

Final Project Report

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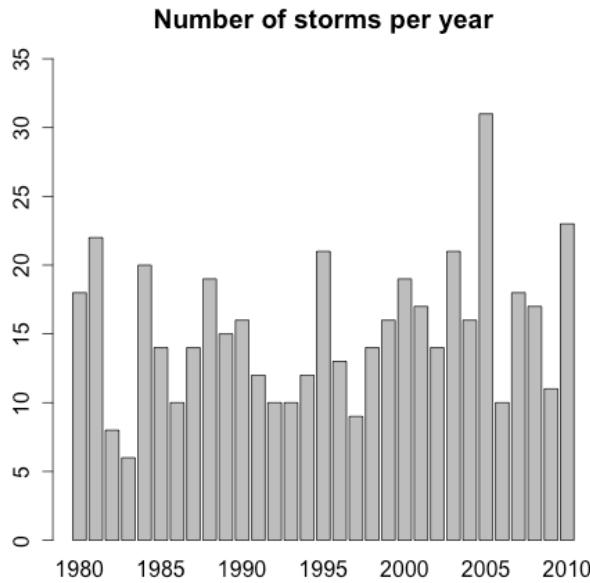
This assignment is designed to provide both written and visual explanations of the storm trajectories between 1980 and 2010. First, I will start by exploring some important questions that naturally arise in analyzing the data.

One thing to note, I had to change the ‘LaTex engine’ from ‘pdflatex’ to ‘xelatex’ in order to avoid errors when knitting pdf.

Obtain frequencies and barplots for number of storms per year.

```
##      num_storms_per_year Freq
## 1              1980     18
## 2              1981     22
## 3              1982      8
## 4              1983      6
## 5              1984     20
## 6              1985     14
## 7              1986     10
## 8              1987     14
## 9              1988     19
## 10             1989     15
## 11             1990     16
## 12             1991     12
## 13             1992     10
## 14             1993     10
## 15             1994     12
## 16             1995     21
## 17             1996     13
## 18             1997      9
## 19             1998     14
## 20             1999     16
## 21             2000     19
## 22             2001     17
## 23             2002     14
## 24             2003     21
## 25             2004     16
## 26             2005     31
## 27             2006     10
## 28             2007     18
## 29             2008     17
## 30             2009     11
## 31             2010     23
```

This table shows the number of storms per year between 1980 and 2010. Notice that there was not a single year when there were no storms.



This barplot visualizes the table above.

Obtain frequencies and barplots for number of storms per year with winds ≥ 35 knots.

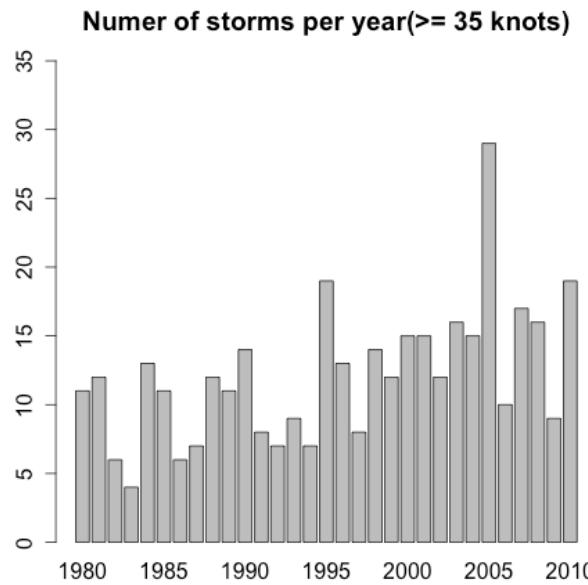
```
##      num_storms_per_year_35 Freq
## 1                      1980    11
## 2                      1981    12
## 3                      1982     6
## 4                      1983     4
## 5                      1984    13
## 6                      1985    11
## 7                      1986     6
## 8                      1987     7
## 9                      1988    12
## 10                     1989    11
## 11                     1990    14
## 12                     1991     8
## 13                     1992     7
## 14                     1993     9
## 15                     1994     7
## 16                     1995    19
## 17                     1996    13
## 18                     1997     8
## 19                     1998    14
## 20                     1999    12
## 21                     2000    15
## 22                     2001    15
## 23                     2002    12
## 24                     2003    16
## 25                     2004    15
## 26                     2005    29
```

```

## 27          2006   10
## 28          2007   17
## 29          2008   16
## 30          2009    9
## 31          2010   19

```

This table shows the number of storms per year between 1980 and 2010 with wind speeds greater than or equal to 35 knots.



