A Group Research Project entitled:

# *"Urban Heat & Greenhouse Gas Trends in Filipino Urban Areas: Pre- vs. Post-Quarantine"*

*A research project presented to the:*

INTERNATIONAL VIRTUAL SCIENCE SYMPOSIUM

By:

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Title: ***Urban Heat & Greenhouse Gas Trends in Filipino Cities: Pre- vs. Post-Quarantine***
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## ABSTRACT

This study examines the impact of quarantine on urban heat and greenhouse gas levels in the Philippines. The research measured air pollutants, Carbon Dioxide ($CO_2$), Carbon Monoxide (CO), Formaldehyde (HCHO), and Total Volatile Organic Compounds (TVOC), along with urban heat parameters before and after quarantine. Air pollution occurs when certain gases and particles, known as pollutants, accumulate in the atmosphere to levels that can cause harm to human health and the environment. The proponents visited several locations, namely IBP Road, San Mateo Bridge, and Don Antonio, to evaluate chemical pollutant levels and urban heat parameters before and after the nationwide lockdown. Meters were placed in these urban locations and exposed for an hour every day for a week. Data analysis involved Pearson's Correlation to test correlations between all sets of data and the T-Test to examine differences in data. The findings indicate a significant decline in greenhouse gas levels (except for HCHO, which showed a slight increase) post-quarantine, with $CO_2$, CO, and TVOC levels dropping across all test locations. However, despite reduced pollutant emissions, urban heat parameters, particularly surface and air temperatures, increased across all areas. The extraneous cloud data suggest that temperatures were lower on days with more cloud cover than that of when clouds were overcast, which corresponds to the higher humidity levels during those same days. The statistical analysis confirmed notable differences between pre- and post-quarantine data, with 61.47% of measured factors showing high variability. These results suggest that while reduced human activity lowered air pollution, it did not immediately mitigate rising urban temperatures. The study underscores the need for long-term, consistent efforts to combat climate change, as halting emissions alone is insufficient to reverse urban heat effects.

*Keywords: Air, Chemical Pollutants, Urban Heat, Quarantine, Greenhouse Gas*

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# CHAPTER I

# INTRODUCTION

Air pollution occurs when certain gases and particles, known as pollutants, accumulate in the atmosphere to levels that can cause harm to human health and the environment. Some of the most common pollutants include Carbon dioxide ($CO_2$), Carbon monoxide (CO), Formaldehyde (HCHO), and Total Volatile Organic Compounds (TVOC).

In December 2019, COVID-19 caused a pandemic and claimed over 6 million lives worldwide.[1] However, although the disease has caused health concerns and economic crises, it proved advantageous to the planet environmentally as it kept people inside due to lockdowns. For instance, scientists at NASA's Ames Research Center discovered that emptier parking lots and cleaner air from fewer vehicles meant that solar heat radiating off dark asphalt and cement surfaces did not stay trapped near the ground which cooled the urban environment. Moreover, scientists found that large parking lots, highway corridors, and commercial rooftops were 10-15°F cooler from March to May 2020 compared to pre-pandemic data[2].

Before quarantine, scientists discovered an increase in harmful greenhouse gases globally, mainly Carbon dioxide ($CO_2$). $CO_2$ is a colorless, non-combustible gas mostly created by animal biological functions and petroleum derivatives[3] $CO_2$ levels normally range from 300-400 ppm yet can be as high as 600-900 ppm in metropolitan regions. Using the Intergovernmental Panel on Climate Change (IPCC), information on $CO_2$ emissions from 1950 to recent years was used to estimate data until 2050. Unfortunately, the results of this endeavor showed the quickly rising levels of $CO_2$ gas as time went on.[4]

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[1] W.H.O., 2022
[2] www.bgr.com, retrieved December 18, 2020
[3] FSIS, retrieved March 19, 2021
[4] Richard Schmalensee, Thomas M. Stoker, and Ruth A. Judson (retrieved 2021)

Methane (CO) is also a greenhouse gas. It can cause multiple respiratory diseases with extended exposure as it displaces oxygen in the blood. Another harmful chemical pollutant is Formaldehyde (HCHO). HCHO is used predominantly as a chemical intermediate. Major toxic effects caused by formaldehyde exposure are eye, nose, nasal cavity, and throat irritation. Other complications include coughing, wheezing, chest pains, and bronchitis.[5] Lastly, Total Volatile Organic Compounds (TVOC) are chemicals that contain carbon and are found in all living things. Many VOCs are classified as known carcinogens, irritants, and toxicants.

During the pre-pandemic period, these gases played a role in global warming as they accumulated under the stratospheric ozone layer — increasing global temperatures and creating urban heat islands (UHI), which is considered one of the serious issues in the 21st century.[6] Urban settings experience higher temperatures due to decreased vegetation, infrastructure geometry, and multiplied human activity.[7] In fact, cities are often 18-27°F hotter than rural places, which is exacerbated during nighttime and winters.[8] As a result, inhabitants of urban settings are the most affected in the growing problem of global warming and climate changes caused by pollutants.

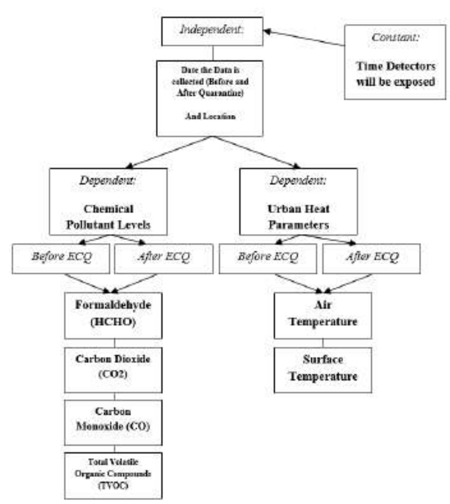
As the population increases, analysts are presently thinking that urbanization further could influence worldwide outflows of $CO_2$ in the next 40 years.[9] By mid-century, researchers estimated that the global population could rise by more than 3 billion people, with most of the increase occurring in urban areas. Generally, specialists found that if the populace follows one of the slower development ways predicted by United Nations demographers, there could be a 16-29% decrease in CO2 emissions by 2050, thereby combating rising temperatures worldwide.

[5] EPA, retrieved 2021
[6] Oke, T. (n.d). 2018
[7] EPA, retrieved 2025
[8] EU Science Hub, retrieved 2025
[9] Proceedings of the National Academy of Sciences, 2010

**Statement of the Problem**

The following are questions to be answered throughout the research and by the project's results. The main question to be answered:

1) ***What are the significant differences between the Urban Heat data from before, a few months after, and a few years after the Community Quarantine?***
    - This is important in order for us to understand the effect of prolonged decreased use of GHG emitting activities such as the use of vehicles, and other related outdoor activities which could contribute to the rapid climate change shifts.
2) ***Is there a correlation between the Greenhouse Gas data and Urban Heat data? If so, (1) how were they correlated and (2) does this correlation change from before, a few months after, and a few years after the Community Quarantine?***
    - This would be able to show us the relationship of how the Greenhouse Gases could be contributing to the Urban Heat fluctuations observed through the collection of air and surface temperature data.
3) ***What are the average and highest levels of Urban Heat and Greenhouse Gas Parameters recorded?***
    - The data that will answer this question could give us a perspective on how high/low the fluctuations of each parameter mentioned.




From the figure, it is seen that the input or main cause of the creation of this research was from many problems caused by humans. This research model focuses on the rapidly growing urban areas, which, in turn caused a rise in population, resulting in more human activities such as gas combustion, automobile pollution, industrial emissions, increased ecological footprints, and so on. Even though these factors clearly affect us, such as when non-toxic yet excess greenhouse gases are emitted, warming the planet, humans seem to disregard the destructive by-products of artificial works and overpopulation.

The *carbon footprint* data would reflect the "ignorance of man-made emissions" in the system, while *population* size will define the "rise in development of urban areas." To clarify the above-mentioned terminology, A carbon footprint is the total amount of greenhouse gas (GHG) emissions generated by a person, entity, event, or product, both directly and indirectly.[10] A population is the group of people from which a statistical sample is taken for a study of statistics.[11]

These two data sets (plus cloud data and relative humidity data as extraneous variables) to be collected from previous data (Carbon Footprints and Population) will be used as the basis for choosing the locations to be tested for. The location will be the main roads in Q.C. where most traffic passes through. These locations were chosen as they were the closest populations to each other, and considering the carbon footprints per location, they were all some of the highest. They were also the most convenient for testing and researching as they did not have strict protocols during the adjustment phase through the end of the quarantine.

**Hypothesis**

**$H_a$** – The Community Quarantine and stop on the GHG emitting activity had an observable effect on the fluctuations of the Urban Heat Parameters and Greenhouse Gas Emissions.

**$H_o$** – The Community Quarantine and stop on the GHG emitting activity had no effect on the fluctuations of the Urban Heat Parameters and Greenhouse Gas Emissions.

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[10] The Carbon Trust (2012) Carbon Footprinting

[11] https://www.investopedia.com/terms/p/population.asp, Momoh and Scott, 2021

**Scope and Limitation**

This study only included gathering data in three main locations in these different locations scattered across Q.C. The study also only considers 3 locations with similar urban development: similar high/low carbon footprints and similar population sizes. The researcher only collected surface temperature and air temperature as parameters for urban heat levels. It also only determines the average levels, highest levels and correlations of the chemical pollutants and urban heat parameters.

To answer the difference and effect of the collected results after the ECQ, data collected from a previous date before the quarantine or lockdown will be used to compare. No other data will be used other than the mentioned dates.

This study will not focus on other chemical pollutant measurements other than Formaldehyde (HCHO), Carbon dioxide (CO2), Carbon monoxide (CO), and Total Volatile Organic Compounds (TVOC). This study is limited to only outdoor measurements of chemical pollutants and urban heat parameters.

The researcher also only used GLOBE protocols to make the data collection process be a great engaging activity and to help maintain consistency of methods. GLOBE's protocols have also been reviewed and made by professionals, ensuring that the data that will be collected would follow protocols made by those who are knowledgeable in the field.

# Chapter 3

# METHODOLOGY

This chapter presents the research design selection and the different procedures applied to the field of study. This chapter outlines the way in which research is to be undertaken and, among other things, identifies the methods to be used in it. It also includes an analysis of data with statistical treatment applied which were done for experimentation.

## *Research Design*

The research design relies on *correlation research* which is a form of non-experimental study in which the researcher tests two variables and assesses their statistical relationship (i.e., the correlation) with little to no effort to control for extraneous variables.

This study is quantitative research, recording levels of the urban heat parameters (Carbon dioxide, Formaldehyde, and TVOC) and Urban Heat (Air and Surface Temperature, Humidity). It also delved into applying statistical treatment, specifically mean, measuring the average of the data collected. This research relies on measuring variables using a numerical system, analyzing measurements using a statistical model and reporting observable phenomena via mathematical or computational techniques.

*Procedures*

**Settling Upon the Possible Locations for Testing**

The researchers searched for the proposed locations of testing and evaluating the levels of chemical pollutants such as Formaldehyde (HCHO), Carbon dioxide ($CO_2$), Carbon monoxide (CO), and Total Volatile Organic Compounds (TVOC) and urban heat parameters such as Air Temperature and Surface Temperature. These locations are specifically 3 public roads in Q.C. The researchers also picked the locations of testing based on how urban they are. The researchers chose a busy area, a middle ground, and an urban area with a more rural surrounding for data variation.


*IBP Road*

**IBP Road** *(14.689908, 121.094561)* was chosen as one of the main areas for testing as it was a good middle ground for the locations. It had a similar size of road with the other locations, but still had a few spots with soil and plants, together with more urban buildings and surroundings.


*San Mateo Bridge*

The **San Mateo bridge** *(14.679415, 121.109877)* was chosen for its similar road size and the traffic that passes through it. It was mainly chosen as the other side of the urban spectrum, which is closer to a flowing river, with more soil and open land with plants and trees, with less buildings but still receives lots of carbon emissions due to the vehicles passing by.


*Don Antonio (Holy Spirit Dr)*

**Don Antonio** *(14.678123, 121.082559)* was chosen as it was the most convenient for the researchers and is also the most busy urban area among the three. With it having a similar size with the other roads, it was the perfect area for testing as the side of the urban spectrum with the busiest streets and most amount of urban buildings and activity.

**Preparation of Greenhouse Gas Meters**

Instruments such as the greenhouse gas; Formaldehyde (HCHO), Carbon dioxide (CO2), Carbon monoxide (CO), and Total Volatile Organic Compounds (TVOC) meters and Air and Surface Thermometers were used in this study. The GLOBE observer app was also used during the more recent data collection rounds to collect cloud data as extraneous variables for a better understanding of what could've been influencing the parameter fluctuations. All materials were prepared onto the field every time data was collected from the time allocations from the set-up.

**Calibration of Instruments**

In calibrating the Air thermometer, the following steps were followed from the Air Thermometer Calibration Protocols on the GLOBE website. *If a digital thermometer is to be used, these steps are to be followed; Open the door to the instrument shelter and hang the calibration thermometer, the digital thermometer, and the soil sensor in the instrument shelter so that they have air flow all around them and do not contact the sides of the shelter. Close the door to the instrument shelter. Wait at least an hour and then open the door to the instrument shelter. Make sure that your digital thermometer is displaying the current temperature(s) (Neither 'MAX' or 'MIN' symbols should be displayed on the screen.* (GLOBE.gov, 2014)

*If they are, press the MAX/MIN button until they disappear). Read the temperatures reported by the air sensor and the soil sensor of the digital thermometer and record them on a sheet of paper. Close the door of the instrument shelter. Repeat steps 2 to 5 four more times, waiting at least one hour between each set of readings. Try to space out the five sets of readings over as much of a day as possible.* (GLOBE.gov, 2014)

*For calibrating the Infrared Sensor for surface temperature, the following steps will be followed; Add crushed ice to a glass or bowl. Add ice-cold water and stir to mix it well with the ice. The goal is to create an ice bath with uniform temperature. Dip a thermometer into the ice bath to take a temperature reading. Remove the thermometer and measure the temperature of the surface of the ice bath with the infrared thermometer.*

*Push the ice down gently to avoid having any floating ice on the surface of the water. Hold the infrared thermometer at the recommended measurement distance and make sure that the lens is perpendicular to the surface of the ice water. Check if the temperature reading on the infrared thermometer matches that of the conventional thermometer. If it doesn't match, calculate the deviation, and then calibrate your thermometer accordingly. In most infrared thermometers, you hold a button for a couple of seconds to access the calibration settings.* (https://metertestlab.co.uk, 2020)

**Experimentation: Evaluation of Levels of Different Areas**

The meters were exposed for an hour every day in a week which means there will be a week of testing, about 500+ data sets per location when including the first set of data from before quarantine and around 600 more plus the additional extraneous data during the collection around *three-four years* after the Community Quarantine. The data was collected in a 10-minute time interval and the data observed was then written down and then analyzed for statistical treatment. The

BATASAN HILLS NATIONAL HIGH SCHOOL
IBP Road, Batasan Hills, Q.C.
*Philippines - GLOBE Program*

**Air Quality Research Data Sheet**
By Andrei Joshua A. Alayon
*In collaboration with the GLOBE Program*

**Date:** **Data Collector:**

| | Air Quality Data | | | Circumstantial Information | | | Urban Temperature | |
|---|---|---|---|---|---|---|---|---|
| Time/Day | $NO_2$ | $CO_2$ | $CH_4$ | Relative Humidity | Cloud Formation | Weather | Air Temperature | Surface Temperature |
| Morning Evaluation | | | | | | | | |
| 9:00 | | | | | | | | |
| 9:10 | | | | | | | | |
| 9:20 | | | | | | | | |
| 9:30 | | | | | | | | |
| 9:40 | | | | | | | | |
| 9:50 | | | | | | | | |
| 10:00 | | | | | | | | |
| Afternoon Evaluation | | | | | | | | |
| 3:00 | | | | | | | | |
| 3:10 | | | | | | | | |
| 3:20 | | | | | | | | |
| 3:30 | | | | | | | | |
| 3:40 | | | | | | | | |
| 3:50 | | | | | | | | |
| 4:00 | | | | | | | | |


detectors were not moved and only stayed in place the whole time they were exposed excluding the infrared sensor. For the Surface temperature data, 9 spots in each location were chosen as points to be used to collect surface temperature in choice: following GLOBE Protocols.

In preparing the instruments, the sensors were placed beside each other, and the data collected were written down for statistical treatment. For the infrared sensor, a heat glove was made using an oven mitt following the GLOBE protocols and guidelines for Surface Temperature collection. The researcher also planned to have circumstantial information recorded each day. Namely, Relative Humidity, Cloud Formation and Weather (Rainy or Shiny).

The researcher will collect the data by filling up a data sheet prepared by the researcher. It includes spaces to be filled up for the Air Quality Data, Urban Heat Parameter Data and Circumstantial Data. The data collected spanned from February 27, 2018 - March 4, 2018 for the Pre-Quarantine data collection, February 27, 2022 - March 4, 2022 for the post quarantine data collection and February 27, 2025 - March 27, 2025 for the post-recovered quarantine data collection.

**Analysis, and Statistical Treatment**

The data recorded will go through analysis. This will help answer if the levels went up and down, or if the levels are constant during the hours of testing. The formula of mean will be used for getting the average levels, mode for the most frequent data, while the formula for linear regression will be used for correlating the data. Analyzing the data will also require Pearson's Correlation for testing correlations between ALL sets of data and T-test to test the difference in data.

For the surface temperature data, the researcher will apply mean deviation to get the average of the 9 spots per cycle of collection. Here are the different formulas and statistical instruments used on the data for the average, the most frequent data, and the correlation of each set of data.

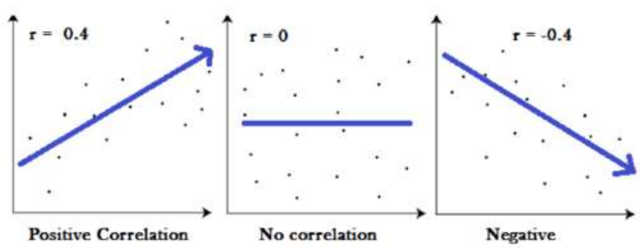
| *Statistical Treatment* | *Formula/s and Tools to be Used* |
|---|---|
| Mean | $\bar{x} = \frac{\sum x}{N}$<br>$\sum x$ – the sum of x<br>$N$ – number of data<br>*Tool Used: Manual Arithmetic Solving* |
| Mode | N/A (Ungrouped Data)<br>*Tool Used: Manual Arithmetic Solving* |
| Linear Regression | $Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$<br>*Tool Used: Minitab 19* |
| Pearson's Correlation | $r = \frac{\sum (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum (x_i - \bar{x})^2 \sum (y_i - \bar{y})^2}}$<br>*Tool Used: Minitab 19* |
| T-Test | $\bar{x}_d$ : sample mean difference<br>$\mu$ : population mean difference<br>$s$ : sample difference standard deviation<br>$n$ : sample size<br>*Tool Used: Minitab 19* |

The results will be between -1 and 1. You will very rarely see 0, -1 or 1. You'll get a number somewhere in between those values. The closer the value of r gets to zero, the greater the variation the data points are around the line of best fit.

*High correlation:* .5 to 1.0 or -0.5 to 1.0

*Medium correlation:* .3 to .5 or -0.3 to .5

*Low correlation:* .1 to .3 or -0.1 to -0.3




**Correlation Coefficient Scale**

| + r values | Positive | – r values | Negative |
|---|---|---|---|
| 1.0 | Perfect + | –1.0 | Perfect – |
| .8 to .99 | Very strong+ | –.8 to –.99 | Very strong– |
| .6 to .8 | Strong + | –.6 to –.8 | Strong – |
| .4 to .6 | Moderate + | –.4 to –.6 | Moderate – |
| .2 to .4 | Weak + | –.2 to –.4 | Weak – |
| 0 to .2 | Very weak + | 0 to –.2 | Very weak – |

# CHAPTER IV

# RESULTS, DATA ANALYSIS AND CONCLUSION

This chapter presents the data gathered, the results of the statistical analysis done, and interpretation of findings. These are presented in tables following the sequence of the specific research problem regarding the Correlation in between Chemical Pollutants in the air with Urban Heat in Q.C.

## Statistical Data and Graphs

The data collected were put into statistical treatment, specifically the Mean, used for getting the average scores per parameter, the Mode, used to get the highest level of parameter taken, and for testing the cause-and-effect of relationship of the two variables, no statistical treatment will be applied because according to McMahon(2020), There is no statistical analysis, by itself, that will demonstrate a cause and effect relationship.

The data recorded went through analysis. This helped answer if the levels went up and down, or if the levels are constant during the hours of testing. The formula of mean is used for getting the average levels, while the formula for linear regression is used for correlating the data. Analyzing the data also requires a T-Test to compare the data from before and after the quarantine.

***Before ECQ Data***

The following data represents the data collected from before the quarantine. This is prior to the data collection taking place during ECQ. This was on February 27, 2018 – March 4, 2018.

*Table 3:* ***Batasan Hills Overpass (bound BHNHS)***

| Parameter | Mean (Average) | Mode (Highest) |
|---|---|---|
| Surface Temperature | 40.05 $^{\circ}C$ | 48.2 $^{\circ}C$ |
| Air Temperature | $31.56\overline{6}$ $^{\circ}C$ | 35 $^{\circ}C$ |
| Carbon Dioxide (CO2) | 53.70ppm | 58.90ppm |
| Carbon Monoxide (CO) | 85ppm | 90ppm |
| Humidity | 52.4% | 61% |
| HCHO (Formaldehyde) | $0.41303\overline{3}$ppm | 0.477ppm |
| TVOC (Volatile Organic Compounds) | 0.8307ppm | 1.071ppm |

