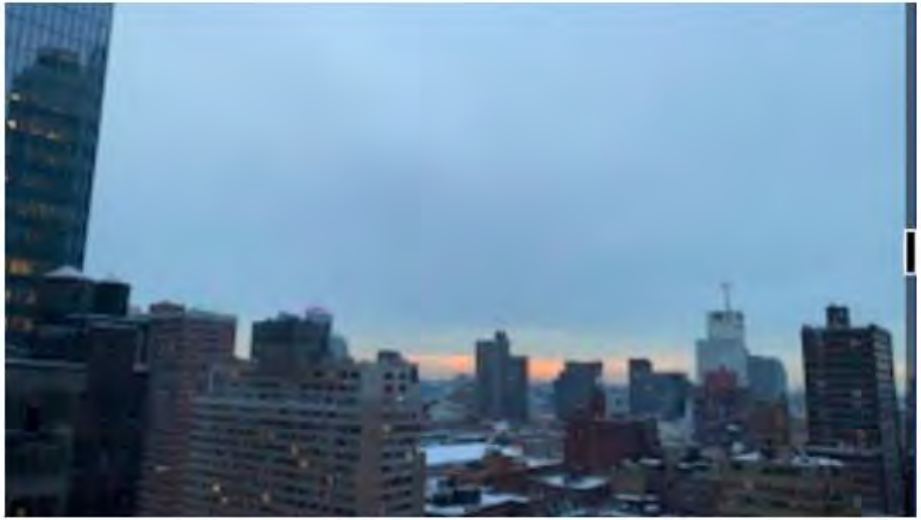
HOW DO AIR QUALITY AND CLOUD COVER CORRELATE?

ABSTRACT

Our inspiration for the research is that we noticed how much better the environment got during the shutdowns that happened during the pandemic. Our research question is how does air quality correlate with cloud cover and temperature? Our hypothesis states that when air pollution is higher then cloud cover will be greater and temperature would be higher. Our objective was to collect data on a daily basis over the course of a week. Our data was collected by observing the sky outside, and using the purple air website to deduce the air quality in raw PM 2.5 levels of the area around us. This data we collected we used to make scatter plots and we found that there was correlation between air quality, cloud cover, and temperature. When the Air Quality is worse, the cloud cover increases and becomes darker and denser, and the temperature goes up.

From all the research and data we've collected, we can hypothesize that the reason for the air quality being low and the blue sky being very visible was because over quarantine, we were much more environmentally friendly due to lockdown protocol. We have noticed that as people are further into quarantine, our old habits have come to life. Things are getting back to normal in the sense of the use of cars, factories opening, oil rigs opening up, and electricity being used at the same rate. There are far more clouds than when COVID was at its highest scare, which demonstrates the effect pollution has on the clouds and global warming. In the data we found in our everyday collections, in the week of we noticed that the air quality got worse and worse, and the cloud cover increased manifold. This has allowed us to open our eyes and see how much of a difference there was. However, the data isn't always reliable. The data we collected during that very week was right after a massive snowstorm caused by a cold front, which could very heavily cause high cloud cover and alter the Air Quality.

Key Words: air quality, cloud cover, temperature, pollution, global warming and PM 2.5.



12/19/20 Midtown, 56th

Some clouds with mostly clear sky, and very dry, no precipitation.

12/19/20 Midtown, 56th

Most data taken is between yellow and orange, which means that the air quality is fine. From the purple air website, these air qualities are acceptable. However, if they are exposed for 24 hours there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.

