

CVL100 Assignment 2

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March 2021

1 Introduction

Pollution has been issue of debate for very long in Delhi. This report is an attempt to analyse the concentration levels pf pollutants in the year 2019 from January 2019 to December 2019. Data used in the report is from Anand Vihar, Delhi - DPCC and is freely available on the website of Central Control Room for Air Quality Management.

2 Pollutants analysed

The following pollutants has been analysed:

1. PM2.5 (Units in $\mu\text{g}/\text{m}^3$)
2. PM10 (Units in $\mu\text{g}/\text{m}^3$)

3 Hourly Average PM2.5 Concentration

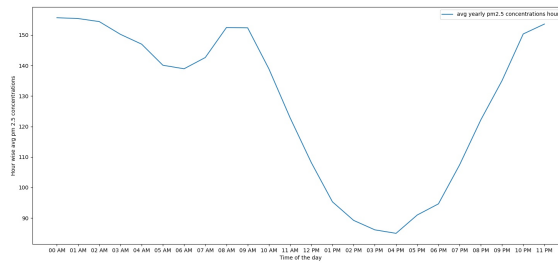


Figure 1: Hourly avg PM2.5 concentration

The above graph (also attached separately in the folder) depicts the hourly average of the concentration of PM2.5 over the year 2019 from January to December. The highest levels of PM2.5 are observed at midnight (around 160

$\mu\text{g}/\text{m}^3$) and the minimum pollutant concentrations are observed at around 4 PM (around $80 \mu\text{g}/\text{m}^3$). There is also a sudden spike in the PM2.5 concentrations during 6 to 9 AM on average. Concentration shows a declining trend during midnight to 6 AM and a steep increase after 5 PM up to midnight.

4 Hourly Average PM10 Concentration

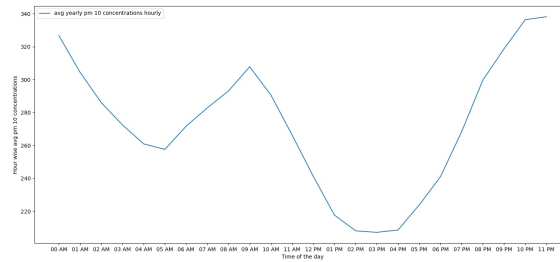


Figure 2: Hourly avg PM10 concentration

The above graph (also attached separately in the folder) depicts the hourly average of the concentration of PM10 over the year 2019 from January to December. The highest levels of PM10 are observed at midnight (around $340 \mu\text{g}/\text{m}^3$) and the minimum pollutant concentrations are observed at around 3 to 4 PM (around $208 \mu\text{g}/\text{m}^3$). There is also a sudden spike in the PM2.5 concentrations during 6 to 9 AM on average. Concentration shows a declining trend during midnight to 6 AM and a steep increase after 5 PM upto midnight.

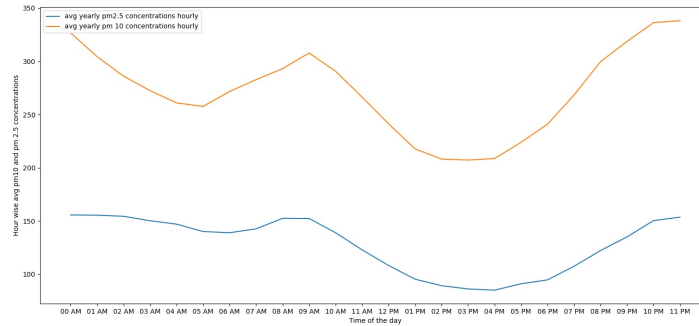


Figure 3: Hourly avg PM10 and PM2.5 concentration

5 Month wise Average PM2.5 Concentration

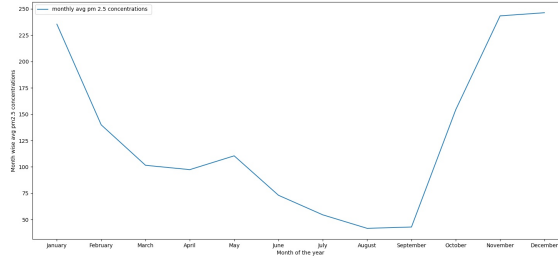


Figure 4: Month wise avg pm2.5 concentrations

The above graph (also attached separately in the folder) depicts the month wise average PM2.5 concentration of months from January to December. . The results of monthly analysis of PM2.5 concentration are similar to AQI analysis. The peak is during November and December (around $243 \mu\text{g}/\text{m}^3$) and the minimum concentration is during August and September (around $42 \mu\text{g}/\text{m}^3$) . There is an increasing trend during September to December and a decreasing trend during January to September except a few exceptions.