*Chart 1:* ***Batasan Hills Overpass (bound BHNHS)*** *Day 1*

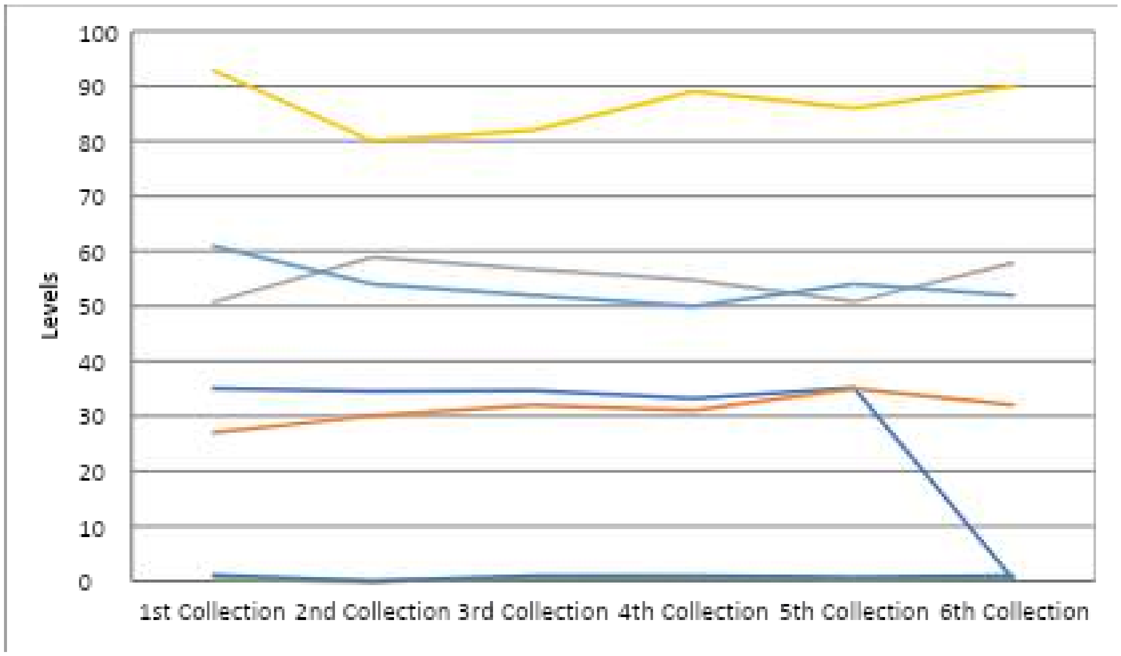



*Chart 2: **Batasan Hills Overpass (bound BHNHS)** Day 2*

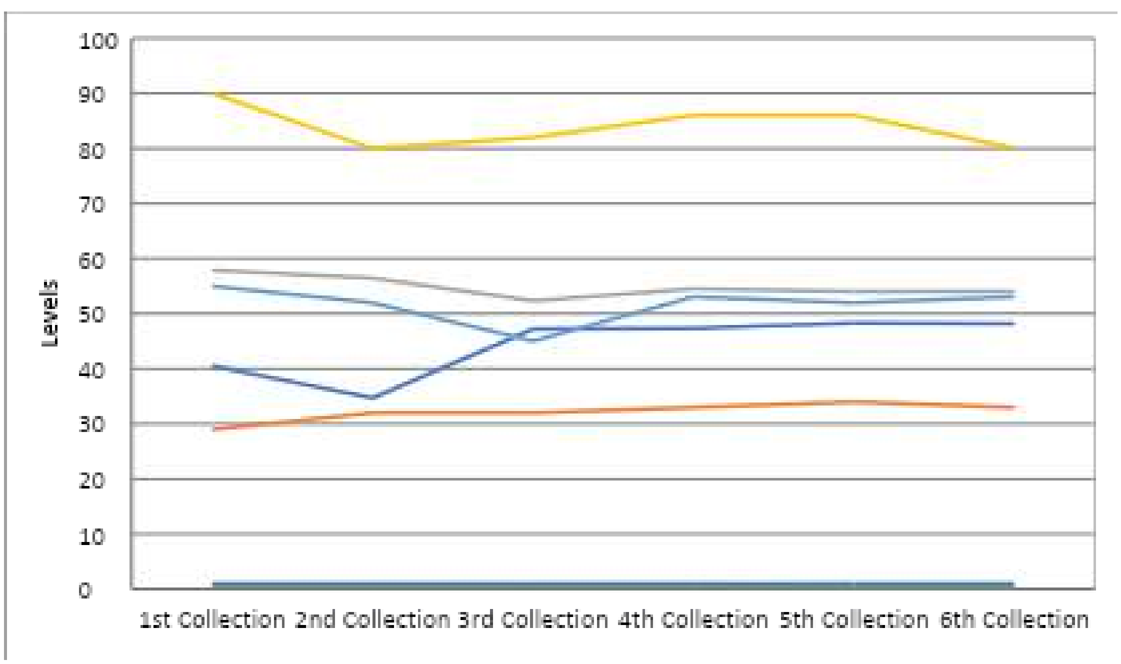


*Chart 3:* ***Batasan Hills Overpass (bound BHNHS)*** *Day 3*

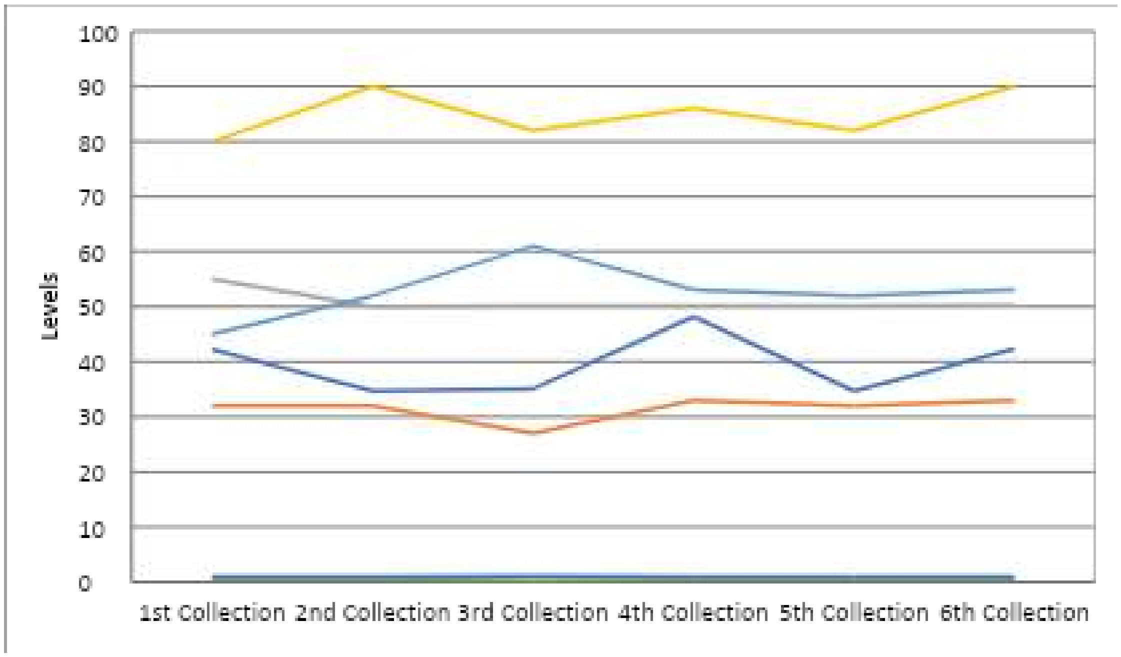



*Chart 4:* ***Batasan Hills Overpass (bound BHNHS)*** *Day 4*

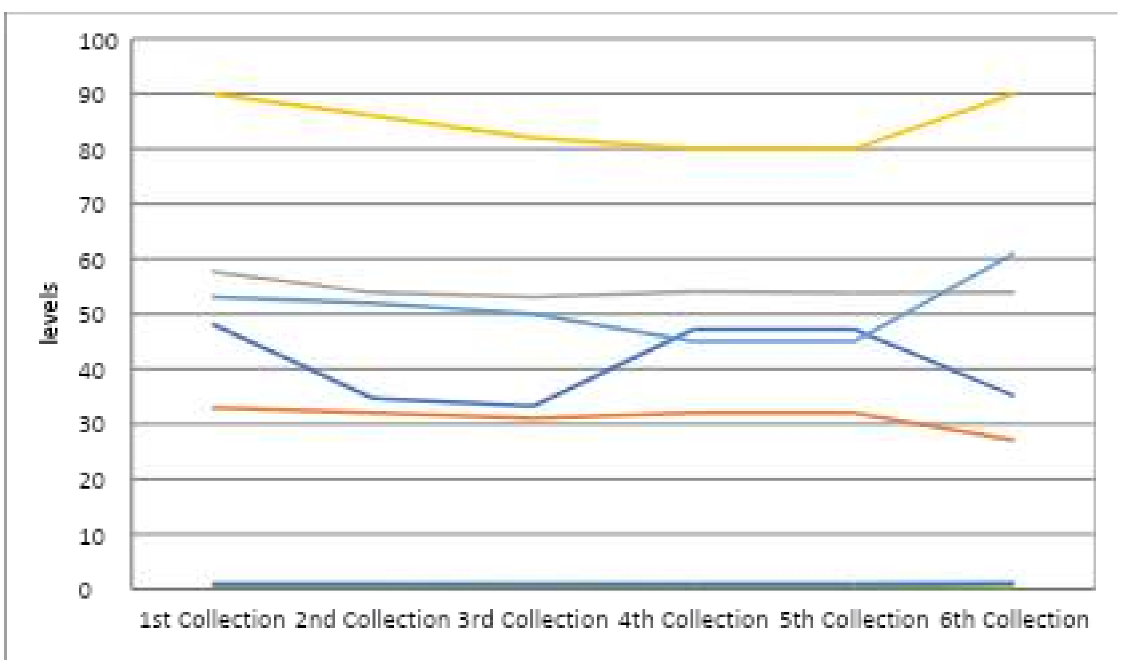
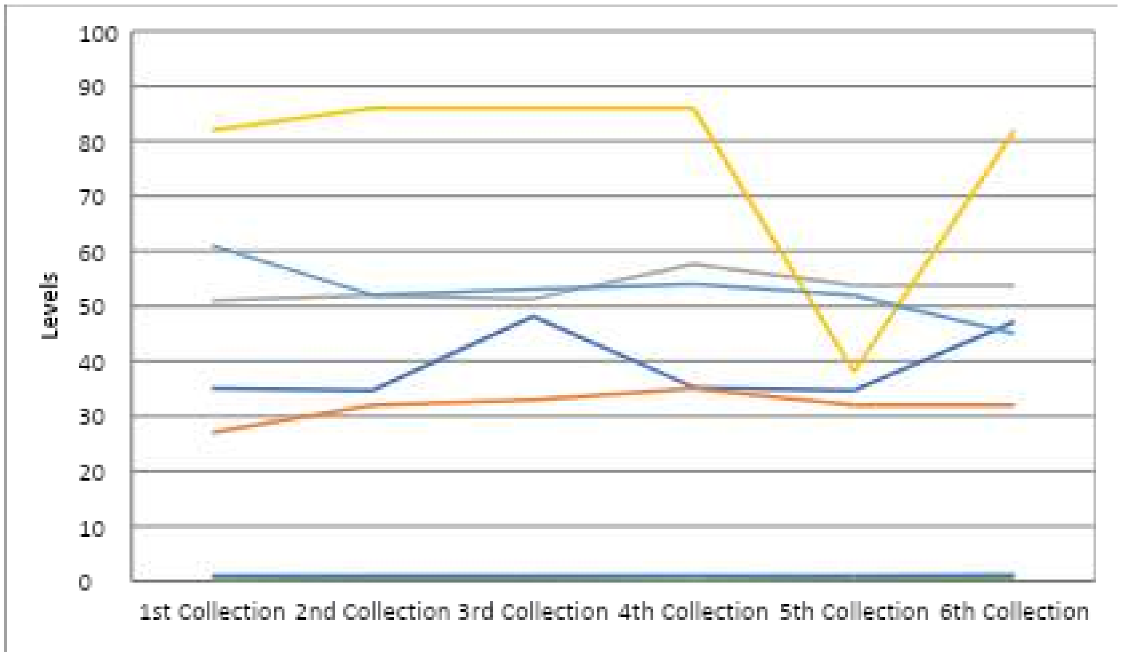



*Chart 5:* ***Batasan Hills Overpass (bound BHNHS)*** *Day 5*




**Formaldehyde (HCHO) vs Air Temperature (AT) and Surface Temperature (ST)**

## Regression Equation

HCHO = -0.411 + 0.00226 ST + 0.0231 AT

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 0.084508 | 0.042254 | 2.19 | 0.131 |
| ST | 1 | 0.005013 | 0.005013 | 0.26 | 0.614 |
| AT | 1 | 0.050765 | 0.050765 | 2.64 | 0.116 |
| Error | 27 | 0.519917 | 0.019256 | | |
| Lack-of-Fit | 11 | 0.519917 | 0.047265 | * | * |
| Pure Error | 16 | 0.000000 | 0.000000 | | |
| Total | 29 | 0.604425 | | | |

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | -0.411 | 0.410 | -1.00 | 0.325 | |
| ST | 0.00226 | 0.00444 | 0.51 | 0.614 | 1.22 |
| AT | 0.0231 | 0.0142 | 1.62 | 0.116 | 1.22 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 0.138767 | 13.98% | 7.61% | 0.00% |

## Fits and Diagnostics for Unusual Observations

| Obs | HCHO | Fit | Resid | Std Resid | |
|---|---|---|---|---|---|
| 2 | 0.0030 | 0.3607 | -0.3577 | -2.67 | R |
| 4 | 0.6680 | 0.3809 | 0.2871 | 2.15 | R |
| 5 | 0.2200 | 0.4779 | -0.2579 | -2.10 | R |
| 21 | 0.6680 | 0.3809 | 0.2871 | 2.15 | R |

*R Large residual*

**Total Volatile Organic Compound (TVOC) vs Air Temperature (AT) and Surface Temperature (ST)**

## Regression Equation

TVOC = 0.730 + 0.00555 ST - 0.0002 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 0.730 | 0.566 | 1.29 | 0.208 | |
| ST | 0.00555 | 0.00612 | 0.91 | 0.372 | 1.22 |
| AT | -0.0002 | 0.0196 | -0.01 | 0.991 | 1.22 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 0.191459 | 3.55% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 0.03639 | 0.018193 | 0.50 | 0.614 |
| ST | 1 | 0.03017 | 0.030172 | 0.82 | 0.372 |
| AT | 1 | 0.00001 | 0.000005 | 0.00 | 0.991 |
| Error | 27 | 0.98972 | 0.036656 | | |
| Lack-of-Fit | 11 | 0.94910 | 0.086282 | 33.98 | 0.000 |
| Pure Error | 16 | 0.04063 | 0.002539 | | |
| Total | 29 | 1.02611 | | | |

## Fits and Diagnostics for Unusual Observations

| Obs | TVOC | Fit | Resid | Std Resid | |
|---|---|---|---|---|---|
| 2 | 0.0000 | 0.9145 | -0.9145 | -4.95 | R |

*R Large residual*

**Carbon Monoxide (CO) vs Air Temperature (AT) and Surface Temperature (ST)**

## Regression Equation

CO = 93.2 - 0.114 ST - 0.112 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 93.2 | 11.7 | 7.98 | 0.000 | |
| ST | -0.114 | 0.126 | -0.90 | 0.376 | 1.22 |
| AT | -0.112 | 0.406 | -0.28 | 0.784 | 1.22 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 3.95602 | 4.72% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 20.915 | 10.457 | 0.67 | 0.521 |
| ST | 1 | 12.656 | 12.656 | 0.81 | 0.376 |
| AT | 1 | 1.196 | 1.196 | 0.08 | 0.784 |
| Error | 27 | 422.552 | 15.650 | | |
| Lack-of-Fit | 11 | 165.728 | 15.066 | 0.94 | 0.531 |
| Pure Error | 16 | 256.824 | 16.051 | | |
| Total | 29 | 443.467 | | | |

**Carbon Dioxide ($CO_2$) vs Air Temperature (AT) and Surface Temperature (ST)**

## Regression Equation

CO2 = 5569 + 0.72 ST - 7.0 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 5569 | 857 | 6.50 | 0.000 | |
| ST | 0.72 | 9.27 | 0.08 | 0.939 | 1.22 |
| AT | -7.0 | 29.8 | -0.24 | 0.816 | 1.22 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 290.048 | 0.21% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 4697 | 2348.6 | 0.03 | 0.972 |
| ST | 1 | 505 | 505.2 | 0.01 | 0.939 |
| AT | 1 | 4647 | 4646.7 | 0.06 | 0.816 |
| Error | 27 | 2271444 | 84127.6 | | |
| Lack-of-Fit | 11 | 998802 | 90800.2 | 1.14 | 0.394 |
| Pure Error | 16 | 1272642 | 79540.1 | | |
| Total | 29 | 2276141 | | | |

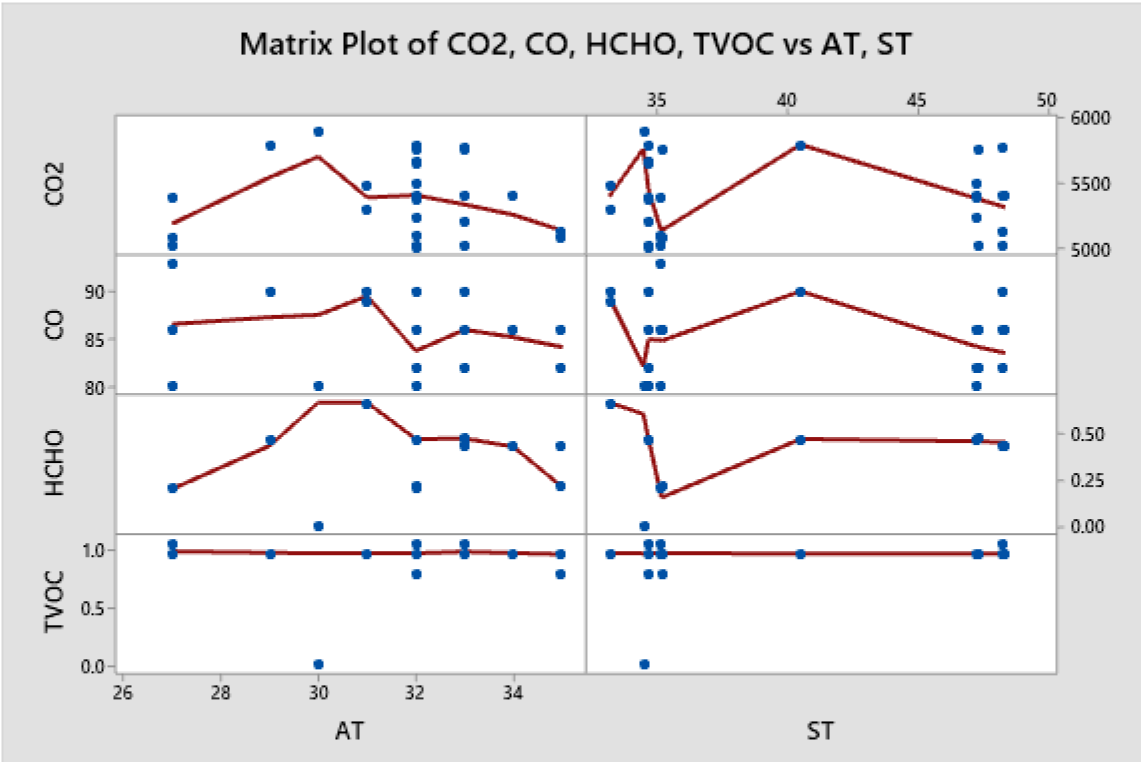
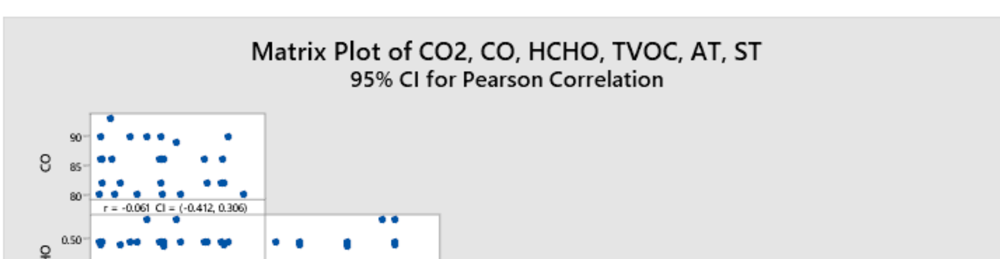



*Chart 6.1: **Batasan Hills Overpass Before Quarantine** Matrix Plot*



## Method

| | |
|---|---|
| Correlation type | Pearson |
| Rows used | 30 |

## Correlations

| | CO | HCHO | TVOC | AT |
|---|---|---|---|---|
| HCHO | -0.239 | | | |
| TVOC | -0.070 | 0.501 | | |
| AT | -0.244 | -0.103 | -0.482 | |
| ST | -0.042 | 0.238 | 0.126 | 0.183 |

*Chart 6.2 and 6.3:* ***Batasan Hills Overpass Before Quarantine*** *Matrix Plot (Pearson's)*

*Table 4:* ***San Mateo Northview (by the Marikina/ San Mateo River)***

| Parameter | Mean (Average) | Mode (Highest) |
|---|---|---|
| **Surface Temperature** | 49.55 C° | 49.3 C° |
| **Air Temperature** | $32.23\overline{3}$ C° | 33 C° |
| **Carbon Dioxide (CO2)** | 51.803ppm | 57.76ppm |
| **Carbon Monoxide (CO)** | 84.53ppm | 86ppm |
| **Humidity** | 49.8% | 61% |
| **HCHO (Formaldehyde)** | 0.41676ppm | 0.478ppm |
| **TVOC(Volatile Organic Compounds)** | 0.8344ppm | 0.976ppm |