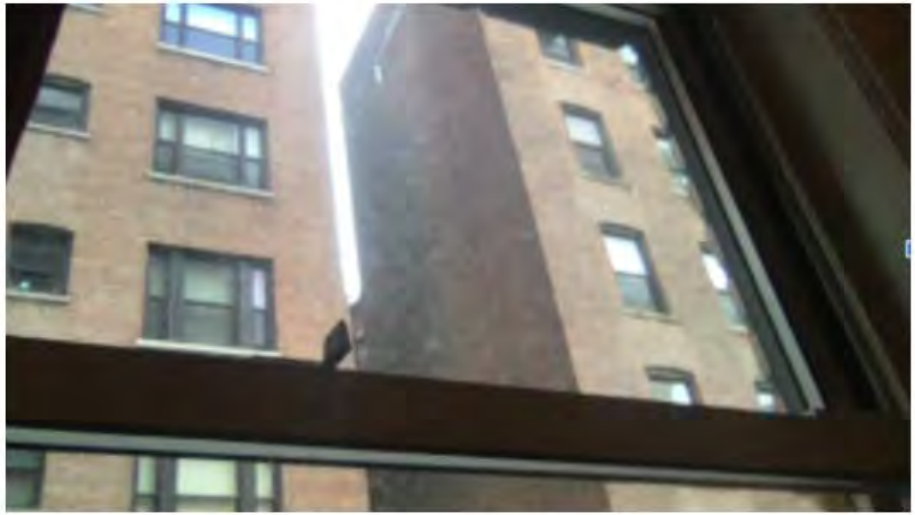
12/20/20

70th and West End

The temperature today was a high of 36 degrees and was cloudy. A little bit of snow from a few days ago was still left on the ground due to the freezing temperatures, as well as a few rain showers.

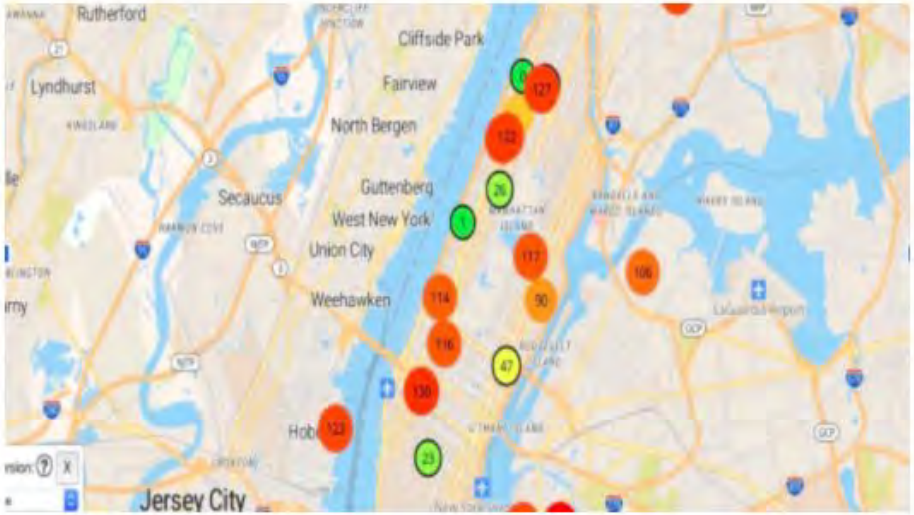
12/20/20 64th and West End

The air quality was very healthy and good on 64th, as well as most other places in the UWS on this day.



12/21/20 on Riverside

It was cloudy and foggy, and the temperature was very similar to the temperature on 12/20/20.



