Checklist parameter thresholds for significant storm types in the WFO BGM CWA

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Outline

• Background
• Defining and identifying significant storm types
• Results
• Alerts added to the checklist
Background

- The WFO BGM severe weather checklist keys on various sounding-based parameters to help forecasters anticipate storm types and event severity.
- Questions: How appropriate is this methodology? Can the parameters in the checklist be used to generate alerts for specific types of major events?
From our historical data base, 3 prevalent major-event-producing events types were identified

- Warm season severe convective lines – Major convective lines occurring from May 15 – September 15. At least 15 wind reports.
- Tornadic supercells – Isolated supercells producing at least one tornado.
- Cool season severe convective lines – Major convective lines occurring from September 15 – May 15. At least 15 wind reports.
Warm season major convective lines
MLCAPE and DCAPE values
Shear values
12-hr 500 mb height fall values
Other flow-based parameters
Warm season major convective lines – key findings / implied thresholds

• These are high CAPE events – values generally over 2000 J/kg.
• Shear is strong, particularly in the 0-3 km layer which is typically greater than 30 kts. 0-6 km shear is often similar in magnitude to the 0-3 km shear.
• Height falls are typically not very large.
• Equilibrium level storm relative flow is typically less than 40 kts.
• Mean flow is often westerly, or west-northwest (not shown).
Tornadic, isolated supercells
MLCAPE values
Shear values
0-1 km helicity values
12-hr 500 mb height values
Isolated, tornadic supercells – key findings / implied thresholds

• MLCAPE values for these events were mostly moderate, and were generally somewhat less than for the severe convective lines. Values mainly from 800 to 2500 J/kg.

• Shear values were larger than for the severe convective lines in the 0-1 (greater than 20 kt) and 0-6 km (greater than 40 kt) layers, and were about the same in the 0-3 km (greater than 30 kt) layer.
Cool season major convective lines
MLCAPE values

MLCAPE box and whisker plot
Shear values

shear box and whisker plots
12-hr 500 mb height falls
Lapse rate values

Surface to 700 mb and 700 mb to 500 mb lapse rates
Cool season major convective lines – key findings / implied thresholds

- These are low CAPE events, with values generally less than 600 J/kg.
- Shear is very strong with these events, 0-1 km shear is usually greater than 30 kt, 0-3 km shear is usually greater than 40 kt, and 0-6 km shear is usually greater than 50 kt.
- Dynamical forcing is often strong. These events were all associated with cold fronts, 12-hr 500 mb height falls were mostly greater than 40 m.
- Despite being cool season events, surface-700 mb lapse rates were fairly steep, mostly at least 6.5 degrees C per km.
Summary / Conclusions

• Parameters from our local severe weather data base appear to indicate some useful thresholds for major severe weather events when the events are segregated by type.

• These thresholds are being used to generate alerts on the checklist when a combination of inputed parameter values exceed the thresholds.