Land Based Temperature Differences in Hurricane Impacted Communities

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GIS Mapping: Risk and Resilience in Ft. Myers, Florida

Abstract

When managing risk in disaster impacted areas, controlling both the upside and downside risk is desirable. Using the Geographic Information Systems (GIS) mapping tool, we can identify and quantify the land-based temperature changes in a post hurricane impacted area. For this study, identifying the temperature changes after Hurricane Ian can provide an insight and potential time window for shifts in rescue operations tempo for emergency first responders, citizens, and community leaders. Data were obtained from Ft. Myers Airport weather stations.

Introduction

Managing risk in disaster impact areas is a tricky endeavor. Mitigating unnecessary risks is a common approach, however, in certain situations, there may be windows of opportunity that present themselves where a change in operations tempo is warranted. By using GIS to map temperature changes in Fort Myers, FL before and after Hurricane Ian, emergency managers can identify window(s) of time where the temperature may lend itself to changing operations tempo. If windows of time are identified to shift rescue operations tempo, emergency managers will have a chance at leveraging "lucky breaks" and avoiding "bad breaks" in the temperature. Furthermore, drastic changes in temperatures can provide additional flexibility in prioritizing logistical concerns for specific vulnerable communities.
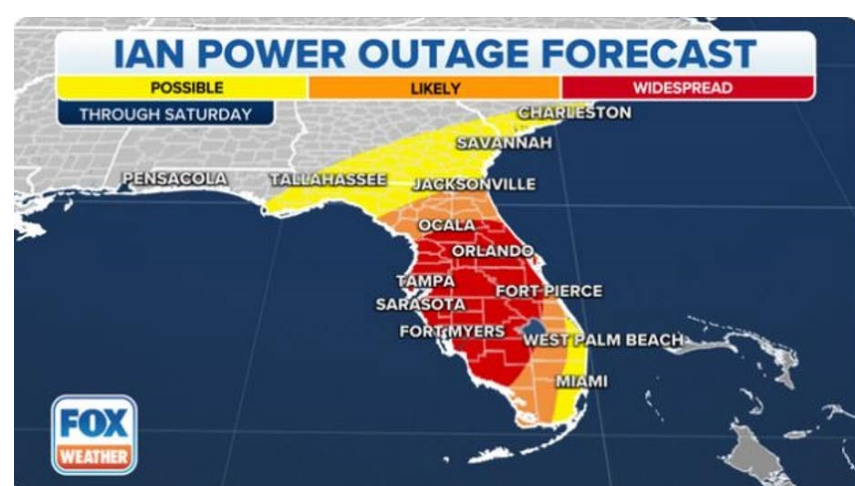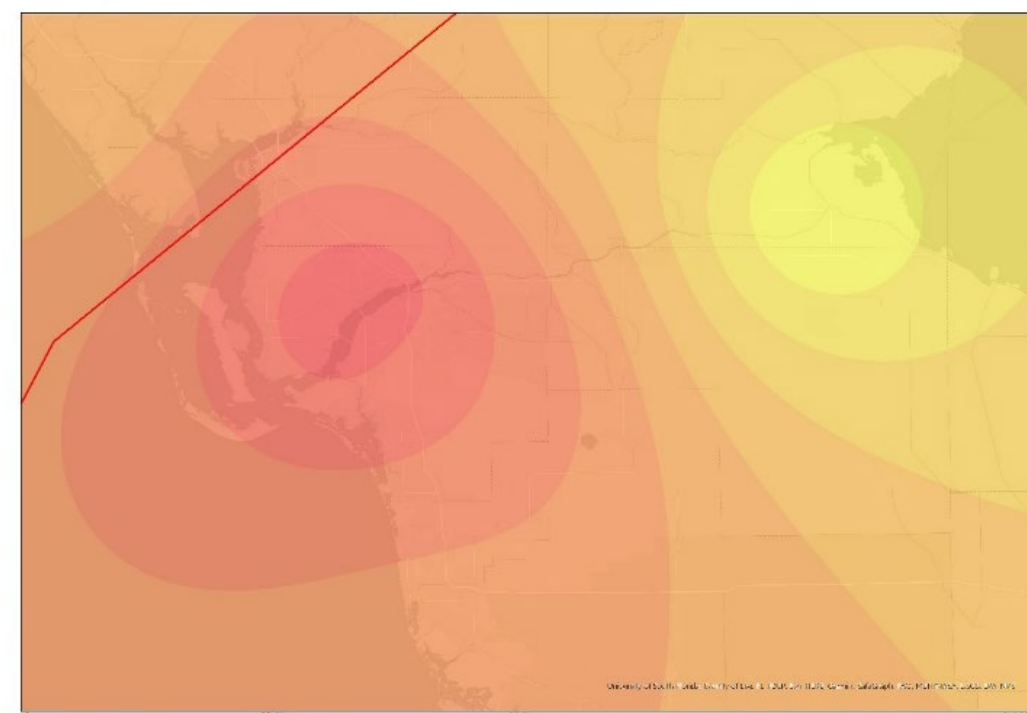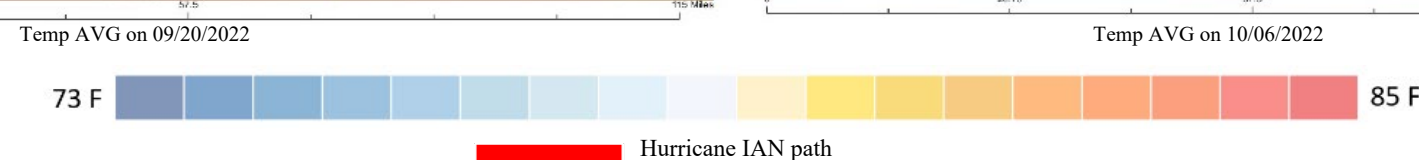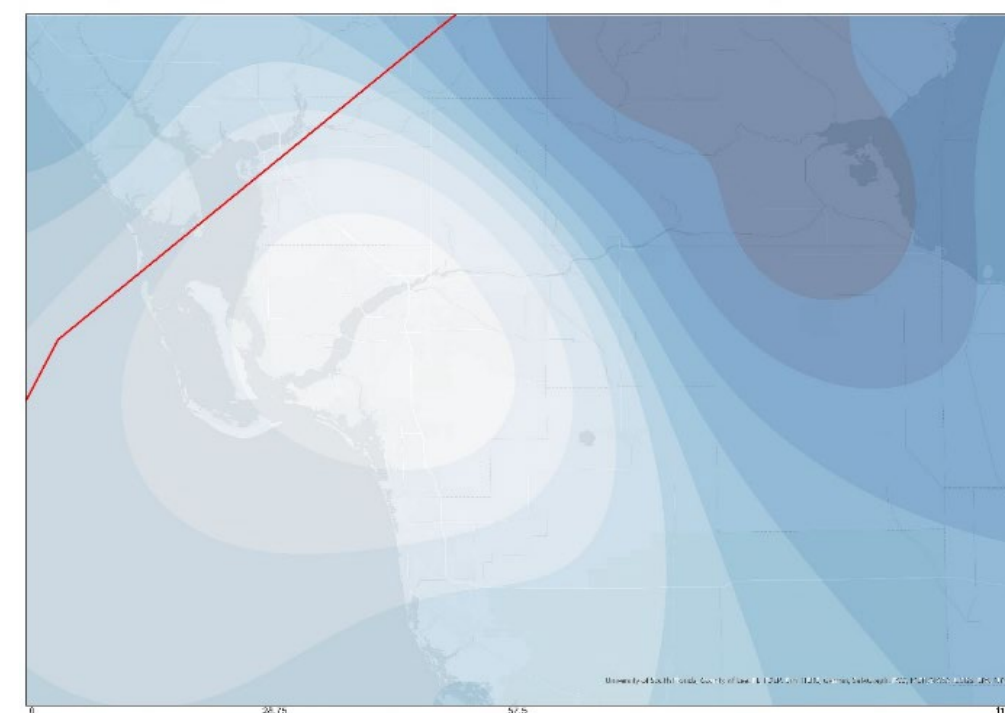

