 For ProbHail:

*a priori:* climatology of severe hail producing thunderstorms from database

**Maximum Expected Size of Hail (MESH) vs the height of the wet bulb 0C**--inclusion of the wet bulb 0C paired with MESH better accounts for lack of melting in low-topped hail storms and increased melting in many southeastern US summertime storms.

**Flash Rate (Earth Networks Total Lightning) vs Effective Bulk Shear**—measure of updraft strength and potential storm organization

**CAPE in -10°C to -30°C layer vs Precipitable Water**—Combination of larger CAPE in hail growth zone and lower precipitable water is more favorable for severe hail

**Satellite growth rate**—Measure of initial updraft intensity

 For ProbWind:

*a priori:* **Mean wind (1-3 km AGL)/MLCAPE**—measure of environmental momentum to potentially transfer to the surface and potential updraft intensity for mixed-layer parcels (mixed-layer parcels are better for wind, while most unstable parcels are better for hail).

**VIL Density**—Measure of precipitation core intensity

**Flash Rate vs 3-6 km AzShear**—measure of updraft intensity and proxy for strength of mid-level storm winds

**Mean wind (1-3 km AGL) vs 0-2 km AzShear**—measure of environmental momentum to potentially transfer to the surface and proxy for strength of low-level storm winds

**Satellite growth rate**—Measure of initial updraft intensity

 For ProbTor:

*a priori:* climatology of tornado producing severe thunderstorms in training database

**Maximum 0-2km AzShear:** Maximum depiction of updraft rotation in lower troposphere

**98th percentile 0-2km AzShear vs 0-1 km Storm Relative Helicity:** Lower tropospheric updraft rotation intensity vs near surface storm relative helicity

**98th percentile 3-6km AzShear vs maximum total lightning flash density:** Middle tropospheric updraft rotation vs measure of updraft intensity

**Effective Bulk Shear vs Mean Wind 1-3 km above ground level:** Storm organization vs momentum present in lower troposphere

**MLCAPE and MLCIN:** Penalty functions only—too little mixed layer instability or too great mixed layer inhibition reduces likelihood of tornado