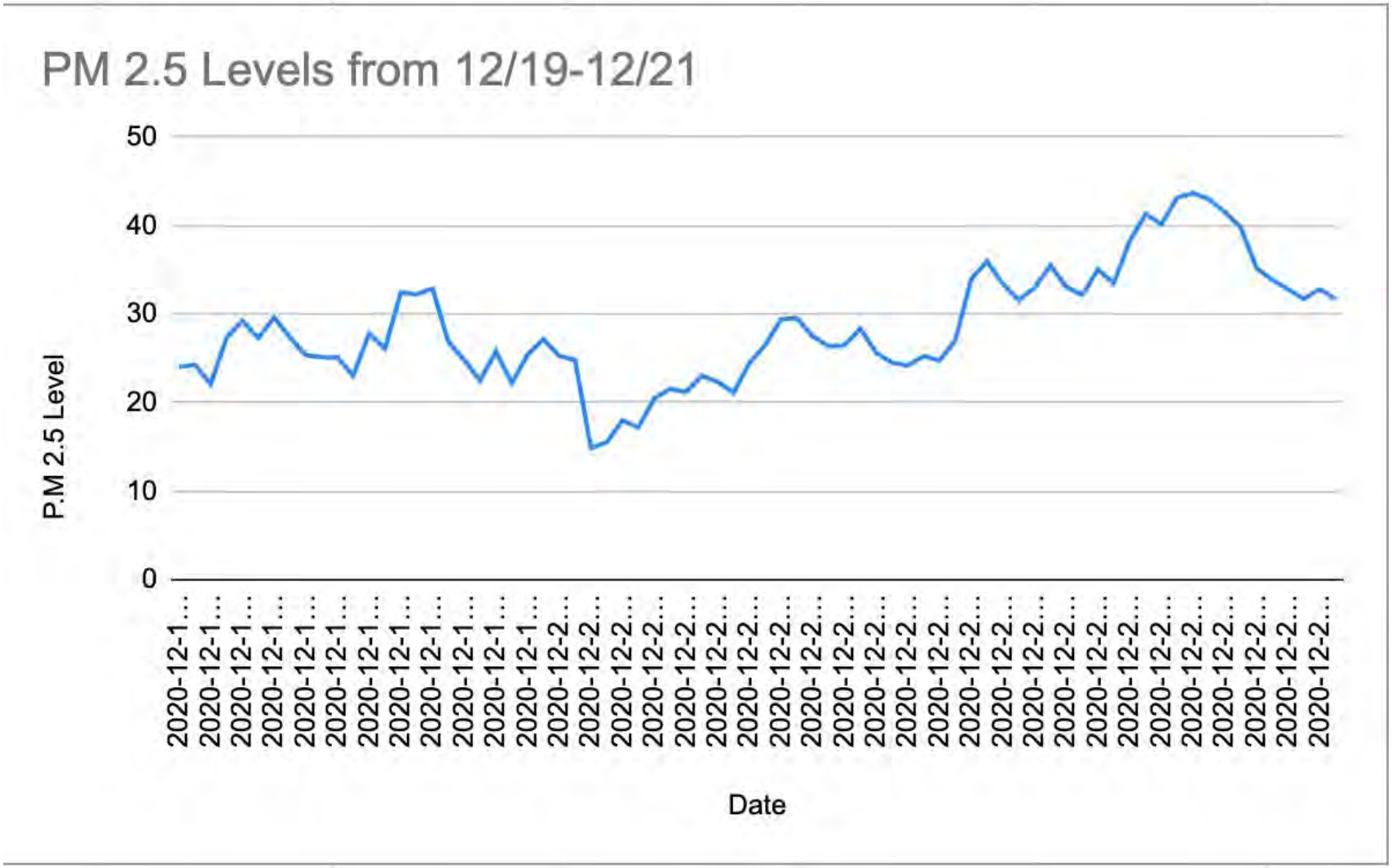
12/21/20 on Riverside

Because of this, it's air quality was similar to that of the day before, very healthy. It is usually healthy in this area, where it may not be in others. For example, the map shows how the AQ is very bad in other areas, but very clean in this area.

Discussion:

The temperature on 12/21 didn't fluctuate a whole lot, and reached a high of 39 degrees, compared to 12/20's 36 high. According to CBS New York, the temperatures on 12/19 were supposed to be very similar to 12/20's weather and since the 21st and 20th had similar numbers, the weather on 12/19 also connects to the 21st. It was much more cloudy on the 20th and the 21st with cloud covers of 97% and 100%. On the 19th the cloud cover was only at 20%, which also seemed to result in a higher temperature than the temperature on 12/20. On 12/20 the temperature was mainly at 31 degrees which is lower than 12/19's 36 degrees. We believe that this could correlate because we see other similar characteristics on the data chart. Our hypothesis is that when the cloud cover is lower, it is hotter, when the cover is higher it is colder.

The data from 12/15 and 12/16 shows that on 12/15 the cloud cover was at 30% and the temperature was 36 degrees. On 12/16, the cloud cover was at 48% and the temperature was 31. This backs up our theory that when the cloud cover is lower, it is warmer. The snowstorm was on 12/16-12/17 and it has impacted a lot of the air quality on the following days. As you can see from the images, as the days went on, the air quality got severely worse and the mark seems to be getting darker. The increase of the air quality might be from the snow storm since the temperature is very low, household heatings might have increased tremendously.


PM 2.5 Levels from 12/19-12/21
50
40
30
20
10
0
P.M 2.5 Level
2020-12-1...
2020-12-2...
Date