An assessment of local forecaster's ability to anticipate convective event severity using the Hazardous Weather Outlook product at WFO Binghamton, NY

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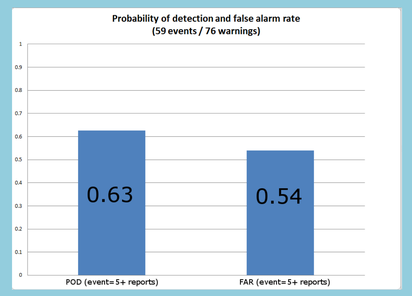
Background / Motivation

- The NWS is collaborating with researchers at SUNY Albany to examine convective events in environments with low predictive skill in the northeast U.S.
- This research is designed to aid with that larger project by identifying characteristics of well-forecast vs. poorly forecast events in the Binghamton, New York county warning area.
- Questions to be answered by this study: How good is our ability to anticipate severe convection? What factors influence our ability to anticipate the magnitude of events.

Outline / methodology

- Examine 0-24 h Hazardous Weather Outlook products issued on the midnight shift from 2011-2014.
- Define a "warning" anytime the local Hazardous Weather Outlook includes "severe", "large hail", or "damaging wind".
- Define an "event" as any day when 5 or more severe weather reports were received. (Source: storm data).
- A false alarm occurs when a "warning" was issued and fewer than 5 severe weather reports were received on that day.



Results

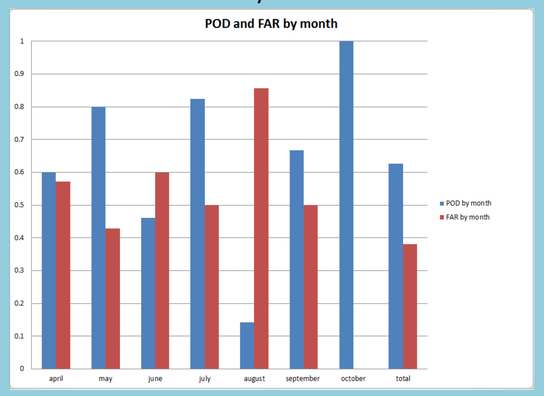
Note: Varying the threshold for what determines a severe event changes the POD and FAR:

Threshold = 1 report: POD = 0.55, FAR = 0.38
Threshold = 5 reports: POD = 0.63, FAR = 0.54
Threshold = 10 reports: POD = 0.76, FAR = 0.63
Threshold = 15 reports: POD = 0.79, FAR = 0.76

Major events are more likely to be forecast than marginally severe events. Raising the event threshold results in many false alarms.

Factors that determine predictability

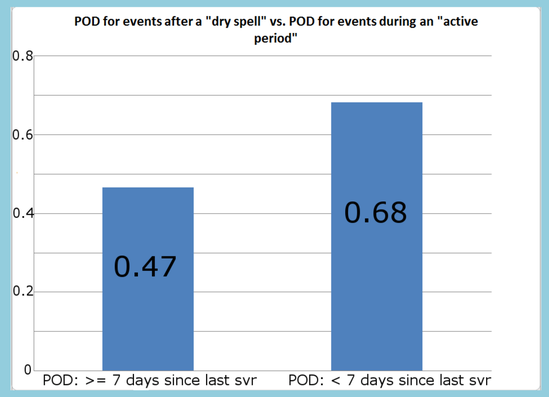
Seasonality



Events:	5	10	13	17	7	6	1	59
Warnings:	7	14	15	24	7	8	1	76

Forecasts have been poor in June and especially August, better in spring and fall.

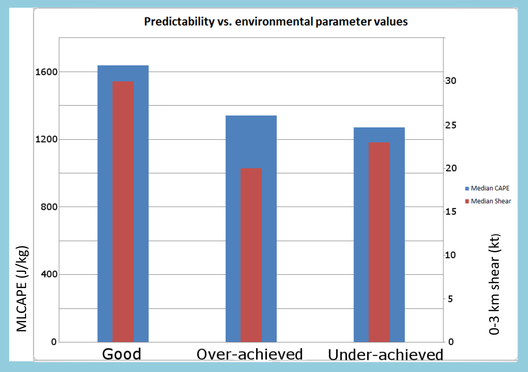
Frequency (do we get "out of practice" during dry spells?)