This barplot visualizes the table above.

Obtain frequencies and barplots for number of storms per year with winds ≥ 64 knots.

```

##      num_storms_per_year_64 Freq
## 1          1980         9
## 2          1981         7
## 3          1982         2
## 4          1983         3
## 5          1984         5
## 6          1985         7
## 7          1986         4
## 8          1987         3
## 9          1988         6
## 10         1989         7
## 11         1990         8
## 12         1991         4
## 13         1992         4
## 14         1993         4
## 15         1994         3
## 16         1995        11
## 17         1996         9

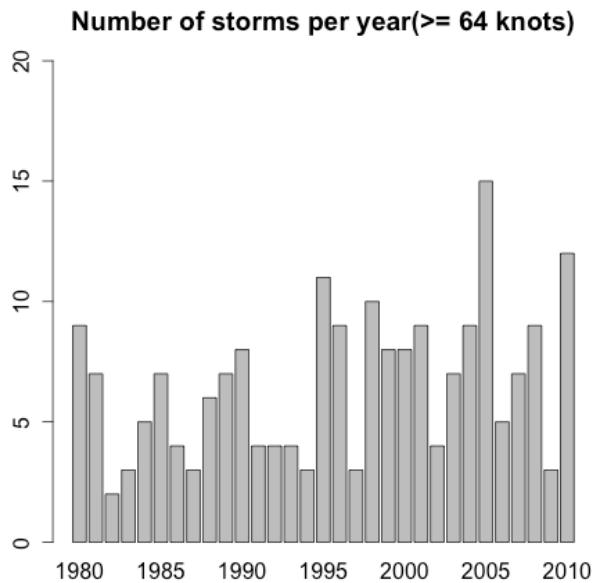
```

```

## 18          1997    3
## 19          1998   10
## 20          1999    8
## 21          2000    8
## 22          2001    9
## 23          2002    4
## 24          2003    7
## 25          2004    9
## 26          2005   15
## 27          2006    5
## 28          2007    7
## 29          2008    9
## 30          2009    3
## 31          2010   12

```

This table shows the number of storms per year between 1980 and 2010 with winds speeds greater than or equal to 64 knots (known as hurricanes).



This barplot visualizes the table above.

Obtain frequencies and barplots for number of storms per year with winds ≥ 96 knots.

```

##      num_storms_per_year_96 Freq
## 1              1980     2
## 2              1981     3
## 3              1982     1
## 4              1983     1
## 5              1984     1
## 6              1985     3
## 7              1987     1
## 8              1988     3

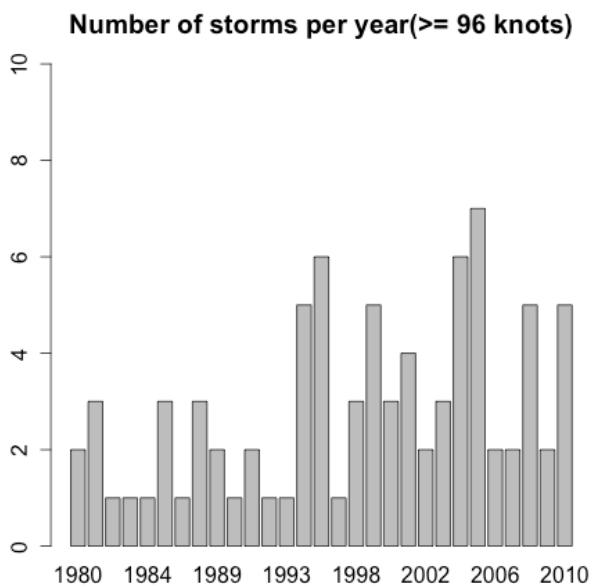
```

```

## 9          1989    2
## 10         1990    1
## 11         1991    2
## 12         1992    1
## 13         1993    1
## 14         1995    5
## 15         1996    6
## 16         1997    1
## 17         1998    3
## 18         1999    5
## 19         2000    3
## 20         2001    4
## 21         2002    2
## 22         2003    3
## 23         2004    6
## 24         2005    7
## 25         2006    2
## 26         2007    2
## 27         2008    5
## 28         2009    2
## 29         2010    5

