Developing the Ozarks Pulse Thunderstorm Index

Doug Cramer, NWSFO Springfield, MO & Noah Lock, University of Kansas

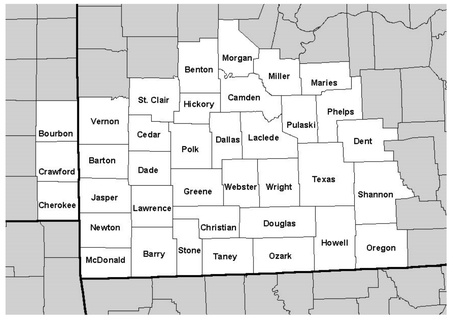
1. Abstract

Pulse (or airmass) thunderstorms present both a forecast challenge and a warning challenge to NWS meteorologists. The Ozarks Pulse Thunderstorm Index (OPTI) was developed at the NWSFO in Springfield, MO in an attempt to identify the environment in which severe pulse thunderstorms occur in the Springfield CWA. The OPTI is based on lowest 100-mb mixed-layer CAPE and CIN, precipitable water, and 700-350 mb RH.

2. Methodology

Period of study: July and August, 1996-2008

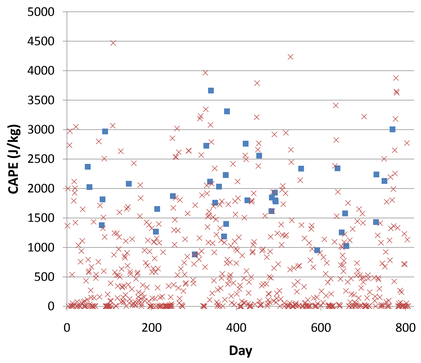
Location of study: NWSFO Springfield CWA (see map below)

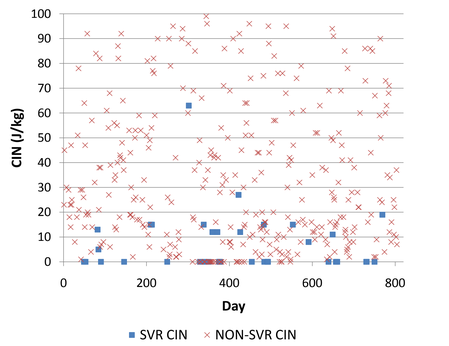


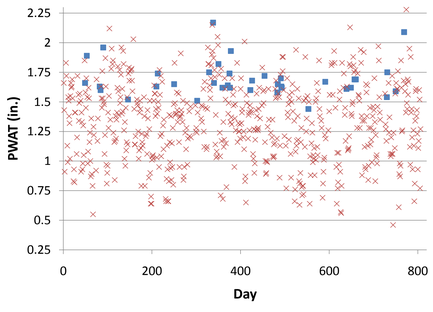
Data sources: Archived 00Z KSGF soundings (accessed on Plymouth St. University site) and North American Regional Reanalysis, provided by Saint Louis University.

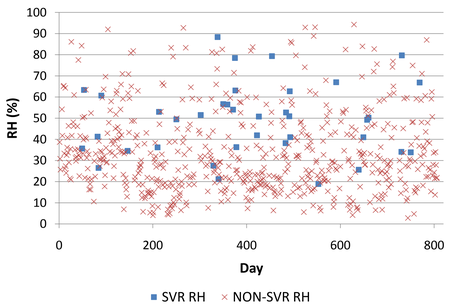
3. Results

- 37 pulse severe days
- 618 non-severe days



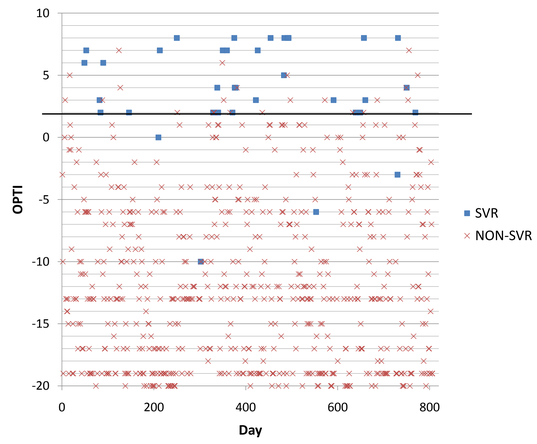






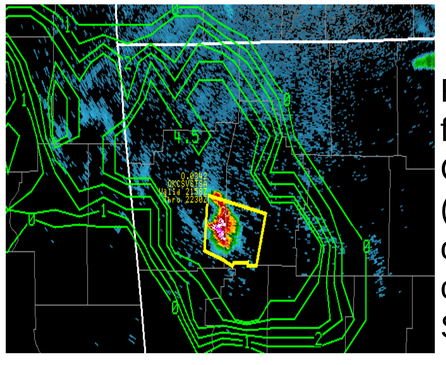
Points assigned (-5 to 2) to value ranges of each parameter, added to give value of OPTI (-20 to 8).

OPTI	-20 to 1	2-4	5-6	7-8
Potential	No Chance	Chance	Likely	Extreme



POD	FAR	CSI
0.89	0.41	0.55

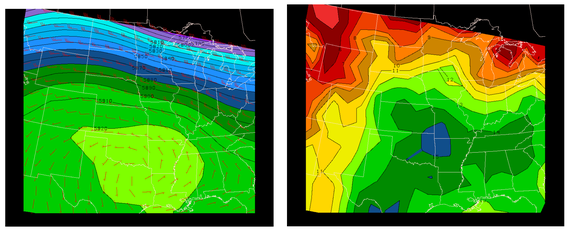
OPTI calculated in AWIPS using model data (RUC, NAM, GFS)



Radar image from 7/13/09 with OPTI contours (using RUC13) overlaid. Image courtesy of Jason Schaumann.

4. Synoptic Pattern

Pulse storms tend to occur:
-On the north side of the 500 mb high
-In areas of greater low-level moisture



Storm-relative composites of 500 mb heights and winds (L) and 850 mb dewpoints (R) on pulse severe days. Storm location shown by "X".

5. Conclusions

In limited testing this summer, the OPTI was able to identify regions of pulse thunderstorm development in advance. However, OPTI values did not necessarily correlate to severity of storms, which is the focus of ongoing study and possible refinement of the index.

6. Acknowledgements

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