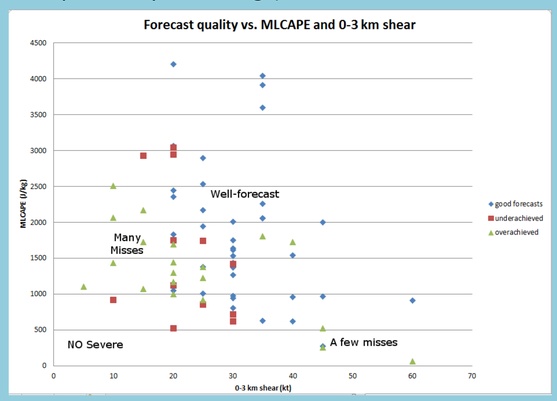
Events: 15 44

Dry spells of severe weather (defined as a period of 7 or more days with no severe weather) appear to adversely affect our ability to anticipate severe weather events.

Environmental characteristics: (Source: 0-6 hr RAP / NAM proximity soundings)

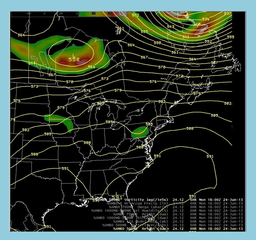


"Good" forecasts (warning issued and event occurred) tend to occur when MLCAPE and 0-3 km shear are both large. Events with severe weather when none was expected ("over-achieved") and false alarms ("under-achieved") both featured less MLCAPE and less 0-3 km shear.

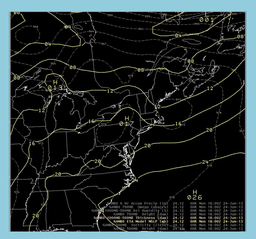


This diagram shows the distribution of good and bad forecasts as a function of MLCAPE and 0-3 km shear. The good forecasts occurred with large MLCAPE and shear, while several missed events occurred with moderate MLCAPE and weak shear (pulse severe environments).

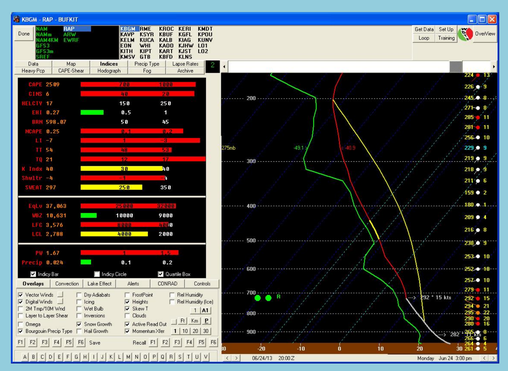
Example of a low predictability event – June 24, 2013



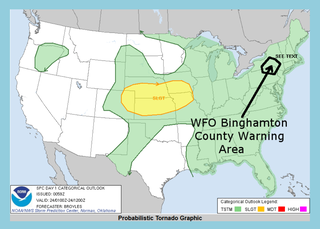
500 mb and vorticity 6/24 18z



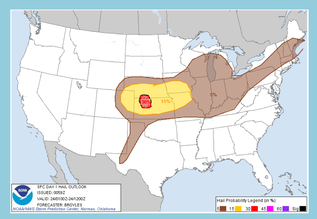
Sea-level pressure 6/24 18z



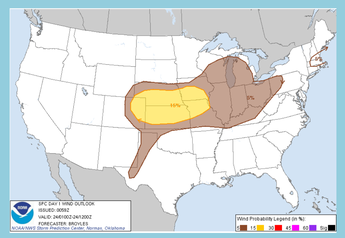
RAP sounding at BGM valid at 6/24 20z. Note the moderately large instability (MLCAPE value of 2509 J/kg) and weak wind field. A 20-25 kt low-level jet can be seen around 800 mb, but mid-level winds were light. 0-3 km bulk wind shear values at this time were approximately 10 kt.



SPC outlook – all severe



SPC outlook - hail



SPC outlook - wind

"SCATTERED THUNDERSTORMS ARE EXPECTED TODAY WITH BEST CHANCES THIS AFTERNOON… SOME MAY CONTAIN HEAVY RAINFALL"

BGM Hazardous Weather Outlook issued at 422 AM June 24, 2013.

KBGM reflectivity – 6/24 19z

June 24th, 2013

-22 large hail reports
-16 damaging wind reports
- 7 days since the previous severe weather occurrence.

Summary: Predictability may be a function of:

The season – More predictable in spring and fall
Severe weather frequency – More predictable in periods of frequent severe weather occurrence.
The environment – More predictable in large MLCAPE / large-shear environments. Weak shear events are often missed.

Future work:

This study will be a part of a larger collaborative study between the NWS and SUNY Albany on severe convection in scenarios with low predictive skill.