Synoptic and Mesoscale Patterns Associated with 27 April 2011 Tornado Outbreak
Analyzing differences and similarities between 27 April 2011 Tornado Outbreak and 25 May 2011 Non-Outbreak Tornado Event to Improve Tornadic Severe Weather Forecasting in the Memphis County Warning Area

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ABSTRACT
Every weather event is different; however, there are many of these events that have similarities. This is why the National Weather Service office in Memphis, Tennessee has aimed their efforts to improve severe tornado forecasting. Moreover, studies have shown that this region has the highest death rate due to tornadoes. Everything is not known about tornadogenesis, but one thing is: tornadoes tend to form within supercell thunderstorms. Hence, 27 April 2011 and 25 May 2011 were days when a Tornado Outbreak was expected to arise. Although 22 tornadoes struck the region on 27 April 2011, only 1 impacted the area on 25 May 2011. In order to understand both events, comparisons of their synoptic and mesoscale features were made. These parameters were studied using the Weather Event Simulator system and the NOAA/NWS Storm Prediction database. This research concentrated on the Surface Frontal Analysis, NAM40 700mb Dew-Points, NAM80 250mb Wind Speed and NAM20 500mb Vorticity images as well as 0-6 km Shear, MUCAPE and VGP mesoscale patterns. As result of this research a Dry-Line ahead of a Cold Front, Dewpoints °C and higher, and Vorticity going from 15x10^-5s^-1 to 30x10^-5s^-1 were synoptic patterns that influenced to the formation on supercell tornadoes. Finally, MUCAPE and VGP favored the possibility of tornadoes occurrence on 25 May 2011, but shear was the factor that made 27 April 2011 a day for a Tornado Outbreak weather event.

2. Methodology

1. Introduction

April 27 2011 and May 25 2011 severe weather events were very similar in terms of their mesoscale and synoptic parameters. However, 22 tornadoes formed on April 27 and one on May 25 in the Memphis Area of responsibility. The intent of this research is to evaluate and analyze the different mesoscale-synoptic patterns for the 27 April 2011 Tornado Outbreak. Furthermore, both events’ mesoscale and synoptic-scale factors were compared to get a better understanding on how differences can be quite small and lead to big changes.

2. Results

3. Results

4. Conclusions

5. Future Work

6. Acknowledgements

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