# NWS WFO La Crosse - Mesoanalyst Reference

(Parameter values should not be followed strictly but rather as spectrums!)

| **Supercells** | **Less-Favorable** | **Favorable** | **Very-Favorable** |
|---|---|---|---|
| *0-6km Bulk Shear (sfc-based storms),*<br>*Effective Shear (elevated storms)* | <35 knots | 38-45 knots (40) | >45 knots |
| *Mean BL CAPE (MLCAPE)* | <1000 | 1000-2500 | >2500 |
| *Storm-relative Helicity (0-3km,sfc-based)*<br>*Effective Storm-relative Helicity (elevated)* | < 150 | 150-300 | >300 |
| *BRN* | >60 with CAPE<2500<br>>150 with CAPE >2500 | 30-60 with CAPE<2500<br>100-150 with CAPE >2500 | <30 with CAPE<2500<br>10-150 with CAPE >2500 |
| *Energy Helicity Index (0-3km)* | <2.0 | 2.0-2.5 | >2.5 |
| *Hodograph* | Backing,length<40knots | Straight,veering,length 40kts | Strong veering, >40knots |
| **Supercell Tor Environments** | **Less-Favorable** | **Favorable** | **Very-Favorable** |
| *Surface Boundaries*<br>*(type/movement/intersections)* | No interaction with boundary<br>Far from bndry, deep cool air<br>Cool side of bndry STABLE | Near or interacting with bndry<br>Cool side unstable | Cool side of shallow bndry<br>Directly on deeper bndry<br>Cool side bndry unstable |
| ***MLCIN***<br>*850-1000mb Lapse Rate* | **>150 J/Kg**<br>< 3.0 C/KM | **150-100 J/Kg**<br>3-5 C/KM | **< 100 J/Kg**<br>>5.0 C/KM |
| *Storm-relative Helicity* ***(0-1km)*** | **<50 [<30% of 3km value]** | **50-75** | **>70-80 [>50%]** |
| ***Energy Helicity Index (0-1km)*** | **<1.0** | **1.0-2.0** | **>2.0** |
| ***0-3 km CAPE*** | **<40 J/Kg [least unstable area]** | **40-70 J/Kg [unstable area]** | **>70 J/Kg [most unstable area]** |
| ***LCL Height***<br>*Lowest 50-100 mb Dwpt Dep*<br>*0-1km mean RH*<br>*LFC Height* | **>3500 ft (1200m)**<br>>19F (>10C)<br><40%<br>>6500 ft (>2200m) | **3000 ft (1000m)**<br>12-18F (6-10C)<br>>50%<br><6500 ft (<2200m) | **2000 ft (600m)**<br><12F (6C)<br>>65%<br><5000 ft (<1600m) |
| ***0-1km Bulk Shear*** | **<10 kts** | **> 10 kts** | **> 20 kts** |
| *VGP (0-2km,0-4km)* | .11 | .21 | .27+ |
| *Storm-relative Helicity (0-3km)*<br>*Energy Helicity Index (0-3km)* | **< 150**<br><2.0 | **150-300**<br>2.0-4.0 | **>300**<br>>4.0 |
| *Surface SR Inflow* | <10kts | 10Kts | >15kts |
| *BRN Shear* | <40 and >100 | 40-100 | 40-100 |
| **Damaging Winds** | **Less-Favorable** | **Favorable** | **Very-Favorable** |
| *500-700 mb Dwpt Dep (C)* | <9C | 10-19C | >19C |
| *0-2km Lapse Rate* | <5.0 C/KM | 6-7 C/KM | >7.0 C/KM |
| *Sounding – Sinking Mid-level parcel* | Warmer than Env T at Sfc | Cooler than Env T at Sfc | Much cooler than Env T at Sfc |
| *DCAPE* | < 800 | > 800 | > 1000 |
| *0-3km Shear* | <18kts, 0-45E to line<br>(little-to-no organization) | 18-32kts, 45-90E to line | >32 kts, perpendicular to line<br>(more organized, longer life) |
| *Derecho: 0-6km Shear, 6-10 km Shear* | <35 knots | 38-45 knots (40), little shear<br>Possible long life | >45 knots,some shear<br>Long-lived |
| *3-6,10km SR Flow* | < 20 kts | 20-30 kts<br>Front-to-Rear Flow, little incr. | >30 kts<br>Front-to-Rear Flow, little incr. |
| *Movement of line vs 500-700mb Wind* | >60E | 45-60E | parallel |