*Chart 7:* ***San Mateo Northview (by the Marikina/ San Mateo River)*** *Day 1*

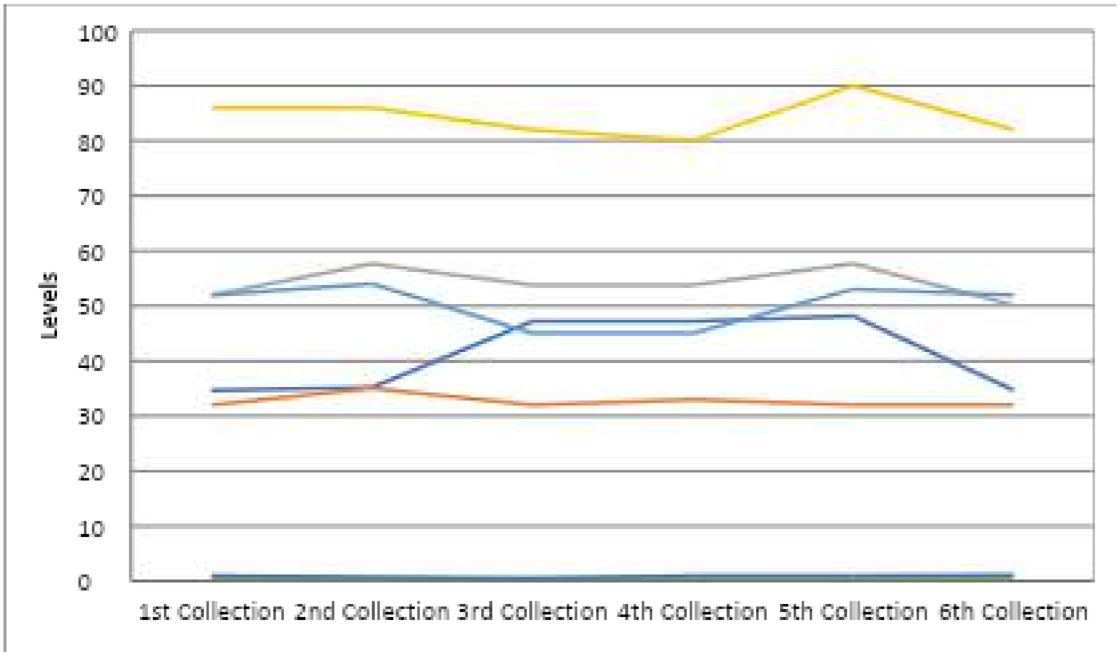



*Chart 8:* ***San Mateo Northview (by the Marikina/ San Mateo River)*** *Day 2*

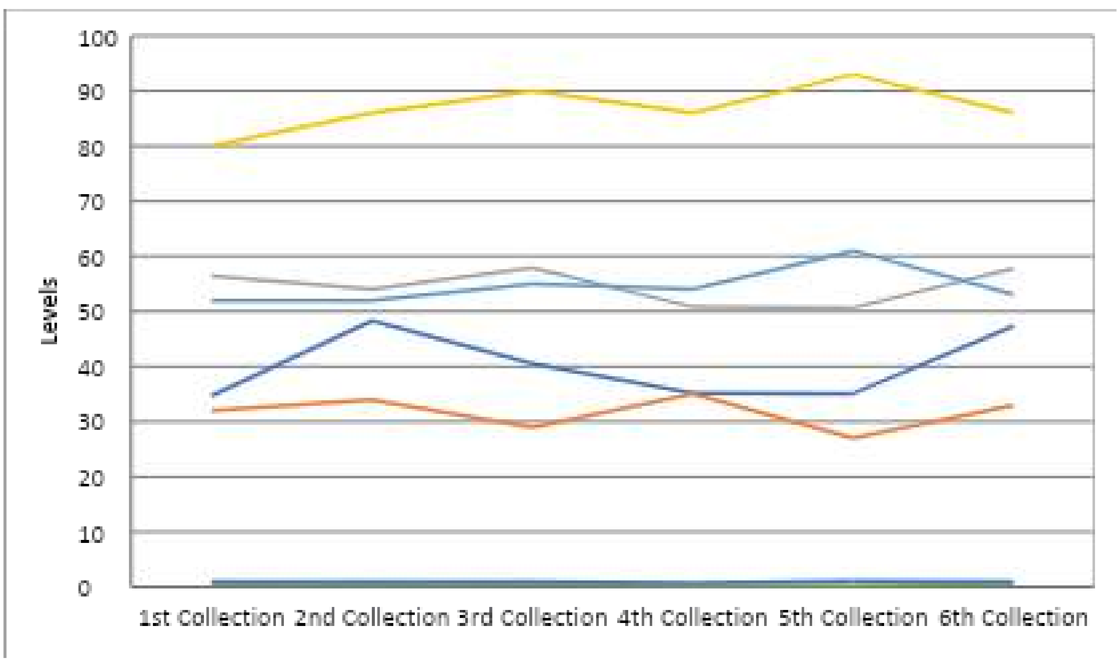



*Chart 9:* ***San Mateo Northview (by the Marikina/ San Mateo River)*** *Day 3*

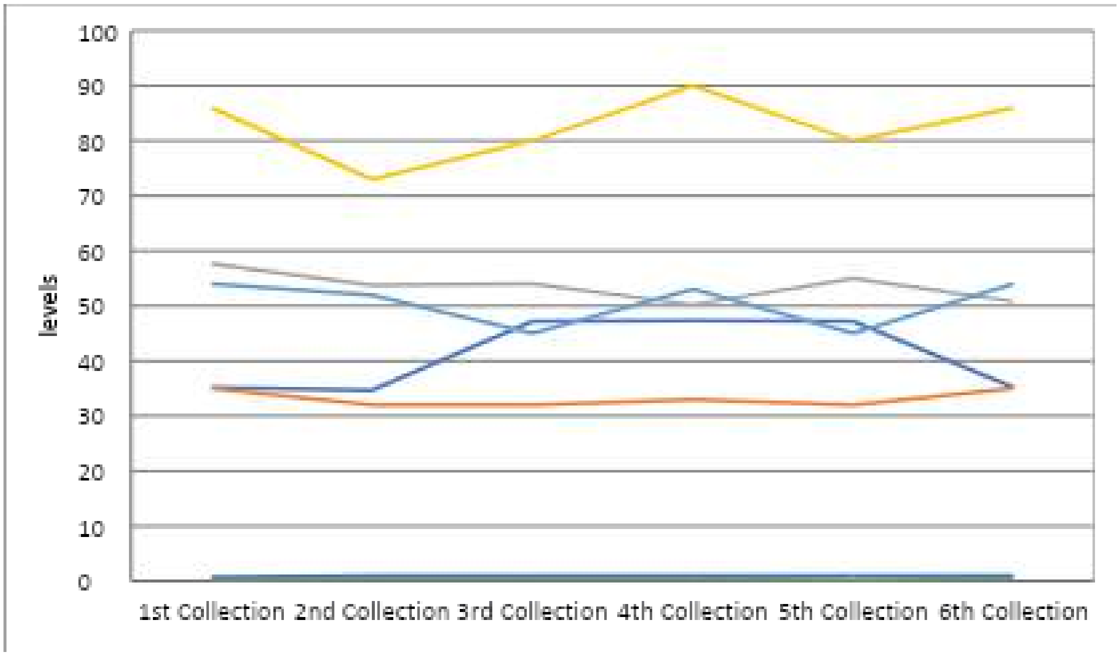



*Chart 10:* ***San Mateo Northview (by the Marikina/ San Mateo River)*** *Day 4*

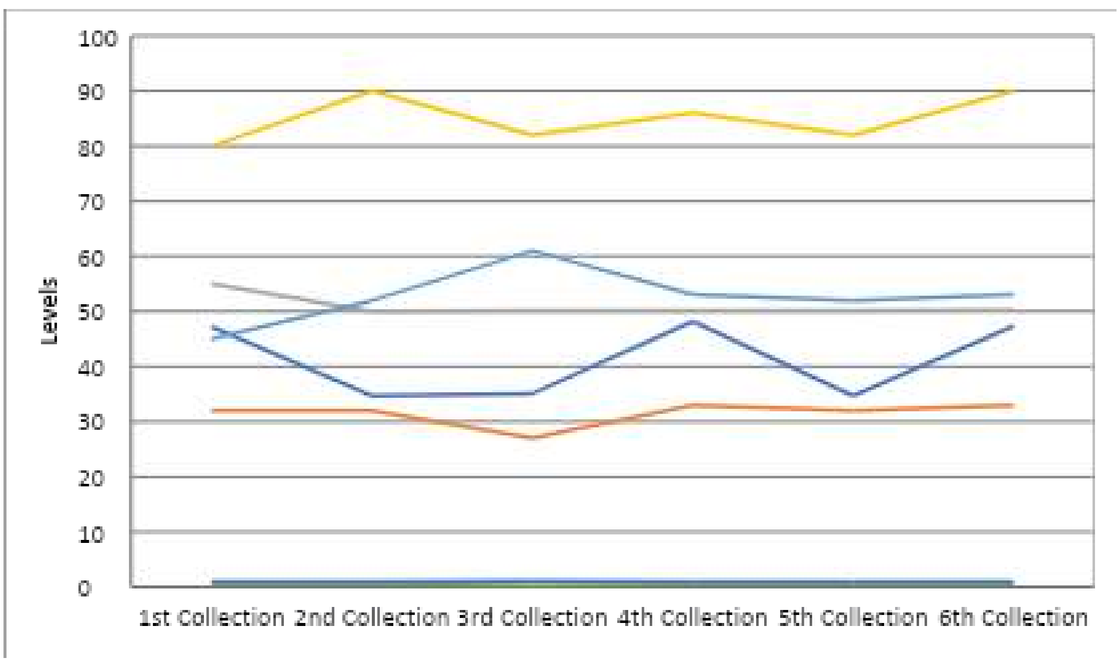
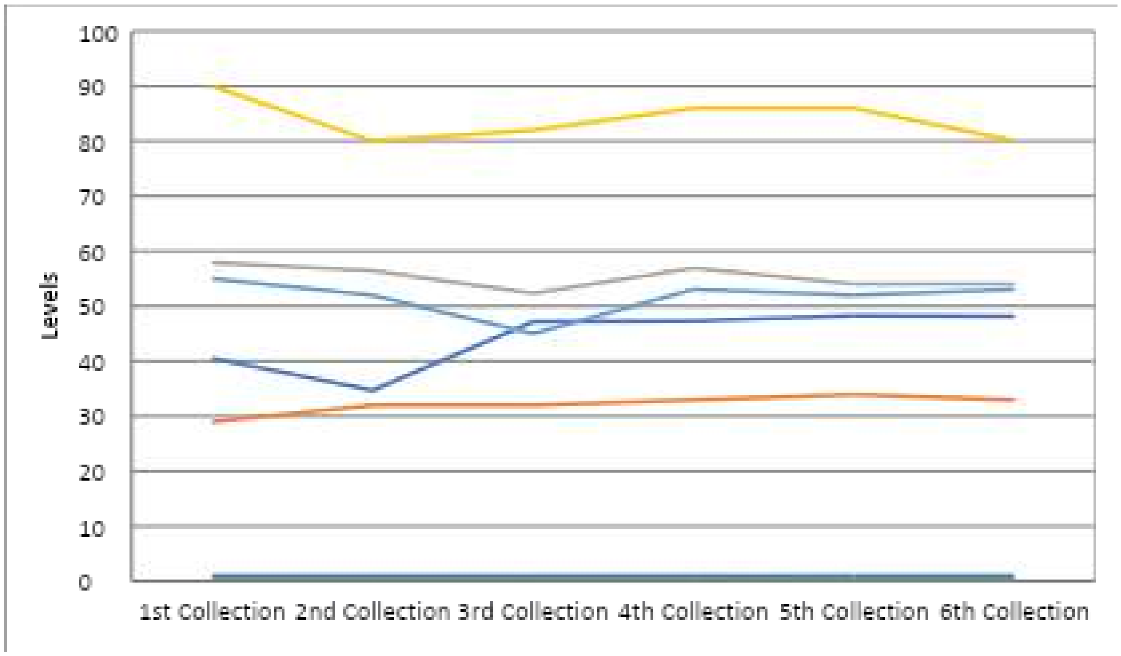



*Chart 11:* ***San Mateo Northview (by the Marikina/ San Mateo River)*** *Day 5*




**Formaldehyde (HCHO) vs Air Temperature (AT) and Surface Temperature (ST)**

## Regression Equation

HCHO = 0.502 + 0.00431 ST - 0.00776 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 0.502 | 0.311 | 1.61 | 0.118 | |
| ST | 0.00431 | 0.00304 | 1.42 | 0.168 | 1.03 |
| AT | -0.00776 | 0.00962 | -0.81 | 0.427 | 1.03 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 0.102429 | 7.91% | 1.08% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 0.024320 | 0.012160 | 1.16 | 0.329 |
| ST | 1 | 0.021072 | 0.021072 | 2.01 | 0.168 |
| AT | 1 | 0.006824 | 0.006824 | 0.65 | 0.427 |
| Error | 27 | 0.283274 | 0.010492 | | |
| Lack-of-Fit | 18 | 0.283266 | 0.015737 | 17704.11 | 0.000 |
| Pure Error | 9 | 0.000008 | 0.000001 | | |
| Total | 29 | 0.307593 | | | |

**Total Volatile Organic Compound (TVOC) vs Air Temperature (AT) and Surface Temperature (ST)**

## Regression Equation

TVOC = 1.453 + 0.00244 ST - 0.01820 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 1.453 | 0.187 | 7.77 | 0.000 | |
| ST | 0.00244 | 0.00183 | 1.33 | 0.193 | 1.03 |
| AT | -0.01820 | 0.00578 | -3.15 | 0.004 | 1.03 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 0.0615677 | 28.01% | 22.68% | 12.05% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 0.039828 | 0.019914 | 5.25 | 0.012 |
| ST | 1 | 0.006746 | 0.006746 | 1.78 | 0.193 |
| AT | 1 | 0.037578 | 0.037578 | 9.91 | 0.004 |
| Error | 27 | 0.102346 | 0.003791 | | |
| Lack-of-Fit | 18 | 0.102345 | 0.005686 | 51172.40 | 0.000 |
| Pure Error | 9 | 0.000001 | 0.000000 | | |
| Total | 29 | 0.142174 | | | |

**CO VS AT AND ST**

## Regression Equation

CO = 102.0 + 0.002 ST - 0.544 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 102.0 | 13.7 | 7.46 | 0.000 | |
| ST | 0.002 | 0.134 | 0.01 | 0.988 | 1.03 |
| AT | -0.544 | 0.423 | -1.29 | 0.209 | 1.03 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 4.50042 | 5.95% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 34.613 | 17.3067 | 0.85 | 0.437 |
| ST | 1 | 0.005 | 0.0045 | 0.00 | 0.988 |
| AT | 1 | 33.591 | 33.5905 | 1.66 | 0.209 |
| Error | 27 | 546.853 | 20.2538 | | |
| Lack-of-Fit | 18 | 421.187 | 23.3993 | 1.68 | 0.216 |
| Pure Error | 9 | 125.667 | 13.9630 | | |
| Total | 29 | 581.467 | | | |

**CO2 VS AT AND ST**

## Regression Equation

$CO2 = 4192 + 10.91\ ST + 23.3\ AT$

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 4192 | 907 | 4.62 | 0.000 | |
| ST | 10.91 | 8.87 | 1.23 | 0.229 | 1.03 |
| AT | 23.3 | 28.0 | 0.83 | 0.413 | 1.03 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 298.710 | 8.99% | 2.25% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 238008 | 119004 | 1.33 | 0.280 |
| ST | 1 | 135002 | 135002 | 1.51 | 0.229 |
| AT | 1 | 61619 | 61619 | 0.69 | 0.413 |
| Error | 27 | 2409148 | 89228 | | |
| Lack-of-Fit | 18 | 1630769 | 90598 | 1.05 | 0.494 |
| Pure Error | 9 | 778379 | 86487 | | |
| Total | 29 | 2647156 | | | |

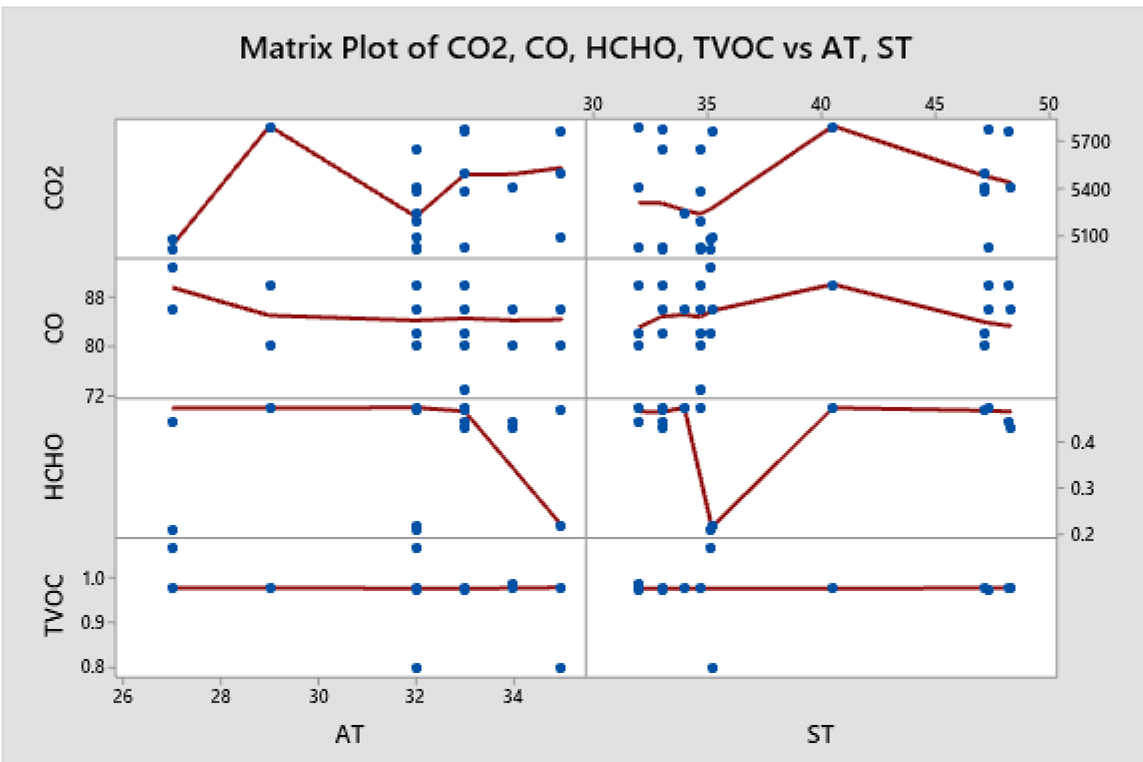
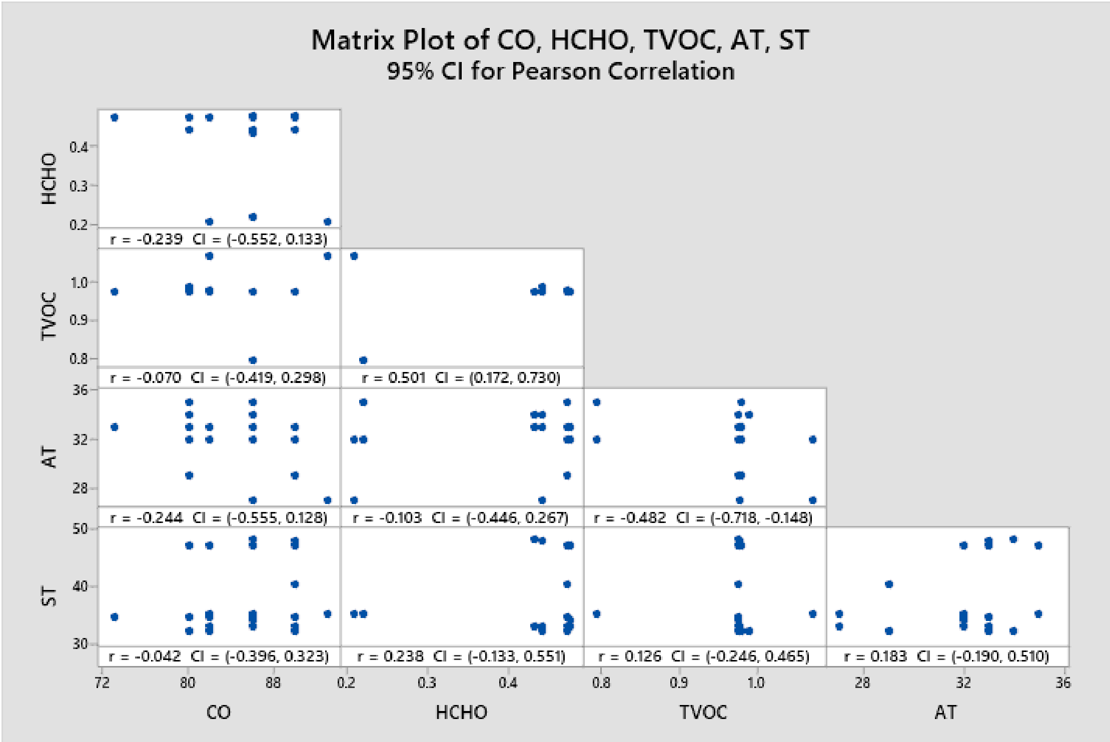



*Chart 12.1: **San Mateo Northview Road Before Quarantine** Matrix Plot*




## Method

| | |
|---|---|
| Correlation type | Pearson |
| Rows used | 30 |

## Correlations

| | CO | HCHO | TVOC | AT |
|---|---|---|---|---|
| HCHO | -0.239 | | | |
| TVOC | -0.070 | 0.501 | | |
| AT | -0.244 | -0.103 | -0.482 | |
| ST | -0.042 | 0.238 | 0.126 | 0.183 |

*Chart 12.2 and 12.3:* ***San Mateo Northview Road Before Quarantine*** *Matrix Plot (Pearson's)*

*Table 5:* ***Don Antonio Overpass (bound Shopwise and Petron)***

| Parameter | Mean (Average) | Mode (Highest) |
|---|---|---|
| **Surface Temperature** | 41.6133 $C^{\circ}$ | 48.2 $C^{\circ}$ |
| **Air Temperature** | 32.233 $C^{\circ}$ | 34 $C^{\circ}$ |
| **Carbon Dioxide (CO2)** | 53.30ppm | 58.90ppm |
| **Carbon Monoxide (CO)** | 85.09ppm | 82ppm |
| **Humidity** | 46.8% | 59% |
| **HCHO (Formaldehyde)** | 0.4788ppm | 0.478ppm |
| **TVOC(Volatile Organic Compounds)** | 0.834ppm | 0.926ppm |

