES-derived, NEXRAD-derived, Earth Networks Total Lightning Network™ (ENTLN)-derived, Rapid Refresh (RAP)-derived, and Storm Prediction Center (SPC) mesoanalysis data.

**ProbSevere Products**

- ProbHail: provides guidance on severe hail.
- ProbWind: provides guidance on severe convective straight-line wind.
- ProbTor: provides guidance on tornado threats.
- probSevere: all-hazards-in-one display, providing guidance on any of the above hazards.
- Products are displayed as contours around storms on radar, colored by their probability of the given hazard(s).
- Data readout is available by sampling the probability contour. This provides the exact probabilities of hazards and the detailed predictor values.
- Forecasters can display each model separately in AWIPSII.
- Each product updates every 2 minutes.

**Concept for Operational Demonstration:**

- GeoJSON files will be delivered to the HWT via the LDM and converted on-the-fly in AWIPSII.

**Concept for Operations:**

- The ProbSevere system (v2.0) became operational at NCEP Central Operations on 14 October 2020. The primary users are radar/warning operators and mesoscale analysts in NWS WFOs. ProbSevere v3 and the time series tool may be incorporated into operations, pending forecaster evaluation.