

GLOBAL WARMING - ARE WE READY?



This beautiful picture is captured from ISS of Harvey which destroyed Houston not long ago. The topic we would like to talk about today is Global Warming which lots of people believe is the main cause of hurricanes.

Introduction

► Team Member:

- Sarah Sutar
- O.J. Ndebbio
- Henry Le

► Agenda:

► Intro & Topic Discover (# 1, 2, 3)	01 min	H. Le / S. Sutar
► Data Sourcing, Clean-Up and Exploration (#4)	01 min	O.J. Ndebbio
► 200yrs/50yrs/Yearly Storms (#5,6)	02 min	S. Sutar
► Storm Frequency (#7)	02 min	O.J. Ndebbio
► Category 3, 4, 5 Hurricanes Storm Trackers (#8, 9)	02 min	H. Le
► Challenges Limitations (#10)	01 min	H. Le
► Summary (#11)	01 min	H. Le
► Q&A (#12)	05 min	Team 4

Include the name of the Project and Group Members

Topic Discover

 **GLOBAL CLIMATE CHANGE**
Vital Signs of the Planet

Hurricanes Will Become Stronger and More Intense



The intensity, frequency and duration of North Atlantic hurricanes, as well as the frequency of the strongest (Category 4 and 5) hurricanes, have all increased since the early 1980s. The relative contributions of human and natural causes to these increases are still uncertain. Hurricane-associated storm intensity and rainfall rates are projected to increase as the climate continues to warm. <https://climate.nasa.gov/effects/>

```
[ ]: Hurricane == 'Stronger and More Intense'  
[2]: True  
[3]: False
```



Hypothesis: Is it true that hurricane is stronger, more intense and increasing in frequency?
To validate by data and hard evidence the claim from NASA about hurricane

Data Sourcing, Clean-Up and Exploration

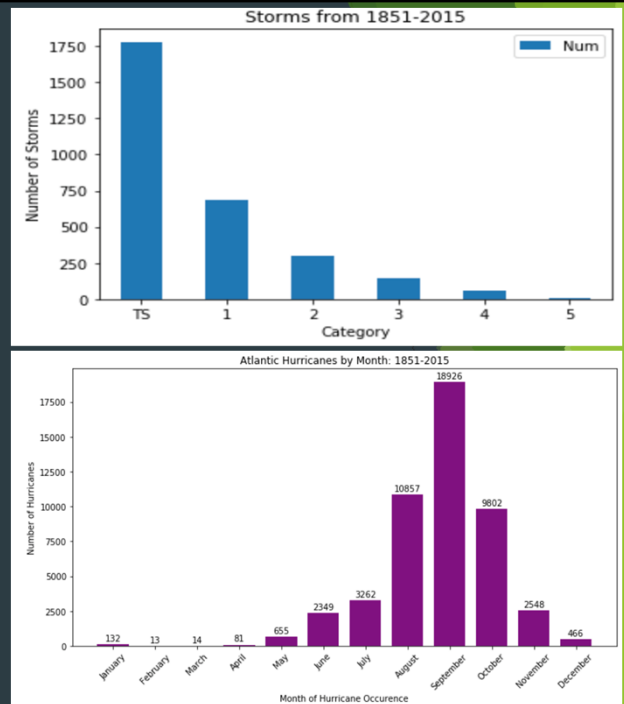
- ▶ Data Type:
 - ▶ Historical data of hurricanes and tropical storms
 - ▶ Continuously updated for 50+ years
- ▶ Data Sourcing & Exploration and Clean-up:
 - ▶ NOAA, EPA, Uni. of Colorado, NASA, [Kaggle](#)
 - ▶ Techniques: `.groupby` | `.loc` | `del` | `matplotlib` | `gmaps` | `pandas` | etc.
 - Drop null values, extract relevant column, covert date to year and month, separate hurricane and tropical storm data, convert coordinates, convert number format.
 - Split Dataset into Hurricanes and Tropical Storms
 - ▶ Final clean data is exported for team utilization

For this project we know that we need historical data of all hurricanes and trop storms, and the database has to have to be at least > 50 years span to see any significant trend.

We have looked through multiple sources including NOAA, NASA, EPA and we finally found on Kaggle 2 csv files of hurricane dated from 1851 to 2015. After inspecting the files, we found both of the csv contains great data for analyzing and answers our questions. We glad that the data we found helps us gain understanding about the real truth behind the claim.