```

This table shows the number of storms per year between 1980 and 2010 with winds speeds greater than or equal to 96 knots (known as major hurricanes).



This barplot visualizes the table above.

Obtain frequencies and barplots for number of storms per month.

```

##   num_storms_per_month Freq
## 1                      4     4

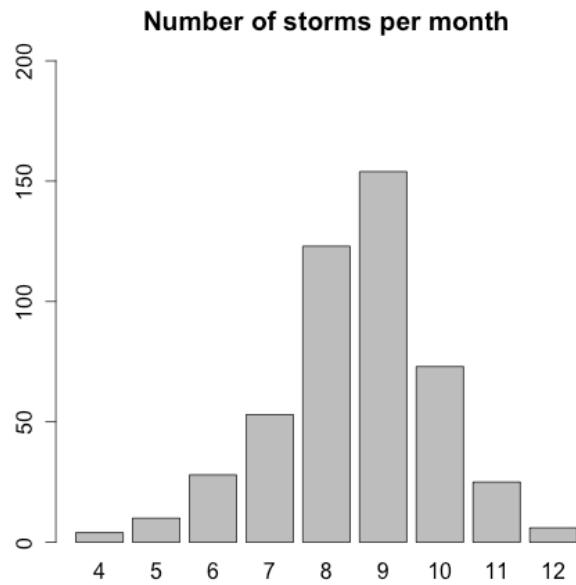
```

```

## 2      5   10
## 3      6   28
## 4      7   53
## 5      8 123
## 6      9 154
## 7     10  73
## 8     11  25
## 9     12   6

```

This table shows the number of storms per month between 1980 and 2010.



This barplot visualizes the above table.

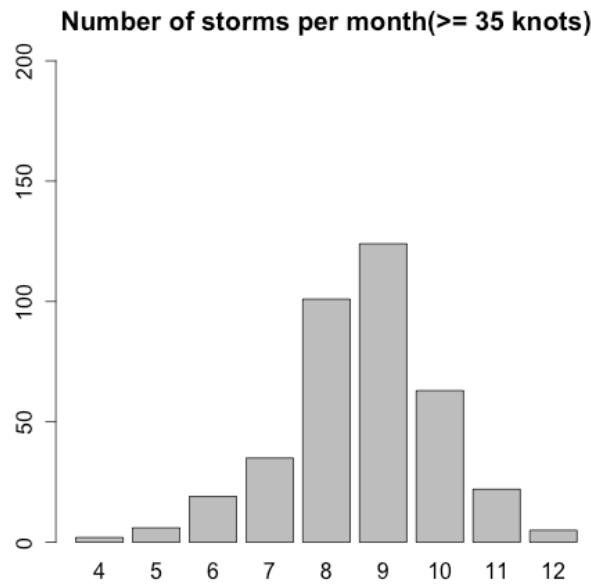
Obtain frequencies and barplots for number of storms per month with winds ≥ 35 knots.

```

## num_storms_per_month_35 Freq
## 1                      4   2
## 2                      5   6
## 3                      6  19
## 4                      7  35
## 5                      8 101
## 6                      9 124
## 7                     10  63
## 8                     11  22
## 9                     12   5

```

This table shows the number of storms per month between 1980 and 2010 with wind speeds greater than or equal to 35 knots.