*Chart 13:* ***Don Antonio Overpass (bound Shopwise and Petron)*** *Day 1*

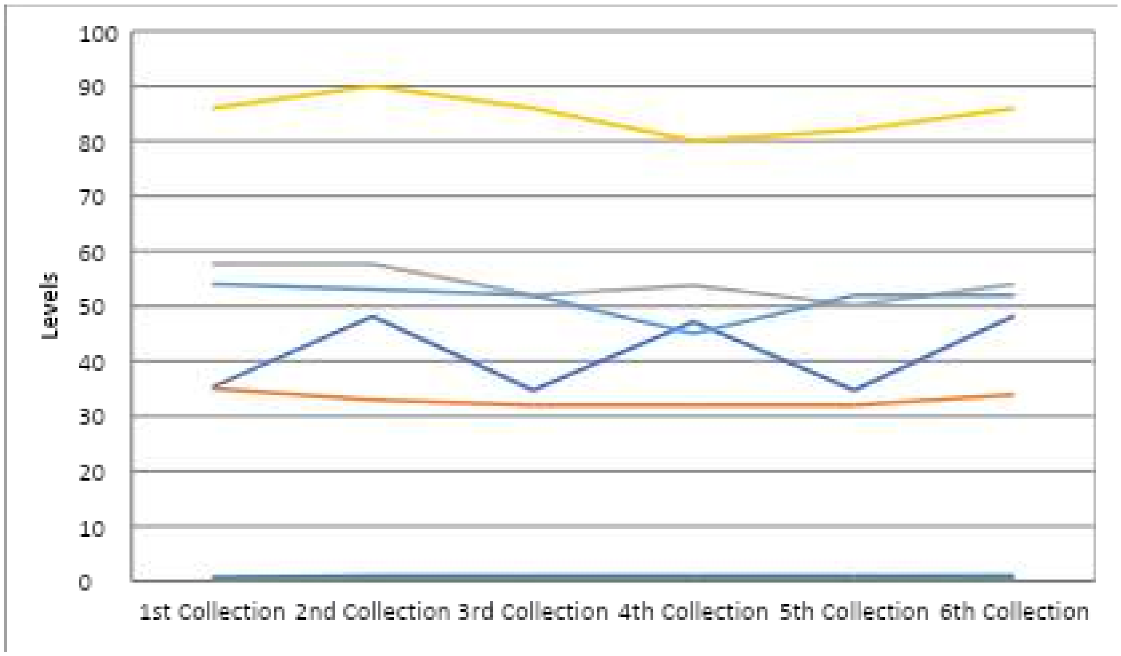



*Chart 14:* ***Don Antonio Overpass (bound Shopwise and Petron)*** *Day 2*

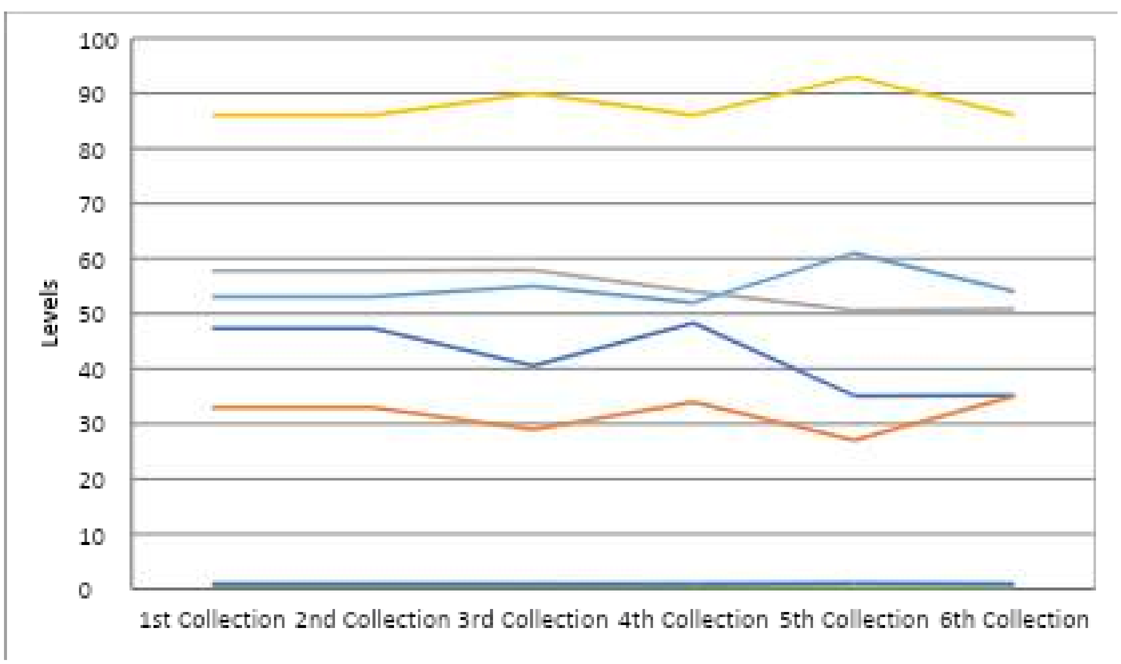



*Chart 15:* ***Don Antonio Overpass (bound Shopwise and Petron)*** *Day 3*

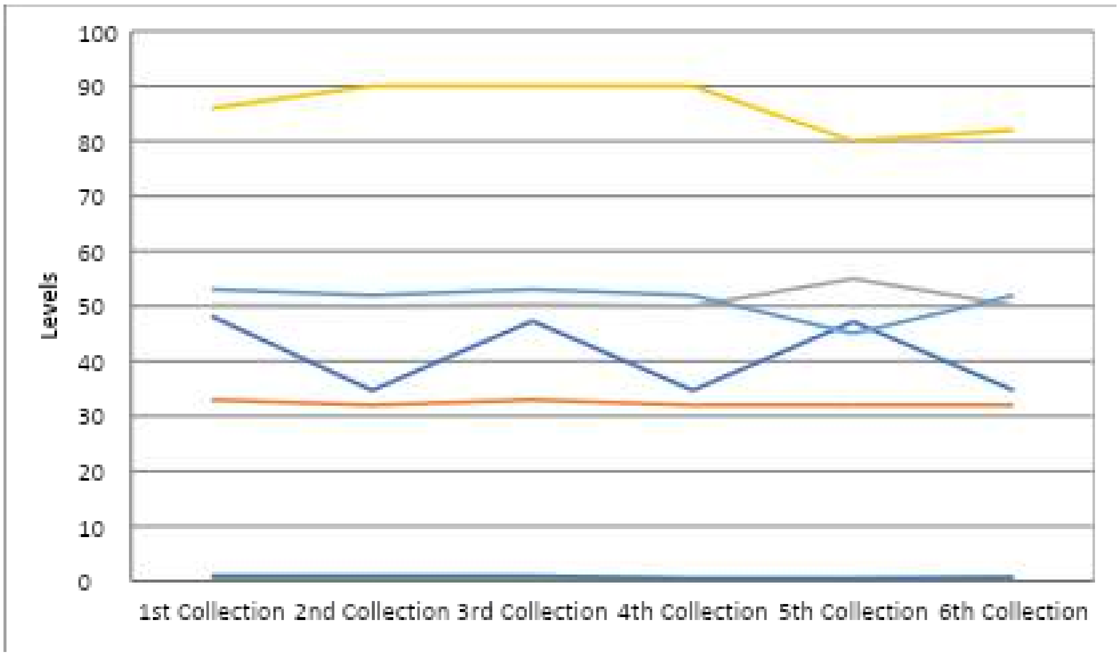



*Chart 16:* ***Don Antonio Overpass (bound Shopwise and Petron)*** *Day 4*

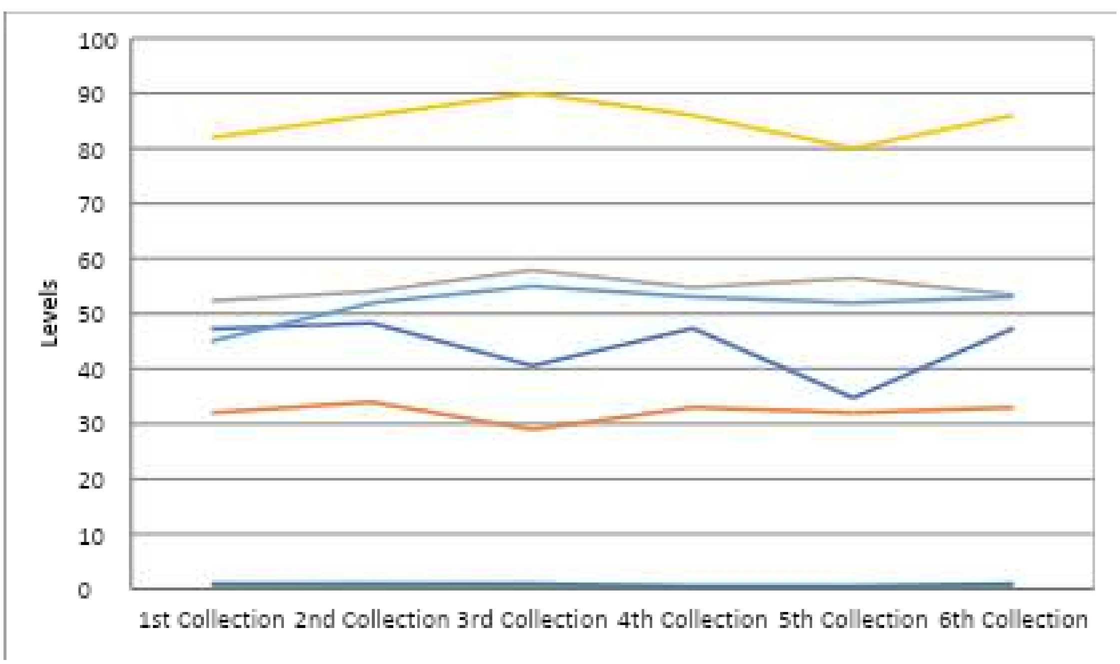
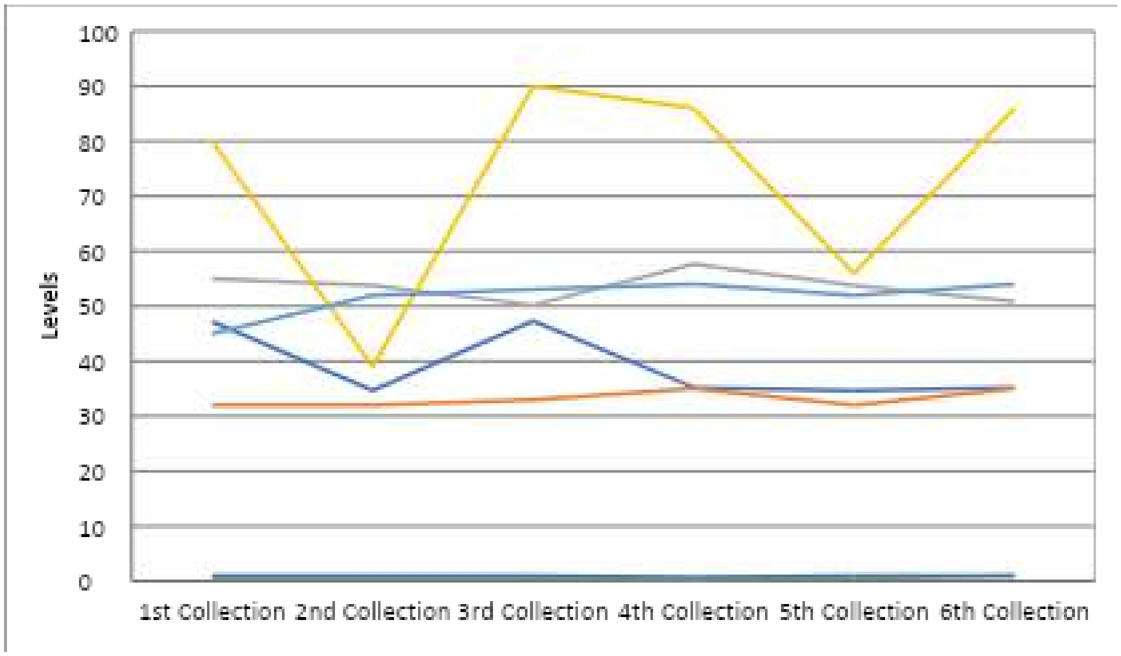



*Chart 17:* ***Don Antonio Overpass (bound Shopwise and Petron)*** *Day 5*




**Formaldehyde (HCHO) vs Air Temperature (AT) and Surface Temperature (ST)**

## Regression Equation

HCHO = 1.213 - 0.0065 ST - 0.0158 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 1.213 | 0.994 | 1.22 | 0.233 | |
| ST | -0.0065 | 0.0236 | -0.28 | 0.784 | 1.04 |
| AT | -0.0158 | 0.0236 | -0.67 | 0.509 | 1.04 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 0.351188 | 2.23% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 0.07585 | 0.037927 | 0.31 | 0.738 |
| ST | 1 | 0.00945 | 0.009451 | 0.08 | 0.784 |
| AT | 1 | 0.05521 | 0.055210 | 0.45 | 0.509 |
| Error | 27 | 3.32999 | 0.123333 | | |
| Lack-of-Fit | 20 | 2.62865 | 0.131433 | 1.31 | 0.375 |
| Pure Error | 7 | 0.70134 | 0.100191 | | |
| Total | 29 | 3.40584 | | | |

**Total Volatile Organic Compound (TVOC) vs Air Temperature (AT) and Surface Temperature (ST)**

## Regression Equation

TVOC = 1.65 - 0.0199 ST - 0.0131 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 1.65 | 1.18 | 1.40 | 0.174 | |
| ST | -0.0199 | 0.0280 | -0.71 | 0.483 | 1.04 |
| AT | -0.0131 | 0.0280 | -0.47 | 0.642 | 1.04 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 0.416760 | 3.17% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 0.15343 | 0.07672 | 0.44 | 0.648 |
| ST | 1 | 0.08804 | 0.08804 | 0.51 | 0.483 |
| AT | 1 | 0.03831 | 0.03831 | 0.22 | 0.642 |
| Error | 27 | 4.68960 | 0.17369 | | |
| Lack-of-Fit | 20 | 3.43856 | 0.17193 | 0.96 | 0.564 |
| Pure Error | 7 | 1.25104 | 0.17872 | | |
| Total | 29 | 4.84303 | | | |

**CO VS AT AND ST**

## Regression Equation

CO = 244 + 1.21 ST - 5.36 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 244 | 369 | 0.66 | 0.515 | |
| ST | 1.21 | 8.76 | 0.14 | 0.891 | 1.04 |
| AT | -5.36 | 8.76 | -0.61 | 0.546 | 1.04 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 130.544 | 1.37% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 6379 | 3189.5 | 0.19 | 0.830 |
| ST | 1 | 325 | 325.1 | 0.02 | 0.891 |
| AT | 1 | 6369 | 6369.0 | 0.37 | 0.546 |
| Error | 27 | 460124 | 17041.6 | | |
| Lack-of-Fit | 20 | 217884 | 10894.2 | 0.31 | 0.980 |
| Pure Error | 7 | 242240 | 34605.7 | | |
| Total | 29 | 466503 | | | |

## Fits and Diagnostics for Unusual Observations

| Obs | CO | Fit | Resid | Std Resid |
|---|---|---|---|---|
| 16 | 778.0 | 117.4 | 660.6 | 5.20 R |

*R Large residual*

**CO2 VS AT AND ST**

## Regression Equation

$CO2 = 2249 + 3.08\ ST + 91.33\ AT$

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 2249 | 396 | 5.68 | 0.000 | |
| ST | 3.08 | 9.38 | 0.33 | 0.745 | 1.04 |
| AT | 91.33 | 9.38 | 9.73 | 0.000 | 1.04 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 139.799 | 78.66% | 77.08% | 72.82% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 1944965 | 972483 | 49.76 | 0.000 |
| ST | 1 | 2107 | 2107 | 0.11 | 0.745 |
| AT | 1 | 1851520 | 1851520 | 94.74 | 0.000 |
| Error | 27 | 527681 | 19544 | | |
| Lack-of-Fit | 20 | 375646 | 18782 | 0.86 | 0.630 |
| Pure Error | 7 | 152035 | 21719 | | |
| Total | 29 | 2472646 | | | |

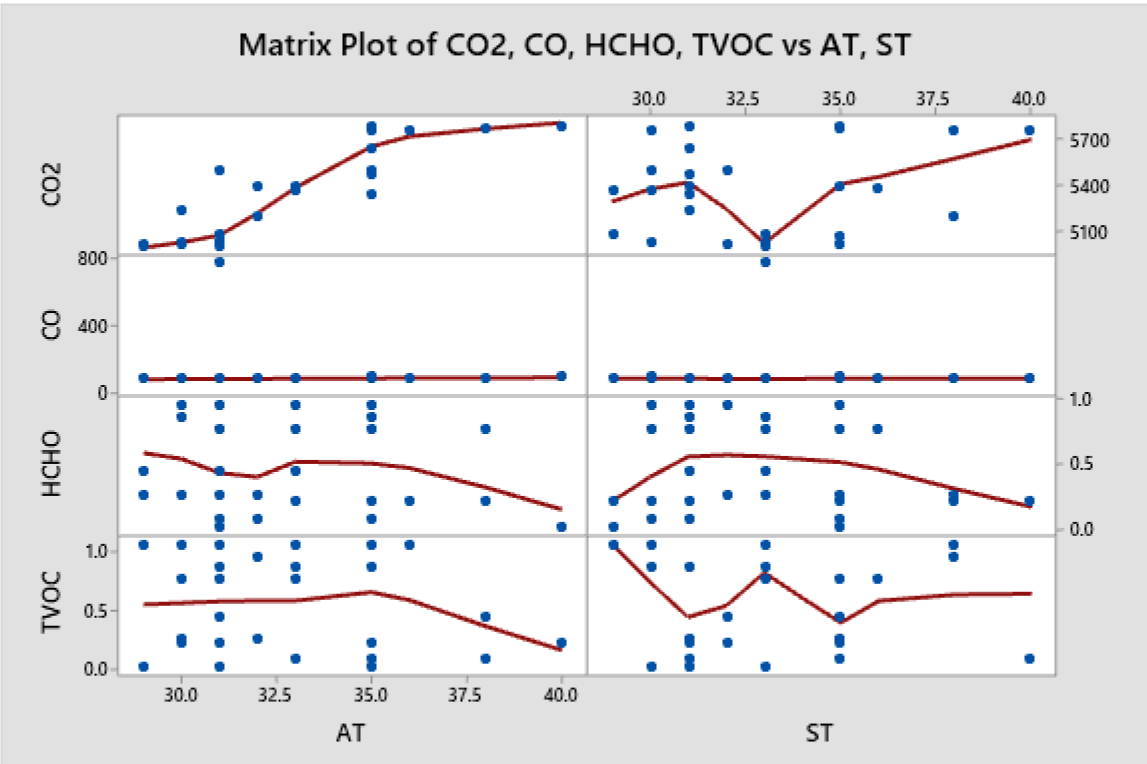
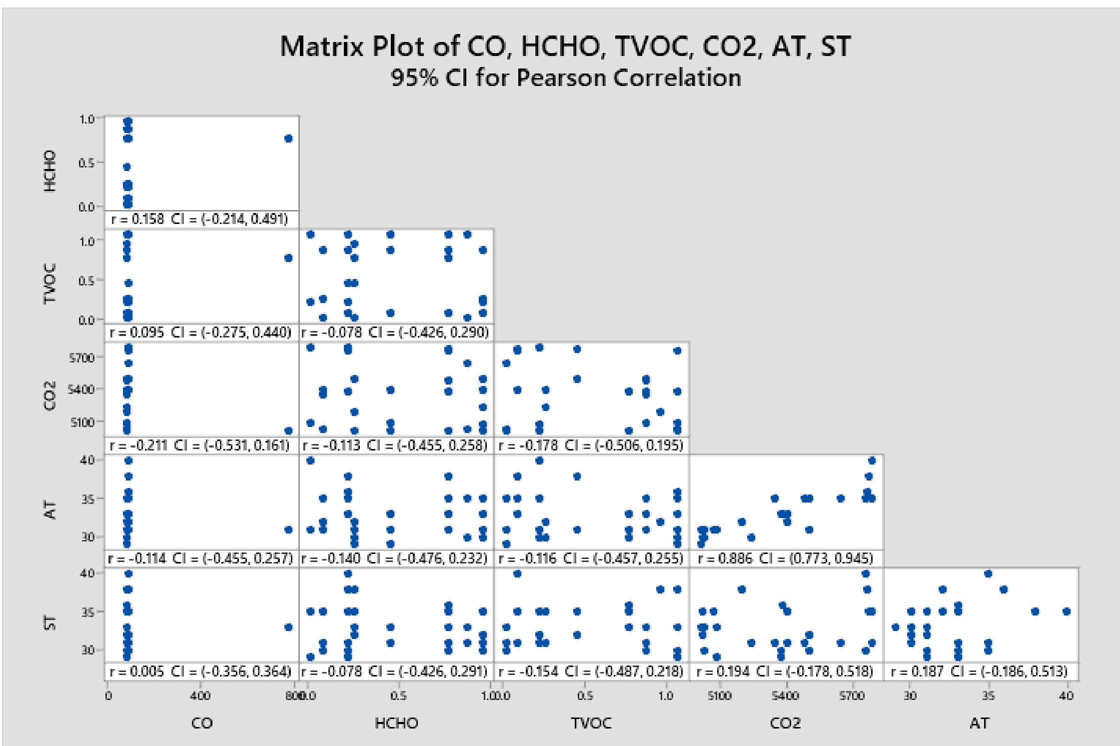



*Chart 18.1: **Don Antonio Before Quarantine** Matrix Plot*



Matrix Plot of CO, HCHO, TVOC, CO2, AT, ST
95% CI for Pearson Correlation
HCHO
TVOC
CO2
AT
ST
r = 0.158 CI = (-0.214, 0.491)
r = 0.095 CI = (-0.275, 0.440)
r = -0.078 CI = (-0.426, 0.290)
r = -0.211 CI = (-0.531, 0.161)
r = -0.113 CI = (-0.455, 0.258)
r = -0.178 CI = (-0.506, 0.195)
r = -0.114 CI = (-0.455, 0.257)
r = -0.140 CI = (-0.476, 0.232)
r = -0.116 CI = (-0.457, 0.255)
r = 0.886 CI = (0.773, 0.945)
r = 0.005 CI = (-0.356, 0.364)
r = -0.078 CI = (-0.426, 0.291)
r = -0.154 CI = (-0.487, 0.218)
r = 0.194 CI = (-0.178, 0.518)
r = 0.187 CI = (-0.186, 0.513)
CO
HCHO
TVOC
CO2
AT

## Method

| | |
|---|---|
| Correlation type | Pearson |
| Rows used | 30 |

## Correlations

| | CO | HCHO | TVOC | CO2 | AT |
|---|---|---|---|---|---|
| HCHO | 0.158 | | | | |
| TVOC | 0.095 | -0.078 | | | |
| CO2 | -0.211 | -0.113 | -0.178 | | |
| AT | -0.114 | -0.140 | -0.116 | 0.886 | |
| ST | 0.005 | -0.078 | -0.154 | 0.194 | 0.187 |

*Chart 18.2 and 18.3:* ***Don Antonio Before Quarantine*** *Matrix Plot (Pearson's)*

***After ECQ Data***

The following data represents the combination of data collected from after the enhanced community quarantine and around three years after the said recovery period. This was taken once the alert in Metro Manila was lowered. This was on February 27, 2022 – March 4 2022 and February 27, 2025 - March 4, 2025.

*Table 6:* ***Batasan Hills Overpass After Quarantine (bound BHNHS)***

| Parameter | Mean (Average) | Mode (Highest) |
|---|---|---|
| Surface Temperature | 45.95°C | 48.3°C |
| Air Temperature | 42.23°C | 47°C |
| Carbon Dioxide ($CO_2$) | 43.68ppm | 48.9ppm |

| | | |
|---|---|---|
| Humidity | 53.3% | 61% |
| HCHO (Formaldehyde) | 0.234ppm | 0.325ppm |
| TVOC (Volatile Organic Compounds) | 0.578ppm | 0.943ppm |

*Chart 19:* ***Batasan Hills Overpass (bound BHNHS)*** *Day 1*

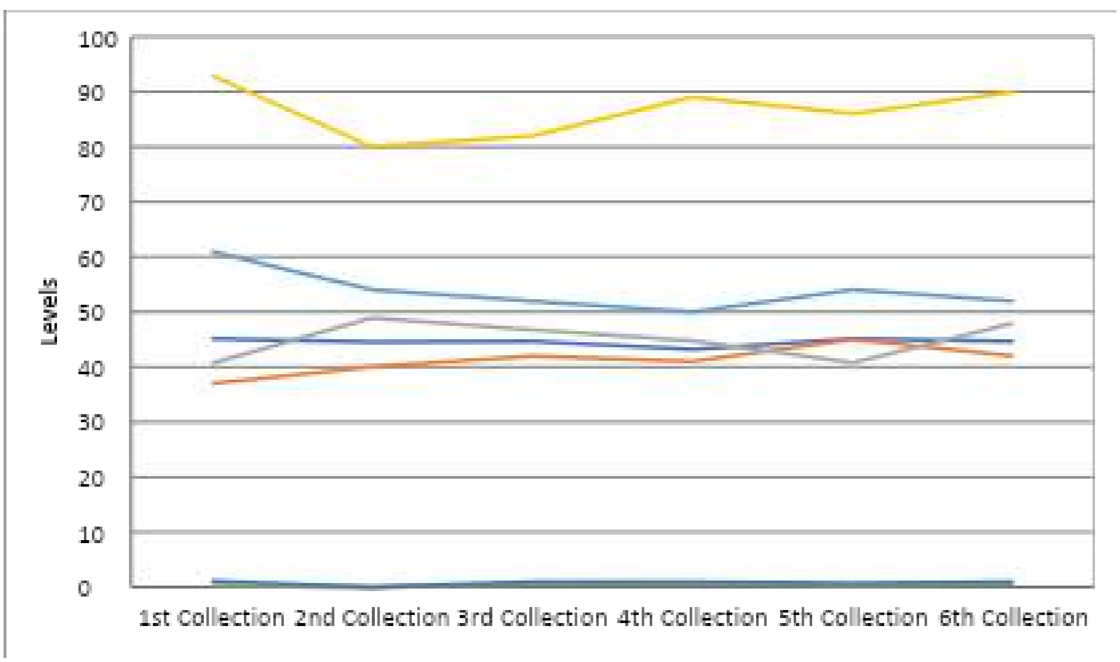



*Chart 20:* ***Batasan Hills Overpass (bound BHNHS)*** *Day 2*

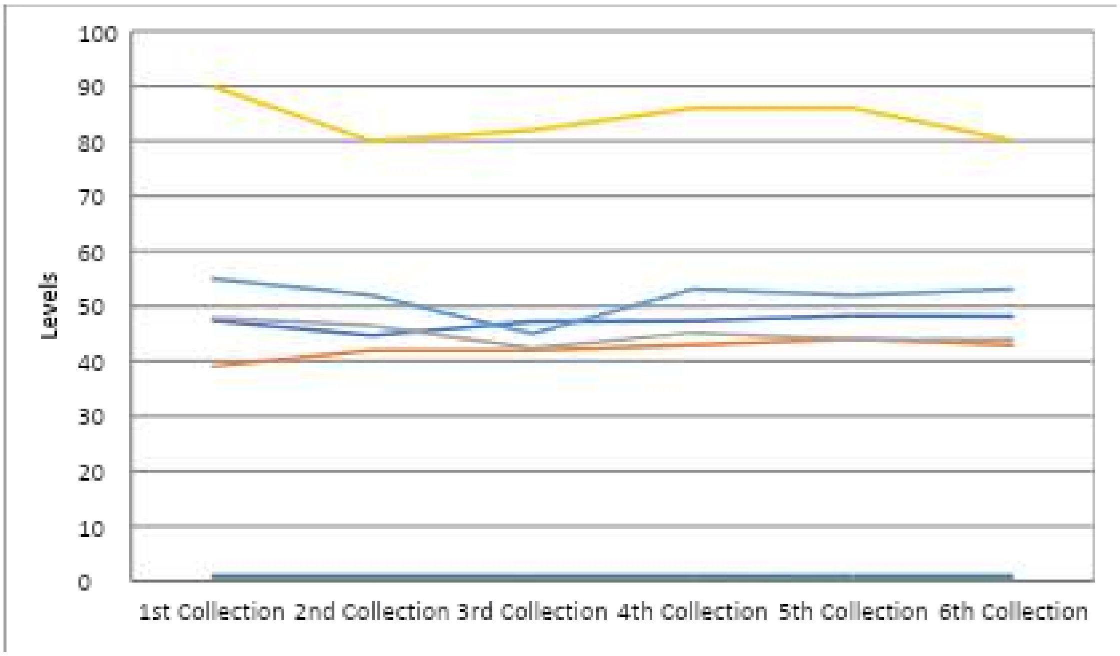

100
90
80
70
60
50
40
30
20
10
0
Levels
1st Collection
2nd Collection
3rd Collection
4th Collection
5th Collection
6th Collection