| **Large Hail*** | **Less-Favorable** | **Favorable** | **Very-Favorable** |
|---|---|---|---|
| *3-6 km SR Flow* | < 20 kts<br>Front-to-Rear Flow, Same w/Z | 20-30 kts<br>Rear-to-Front Flow, Incr w/Z | >30 kts<br>Rear-to-Front Flow, Incr w/Z |
| *Wet-Bulb Zero Height* | >12,500 ft or <9000 ft | 11,000, 9000 ft | 9000-11,000 ft |
| *Updraft Freezing Level* | >14,000 feet | 11,500-14000 feet | <11,500 feet |
| **Flash Flood** | **Less-Favorable** | **Favorable** | **Very-Favorable** |
| *Precipitable Water (% normal)* | <100% | 100-200% | 200% |
| *Frontal Boundary* | Fast-moving | Slow-moving, 45-90 degrees to low-level jet/ moisture flow | Stationary, 90 degrees to low-level jet/imoisture inflow |
| *Storm Motion* | >15kts | 5-10kts | <5kts |
| *Low-level Jet Moisture Transport* | No MTV convergence, rapidly moving, <75 unit maximum | Area on downstream, convergent side of MTV grad which remains nearly stationary or moves slowly, >100-200 unit maximum | Area on downstream , convergent side of the MTV gradient which remains stationary, >200 unit maximum |
| *Corfidi Vectors suggest:* | Moderate-Fast storms | Slow storms | Backbuilding/Stnry storms |
| *Precipitation Efficiency* | Shallow/No warm cloud depth<br>Cld base to 0C <2.5km | Moderate warm cloud depth<br>Cld base to 0C is 2.5-4.0 km | Deep warm cloud depth<br>Cld base to 0C >4km |
| | Warm cloud depth is vertical height from cloud base to 0EC on parcel trajectory. | | |
| *Flash Flood Guidance* | Near or Above normal | Below normal | Much below normal |
| *Updraft Strength* | Intense | Intense-Moderate | Weak-Moderate |
| *Radar - Storm Centroid Height* | In upper ½ of storm | Near middle of storm | In lower ½ of storm |

* Favorable if supercells are forecast.

| **Storm Initiation** | **Less-Favorable** | **Favorable** | **Very-Favorable** |
|---|---|---|---|
| *850-1000mb Frontogenesis* | Weak Fn Convergence <10 | Moderate Fn Conv (10-20) | Strong Fn Convergnce (>20) |
| *CIN (J/Kg)* | >60-80 | 50 | 25 |
| *Moisture Convergence (g/kg/12h)* | <20 | 20-30 | >30 |
| *Near Surface Isentropic Flow* | Neutral/Downglide | Weak Upglide | Mod-Strong Upglide |
| **Landspout Tornadoes**** | **Less-Favorable** | **Favorable** | **Very-Favorable** |
| *CAPE* | <500 J/Kg | 1000 J/Kg | > 2000 J/Kg |
| *0-3km CAPE* | <50 J/Kg | 50-150J/Kg | >200 J/Kg |
| *CIN* | High | Lower | None |
| *Surface Boundary* | Moving rapidly | Slow-moving-stationary | Stationary |
| *0-2km Lapse Rate* | <7-8C/Km | 8-9C/Km | 9-10C/Km |
| *Surface Relative Vorticity (vertical)* | Ill-defined boundary | Moderate boundary/wind shift | Strong along boundary/<br>wind shift |
| *Storm Motion* | Moving off boundary | Stays near boundary | Stays on boundary |
| *NST* | < 1 | 1 | > 1 |

** Weak deep shear unfavorable for supercell development.