Improving Lightning Awareness in South Florida

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Abstract

The state of Florida is the lightning capital of the country. With thunderstorms occurring most afternoons during the late spring, summer, and early fall, residents and visitors of Florida are particularly susceptible to the often-dangerous impacts from lightning. In fact, during the last 22 years there have been over 200 documented injuries and deaths across South Florida alone. The objective for this project is to investigate methods which can increase awareness for South Floridians about the dangers of lightning. Using NOAA's Storm Event Database from January 1996 through August 2018 to collect data on lightning injuries and deaths, as well as lightning flash data from Vaisala's National Lightning Detection Network (NLDN) via NOAA's Severe Weather Data Inventory, we recorded the number and location of lightning strikes which best matched the location and time indicated in the NOAA Storm Event Database. We then measured the distance between the core of the parent storm (often perceived to be the most dangerous area) using reflectivity data from the National Weather Service's Weather Surveillance Radar (WSR 88-D), and the lightning strikes suspected to have caused the fatality or injury in each event. Upon aggregating all cases, this study reveals a particularly impactful finding: most lightning strikes that caused injury or death occurred a few to several miles from the core of the parent storm. The ultimate goal of this work is to lay the foundation for data-driven outreach to improve lightning awareness, and promote safety campaigns oriented at limiting the occurrence of injury and fatalities directly related to lightning in South Florida.

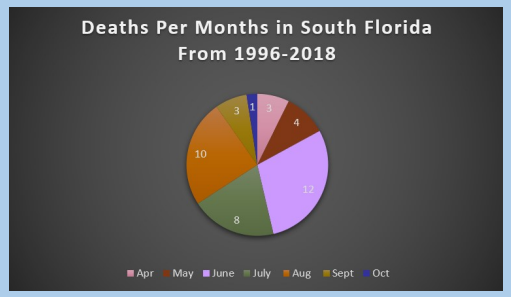

Figure 1: Deaths per month in South Florida occurring in the years 1996 to 2018. The months with deaths occurring are displayed. June had the highest death rate due to lightning strikes.

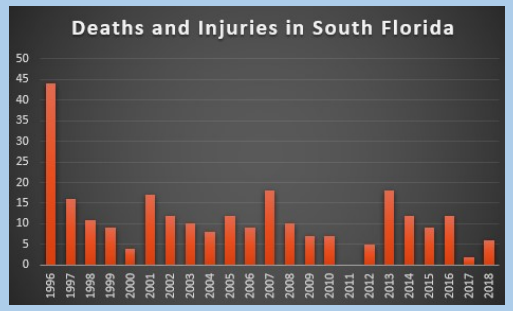

Figure 2: Deaths and injuries in South Florida occurring from 1996 to 2018. In 1996, 2001, 2007 and 2013 there were over 15 lightning injuries and deaths in one year!

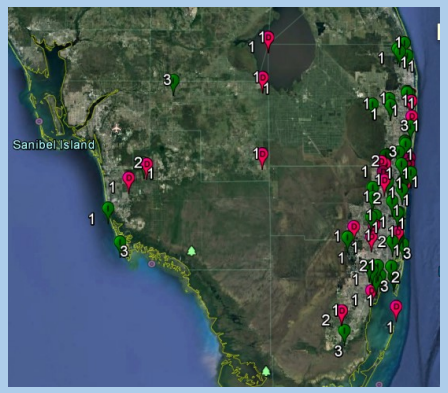

Figure 3: Location of the lightning injuries and deaths. The death locations are pinned in pink and the injury locations are in green.

Example Case

On August 4th, 2016 in Broward County, FL, there was only one lightning strike within a 5 mile radius for the entire day. This lone strike was likely responsible for two people being injured outside of a furniture store. This case validates that you do not need to be located near the core of the storm to become injured or killed by a lightning strike.

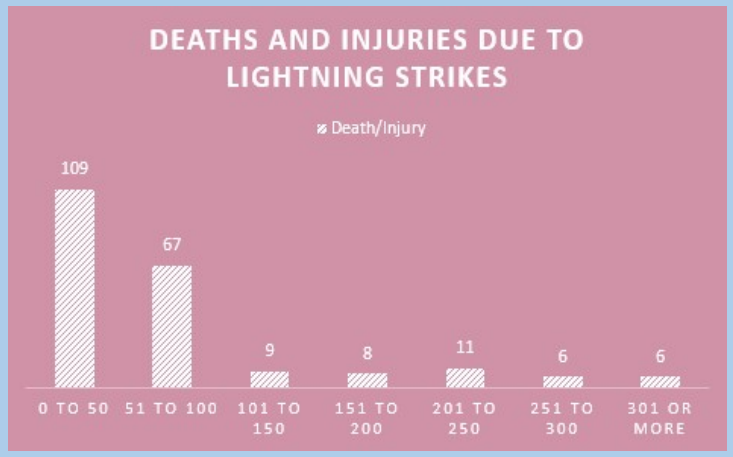

Figure 4: Deaths and injuries from lightning strikes. The categories are separated in how many lightning strikes occurred the day of the incident in a 5 mile square radius around the location.

Methods

The initial data was found from the *NOAA's Storm Event Data Base.* From there, the amount of people injured/killed was collected as well as the coordinates, time, and date of the incident. With this information, each location, time, and date were uploaded into the *NOAA's Severe Weather Data Inventory* which detects the amount of lightning strikes within a 5 mile radius for the location selected (Figure 5). The data was then narrowed down to which strike was the one that did the damage. The data was then reorganized into county of occurrence, amount of injuries, and the distance of the strike from the incident. Using the GIS Radar Data Map, the location of the incident was detected and the distance from the core of the storm was found for when that strike occurred.

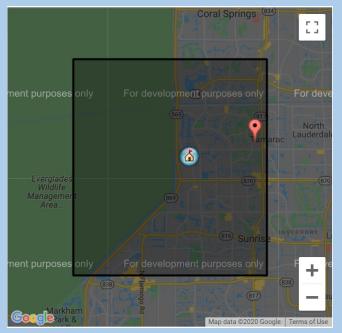

Figure 5: Example of data found from the NOAA's Severe Weather Data Inventory. The red pin represents the lightning strikes.

Results

As shown in Figure 1, the month with the most deaths caused by lightning occurs in June, which is when the weather is exceptionally active. Using the data found in Figure 5, the distance of the strike from the incident was calculated. The results of these measurements found that in most cases the days with the least amount of lightning strikes caused the most amount of human damages (as seen in Figure 4). Additionally 56% of the injuries or deaths happened when the core of the storm was over a mile away.

Conclusion

Based on the findings in this study it is important that warning and alerting systems take in to account lightning strikes that can occur outside the main core of the storm. While many facilities, including parks and stadiums, already alert for lightning strikes within a 5 mile or greater radius, greater public awareness of lightning strikes away from the core of the storm is still needed to reduce the number of lightning causalities In conclusion, even when it does not look as storm-like outside, there is still a possibility of being struck by lightning and therefore greater public awareness is needed. This could be done via public lightning awareness campaigns as well as through heightened meteorological analysis and alerting.