Aurora Borealis Predictions

# **Katie Briggs Winter 2020** <https://github.com/Briggskm9/DSC680>

# Which Domain?

1. National Oceanic and Atomospheric Administration, Space Weather Prediction Center. Swpc.noaa.gov/noaa-scales-explanation. This is a way to communicate current and future space weather conditions and the possible effects on people and systems. <https://www.swpc.noaa.gov/>

2. University of Alaska Fairbanks, Geophysical Institute, Aurora Forecast. This is a daily forecast of geomagnetic activity on a KP Index. https://www.gi.alaska.edu/monitors/aurora-forecast

3. Science on a Sphere, National Oceanic and Atomospheric Administration. Earth at night, a data set that was recorded by the Defense Meteorological Satellite Program using polar orbiting satellites that provide global cover. https://sos.noaa.gov/datasets/nighttime-lights/

4. Data.gov, Solar Features – Solar Flares, data on radiation emitted from sunspots National Oceanic and Atmospheric Administration. Solar activity causes the kp index of aurora to increase. Dataset is available for download.

5. Space Weather Live, Real time auroral and solar activity. Archived data available of geomagnetic activity, solar winds, flare and kp index.

6. Deal Alert, The Points Guy, How to use promotions to see the northern lights for up to 35

percent off. Fan, K., (2020), Deals Alert, Retrieved from: [https://thepointsguy.com/deals/deal- alert-visit-alaska-to-see-the-northern-lights-for-up-to-35-off/](https://thepointsguy.com/deals/deal-%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20%20alert-visit-alaska-to-see-the-northern-lights-for-up-to-35-off/)

Historical references of best times to see the lights.

7. The Northern Light Centre, Northern Lights, Historical data to the Geographic Institute.

https://www.northernlightscentre.ca/northernlights.html

8. Notifications Archive of Aurora KP indexes. https://auroranotify.com/data/archives/

9. Marketing Dive, Alaska Airlines ties Airfare discounts to Northern Lights., Williams, R., (2020),

Retrieved from: <https://www.marketingdive.com/news/alaska-airlines-ties-airfare-discounts-to->

northern-lights/570365/

10. Making New Year’s Travel Resolutions more Affordable Through the Power of Science, (2020), The

higher the kp index the deeper the discount. Retrieved from:

<https://finance.yahoo.com/news/alaska-airlines-harnesses-northern-lights-120000593.html>

# Which Data?

The dataset I will be using is the Multilabel Dataset from Kaggle and historical data from Data.gov and NOAA space weather data.

# Research Questions? Benefits? Why analyze these data?

I want to examine when is the optimal time to take an arctic vacation to view the northern lights. What times are the best viewing times, what days would have the best probability and provide promotions for traveling during this time.

# What Method?

First, I will use R and Python to perform exploratory data analysis, as well as clean the data. The data will need to be binned by age group, as well as type solar flares, what solar involvement occurred, and the kp index. I plan to use logistic regression, as the data is categorical in nature. I will look for correlations between the variables and the outcome of a solar flare and aurora activity.

# Potential Issues?

Some challenges include insufficient data, missing data, or incorrect data. There may not be sufficient data to make conclusions regarding the kp index that was created in result of the solar flare. Or, the dataset may be too big to run on my local computer, which could cause large processing time. One of the biggest obstacles is that the dataset may not contain correct space weather data to grab aurora predictions.

# Concluding Remarks

The Aurora Borealis is a phenomenon that occurs when electrically charged particles from the sun enter the earth’s atmosphere. They have been captured in photography, placed on post cards, and has been themes to vacationers across the global. They display colors that range from pale green, red, yellow, blue and violet. They may appear to dance across the sky in forms of patches or ribbons.

The lights have been suspected to be caused by sunspot activity since the 1800s. In the 1950’s it was confirmed by scientific research that the electrons and protons from the sun are release during a solar wind.

# References:

Northern Lights Centre, What are the Northern Lights?, Retrieved from: <https://www.northernlightscentre.ca/northernlights.html>