Image 1. Forecasted power interruptions in the areas impacted by Hurricane Ian. Power outages can be deadly for vulnerable communities of Florida.

GIS Mapping Materials

Average Temperatures before Hurricane IAN in Fort Myers area
Temp AVG on 09/20/2022

Average Temperatures after Hurricane IAN in Fort Myers area
Temp AVG on 10/06/2022

73 F ... 85 F

— Hurricane IAN path

Change in temperatures before and after Hurricane IAN in Fort Myers
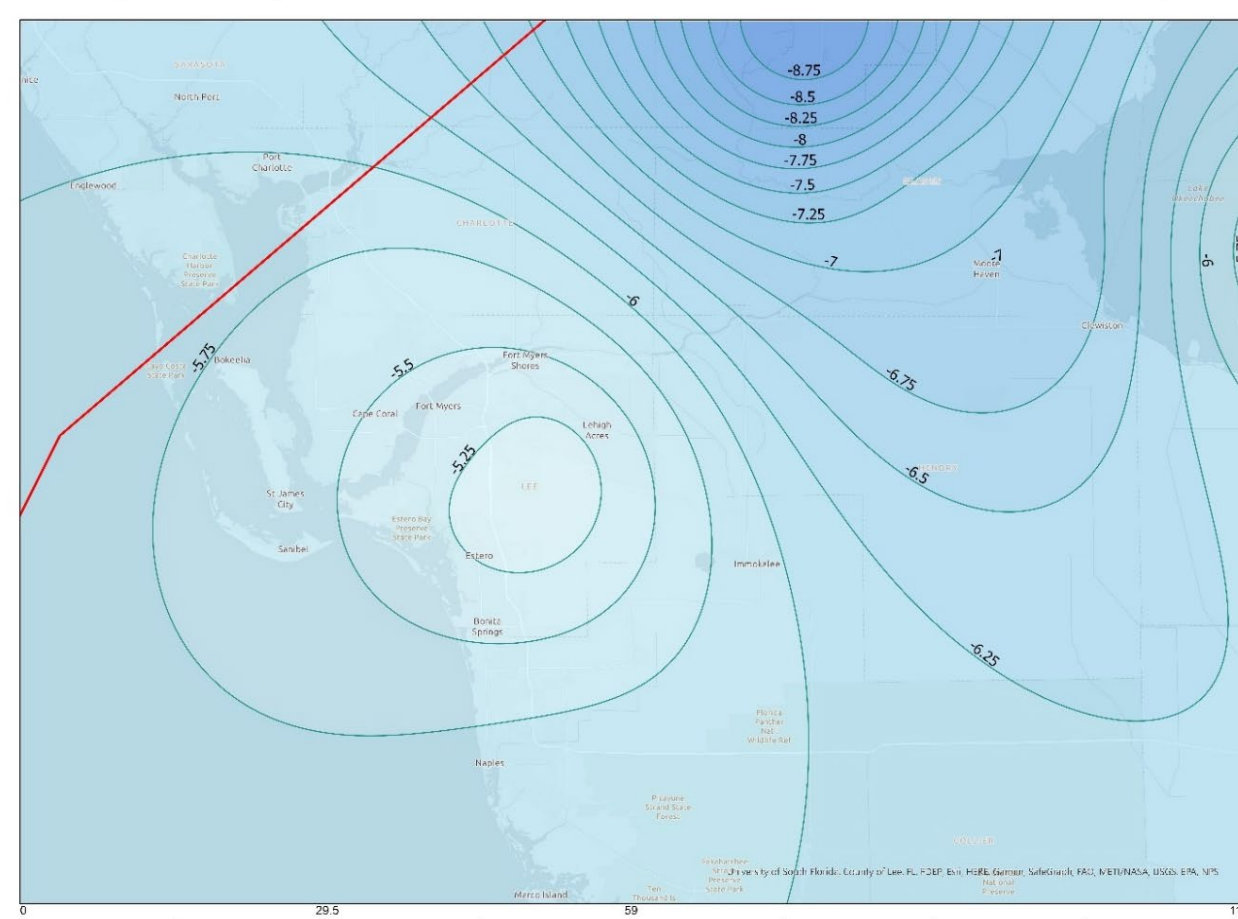
Image 2. Temperature difference between 09.20 and 10.06 in Fahrenheit, Hurricane Ian hit Fort Myers in 09.28

Conclusion

With limited temperature data availability for the hours immediately after Hurricane Ian's departure from Florida, identifying the specific impact the hurricane had on local temperatures can be improved. From the data available, temperature differences were seen dropping in excess of 8 degrees Fahrenheit, a noticeable difference. With better available data immediately following the storm, emergency managers may be able to forecast favorable conditions to increased operations tempo once the "all clear" is given.

Methodology

For the purpose of our project we used the average temperature of the day as parameter.

Combining and interacting using the powerful ArcGIS pro software we obtained a maps that displayed the temperature in the Fort Myers area.

GIS and subsequent raster files were used to identify Hurricane Ian's (2022) track across South and Central Florida. Additionally, temperature data files from several weather and airport stations that weren't disrupted because of hurricane impacts were used. For this study, the project team collected what limited data from Hurricane Ian that it could.

In order to study the temperature after hurricane, we considered where IAN made landfall – Fort Myers. The sorrounded area has many weather stations. Here is the list of the stations where we were able to collect the temperatures data:

- FORT MYERS SW FLORIDA REGIONAL AP
- FORT MYERS PAGE FIELD AP
- MARCO ISLAND
- MOORE HAVEN LOCK 1
- CANAL POINT USDA
- VENICE
- ARCHBOLD BIO STATION

References

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- McCann, D.G. (2011), A Review of Hurricane Disaster Planning for the Elderly. World Medical & Health Policy, 3: 1-26. https://doi.org/10.2202/1948-4682.1144

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