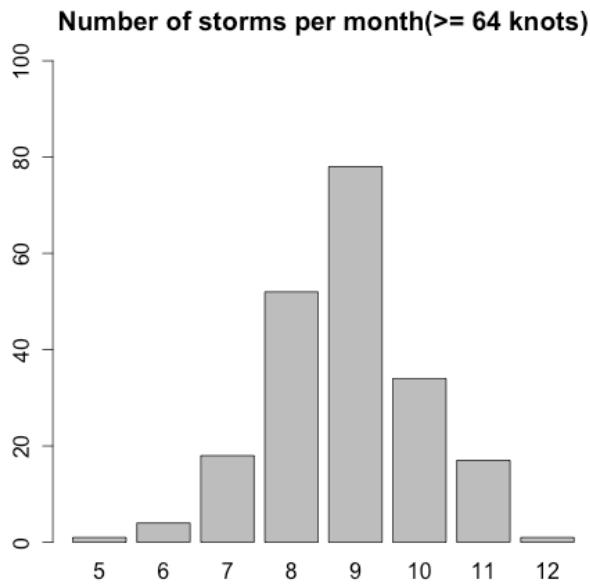


This barplot visualizes the above table.

Obtain frequencies and barplots for number of storms per month with winds ≥ 64 knots.

```
##   num_storms_per_month_64 Freq
## 1                      5    1
## 2                      6    4
## 3                      7   18
## 4                      8   52
## 5                      9   78
## 6                     10   34
## 7                     11   17
## 8                     12    1
```

This table shows the number of storms per month between 1980 and 2010 with wind speed greater than or equal to 64 knots (known as hurricanes).

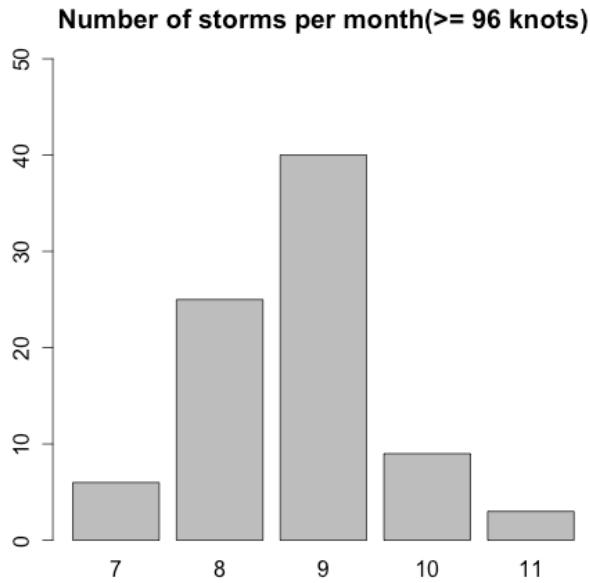


This barplot visualizes the above table.

Obtain frequencies and barplots for number of storms per month with winds ≥ 96 knots.

```
##   num_storms_per_month_96 Freq
## 1                      7    6
## 2                      8   25
## 3                      9   40
## 4                     10    9
## 5                     11    3
```

This table shows the number of storms per month between 1980 and 2010 with wind speed greater than or equal to 96 knots (known as major hurricanes).



This visualizes the above table.

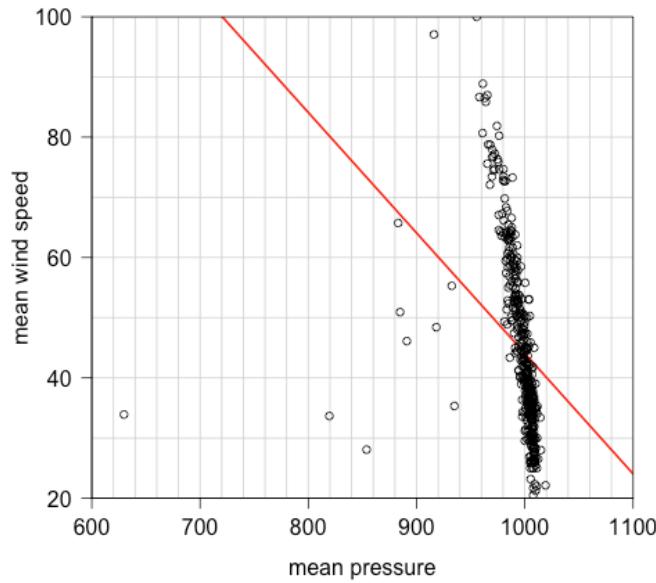
Obtain annual average number of storms for each category.

```
##           X      mean       sd   q1   q2   q3
## 1 35 knots 12.161290 4.993975 8.5 12 15
## 2 64 knots  6.612903 3.116381 4.0  7  9
## 3 96 knots  2.862069 1.787339 1.0  2  4
```

This table provides a brief summary of the number of storms categorized by wind speeds.

