



The Effects Of ENSO Events On Tornado Activity Over The Spring Months Of April Through June In Dixie Alley

From 1983-2013
Caitlin J. Lawrence



Introduction

Increased frequency of tornadoes in the southeastern United States that comprise Dixie Alley and is considered an extension to Tornado Alley.

Dixie Alley States include Alabama, Georgia, Tennessee, Mississippi, Louisiana, and Arkansas.

Dixie Alley produces more transitional and nocturnal tornadoes than anywhere in the United States and has an above normal number of tornadoes that occur there every year, which gave this region its name of Dixie Alley.

Not as much research done in this area, which opens the door to scientific investigation as to why tornadoes are more frequent here.

Purpose

Study the relationship between the EL Nino Southern Oscillation cycle (ENSO) to the number of tornadoes produced in Dixie Alley and the strongest tornadoes ranging from F3-F5 over the spring months of April through June from 1983-2013 to investigate whether a possible correlation exists among the data or if certain jet stream patterns are producing more or less frequent and strong tornadoes.

Not as much research done in this area on the spring transitional season, which is a time when tornadoes are more prone in this area.

Highly populated area, is associated with fewer storm shelters, and is exposed to more obstructions such as buildings and trees that would lead to more damage and harm to humans, which is why this research is important to study in order to improve tornado prediction accuracy in these areas to forewarn residents.

Study each month separately showing the relationship between the ENSO cycle and tornado frequency and the ENSO cycle to F3-F5 tornadoes to see the overall correlation and pattern for each individual month in these two separate studies.

Study the same data for each case study with the months combined to see the overall correlation and pattern for the season.

Previous research

Previous research at other times of the year has shown that more scientific investigation needs to be performed as to why tornadoes are more frequent in Dixie Alley and in the spring months. This would also include tornado behaviors, their paths, the time of year they form, and the synoptic meteorological patterns and parameters that cause the tornadoes to form at certain times of the day and year in these particular states. Past research has indicated that Dixie Alley tornadoes form year round, but are more prone to form in the transitional seasons, which include fall and spring. (Dixon, et al 2014).

All of the previous research done and lack of research that needs to be studied in Dixie Alley inspired me to do further research for the reasons for tornado development in Dixie Alley by comparing ENSO to tornado production in this region.

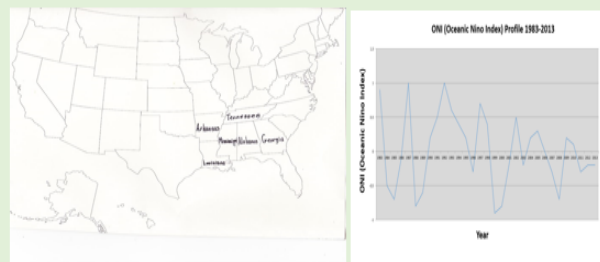
Methodology

Climate Prediction Center (El Nino Southern Oscillation Data) 1983-2013

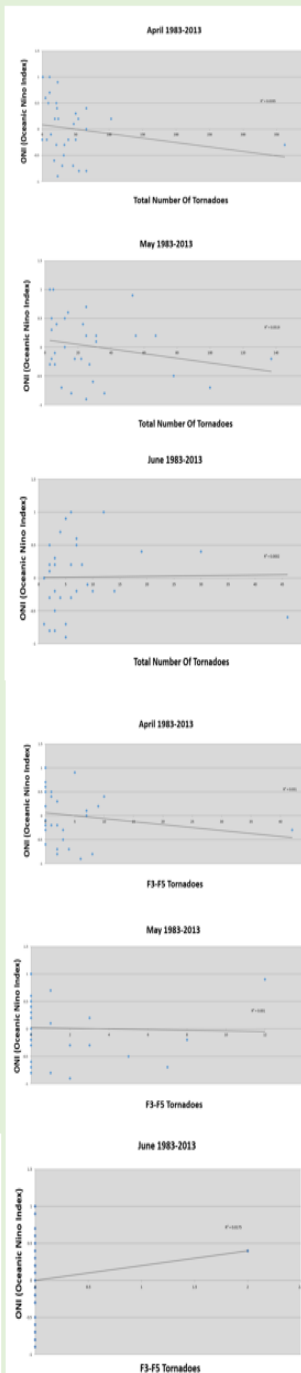
Tornado History Project (Avoids path width to eliminate population bias and is only focused on the weather conditions that produced the tornado, updated frequently, improved accuracy and trusted site for data gathering) 1983-2013.

Spring months of April, May, and June will be analyzed separately for two different case studies in scatter plots to find the pattern and correlation among the data -relationship between the ENSO cycle and tornado frequency -relationship between the ENSO cycle and tornado strength ranging from F3-F5.

These months will also be analyzed together to study the overall correlation and pattern for the season in scatter plots for two different case studies -relationship between the ENSO cycle and tornado frequency -relationship between the ENSO cycle and tornado strength ranging from F3-F5.



Analysis



Conclusions

El Nino does not play any significant role on how frequent tornadoes may occur or how strong they will be throughout the spring months of April through June over these defined years.

Research still needs to be done to compare other types of meteorological reasoning as to why tornadoes are more frequent and what strengthens them as well in the transitional seasons of the year.

It was discovered that the neutral phase of the ENSO cycle favored the most tornadoes overall. The correlation coefficients among all of the datasets were too miniscule to support any relationship among the data. Therefore, the alternative hypotheses is rejected and the null hypothesis remains approved.

Future Work

I would like to compare other teleconnections to tornado frequency and strength, such as; the North Atlantic Oscillation and the Pacific North American pattern to investigate whether a relationship exists among the data in the southeastern states that comprise Dixie Alley over a few decades. I would also like to compare certain sounding parameters to tornado frequency and strength in Dixie Alley throughout several decades. This will enhance my research and knowledge as to what actually relates to or does not relate to the possible formation of tornadoes in this region.

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