*Chart 21:* ***Batasan Hills Overpass (bound BHNHS)*** *Day 3*

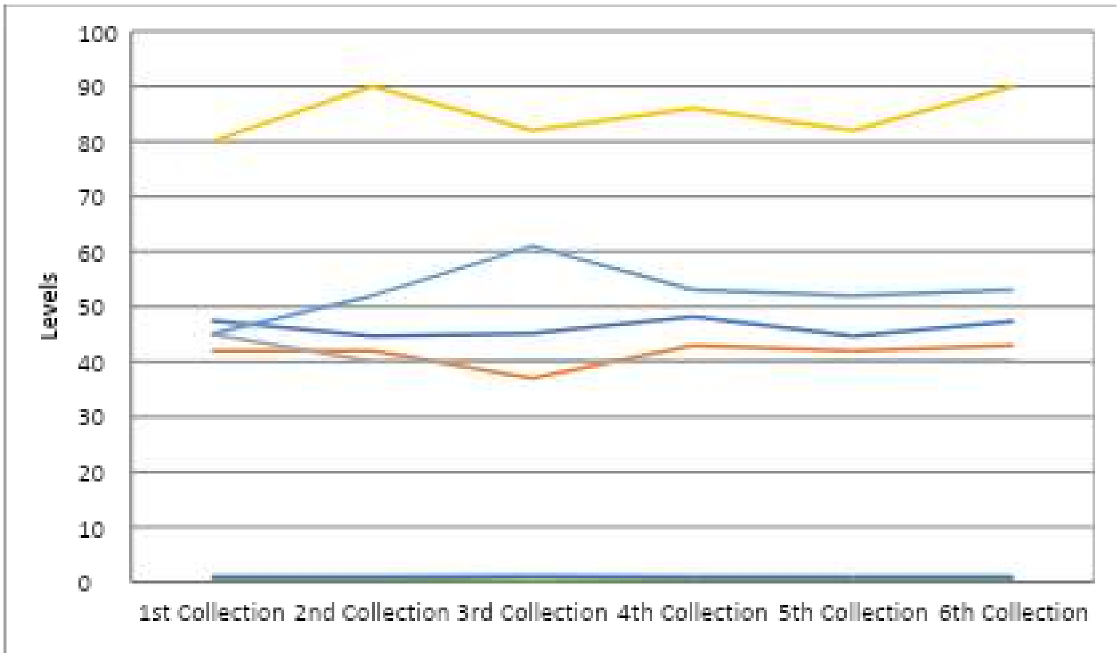



*Chart 22:* ***Batasan Hills Overpass (bound BHNHS)*** *Day 4*

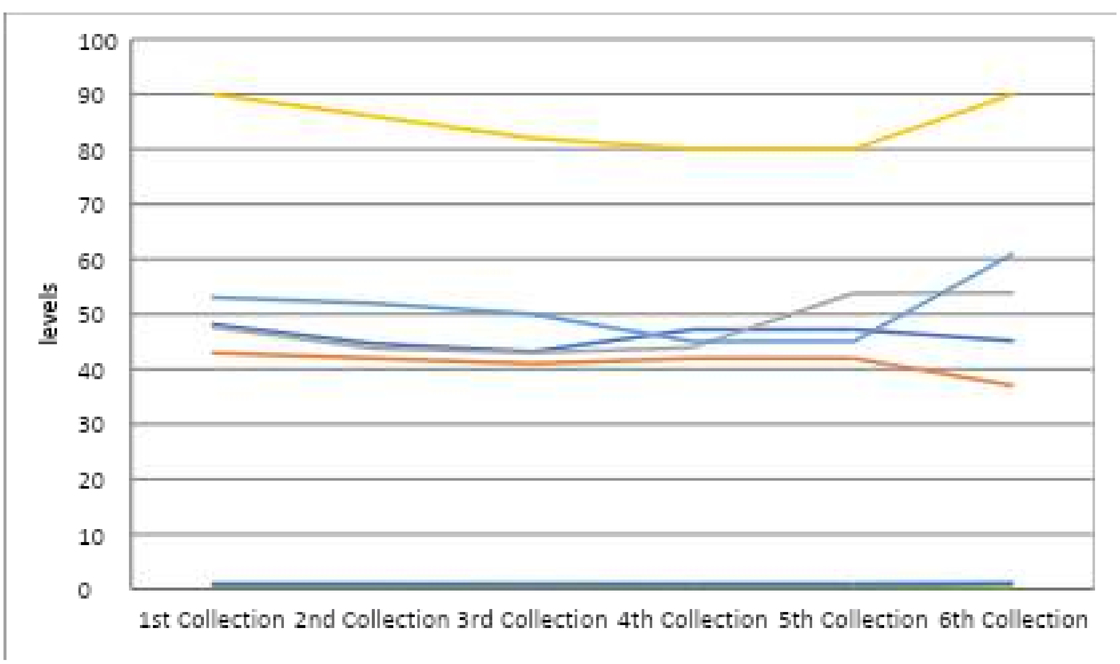
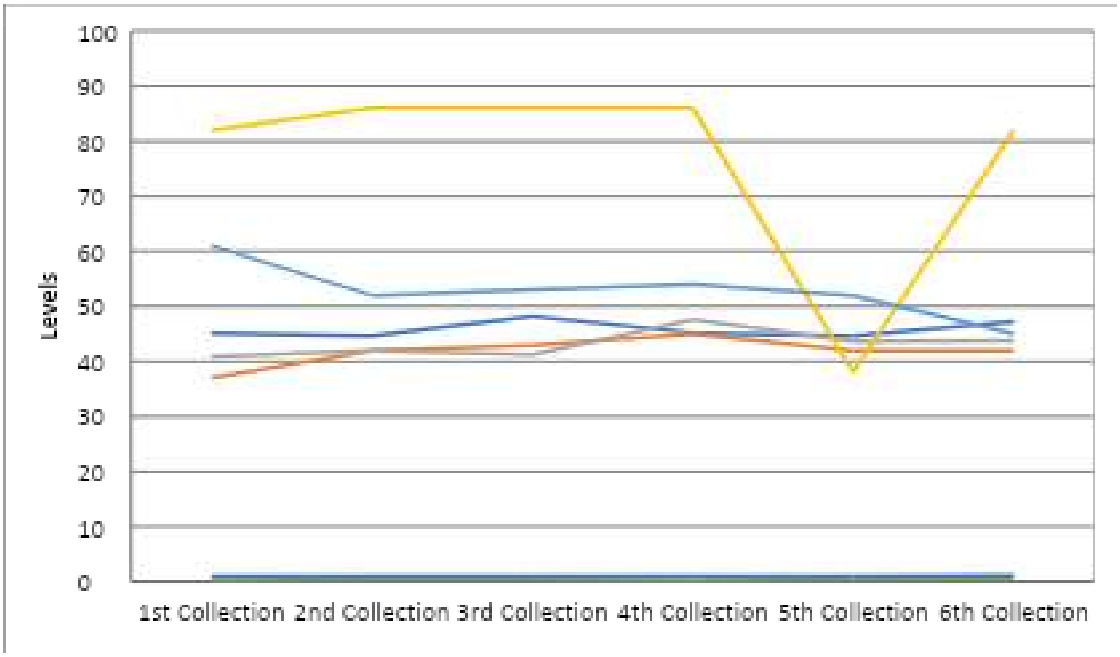


*Chart 23: **Batasan Hills Overpass (bound BHNHS)** Day 5*




**CO2 VS AT AND ST**

## Regression Equation

CO2 = 45.4 + 0.105 AT - 0.115 ST

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 45.4 | 19.0 | 2.39 | 0.023 | |
| AT | 0.105 | 0.288 | 0.36 | 0.718 | 1.10 |
| ST | -0.115 | 0.409 | -0.28 | 0.780 | 1.10 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 3.60092 | 0.50% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 2.134 | 1.067 | 0.08 | 0.921 |
| AT | 1 | 1.715 | 1.715 | 0.13 | 0.718 |
| ST | 1 | 1.027 | 1.027 | 0.08 | 0.780 |
| Error | 33 | 427.897 | 12.967 | | |
| Lack-of-Fit | 8 | 75.294 | 9.412 | 0.67 | 0.715 |
| Pure Error | 25 | 352.603 | 14.104 | | |
| Total | 35 | 430.031 | | | |

**CO VS AT AND ST**

## Regression Equation

CO = 48.7 - 0.480 AT + 1.193 ST

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 48.7 | 46.3 | 1.05 | 0.301 | |
| AT | -0.480 | 0.702 | -0.68 | 0.498 | 1.10 |
| ST | 1.193 | 0.998 | 1.20 | 0.241 | 1.10 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 8.78355 | 4.47% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 119.03 | 59.51 | 0.77 | 0.471 |
| AT | 1 | 36.16 | 36.16 | 0.47 | 0.498 |
| ST | 1 | 110.21 | 110.21 | 1.43 | 0.241 |
| Error | 33 | 2545.97 | 77.15 | | |
| Lack-of-Fit | 8 | 212.27 | 26.53 | 0.28 | 0.965 |
| Pure Error | 25 | 2333.70 | 93.35 | | |
| Total | 35 | 2665.00 | | | |

**HCHO VS AT AND ST**

## Regression Equation

HCHO = -0.449 + 0.0154 AT + 0.0050 ST

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | -0.449 | 0.692 | -0.65 | 0.521 | |
| AT | 0.0154 | 0.0105 | 1.47 | 0.151 | 1.10 |
| ST | 0.0050 | 0.0149 | 0.33 | 0.741 | 1.10 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 0.131284 | 7.90% | 2.32% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 0.048807 | 0.024404 | 1.42 | 0.257 |
| AT | 1 | 0.037281 | 0.037281 | 2.16 | 0.151 |
| ST | 1 | 0.001914 | 0.001914 | 0.11 | 0.741 |
| Error | 33 | 0.568772 | 0.017236 | | |
| Lack-of-Fit | 8 | 0.350252 | 0.043781 | 5.01 | 0.001 |
| Pure Error | 25 | 0.218520 | 0.008741 | | |
| Total | 35 | 0.617579 | | | |

**TVOC VS AT AND ST**

## Regression Equation

TVOC = 0.155 - 0.0033 AT + 0.0204 ST

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 0.155 | 0.906 | 0.17 | 0.865 | |
| AT | -0.0033 | 0.0137 | -0.24 | 0.810 | 1.10 |
| ST | 0.0204 | 0.0195 | 1.05 | 0.303 | 1.10 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 0.171847 | 3.23% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 0.03252 | 0.016260 | 0.55 | 0.582 |
| AT | 1 | 0.00174 | 0.001735 | 0.06 | 0.810 |
| ST | 1 | 0.03234 | 0.032338 | 1.10 | 0.303 |
| Error | 33 | 0.97453 | 0.029531 | | |
| Lack-of-Fit | 8 | 0.93035 | 0.116294 | 65.81 | 0.000 |
| Pure Error | 25 | 0.04418 | 0.001767 | | |
| Total | 35 | 1.00705 | | | |

**TVOC VS AT AND ST**

## Regression Equation

Humidity = 68.7 - 0.969 AT + 0.521 ST

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 68.7 | 20.8 | 3.30 | 0.002 | |
| AT | -0.969 | 0.315 | -3.08 | 0.004 | 1.10 |
| ST | 0.521 | 0.448 | 1.16 | 0.253 | 1.10 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 3.94298 | 22.41% | 17.71% | 6.90% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 148.17 | 74.08 | 4.77 | 0.015 |
| AT | 1 | 147.26 | 147.26 | 9.47 | 0.004 |
| ST | 1 | 21.04 | 21.04 | 1.35 | 0.253 |
| Error | 33 | 513.05 | 15.55 | | |
| Lack-of-Fit | 8 | 136.05 | 17.01 | 1.13 | 0.379 |
| Pure Error | 25 | 377.00 | 15.08 | | |
| Total | 35 | 661.22 | | | |

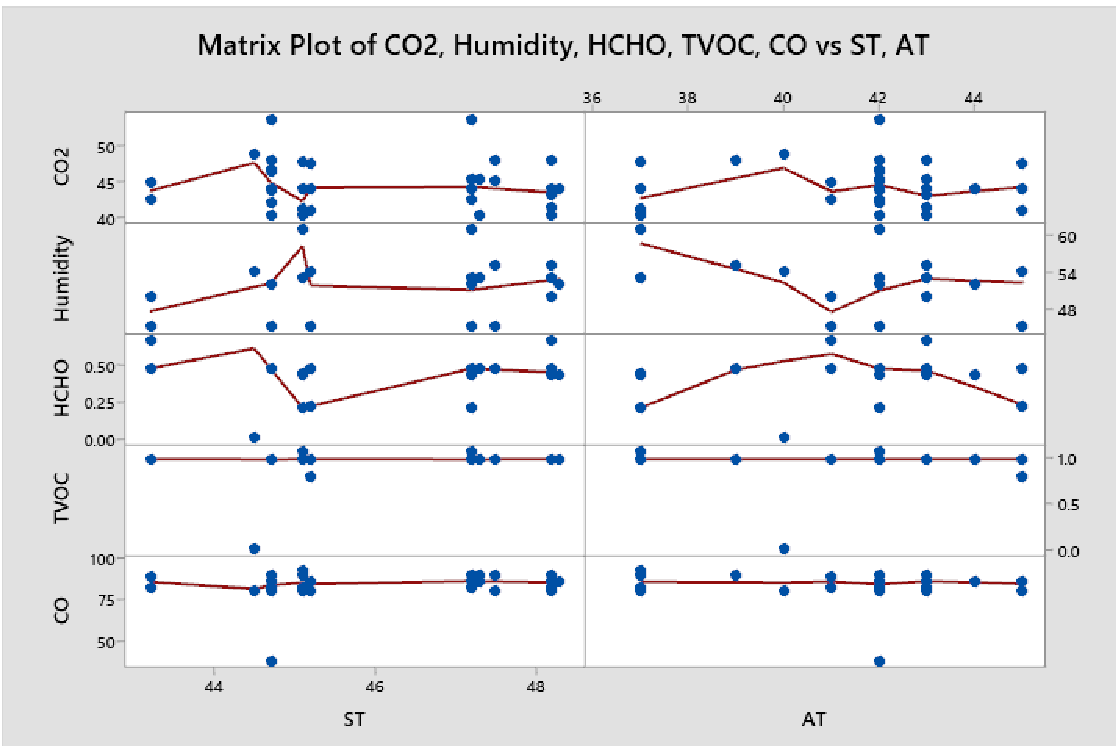
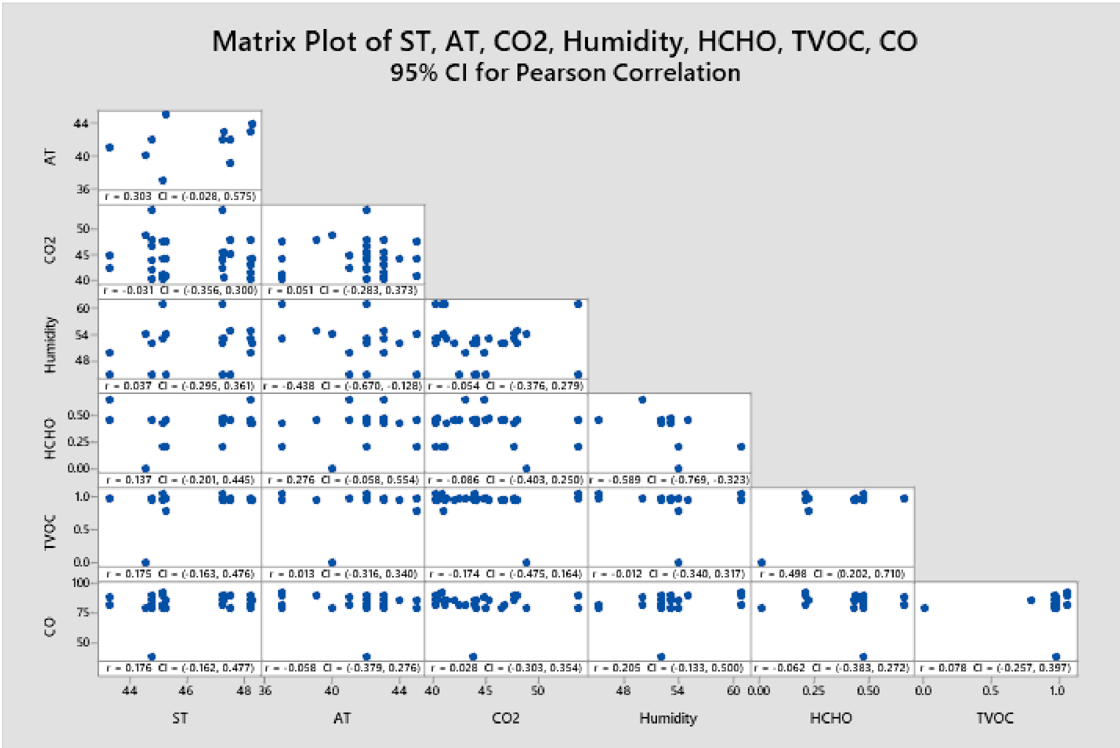



*Chart 24.1: **Batasan Hills Overpass After Quarantine** Matrix Plot*




## Method

| | |
|---|---|
| Correlation type | Pearson |
| Rows used | 36 |

## Correlations

| | ST | AT | CO2 | Humidity | HCHO | TVOC |
|---|---|---|---|---|---|---|
| AT | 0.303 | | | | | |
| CO2 | -0.031 | 0.051 | | | | |
| Humidity | 0.037 | -0.438 | -0.054 | | | |
| HCHO | 0.137 | 0.276 | -0.086 | -0.589 | | |
| TVOC | 0.175 | 0.013 | -0.174 | -0.012 | 0.498 | |
| CO | 0.176 | -0.058 | 0.028 | 0.205 | -0.062 | 0.078 |

*Chart 24.2 and 24.3: **IBP Road After Quarantine** Matrix Plot (Pearson's)*

*Table 7:* ***San Mateo Northview (by the Marikina/ San Mateo River)***

| Parameter | Mean (Average) | Mode (Highest) |
|---|---|---|
| **Surface Temperature** | 51.62°C | 58.3°C |
| **Air Temperature** | 42.9°C | 49°C |
| **Carbon Dioxide (CO2)** | 43.895ppm | 49.8ppm |
| **Humidity** | 49.8% | 61% |
| **HCHO (Formaldehyde)** | 0.3436ppm | 0.3578ppm |
| **TVOC (Volatile Organic Compounds)** | 0.7345ppm | 0.9632ppm |

*Chart 25:* ***San Mateo Northview (by the Marikina/ San Mateo River)*** *Day 1*

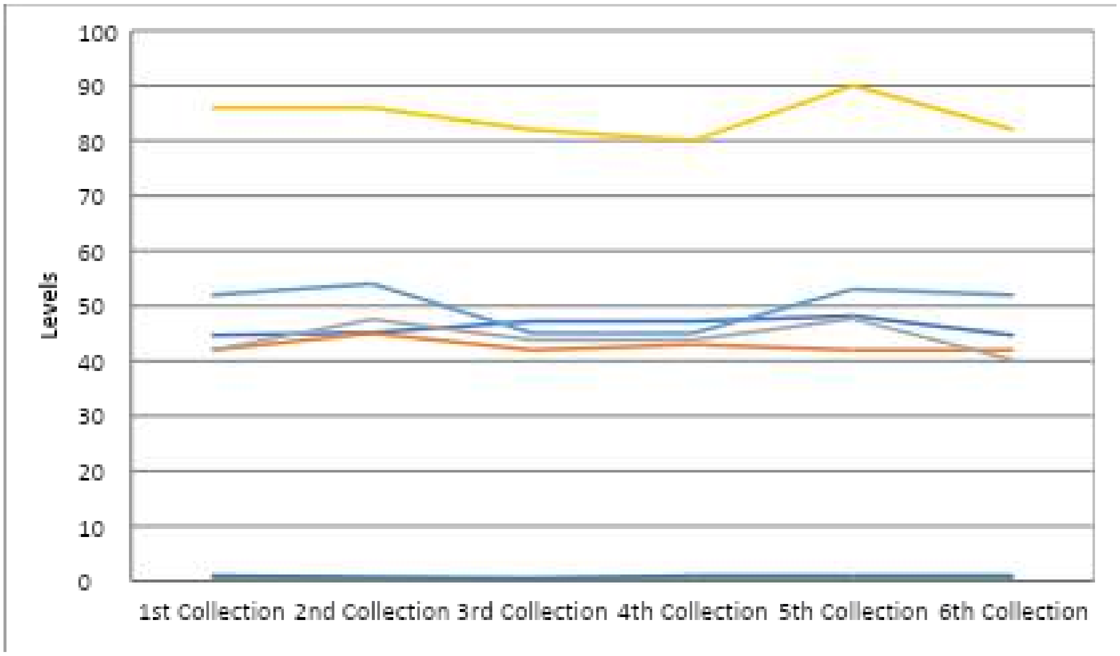



*Chart 26:* ***San Mateo Northview (by the Marikina/ San Mateo River)*** *Day 2*

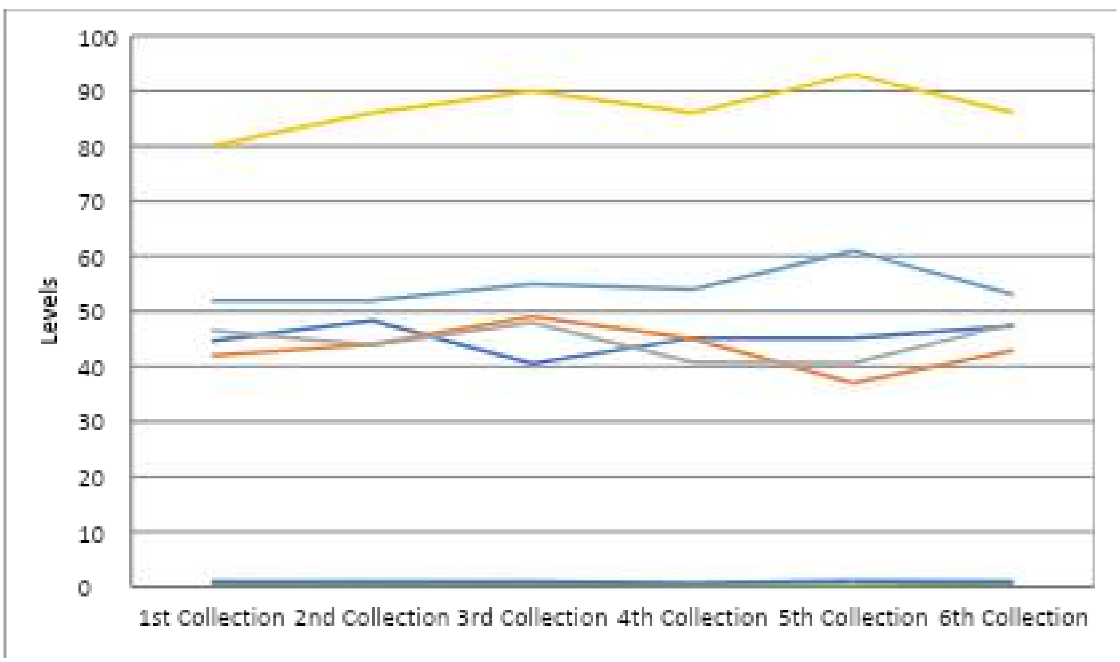



*Chart 27:* ***San Mateo Northview (by the Marikina/ San Mateo River)*** *Day 3*

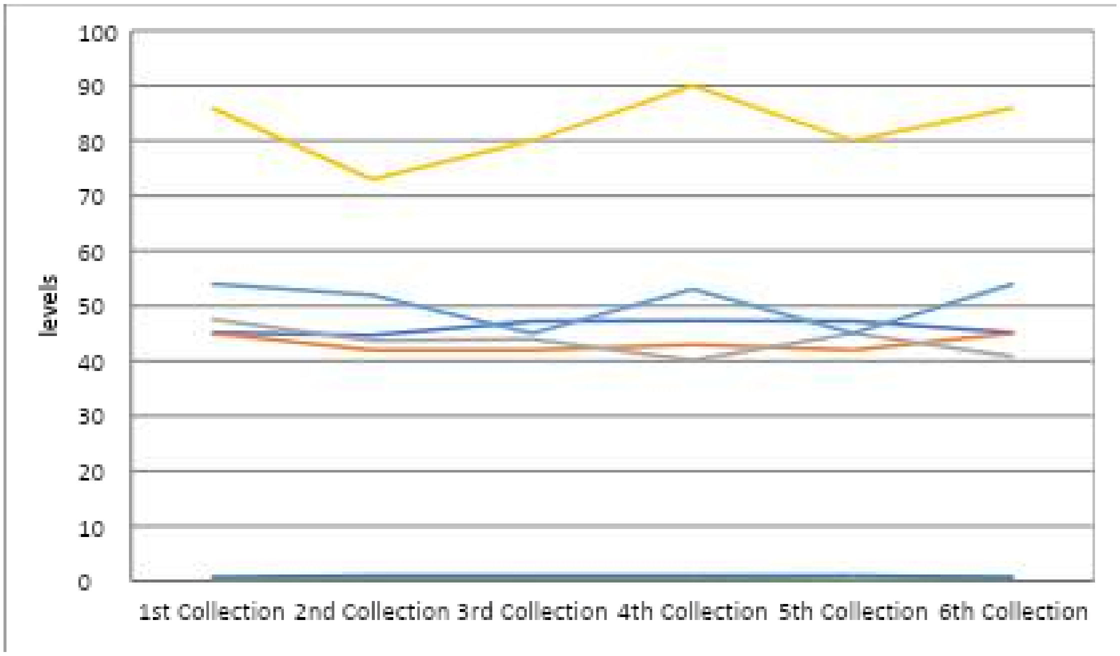



*Chart 28:* ***San Mateo Northview (by the Marikina/ San Mateo River)*** *Day 4*

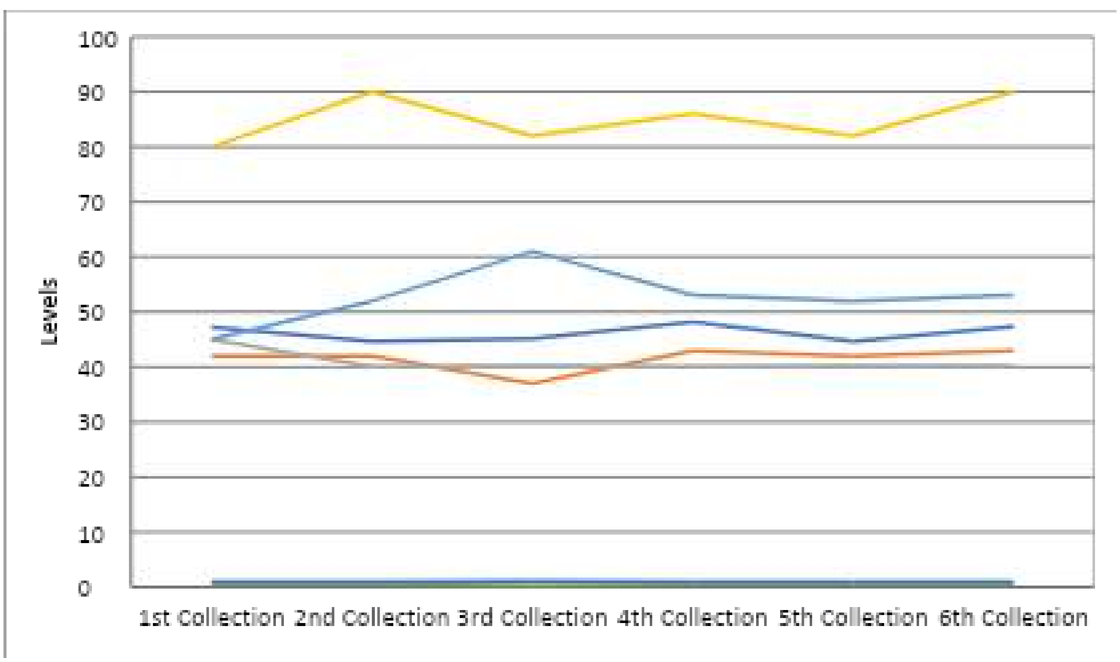
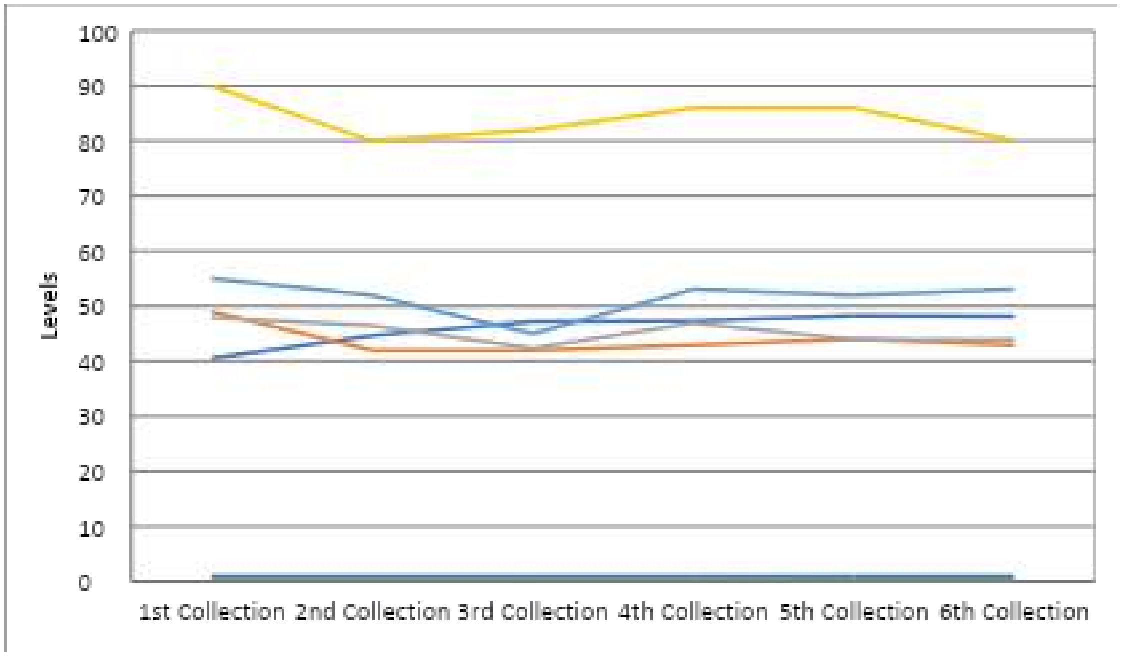



*Chart 29:* ***San Mateo Northview (by the Marikina/ San Mateo River)*** *Day 5*




**CO2 VS AT AND ST**

## Regression Equation

CO2 = 18.2 + 0.032 ST + 0.560 A.T.