Obtain regression analysis of mean pressure and mean wind speed for each storm.

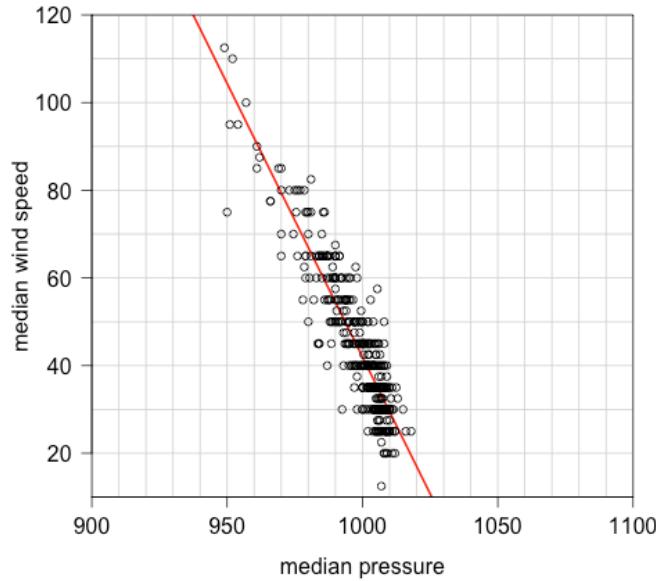
Regression Line(pressure/wind speed for mean)



There is a pretty nice regression line (once you get rid of the obvious outliers) indicating the pressure and wind speed are highly correlated.

Obtain regression analysis of median pressure and median wind speed for each storm.

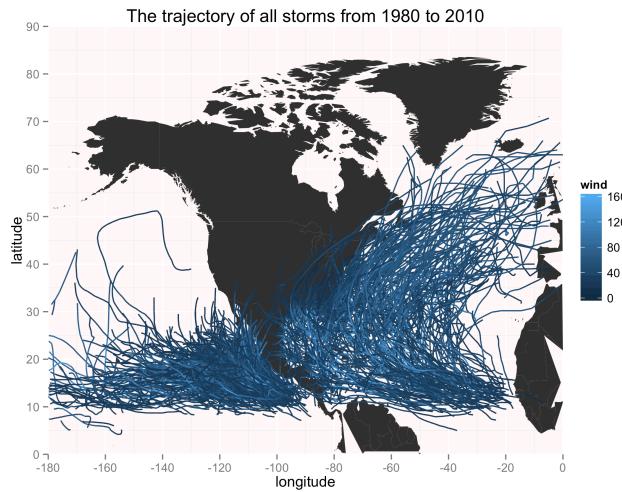
Regression Line for median(pressure/wind speed)



Again, just like the mean values, the median values of pressure and wind speed also indicate a high correlation.

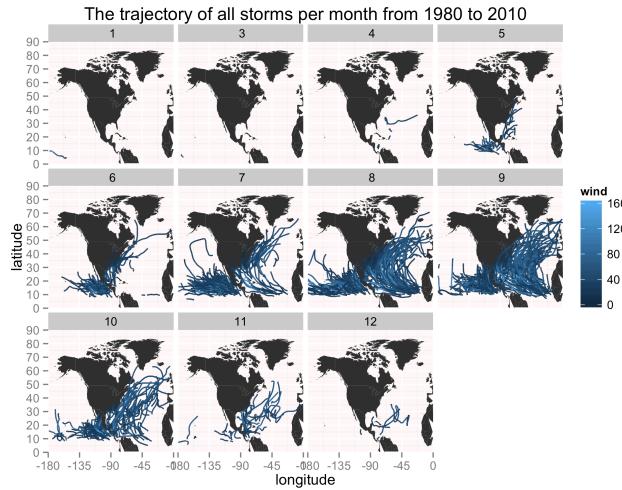
Now we get to see the cool plots.