Team Member: Sarah

- Questions to Answer
- Why These Questions?
- Data Analytics
- Conclusion



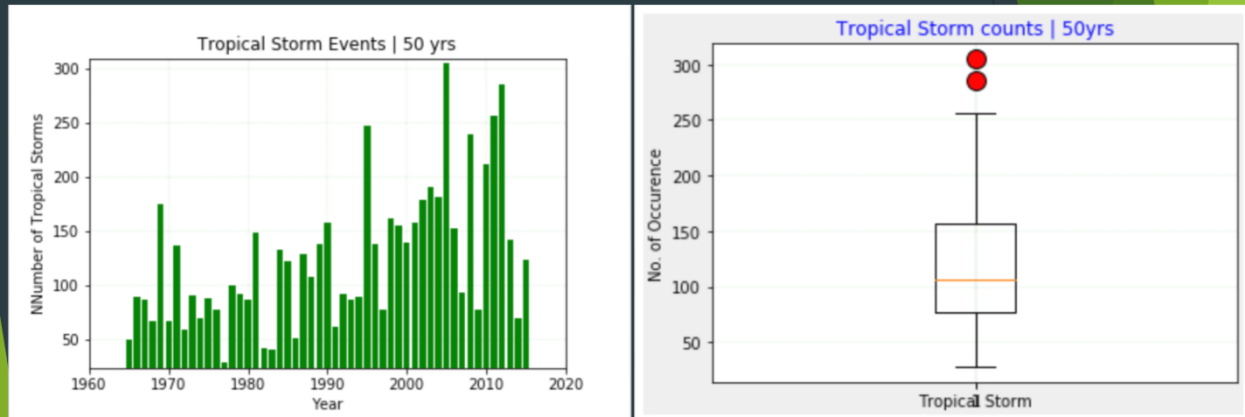
The question I asked was, "Are hurricanes occurring more or less than tropical storms and if so which category is it occurring in the most?" Firstly, to even become a category it has to be wind speeds greater than 73 miles per hour. Therefore, under TS which stands for tropical storms all the storms below 74 miles per hour were filtered into.

The reason I asked this question was to see if global warming was related directly to the number of tropical storms or hurricanes occurring and through this data I saw that it can possibly be because of the number of Tropical storms because there is a big gap between the number of times they occurred. In addition, it was interesting to see that each category occurring decreased as the category increased.

This visual brought me to my next visual's question about if TS are filtered out then just looking at categories 1 to 5, in which month is it occurring the most from 1851 to 2015? The reason I wanted to investigate this question was to see if hurricanes have been affected equally throughout entering the months from May to October due to an increase of global warming or has it created a bell curve? Results showed that a bell curve occurred and that the hurricanes weren't just equally distributed throughout May to October and that there was a gradual increase and decrease from 1851 to 2015 instead of a number gap with no pattern. For example, a difference of about 8,000 hurricanes on the right and left months of the peak month.

What month was hurricanes occurring the most? September. Limitation: Although it was September what would be the pattern throughout the board throughout the specific years because then each year has to be plotted by category.

Team Member: Sarah / Henry



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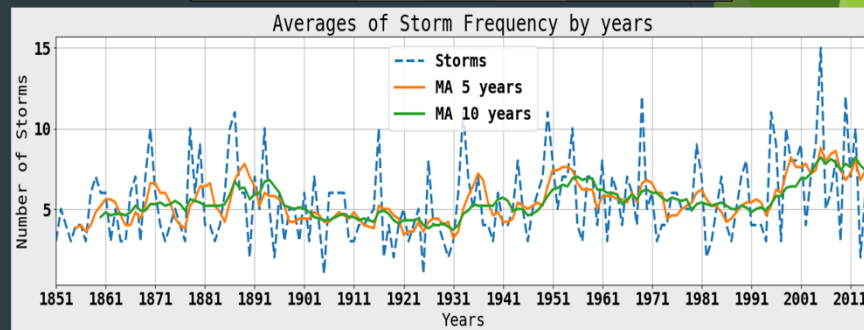
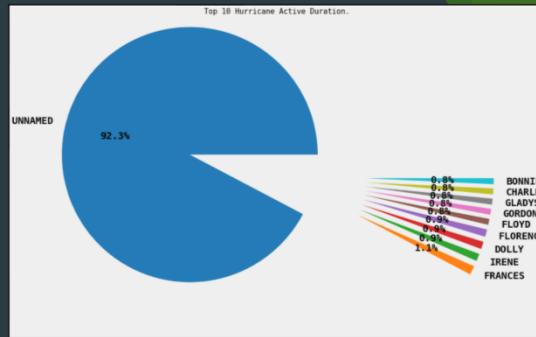
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would think that global warming is throwing the hurricanes off through out the months which would have gradually created an equality of hurricanes through the months by an increase number of hurricanes in May, June, July, October, and November by 2015 which it didn't.

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Team Member: O.J.