6 Month wise Average PM10 Concentration

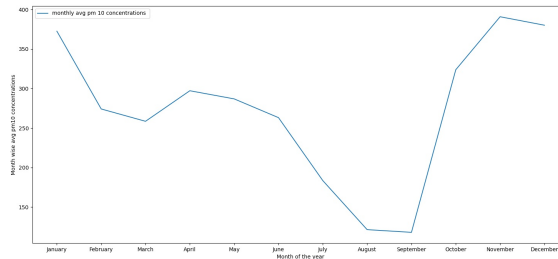


Figure 5: Month wise avg pm10 concentrations

The above graph (also attached separately in the folder) depicts the month wise average PM10 concentration of months from January to December. The results of monthly analysis of PM10 concentration are similar to AQI analysis. The peak is during November and December (around $309 \mu\text{g}/\text{m}^3$) and the minimum concentration is during August and September (around $120 \mu\text{g}/\text{m}^3$) . There is an increasing trend during September to December and a decreasing trend during January to September except a few exceptions.

7 Season wise Average PM2.5 Concentration

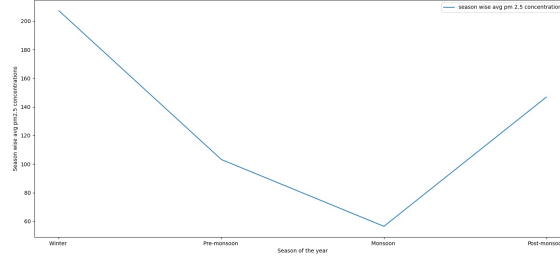


Figure 6: Season wise avg pm2.5 concentrations

The above graph (also attached separately in the folder) depicts the season wise average PM2.5 concentration of months from January to December. Winter includes January 2019, November 2019 and December 2019. The peak is during Winters (around $210 \mu\text{g}/\text{m}^3$) and the minimum concentration is during Monsoon (around $60 \mu\text{g}/\text{m}^3$). There is an upward trend in concentration of PM2.5 levels after monsoon and a downward trend after winters going into summers. Also there is a small peak during mid May or June.

8 Season wise Average PM10 Concentration

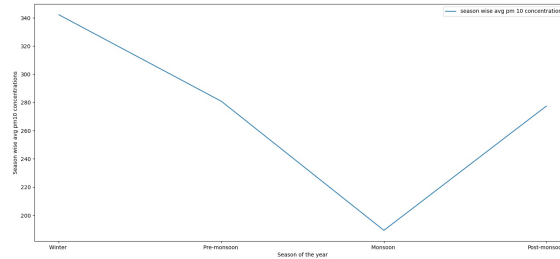


Figure 7: Season wise avg pm10 concentrations

The above graph (also attached separately in the folder) depicts the season wise average PM10 concentration of months from January to December. Winter includes January 2019, November 2019 and December 2019. The peak is during Winters (around $340 \mu\text{g}/\text{m}^3$) and the minimum concentration is during Monsoon (around $190 \mu\text{g}/\text{m}^3$). There is an upward trend in concentration of PM10 levels after monsoon and a downward trend (faster as compared to PM2.5) after winters going into summers. There is also a small peak during April and May.

9 Possible explanations

Concentration of PM10 is always higher than PM2.5 which can be explained by the definition according which PM2.5 is a subset of PM10 . To a bit surprise the concentration levels are higher during nights which can be explained by cooler nights of Delhi and this a decrease in mixing height levels at night which gradually settles of due to less activity at night. Minimum levels during evening can be explained by warmer days and thus increase in mixing height levels. Also morning rush hours have an impact which can be observed by small sudden rise during morning time . Winters are cooler (hence low mixing height levels) and so both PM2.5 and PM10 has highest concentration levels in winter. A small peak during May or June might be related with dust storms during the period in Delhi other than that during summers due to high mixing height levels concentrations are on decreasing trend in summers. Low concentration levels of PM2.5 and PM10 during monsoon suggests washing of pollutants in monsoon.

References

<http://app.cpcbcr.com/ccr/#/caaqm-dashboard-all/caaqm-landing/data>