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 18.2 | 18.4 | 0.99 | 0.330 | |
| ST | 0.032 | 0.270 | 0.12 | 0.907 | 1.18 |
| A.T. | 0.560 | 0.221 | 2.54 | 0.017 | 1.18 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 2.68506 | 21.38% | 15.56% | 9.66% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 52.949 | 26.4745 | 3.67 | 0.039 |
| ST | 1 | 0.100 | 0.1001 | 0.01 | 0.907 |
| A.T. | 1 | 46.343 | 46.3430 | 6.43 | 0.017 |
| Error | 27 | 194.658 | 7.2095 | | |
| Lack-of-Fit | 7 | 33.913 | 4.8447 | 0.60 | 0.747 |
| Pure Error | 20 | 160.745 | 8.0372 | | |
| Total | 29 | 247.607 | | | |

**CO VS AT AND ST**

## Regression Equation

CO = 77.2 - 0.192 ST + 0.377 A.T.

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 77.2 | 30.7 | 2.52 | 0.018 | |
| ST | -0.192 | 0.452 | -0.42 | 0.675 | 1.18 |
| A.T. | 0.377 | 0.369 | 1.02 | 0.317 | 1.18 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 4.48971 | 6.40% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 37.215 | 18.608 | 0.92 | 0.409 |
| ST | 1 | 3.629 | 3.629 | 0.18 | 0.675 |
| A.T. | 1 | 20.958 | 20.958 | 1.04 | 0.317 |
| Error | 27 | 544.252 | 20.157 | | |
| Lack-of-Fit | 7 | 276.095 | 39.442 | 2.94 | 0.027 |
| Pure Error | 20 | 268.157 | 13.408 | | |
| Total | 29 | 581.467 | | | |

**HCHO VS AT AND ST**

## Regression Equation

HCHO = -0.561 + 0.00841 ST + 0.01386 A.T.

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | -0.561 | 0.653 | -0.86 | 0.398 | |
| ST | 0.00841 | 0.00961 | 0.88 | 0.389 | 1.18 |
| A.T. | 0.01386 | 0.00786 | 1.76 | 0.089 | 1.18 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 0.0954903 | 10.45% | 3.82% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 0.028734 | 0.014367 | 1.58 | 0.225 |
| ST | 1 | 0.006986 | 0.006986 | 0.77 | 0.389 |
| A.T. | 1 | 0.028381 | 0.028381 | 3.11 | 0.089 |
| Error | 27 | 0.246197 | 0.009118 | | |
| Lack-of-Fit | 7 | 0.149787 | 0.021398 | 4.44 | 0.004 |
| Pure Error | 20 | 0.096410 | 0.004821 | | |
| Total | 29 | 0.274931 | | | |

**TVOC VS AT AND ST**

## Regression Equation

TVOC = 2.050 - 0.0095 ST - 0.01569 A.T.

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 2.050 | 0.757 | 2.71 | 0.012 | |
| ST | -0.0095 | 0.0111 | -0.85 | 0.403 | 1.18 |
| A.T. | -0.01569 | 0.00912 | -1.72 | 0.097 | 1.18 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 0.110834 | 9.98% | 3.31% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 0.036776 | 0.018388 | 1.50 | 0.242 |
| ST | 1 | 0.008852 | 0.008852 | 0.72 | 0.403 |
| A.T. | 1 | 0.036347 | 0.036347 | 2.96 | 0.097 |
| Error | 27 | 0.331673 | 0.012284 | | |
| Lack-of-Fit | 7 | 0.126844 | 0.018121 | 1.77 | 0.150 |
| Pure Error | 20 | 0.204829 | 0.010241 | | |
| Total | 29 | 0.368449 | | | |

**Humidity VS AT AND ST**

## Regression Equation

Humidity = 118.8 - 1.027 ST - 0.458 A.T.

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 118.8 | 26.0 | 4.58 | 0.000 | |
| ST | -1.027 | 0.382 | -2.69 | 0.012 | 1.18 |
| A.T. | -0.458 | 0.313 | -1.47 | 0.154 | 1.18 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 3.79836 | 21.57% | 15.76% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 107.157 | 53.579 | 3.71 | 0.038 |
| ST | 1 | 104.311 | 104.311 | 7.23 | 0.012 |
| A.T. | 1 | 31.030 | 31.030 | 2.15 | 0.154 |
| Error | 27 | 389.543 | 14.428 | | |
| Lack-of-Fit | 7 | 389.543 | 55.649 | * | * |
| Pure Error | 20 | 0.000 | 0.000 | | |
| Total | 29 | 496.700 | | | |

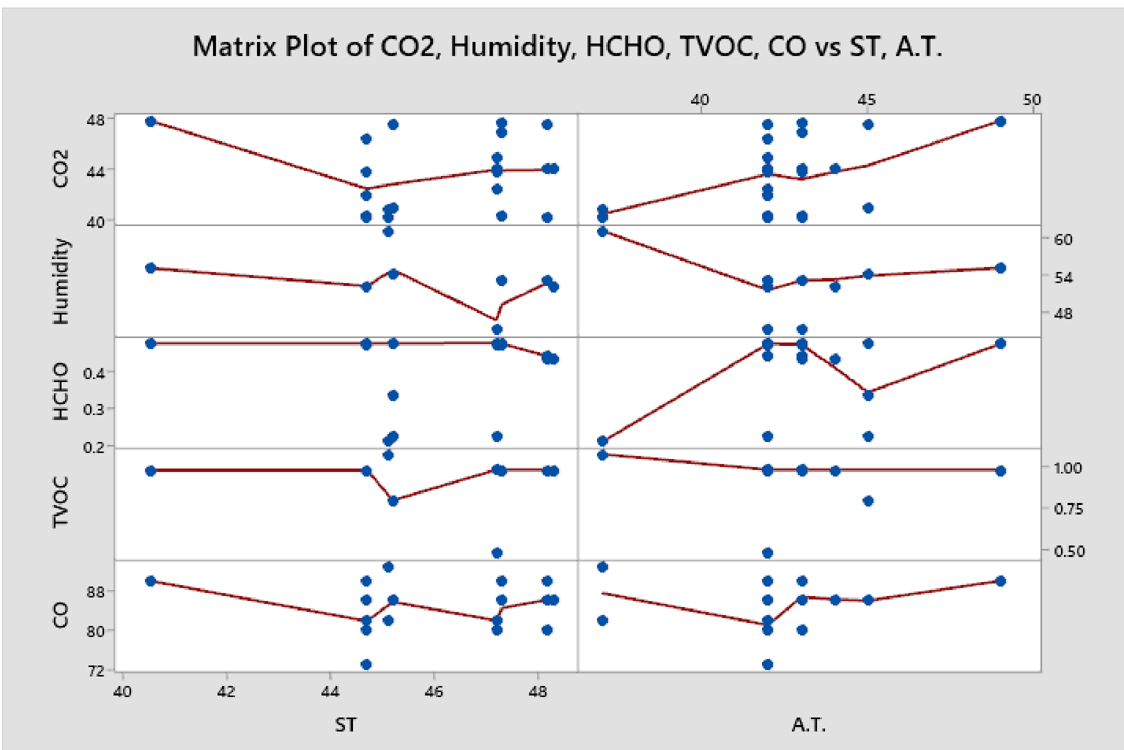
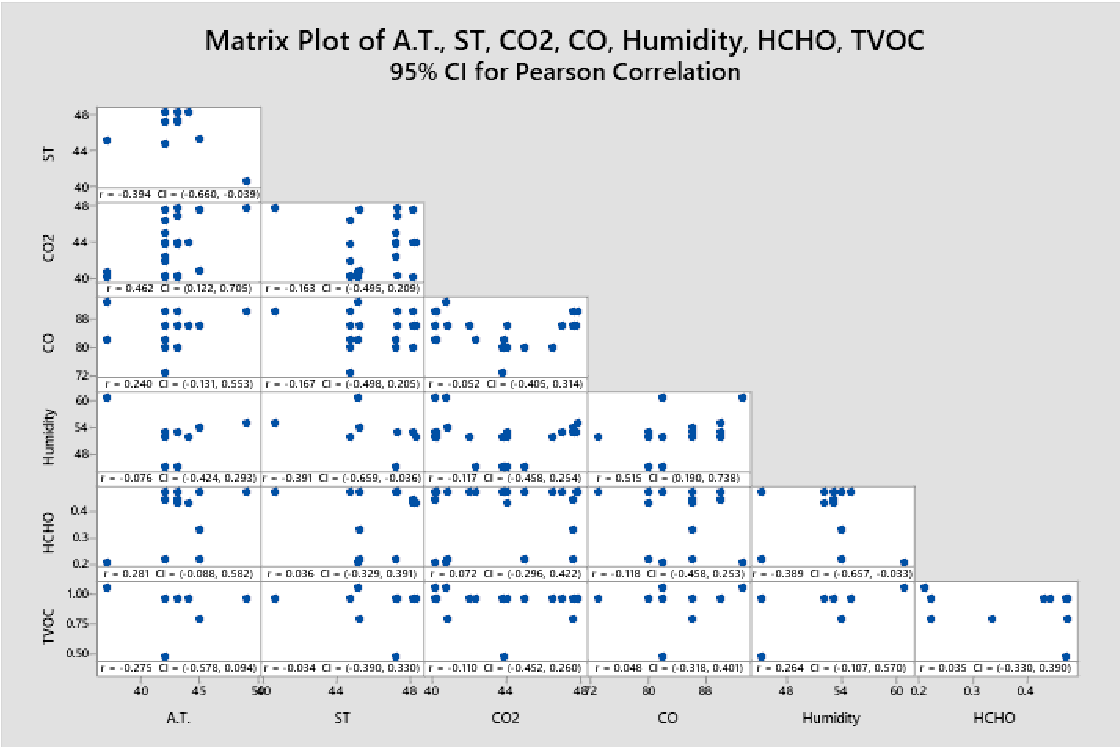



*Chart 30.1: **San Mateo After Quarantine** Matrix Plot*




## Method

| | |
|---|---|
| Correlation type | Pearson |
| Rows used | 30 |

## Correlations

| | A.T. | ST | CO2 | CO | Humidity | HCHO |
|---|---|---|---|---|---|---|
| ST | -0.394 | | | | | |
| CO2 | 0.462 | -0.163 | | | | |
| CO | 0.240 | -0.167 | -0.052 | | | |
| Humidity | -0.076 | -0.391 | -0.117 | 0.515 | | |
| HCHO | 0.281 | 0.036 | 0.072 | -0.118 | -0.389 | |
| TVOC | -0.275 | -0.034 | -0.110 | 0.048 | 0.264 | 0.035 |

*Chart 30.2 and 30.3:* ***San Mateo After Quarantine*** *Matrix Plot (Pearson's)*

*Table 8:* ***Don Antonio Overpass (bound Shopwise and Petron)***

| Parameter | Mean (Average) | Mode (Highest) |
|---|---|---|
| **Surface Temperature** | 51.88°C | 58.3°C |
| **Air Temperature** | 42.43°C | 45 °C |
| **Carbon Dioxide (CO2)** | 43.340ppm | 48.3240ppm |
| **Humidity** | 48.8% | 49% |
| **HCHO (Formaldehyde)** | 0.3358ppm | 0.2478ppm |
| **TVOC (Volatile Organic Compounds)** | 0.6234ppm | 0.7526ppm |

*Chart 31:* ***Don Antonio Overpass (bound Shopwise and Petron)*** *Day 1*

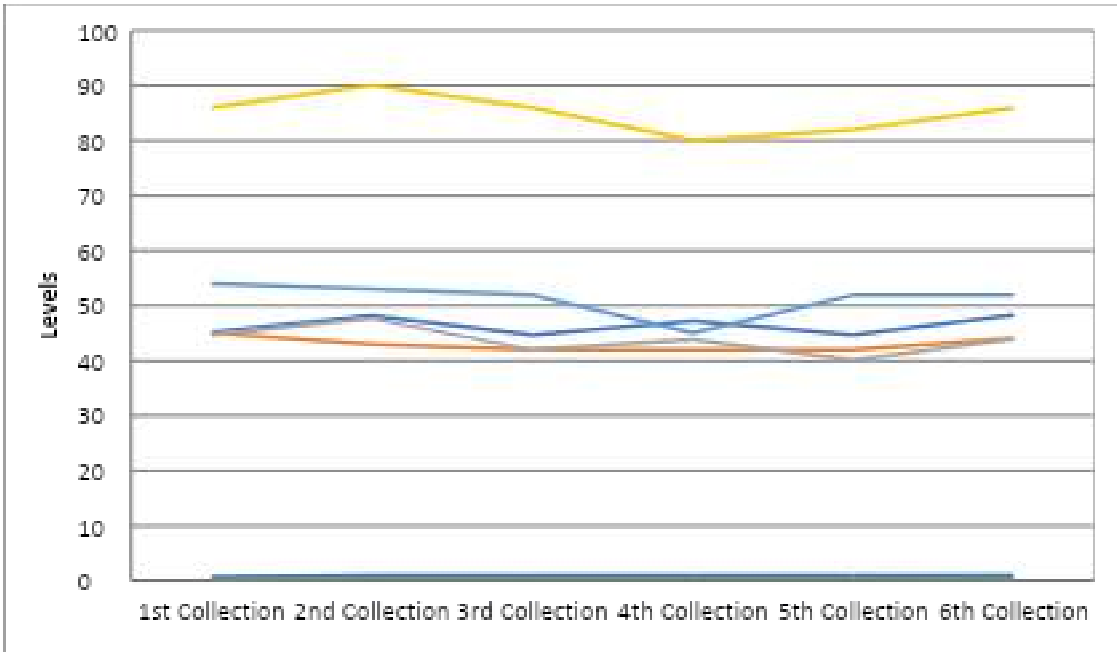



*Chart 32:* ***Don Antonio Overpass (bound Shopwise and Petron)*** *Day 2*

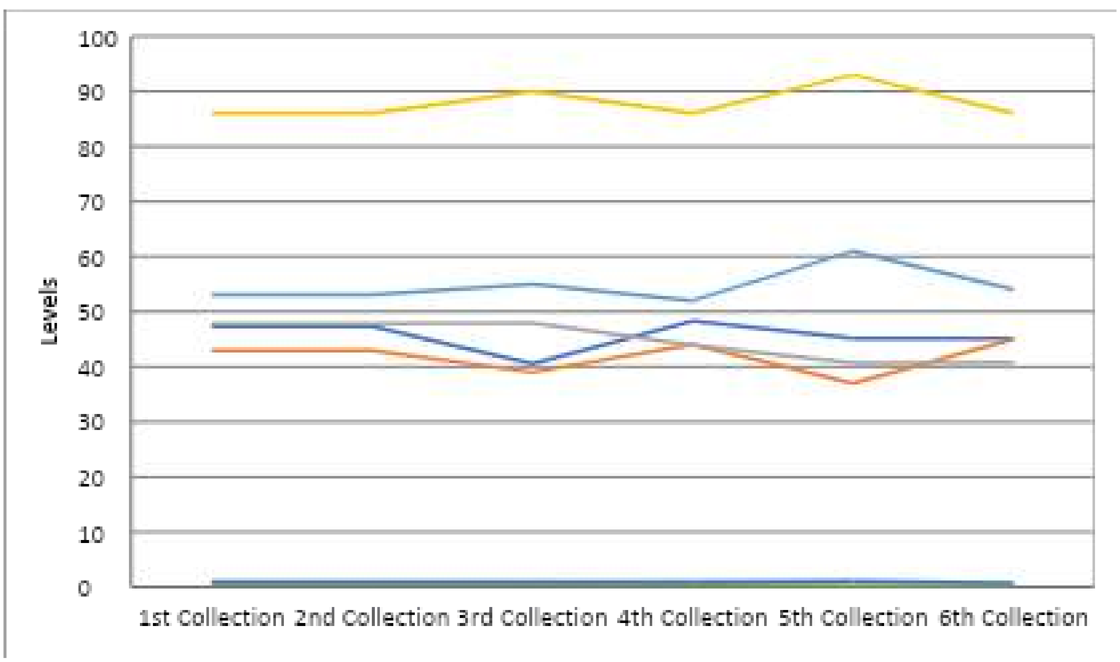



*Chart 33:* ***Don Antonio Overpass (bound Shopwise and Petron)*** *Day 3*

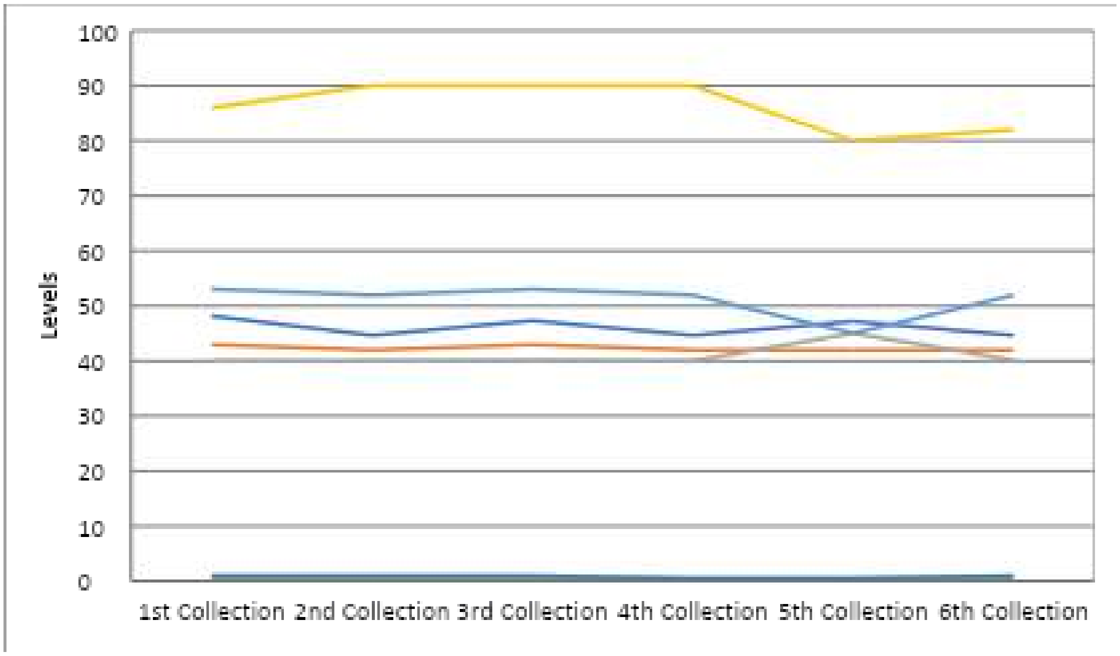



*Chart 34:* ***Don Antonio Overpass (bound Shopwise and Petron)*** *Day 4*

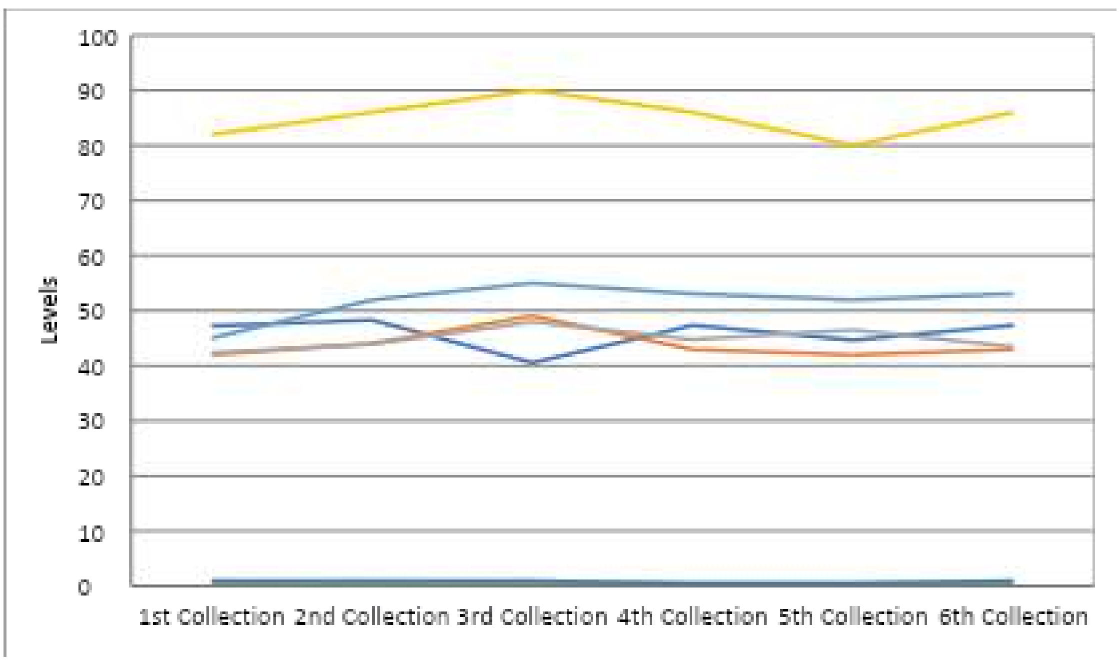
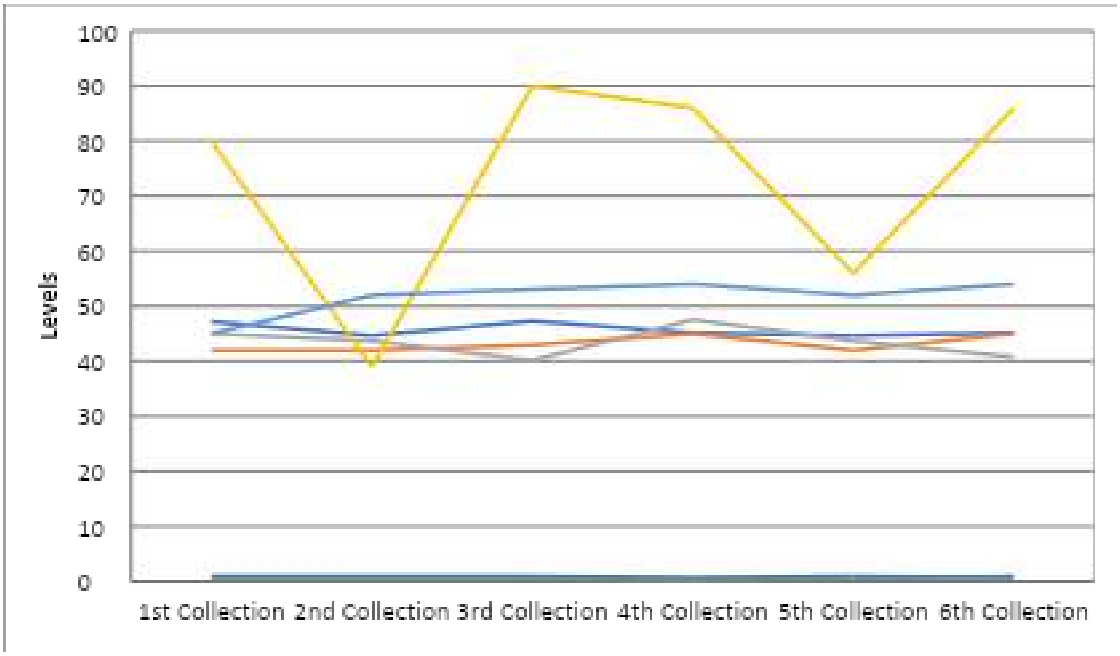



