

**Goals:**

- Provide probabilistic guidance to increase forecaster confidence and skillfully extend lead-time to severe hazards for NWS warnings during potential severe weather situations.
- Consolidate pertinent observations/data during busy weather situations into one ‘quick-look’ product.

**Methodology:**

- The model leverages an object-centric approach, whereby satellite-object tracking and radar-object tracking operate simultaneously.
- A trained statistical model (naïve Bayesian classifier) computes the probability that a storm will produce severe weather in the near-term, using features extracted from GOES-derived, NEXRAD-derived, Earth Networks Total Lightning Network™ (ENTLN)-derived, and Rapid Refresh (RAP)-derived data.

**Display**

- Product is displayed as color contours of severe probabilities, designed to be overlaid on radar reflectivity.
- Data readout is available by sampling the probability contour. This provides the exact probability of severe and the detailed model predictor values.

**Predictors:**

- For each predictor, larger values increase the probability of severe
- **MUCAPE and Effective Bulk Shear (EBS)**
  - These predictors determine the *a priori* probability, or ‘initial guess’
- **MRMS maximum expected size of hail (MESH)**
- **Normalized vertical growth rate** (GOES-derived)
  - Analogous to 11- $\mu$ m brightness temperature cooling
- **Cloud-top glaciation rate** (GOES-derived)
- **Total lightning flash rate** (CG + IC) and **EBS**
  - A two-dimensional predictor
  - In general, a storm with increasing flash rate and large EBS increases the probability of severe faster than an increasing flash rate at small EBS.

**Strengths:**

- Most large hail situations
- Most discrete, deep convective storms
- Highest skill in high shear environments
- Better lead-time when satellite growth rates are observable (i.e., un-obscured by thick cirrus)

**Weaknesses:**

- Shallow, low-topped convection (low lightning, low MESH)
- Some weaker convective lines or line segments
- Low POD of identifying severe storms in low-shear, low-CAPE environments.
- No tornadogenesis predictors

**On-going development:**

- Create hazard-specific (hail, wind, tornado) storm-based probabilistic guidance
  - Investigate and **incorporate additional radar, NWP, and satellite fields relevant to each specific hazard**

**NWS Feedback: ProbSevere is an experimental product and we welcome constructive feedback to improve its performance and utility, including suggestions for potential predictors for each hazard or in general.**