Determining Missed Events when Evaluating Probabilistic Convective Outlooks

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Introduction

- Probabilistic outlooks above the minimum thresholds (2 or 5%) are difficult to assess
- Not every observed storm report (OSR) is forecast by these heightened outlooks
- **How can those OSRs that should be used to evaluate a particular outlook be identified?**
- If OSRs can be linked to specific outlooks for evaluation purposes, missed events can also be determined

Data & Methods

- Probabilistic outlooks (issued at 06 UTC) and corresponding OSRs were gridded on an 80-km lat-lon grid for each day during 2006–15
- OSR grid boxes were assigned values of ‘0’ or ‘1’, and smoothed to form “Practically Perfect” (PP) forecasts with values ranging from 0.0 to 1.0
- PP forecasts take on the appearance of convective outlooks by identifying a threshold value (e.g. 0.5) and making a contour
- For each day, OSRs are compared to PP contours beginning at 0.01 until the coverage meets or exceeds the outlook probability value

Preliminary Results

- Those OSRs within an identified PP contour are used to evaluate the corresponding convective outlook using metrics from 2x2 contingency tables (i.e., POD, FAR, CSI)
- A forecast is skillful when its CSI value is higher than that achieved using the 0.0 PP contour
- Measures are calculated using either all days (including missed events), or only those days on which convective outlooks were issued

Table 1. Probabilistic tornado outlooks.

	Outlooks	Skillful	Misses	False Alarms	Skillful (Outlooks)	Skillful (All)	False Alarms	Correct Issuance
Torn02	1648	215	781	537	13.0%	8.9%	32.6%	58.7%
Torn05	831	284	542	304	34.2%	20.7%	36.6%	49.3%
Torn10	210	125	543	34	59.5%	16.6%	16.2%	24.5%
Torn15	64	50	500	4	78.1%	8.9%	6.3%	10.7%
Torn30	6	5	219	0	83.3%	2.2%	>0.1%	2.7%
Torn45	1	0	102	0	0.0%	0.0%	0.0%	1.0%
Torn60	0	0	102	0	---	0.0%	---	0.0%

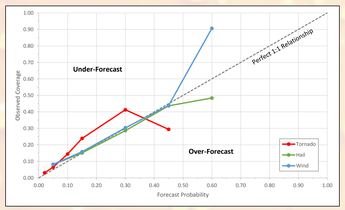
Table 2. Probabilistic hail outlooks.

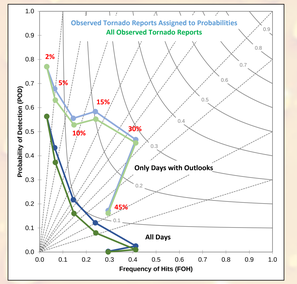
	Outlooks	Skillful	Misses	False Alarms	Skillful (Outlooks)	Skillful (All)	False Alarms	Correct Issuance
Hail05	1906	672	556	300	35.3%	27.3%	15.7%	74.3%
Hail15	1278	789	721	144	61.7%	39.5%	11.3%	61.1%
Hail30	448	302	951	35	67.4%	21.6%	7.8%	30.3%
Hail45	81	60	878	2	74.1%	6.3%	2.5%	8.3%
Hail60	3	3	602	0	100.0%	0.5%	0.0%	0.5%

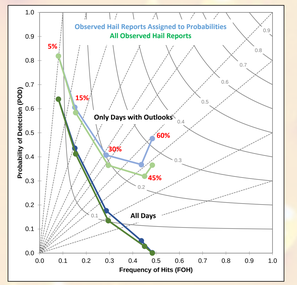
Table 3. Probabilistic wind outlooks.

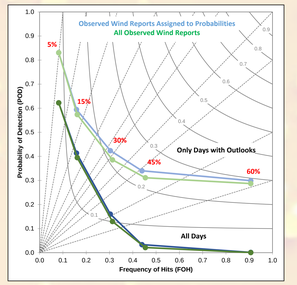
	Outlooks	Skillful	Misses	False Alarms	Skillful (Outlooks)	Skillful (All)	False Alarms	Correct Issuance
Wind05	2080	647	561	424	31.1%	24.5%	20.4%	74.7%
Wind15	1388	798	740	197	57.5%	37.5%	14.2%	61.7%
Wind30	444	305	1058	35	68.7%	20.3%	7.9%	27.9%
Wind45	61	38	1031	1	62.3%	3.5%	1.6%	5.5%
Wind60	1	1	768	0	100.0%	0.1%	0.0%	0.1%

- This approach identifies too many missed events
- The rate at which forecasts are skillful increases as probability values rise
- The rate at which outlooks are incorrectly issued decreases with incr. probs









- When comparing scores based upon this approach vs using all OSRs for all outlooks small improvements in POD and CSI were observed
- Larger differences in POD and CSI values are evident when calculating using all days vs only outlook days
- On the reliability diagram, hail and wind were well forecast, while tornadoes were under-forecast at higher probabilities
- At higher probabilities, there are too few forecasts to identify meaningful trends or draw meaningful conclusions

Continuing Work

- The number of missed events identified using this approach is a problem, but one solution to reducing this number may lie in incorporating the magnitude and severity of OSRs into it