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- Why These Questions?
- Data Analytics
- Conclusion



PACMAN Pie Plot tries to eat pizzas

Analysis: Plot A

-After cleaning up the data and doing the necessary groupings for the analysis, a pie plot was created to show the 10 top hurricanes that occurred during the time interval. 92% of the storm was unnamed and 8% represented the 10 top hurricane hits.

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Plot B (Periodic hurricane intervals)

-The second plot shows the average storm hits yearly. An average of 10 storms occurs during each hurricane season looking at the plot.

-The plot also shows a slight increase in the occurrence & severity of storms over the decades.

-It could also be said that with the slight spike in hurricane activities, this could be as a result of multi-decadal oscillation patterns in the north Atlantic ocean.

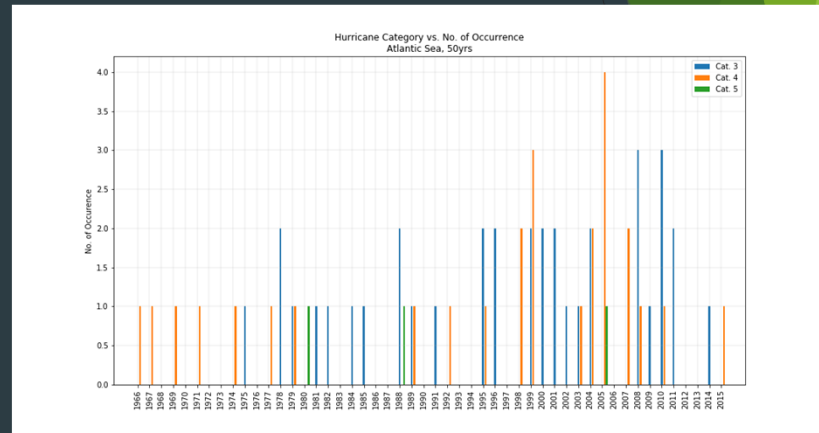
-Conclusion:

-From the analysis above, it's still uncertain to say if climate change is the cause for the increase in occurrence & severity of storms.

-A more comprehensive analysis taking all other causes and effects would validate the concept of global warming.

Team Member: Henry

- Questions to Answer
- Why These Questions?
- Data Analytics
- Conclusion



1. What is the trend of number of hurricanes in the past 25-50 years, or may be more?
2. How often do we see catastrophic hurricane (Cat 3, 4, 5)?
3. Where are all the hurricanes on the map? Any trend of a certain concentrated region?

Why: tendency of increasing as per claim

Team Member: Henry



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Challenges

- ▶ Date format: year, month, date was combined into one string; no separator
- ▶ Coordinates were in different format: **N, **W
- ▶ Multiple indexes data frame encountered
- ▶ Watermarks on Gmaps

Limitations

- ▶ Does it include every storm/ hurricane that actually occurred?
- ▶ 200yrs dataset

Summary (Atlantic)

- ▶ Increasing Trend of Tropical Storm Occurrence observed
- ▶ No clear trend of Hurricane getting more stronger/ intense over time
- ▶ ~50% Hurricanes and ~50% Tropical Storms (200yrs period)
- ▶ Average 105 Tropical Storms per years
- ▶ 2005 was a very active year of hurricanes including Katrina and Rita

What else:

- ▶ Pacific Analysis
- ▶ Factors affect Hurricane besides Global Warming
- ▶ Expand Dataset into millennium: Has it been like this even before industrial revolution?
- ▶ Analyze hurricane energy for better resolution of hurricane severity



THANK YOU!

Q&A

Presentation Guidelines

You are free to structure your presentations to your liking, but students tend to have success with the following format.

- Title Slide
 - Include the name of the Project and Group Members
- Motivation & Summary Slide
 - Define the core message or hypothesis of your project.
 - Describe the questions you asked, and why you asked them
 - Describe whether you were able to answer these questions to your satisfaction, and briefly summarize your findings
- Questions & Data
 - Elaborate on the questions you asked, describing what kinds of data you needed to answer them, and where you found it
- Data Cleanup & Exploration
 - Describe the exploration and cleanup process
 - Discuss insights you had while exploring the data that you didn't anticipate
 - Discuss any problems that arose after exploring the data, and how you resolved them
 - Present and discuss interesting figures developed during exploration, ideally with the help of Jupyter Notebook
- Data Analysis
 - Discuss the steps you took to analyze the data and answer each question you asked in your proposal
 - Present and discuss interesting figures developed during analysis, ideally with the help of Jupyter Notebook
- Discussion
 - Discuss your findings. Did you find what you expected to find? If not, why not? What inferences or general conclusions can you draw from your analysis?
- Post Mortem
 - Discuss any difficulties that arose, and how you dealt with them
 - Discuss any additional questions that came up, but which you didn't have time to answer: What would you research next, if you had two more weeks?
- Questions
 - Open-floor Q&A with the audience