*Chart 35:* ***Don Antonio Overpass (bound Shopwise and Petron)*** *Day 5*




**CO2 VS AT and ST**

## Regression Equation

$CO2 = 37.5 - 0.160\ ST + 0.312\ AT$

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 37.5 | 16.4 | 2.29 | 0.030 | |
| ST | -0.160 | 0.261 | -0.61 | 0.544 | 1.00 |
| AT | 0.312 | 0.261 | 1.19 | 0.243 | 1.00 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 2.83914 | 6.24% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 14.489 | 7.245 | 0.90 | 0.419 |
| ST | 1 | 3.037 | 3.037 | 0.38 | 0.544 |
| AT | 1 | 11.475 | 11.475 | 1.42 | 0.243 |
| Error | 27 | 217.639 | 8.061 | | |
| Lack-of-Fit | 6 | 53.088 | 8.848 | 1.13 | 0.380 |
| Pure Error | 21 | 164.551 | 7.836 | | |
| Total | 29 | 232.129 | | | |

**CO VS AT and ST**

## Regression Equation

CO = 44.6 + 0.39 ST + 0.49 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 44.6 | 62.9 | 0.71 | 0.485 | |
| ST | 0.39 | 1.00 | 0.39 | 0.701 | 1.00 |
| AT | 0.49 | 1.00 | 0.49 | 0.629 | 1.00 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 10.9084 | 1.42% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 46.38 | 23.19 | 0.19 | 0.824 |
| ST | 1 | 17.92 | 17.92 | 0.15 | 0.701 |
| AT | 1 | 28.38 | 28.38 | 0.24 | 0.629 |
| Error | 27 | 3212.82 | 118.99 | | |
| Lack-of-Fit | 6 | 832.61 | 138.77 | 1.22 | 0.333 |
| Pure Error | 21 | 2380.21 | 113.34 | | |
| Total | 29 | 3259.20 | | | |

**HCHO VS AT and ST**

## Regression Equation

HCHO = 0.143 + 0.0001 ST + 0.0071 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 0.143 | 0.786 | 0.18 | 0.857 | |
| ST | 0.0001 | 0.0125 | 0.01 | 0.996 | 1.00 |
| AT | 0.0071 | 0.0125 | 0.57 | 0.575 | 1.00 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 0.136240 | 1.18% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 0.005984 | 0.002992 | 0.16 | 0.852 |
| ST | 1 | 0.000001 | 0.000001 | 0.00 | 0.996 |
| AT | 1 | 0.005983 | 0.005983 | 0.32 | 0.575 |
| Error | 27 | 0.501154 | 0.018561 | | |
| Lack-of-Fit | 6 | 0.072502 | 0.012084 | 0.59 | 0.733 |
| Pure Error | 21 | 0.428652 | 0.020412 | | |
| Total | 29 | 0.507137 | | | |

**TVOC VS AT and ST**

## Regression Equation

TVOC = 1.08 + 0.0035 ST - 0.0082 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 1.08 | 1.06 | 1.02 | 0.318 | |
| ST | 0.0035 | 0.0169 | 0.21 | 0.836 | 1.00 |
| AT | -0.0082 | 0.0169 | -0.48 | 0.632 | 1.00 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 0.183628 | 1.02% | 0.00% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 0.009371 | 0.004685 | 0.14 | 0.871 |
| ST | 1 | 0.001465 | 0.001465 | 0.04 | 0.836 |
| AT | 1 | 0.007919 | 0.007919 | 0.23 | 0.632 |
| Error | 27 | 0.910418 | 0.033719 | | |
| Lack-of-Fit | 6 | 0.130464 | 0.021744 | 0.59 | 0.738 |
| Pure Error | 21 | 0.779954 | 0.037141 | | |
| Total | 29 | 0.919789 | | | |

**Humidity VS AT AND ST**

## Regression Equation

Humidity = 79.9 - 0.579 ST - 0.028 AT

## Coefficients

| Term | Coef | SE Coef | T-Value | P-Value | VIF |
|---|---|---|---|---|---|
| Constant | 79.9 | 18.5 | 4.31 | 0.000 | |
| ST | -0.579 | 0.295 | -1.96 | 0.060 | 1.00 |
| AT | -0.028 | 0.296 | -0.10 | 0.924 | 1.00 |

## Model Summary

| S | R-sq | R-sq(adj) | R-sq(pred) |
|---|---|---|---|
| 3.21348 | 12.52% | 6.03% | 0.00% |

## Analysis of Variance

| Source | DF | Adj SS | Adj MS | F-Value | P-Value |
|---|---|---|---|---|---|
| Regression | 2 | 39.885 | 19.9427 | 1.93 | 0.164 |
| ST | 1 | 39.782 | 39.7816 | 3.85 | 0.060 |
| AT | 1 | 0.096 | 0.0958 | 0.01 | 0.924 |
| Error | 27 | 278.815 | 10.3265 | | |
| Lack-of-Fit | 6 | 278.815 | 46.4691 | * | * |
| Pure Error | 21 | 0.000 | 0.0000 | | |
| Total | 29 | 318.700 | | | |

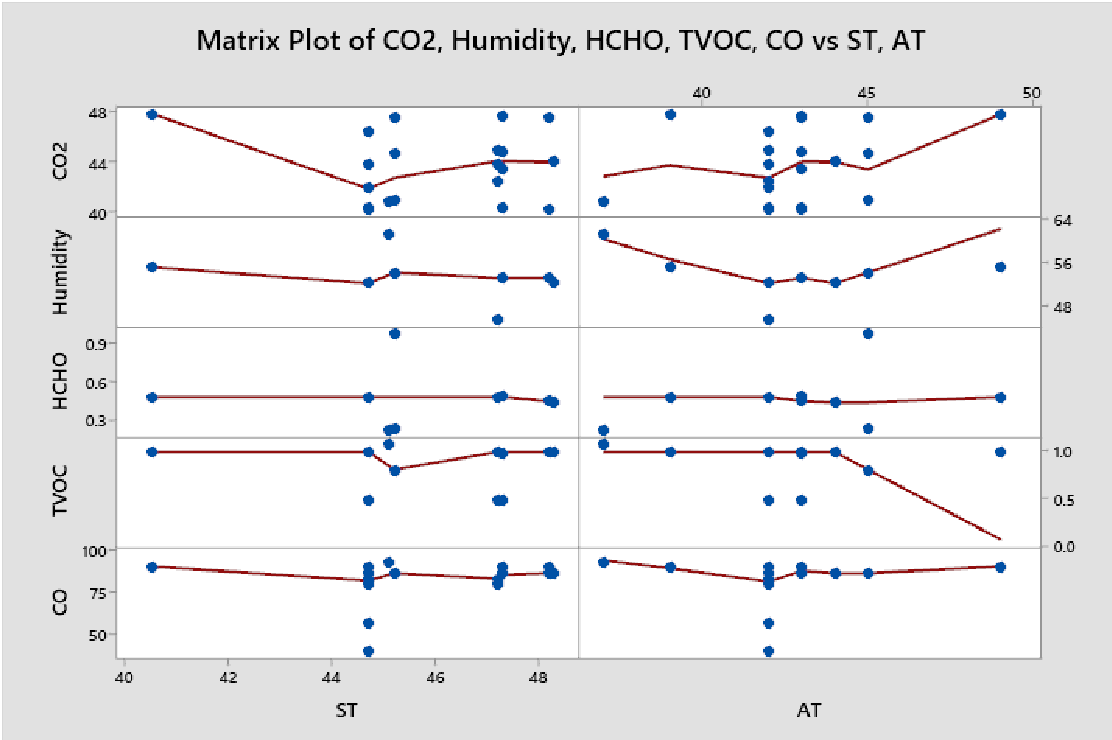
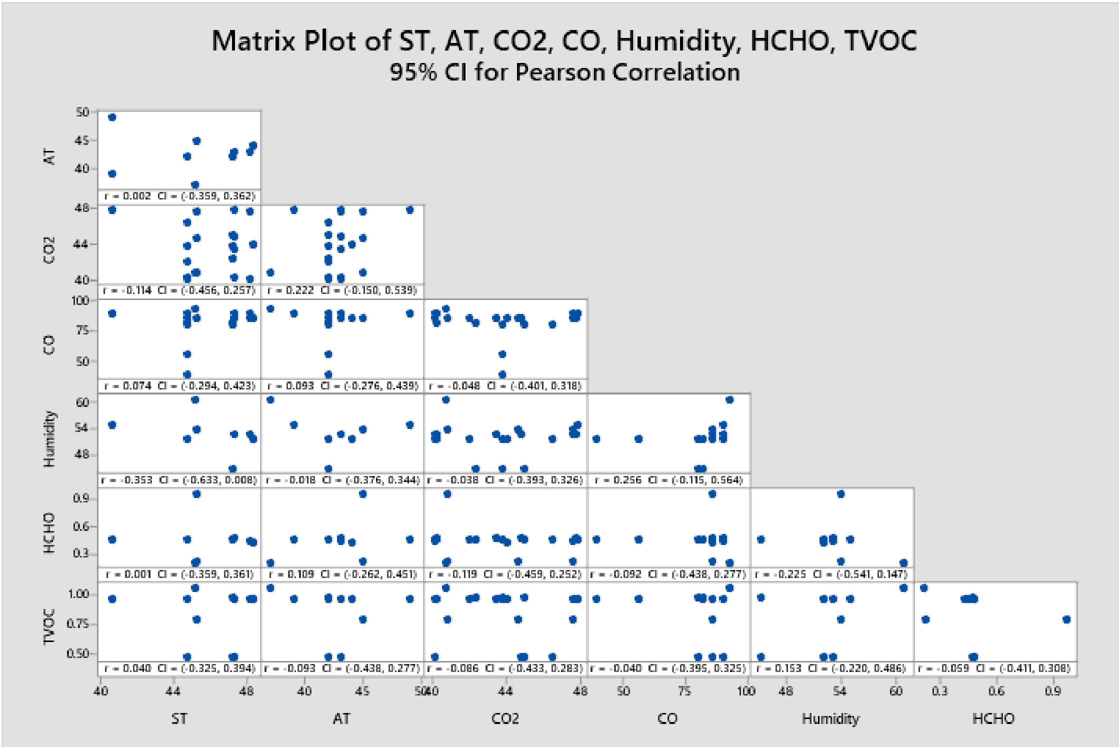



*Chart 36.1:* ***Don Antonio After Quarantine*** *Matrix Plot*




## Method

| | |
|---|---|
| Correlation type | Pearson |
| Rows used | 30 |

## Correlations

| | ST | AT | CO2 | CO | Humidity | HCHO |
|---|---|---|---|---|---|---|
| AT | 0.002 | | | | | |
| CO2 | -0.114 | 0.222 | | | | |
| CO | 0.074 | 0.093 | -0.048 | | | |
| Humidity | -0.353 | -0.018 | -0.038 | 0.256 | | |
| HCHO | 0.001 | 0.109 | -0.119 | -0.092 | -0.225 | |
| TVOC | 0.040 | -0.093 | -0.086 | -0.040 | 0.153 | -0.059 |

*Chart 36.2 and 36.3:* ***Don Antonio After Quarantine*** *Matrix Plot (Pearson's)*

***Before and After Quarantine Comparison***

These set of data are the comparisons received from entering the data into a T-Test formula through a program called Minitab 19.

**Batasan Hills Overpass**

**ST before VS ST After**

Surface Temperature from before quarantine is denoted as ST_1; Meanwhile, Surface Temperature from after quarantine is denoted as ST.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| ST | 30 | 45.96 | 1.60 | 0.29 |
| ST_1 | 30 | 40.05 | 6.41 | 1.17 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| 5.910 | 4.917 | 0.898 | (4.074, 7.746) |

*μ_difference: mean of (ST - ST_1)*

## Test

| | |
|---|---|
| Null hypothesis | $H_0$: μ_difference = 0 |
| Alternative hypothesis | $H_1$: μ_difference ≠ 0 |

| T-Value | P-Value |
|---|---|
| 6.58 | 0.000 |

**AT before VS AT After**

Air Temperature from before quarantine is denoted as AT_1; Meanwhile, Air Temperature from after quarantine is denoted as AT.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| AT | 30 | 41.567 | 2.176 | 0.397 |
| AT_1 | 30 | 31.733 | 1.999 | 0.365 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| 9.833 | 1.147 | 0.209 | (9.405, 10.262) |

*μ_difference: mean of (AT - AT_1)*

## Test

Null hypothesis $H_0$: μ_difference = 0

Alternative hypothesis $H_1$: μ_difference ≠ 0

| T-Value | P-Value |
|---|---|
| 46.95 | 0.000 |

**CO2 before VS CO2 After**

Carbon Dioxide (CO2) from before quarantine is denoted as CO2_1; Meanwhile, Carbon Dioxide (CO2) from after quarantine is denoted as CO2.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| CO2 | 30 | 44.705 | 3.658 | 0.668 |
| CO2_1 | 30 | 53.761 | 2.802 | 0.511 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| -9.056 | 2.962 | 0.541 | (-10.162, -7.950) |

*μ_difference: mean of (CO2 - CO2_1)*

## Test

Null hypothesis $H_0$: μ_difference = 0

Alternative hypothesis $H_1$: μ_difference ≠ 0

| T-Value | P-Value |
|---|---|
| -16.75 | 0.000 |

**CO before VS CO After**

Carbon Monoxide (CO) from before quarantine is denoted as CO_1; Meanwhile, Carbon Monoxide (CO) from after quarantine is denoted as CO.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| CO | 30 | 84.867 | 4.216 | 0.770 |
| CO_1 | 30 | 85.133 | 3.910 | 0.714 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| -0.267 | 4.863 | 0.888 | (-2.083, 1.549) |

*μ_difference: mean of (CO - CO_1)*

## Test

| | |
|---|---|
| Null hypothesis | $H_0$: μ_difference = 0 |
| Alternative hypothesis | $H_1$: μ_difference ≠ 0 |

| T-Value | P-Value |
|---|---|
| -0.30 | 0.766 |

**HCHO before VS HCHO After**

Formaldehyde (HCHO) from before quarantine is denoted as HCHO_1; Meanwhile, Formaldehyde (HCHO) from after quarantine is denoted as HCHO.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| HCHO | 30 | 0.4288 | 0.1341 | 0.0245 |
| HCHO_1 | 30 | 0.4134 | 0.1444 | 0.0264 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| 0.0154 | 0.1057 | 0.0193 | (-0.0241, 0.0549) |

*μ_difference: mean of (HCHO - HCHO_1)*

## Test

| | |
|---|---|
| Null hypothesis | $H_0$: μ_difference = 0 |
| Alternative hypothesis | $H_1$: μ_difference ≠ 0 |

| T-Value | P-Value |
|---|---|
| 0.80 | 0.432 |

**TVOC before VS TVOC After**

Total Volatile Organic Compounds (TVOC) from before quarantine is denoted as TVOC_1; Meanwhile, Total Volatile Organic Compounds (TVOC) from after quarantine is denoted as TVOC.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| TVOC | 30 | 0.9479 | 0.1847 | 0.0337 |
| TVOC_1 | 30 | 0.9449 | 0.1881 | 0.0343 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| 0.00297 | 0.05215 | 0.00952 | (-0.01651, 0.02244) |

*μ_difference: mean of (TVOC - TVOC_1)*

## Test

Null hypothesis $H_0$: μ_difference = 0

Alternative hypothesis $H_1$: μ_difference ≠ 0

| T-Value | P-Value |
|---|---|
| 0.31 | 0.758 |

**San Mateo Road**

**ST before VS ST After**

Surface Temperature from before quarantine is denoted as ST_1; Meanwhile, Surface Temperature from after quarantine is denoted as ST.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| ST | 30 | 45.947 | 2.024 | 0.369 |
| ST_1 | 30 | 33.000 | 2.816 | 0.514 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| 12.947 | 3.365 | 0.614 | (11.690, 14.203) |

*μ_difference: mean of (ST - ST_1)*

## Test

| | |
|---|---|
| Null hypothesis | $H_0$: μ_difference = 0 |
| Alternative hypothesis | $H_1$: μ_difference ≠ 0 |

| T-Value | P-Value |
|---|---|
| 21.07 | 0.000 |

**AT before VS AT After**

Air Temperature from before quarantine is denoted as AT_1; Meanwhile, Air Temperature from after quarantine is denoted as AT.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| AT | 30 | 42.833 | 2.019 | 0.369 |
| AT_1 | 30 | 33.000 | 2.816 | 0.514 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| 9.833 | 3.374 | 0.616 | (8.573, 11.093) |

*μ_difference: mean of (AT - AT_1)*

## Test

| | |
|---|---|
| Null hypothesis | $H_0$: μ_difference = 0 |
| Alternative hypothesis | $H_1$: μ_difference ≠ 0 |

| T-Value | P-Value |
|---|---|
| 15.96 | 0.000 |

**CO2 before VS CO2 After**

Carbon Dioxide (CO2) from before quarantine is denoted as CO2_1; Meanwhile, Carbon Dioxide (CO2) from after quarantine is denoted as CO2.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| $CO_2$ | 30 | 43.5 | 2.8 | 0.5 |
| CO2_1 | 30 | 5364.7 | 292.0 | 53.3 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| -5321.2 | 289.2 | 52.8 | (-5429.2, -5213.2) |

*μ_difference: mean of (CO2 - CO2_1)*

## Test

| | |
|---|---|
| Null hypothesis | $H_0$: μ_difference = 0 |
| Alternative hypothesis | $H_1$: μ_difference ≠ 0 |

| T-Value | P-Value |
|---|---|
| -100.77 | 0.000 |

**CO before VS CO After**

Carbon Monoxide (CO) from before quarantine is denoted as CO_1; Meanwhile, Carbon Monoxide (CO) from after quarantine is denoted as CO.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| CO | 30 | 83.4 | 10.6 | 1.9 |
| CO_1 | 30 | 106.7 | 126.8 | 23.2 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| -23.3 | 126.0 | 23.0 | (-70.3, 23.8) |

*μ_difference: mean of (CO - CO_1)*

## Test

| | |
|---|---|
| Null hypothesis | $H_0$: μ_difference = 0 |
| Alternative hypothesis | $H_1$: μ_difference ≠ 0 |

| T-Value | P-Value |
|---|---|
| -1.01 | 0.320 |

**HCHO before VS HCHO After**

Formaldehyde (HCHO) from before quarantine is denoted as HCHO_1; Meanwhile, Formaldehyde (HCHO) from after quarantine is denoted as HCHO.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| HCHO | 30 | 0.4508 | 0.1322 | 0.0241 |
| HCHO_1 | 30 | 0.4776 | 0.3427 | 0.0626 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| -0.0269 | 0.3991 | 0.0729 | (-0.1759, 0.1222) |

*μ_difference: mean of (HCHO - HCHO_1)*

## Test

Null hypothesis $H_0$: μ_difference = 0

Alternative hypothesis $H_1$: μ_difference ≠ 0

| T-Value | P-Value |
|---|---|
| -0.37 | 0.715 |

**TVOC before VS TVOC After**

Total Volatile Organic Compounds (TVOC) from before quarantine is denoted as TVOC_1; Meanwhile, Total Volatile Organic Compounds (TVOC) from after quarantine is denoted as TVOC.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| TVOC | 30 | 0.8881 | 0.1781 | 0.0325 |
| TVOC_1 | 30 | 0.5559 | 0.4087 | 0.0746 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| 0.3322 | 0.4553 | 0.0831 | (0.1622, 0.5022) |

*μ_difference: mean of (TVOC - TVOC_1)*

## Test

Null hypothesis $H_0$: μ_difference = 0

Alternative hypothesis $H_1$: μ_difference ≠ 0

| T-Value | P-Value |
|---|---|
| 4.00 | 0.000 |

**Don Antonio Overpass**

**ST before VS ST After**

Surface Temperature from before quarantine is denoted as ST_1; Meanwhile, Surface Temperature from after quarantine is denoted as ST.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| ST | 30 | 45.95 | 2.01 | 0.37 |
| ST_1 | 30 | 38.20 | 6.36 | 1.16 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| 7.75 | 5.89 | 1.07 | (5.55, 9.94) |

*μ_difference: mean of (ST - ST_1)*

## Test

| | |
|---|---|
| Null hypothesis | $H_0$: μ_difference = 0 |
| Alternative hypothesis | $H_1$: μ_difference ≠ 0 |

| T-Value | P-Value |
|---|---|
| 7.21 | 0.000 |

**AT before VS AT After**

Air Temperature from before quarantine is denoted as AT_1; Meanwhile, Air Temperature from after quarantine is denoted as AT.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| AT | 30 | 42.900 | 2.454 | 0.448 |
| AT_1 | 30 | 32.233 | 2.012 | 0.367 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| 10.667 | 2.758 | 0.504 | (9.637, 11.697) |

*μ_difference: mean of (AT - AT_1)*

## Test

Null hypothesis $H_0$: μ_difference = 0

Alternative hypothesis $H_1$: μ_difference ≠ 0

| T-Value | P-Value |
|---|---|
| 21.18 | 0.000 |

**CO2 before VS CO2 After**

Carbon Dioxide (CO2) from before quarantine is denoted as CO2_1; Meanwhile, Carbon Dioxide (CO2) from after quarantine is denoted as CO2.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| CO2 | 30 | 44.705 | 3.658 | 0.668 |
| CO2_1 | 30 | 53.761 | 2.802 | 0.511 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| -9.056 | 2.962 | 0.541 | (-10.162, -7.950) |

*μ_difference: mean of (CO2 - CO2_1)*

## Test

| | |
|---|---|
| Null hypothesis | $H_0$: μ_difference = 0 |
| Alternative hypothesis | $H_1$: μ_difference ≠ 0 |

| T-Value | P-Value |
|---|---|
| -16.75 | 0.000 |

**CO before VS CO After**

Carbon Monoxide (CO) from before quarantine is denoted as CO_1; Meanwhile, Carbon Monoxide (CO) from after quarantine is denoted as CO.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| CO | 30 | 84.867 | 4.216 | 0.770 |
| CO_1 | 30 | 85.133 | 3.910 | 0.714 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| -0.267 | 4.863 | 0.888 | (-2.083, 1.549) |

*μ_difference: mean of (CO - CO_1)*

## Test

| | |
|---|---|
| Null hypothesis | $H_0$: μ_difference = 0 |
| Alternative hypothesis | $H_1$: μ_difference ≠ 0 |

| T-Value | P-Value |
|---|---|
| -0.30 | 0.766 |

**HCHO before VS HCHO After**

Formaldehyde (HCHO) from before quarantine is denoted as HCHO_1; Meanwhile, Formaldehyde (HCHO) from after quarantine is denoted as HCHO.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| HCHO | 30 | 0.4204 | 0.0974 | 0.0178 |
| HCHO_1 | 30 | 0.4168 | 0.1030 | 0.0188 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| 0.0036 | 0.0703 | 0.0128 | (-0.0226, 0.0299) |

*μ_difference: mean of (HCHO - HCHO_1)*

## Test

Null hypothesis $H_0$: μ_difference = 0
Alternative hypothesis $H_1$: μ_difference ≠ 0

| T-Value | P-Value |
|---|---|
| 0.28 | 0.779 |

**TVOC before VS TVOC After**

Total Volatile Organic Compounds (TVOC) from before quarantine is denoted as TVOC_1; Meanwhile, Total Volatile Organic Compounds (TVOC) from after quarantine is denoted as TVOC.

