

NLDN Lightning Strike Patterns for Southwest Lower Michigan

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## Why Bother?

## Two Motivations ...



I used to work in Tallahassee and attended Florida State University. Applied lightning research has been very active there.



The Florida Panhandle coastline has similarities to the Southwest Lower MI coast. Would lightning patterns be similar, or will the stronger mid-latitude prevailing flow wipe that out?



This is a great opportunity to develop skill with Python, NumPy, and other applications that will be helpful for other research opportunities.





Dataset for 2014 seemed like such an outlier, it was deemed questionable and omitted for the purposes of the study.





This is how the lightning data were gridded and normalized. A value of "1" in a grid means there has to be an average of one strike per hour every month and every year – highly unlikely given the cold season and nighttime when convection is less common.



Most afternoon storms occur with prevailing low-level southwesterly winds bringing moisture into the area. Horizontal Convective Rolls (HCRs) form and the one that parallels the lakeshore for the longest period of time becomes dominant, likely due to solenoidal forcing between the cooler water and warmer land. Big and Little Sable Points to the northwest should help focus winds into convergent boundaries. Southern points gets added topographic forcing. We often see a lake shadow (blue dashed line) that sometimes lines up with the topo gradient. Finally there is elevated terrain in Southeastern Lower MI that can play an influence.





Lightning minimum over SE LM Ridge.





Dominant HCR convection over SW Lower MI starting to appear over Berrien Co. Continued lightning min at ridge top to east with possible upslope flow to west.











Starting to see far more activity over Lake MI.



Lake MI continues.



Interesting E-W maximum extending from Detroit.



Surprisingly strong signal of convection moving onshore around 1 am. Is this real?



Most lightning now near or just offshore.



No looking at just May. Minimum seems to be around noon.





Questionable maximum just north of Grand Rapids.





Apparent extension of dominant HCR activity in south Central Lower MI.





Possible increase in positive strikes towards downshear end of HCR.



We do see a subtle maximum along the southern point that later aligns with topography.

NLDN Lightning Strike Patterns for Southwest Lower Michigan **Future Work?**• Assess Patterns in other areas (mountains?)

• Bin data by flow direction, stability, etc.

• Use only days with no Lake MI convection

Not having the influence of convection moving onshore should better isolate the lake breeze effects.

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## Thank You!

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