Let's start with the plot showing the trajectory of all storms between 1980 and 2010.



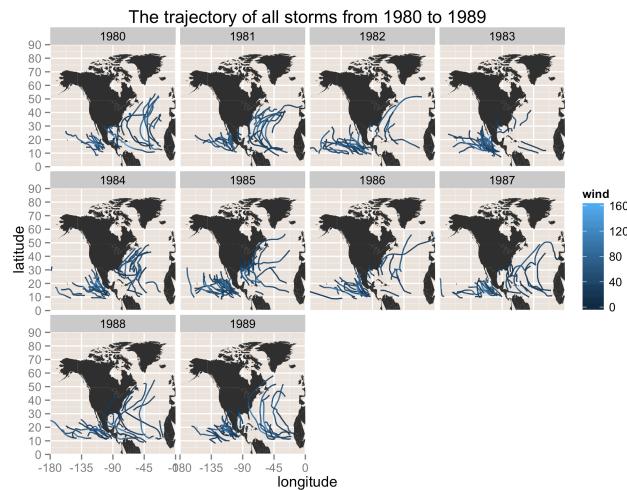
Each curve represents the trajectory of the certain storm. As you can tell, there have been a lot of storms in this 31 year interval.

Then the plot showing the trajectory of storms per month



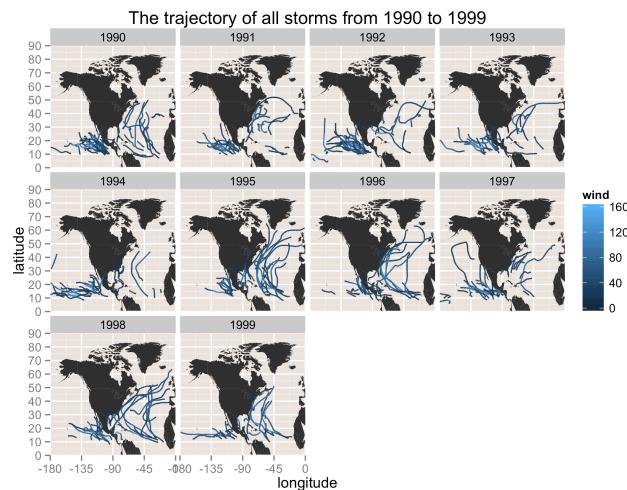
Notice that there are significantly less storms in certain months. There were actually no storms that started and ended in February (the one that started in January but ended in February is plotted in the January facet).

Obtain the plot showing the trajectory of storms in decade 1980s



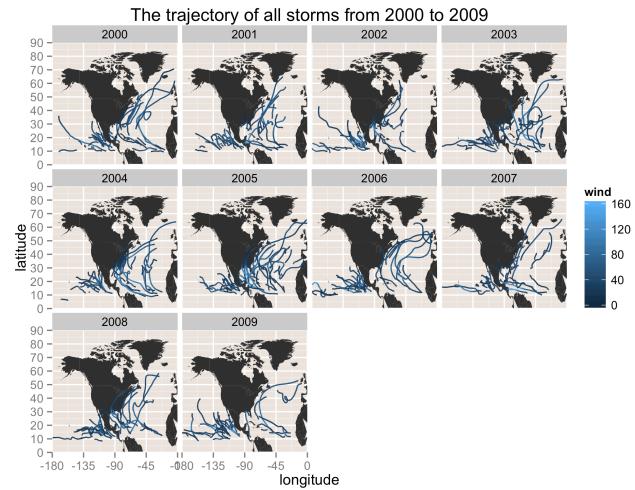
Nicely distributed storms in the course of a ten year period.

Obtain the plot showing the trajectory of storms in decade 1990s



Again, storms are distributed evenly.

Obtain the plot showing the trajectory of storms in decade 2000s



These are the storms from the most recent decade (2000s). Studying these patterns might lead us somewhere.

Thank you very much for reading this project. It's been a great semester everyone!