## Descriptive Statistics

| Sample | N | Mean | StDev | SE Mean |
|---|---|---|---|---|
| TVOC | 30 | 0.9418 | 0.1127 | 0.0206 |
| TVOC_1 | 30 | 0.9591 | 0.0700 | 0.0128 |

## Estimation for Paired Difference

| Mean | StDev | SE Mean | 95% CI for μ_difference |
|---|---|---|---|
| -0.0173 | 0.0923 | 0.0169 | (-0.0518, 0.0172) |

*μ_difference: mean of (TVOC - TVOC_1)*

## Test

Null hypothesis $H_0$: μ_difference = 0

Alternative hypothesis $H_1$: μ_difference ≠ 0

| T-Value | P-Value |
|---|---|
| -1.03 | 0.313 |

**Discussion**

The results show that most of the levels of chemical pollutants are high in the roads chosen when we look at the data from before the quarantine. For the **IBP Road**, the Surface temperature had an average score of 40.05C and a modal score of 48.2C, air temperature had an average level of 31.566C and a modal score of 35C, Carbon dioxide ($CO_2$) had an average score of 5370ppm and a modal score of 5890ppm, Carbon monoxide (CO) has an average score of 85ppm and a modal score 90ppm. Other chemical pollutants such as Formaldehyde (HCHO) had an average score of 0.413033mg/$m^3$ and a modal score of 0.477mg/$m^3$, while Total Volatile Organic Compounds (TVOC) has an average level of 0.8307ppm and a modal score of 1.071ppm.

For the **San Mateo Northview Road**, the Surface temperature had an average score of 49.55C and a modal score of 49.3 degrees Celsius, air temperature had an average level of 32.233C and a modal score of 33C, Carbon dioxide ($CO_2$) had an average score of 5180.3ppm and a modal score of 5776ppm, Carbon monoxide (CO) has an average score of 84.533ppm and a modal score 86ppm. Other chemical pollutants such as Formaldehyde (HCHO) had an average score of 0.41676ppm and a modal score of 0.478, while Total Volatile Organic Compounds (TVOC) has an average level of 0.8344ppm and a modal score of 0.976ppm.

For the **Don Antonio Overpass**, the Surface temperature had an average score of 41.6133 C and a modal score of 48.2C, air temperature had an average level of 32.233C and a modal score of 34C, Carbon dioxide ($CO_2$) had an average score of 5330ppm and a modal score of 5890ppm, Carbon monoxide (CO) has an average score of 85.09ppm and a modal score 82ppm. Other chemical pollutants such as Formaldehyde (HCHO) had an average score of

0.4788ppm and a modal score of 0.478ppm, while Total Volatile Organic Compounds (TVOC) has an average level of 0.834ppm and a modal score of 0.926ppm.

Meanwhile, the results show that most of the levels of chemical pollutants are lower in the roads chosen when we look at the data from after the quarantine excluding the temperatures. For the **IBP Road**, the Surface temperature had an average score of 45.95C and a modal score of 48.3C, air temperature had an average level of 42.23C and a modal score of 47C, Carbon dioxide (CO2) had an average score of 43.68ppm and a modal score of 48.9ppm. Other chemical pollutants such as Formaldehyde (HCHO) and Total Volatile Organic Compounds (TVOC) had fairly the same average and modal score as the first data sets.

For the **San Mateo Northview Road**, the Surface temperature had an average score of 51.62C and a modal score of 589.3 degrees Celsius, air temperature had an average level of 42.9C and a modal score of 49C, Carbon dioxide (CO2) had an average score of 43.895ppm and a modal score of 49.8ppm. Other chemical pollutants such as Formaldehyde (HCHO) and Total Volatile Organic Compounds (TVOC) had fairly the same average and modal score as the first data sets.

For the **Don Antonio Overpass**, the Surface temperature had an average score of 51.88C and a modal score of 58.3C, air temperature had an average level of 42.43C and a modal score of 45C, Carbon dioxide (CO2) had an average score of 43.340ppm and a modal score of 48.3240ppm. Other chemical pollutants such as Formaldehyde (HCHO) and Total Volatile Organic Compounds (TVOC) had fairly the same average and modal score as the first data sets.

In comparing previous data sets recorded from Pre- and Post Quarantine, the t-test experiment displayed the following results.

For the **Batasan Hills Overpass area**, the Urban Heat Parameters (Surface Temperature and Air Temperature), and CO2 showed high intensity differences in terms of data. The Urban Heat Parameters showed positive differences, meaning their values were higher than the older data. Meanwhile, CO2 levels showed negative differences, meaning their values drifted lower when compared to different data.

Meanwhile, the other Greenhouse Gas parameters (CO, HCHO and TVOC) showed low intensity differences in terms of data. CO and TVOC had negative differences, meaning their values were lower than old data, while HCHO on the other hand became higher, having a positive value.

For the **San Mateo Road area**, the Urban Heat Parameters (Surface Temperature and Air Temperature), and CO2 also showed high intensity differences in terms of data. The Urban Heat Parameters showed positive differences again, meaning their values were higher than the older data. Meanwhile, CO2 levels showed negative differences also, meaning their values drifted lower when compared to different data.

Meanwhile, the other Greenhouse Gas parameters (CO, HCHO and TVOC) showed low intensity differences in terms of data. CO and HCHO had negative differences, meaning their values were lower than old data, while TVOC on the other hand became higher, having a positive value.

For the **Don Antonio Overpass**, the Urban Heat Parameters (Surface Temperature and Air Temperature), and CO2 showed high intensity differences in terms of data once again. The Urban Heat Parameters showed positive differences, meaning their values were higher than the older data only this time—Surface Temperature had a lower difference between pre and current quarantine timelines. Meanwhile, $CO_2$ levels showed negative differences again, meaning their values drifted lower when compared to different data. Meanwhile, the other Greenhouse Gas parameters (CO, HCHO and TVOC), like the other locations, showed low intensity differences in terms of data. CO and TVOC had negative differences, meaning their values were lower than old data, while HCHO on the other hand became higher again, having a positive value.

Here is a diagram showing a clearer explanation of the relationships between the data of each parameter from pre- and post quarantine timelines.

Batasan Hills Overpass

| *Parameter* | **Positive or Negative Difference** | **Height of Difference** |
|---|---|---|
| **ST** | **+** | **High** |
| **AT** | **+** | **High** |
| **CO** | **-** | **High** |
| **CO2** | **-** | **Low** |
| **HCHO** | **+** | **Low** |
| **TVOC** | **-** | **Low** |

San Mateo Road

| *Parameter* | **Positive or Negative Difference** | **Height of Difference** |
|---|---|---|
| **ST** | **+** | **High** |
| **AT** | **+** | **High** |
| **CO** | **-** | **High** |
| **CO2** | **-** | **Low** |
| **HCHO** | **-** | **Low** |
| **TVOC** | **+** | **Low** |

Don Antonio Overpass

| *Parameter* | **Positive or Negative Difference** | **Height of Difference** |
|---|---|---|
| **ST** | **+** | **Low** |
| **AT** | **+** | **High** |
| **CO** | **-** | **High** |
| **CO2** | **-** | **Low** |
| **HCHO** | **+** | **Low** |
| **TVOC** | **-** | **Low** |

*Data T-Test Interpretation*

The extraneous cloud data suggest that during the days with less cloud cover, temperatures were less than that of when clouds were overcast, which corresponds to the higher humidity levels during those same days.

**Conclusion**

The investigation has led to the discovery of multiple things. First, the data from the first collection shows the high levels of Urban Heat temperatures and Greenhouse Gases. Compared to the second collection, Urban Heat temperatures have risen, meanwhile Greenhouse Gases have decreased. The researcher notices there were big differences between the two data sets and most of these differences were found with the Urban Heat Parameters rising and the Greenhouse Gas Parameters dropping.

Overall, across all data sets, 44.44% of the factors had high differences (both increased and decreased) when compared to old data. This had increased to 61.47% after around three to four years.

This tells us that although there is a significance between the two factors (considering how heat affects diffusion rate of these gases and how the quarantine period greatly decreased the GHG emissions), we can't solve both problems at once even if we tried. To explain further, heat is expected to come from the built-up gases in the atmosphere, but because these gases were produced excessively and suddenly cut off because of the quarantine, we expected climate change to at least decrease.

This research shows that because we had already done damage by producing so many chemically dangerous gases in the air in the past, simply stopping the production of these gases won't solve all of our issues with temperature. The data shows that because of quarantine, we produced less dangerous gases, meaning that if we all collectively worked together to decrease the activities that may produce these gases, we can hopefully slow down climate change even if we cannot solve it immediately.

**Recommendation**

When creating research in collecting data as such, it is recommended that researchers and students follow specific protocol to get accurate data. It's recommended also that the researcher use statistical treatment through software that produces graphs for the data to help the researcher create matrix plots of the correlations of their data.

The researcher recommends conducting the research with caution, of course, the researcher should wear a mask because inhalation of these chemicals, although small amounts, can still lead to a few complications in terms of health. It is also recommended to collect data in more urban areas when conducting trials and collecting data to help explore more of the pollutant production around the globe to find out how much pollutants and heat are being excreted by these locations.

\

# CHAPTER 5

# BIBLIOGRAPHY

This part of the research is a list of books, scholarly articles, speeches, private records, diaries, interviews, laws, letters, websites, and other sources the researcher used when researching the topic and writing the paper.

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# Appendix

Don Antonio Post-Quarantine(2 Years Later) Raw Data Digitized:
*https://acesse.one/donantonioNEW*

IBP Road Post-Quarantine(2 Years Later) Raw Data Digitized: *https://l1nk.dev/ibproadNEW*

San Mateo Road Post-Quarantine(2 Years Later) Raw Data Digitized:
*https://acesse.one/sanmateoNEW*

Don Antonio Pre-Quarantine Raw Data Digitized: *https://l1nk.dev/donantoniobefore*

IBP Pre-Quarantine Raw Data Digitized: *https://acesse.one/IBProadBEFORE*

San Mateo Pre-Quarantine Raw Data Digitized: *https://acesse.one/sanmateobefore*

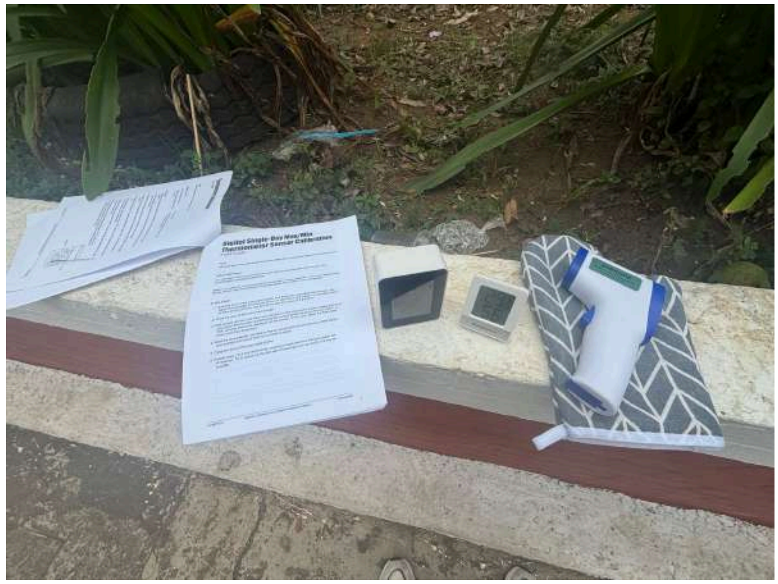
Materials Links:

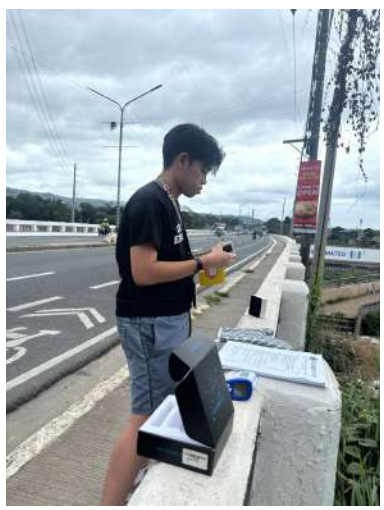
*Infrared Thermometer* - https://tinyurl.com/3tpbswhc

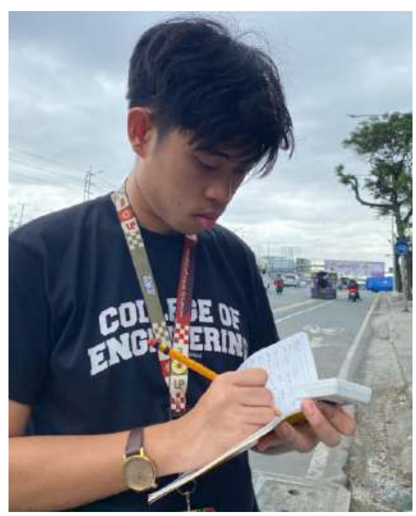
*Greenhouse Gas Detector* - https://tinyurl.com/y3s555hw

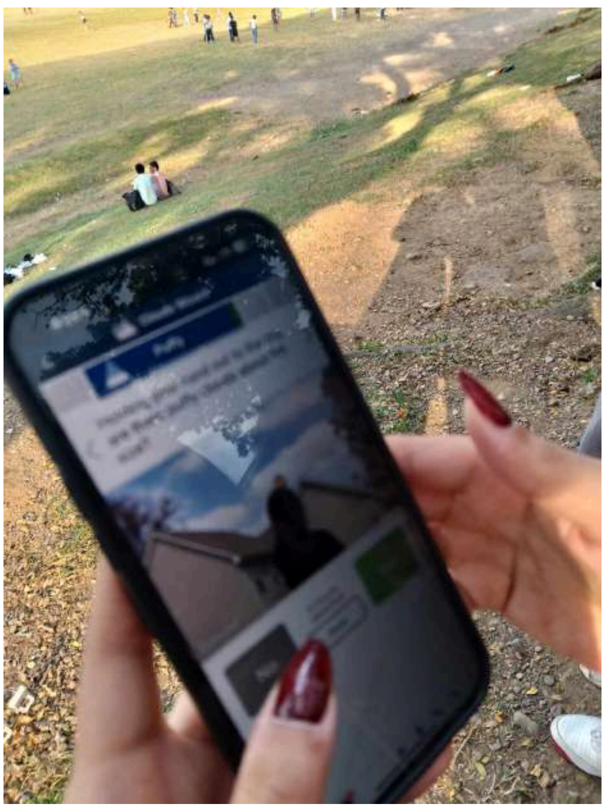
*Air Thermometer* - https://tinyurl.com/2n3r6eu3

*Documentation*






Infrared Thermometer
Carbon Monoxide (CO) Detector
TVOC (Total Volatile Organic Compound) and Formaldehyde (HCHO) Detector
Air Thermometer, Barometer, Humidity Sensor and Carbon Dioxide Level Detector

# ibp road

## day 1

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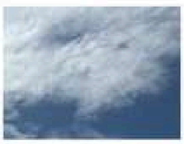
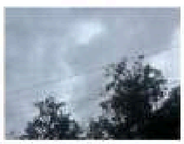
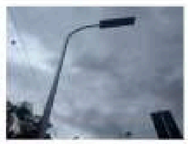
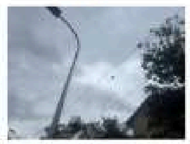
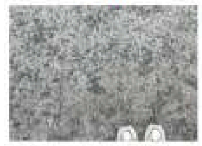


## day 2

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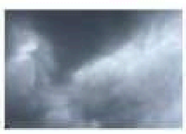
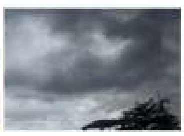
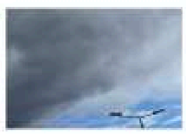
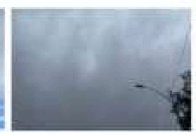
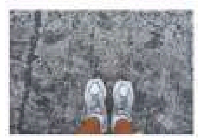


## day 3

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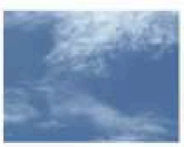
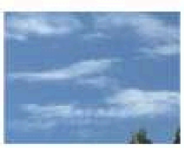
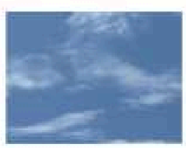
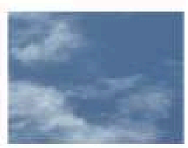
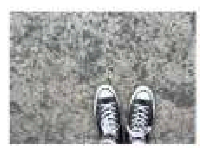
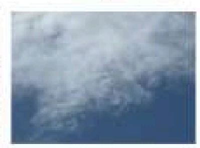

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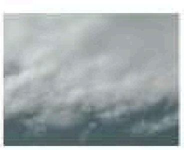


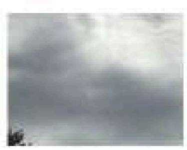
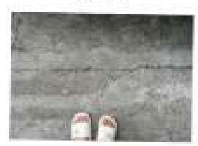
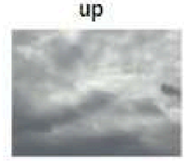

## day 5

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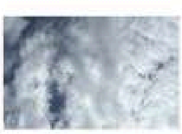
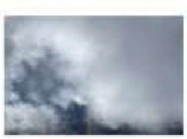
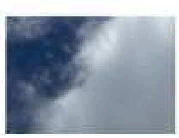

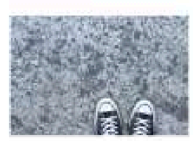
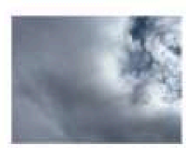

# don antonio

## day 1

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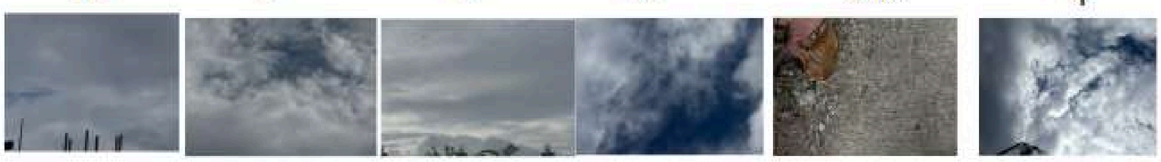

## day 2

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## day 3

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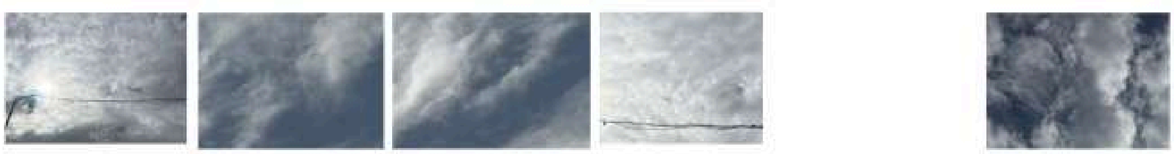

## day 4

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## day 5

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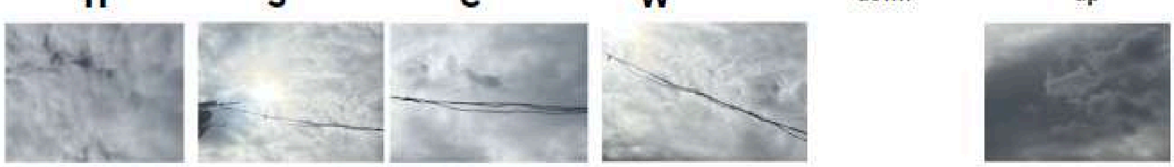

# san mateo

## day 1

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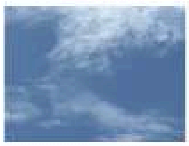 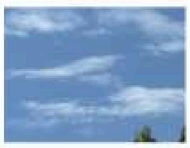 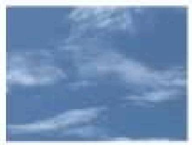 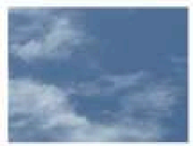

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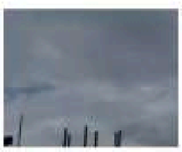
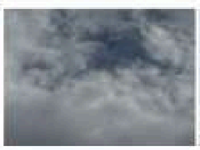
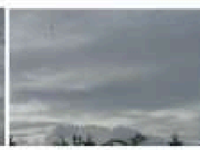
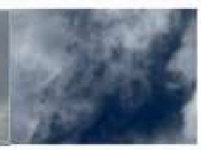
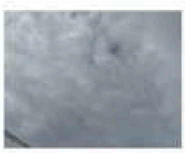
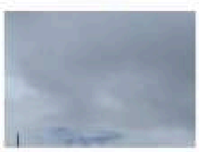
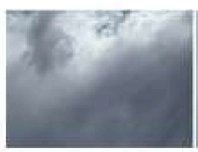
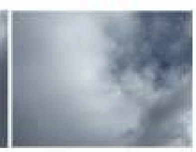
   

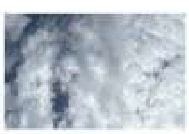
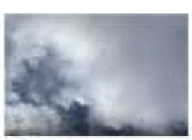
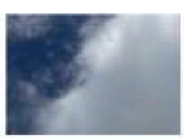
## day 3

n s e w down up

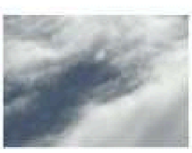
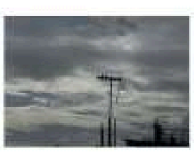
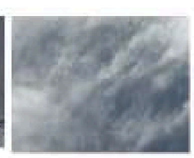
## day 4

n s e w down up

## day 5

n s e w down up

## *San Mateo Road Data Collection*

| Time/Day | Co/Co2 | | | HCHO | | | TVOC | | | Relative Humidity | | | Cloud Formation | | | Weather | Air Temperature | | | Surface Temperature | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day 1 | SD | BHNHS | SMR | | | | | | | | | | | | | | | | | | | |
| 3:00 | 403 | 491 | 412 | 0.005 | 0.005 | 0.001 | 0.007 | 0.019 | 0.01 | 50% | 45% | 45% | stratus | stratus | stratus | clear/sunny | 30°C | 31°C | 32°C | 42.2°C | 43.2°C | 47.7°C |
| 3:10 | 461 | 442 | 415 | 0.003 | 0.006 | 0.003 | 0.007 | 0.021 | 0.025 | 51% | 45% | 44% | | | | | 31°C | 32°C | 32°C | 43.0 | 42.0 | 46.0 |
| 3:20 | 455 | 441 | 402 | 0.005 | 0.006 | 0.005 | 0.006 | 0.02 | 0.021 | 49% | 45% | 44% | | | | | 33°C | 32°C | 32°C | 42 | 40.1 | 46.8 |
| 3:30 | 461 | 446 | 415 | 0.005 | 0.004 | 0.005 | 0.007 | 0.02 | 0.019 | 49% | 47% | 44% | | | | | 32°C | 32°C | 32°C | 44 | 39.4 | 46.8 |
| 3:40 | 463 | 464 | 429 | 0.004 | 0.007 | 0.007 | 0.007 | 0.018 | 0.019 | 49% | 42% | 44% | | | | | 30°C | 33°C | 32°C | 43.5 | 40.8 | 47.3 |
| 3:50 | 470 | 402 | 437 | 0.005 | 0.008 | 0.005 | 0.005 | 0.020 | 0.019 | 49% | 42% | 44% | | | | | 31°C | 33°C | 32°C | 45 | 41.8 | 46.7 |
| 4:00 | 472 | 485 | 470 | 0.005 | 0.005 | 0.005 | 0.004 | 0.019 | 0.020 | 48% | 42% | 44% | | | | | 31°C | 33°C | 32°C | 44 | 43.5 | 47.7 |
| Day 2 | | | | | | | | | | | | | | | | | | | | | | |
| 3:00 | 401 | 491 | 415 | 0.005 | 0.005 | 0.003 | 0.019 | 0.020 | 0.019 | 49% | 44% | 46% | stratus | stratus | stratus | cloudy | 29°C | 30°C | 31°C | 41.1°C | 42 | 48 |
| 3:10 | 402 | 442 | 417 | 0.005 | 0.004 | 0.005 | 0.007 | 0.020 | 0.055 | 50% | 46% | 45% | | | | | 32°C | 31°C | 31°C | 43°C | 41 | 47 |
| 3:20 | 403 | 442 | 410 | 0.005 | 0.005 | 0.006 | 0.008 | 0.019 | 0.020 | 50% | 46% | 45% | | | | | 32°C | 31°C | 31°C | 41°C | 40 | 47 |
| 3:30 | 403 | 440 | 418 | 0.004 | 0.005 | 0.004 | 0.010 | 0.021 | 0.020 | 50% | 45% | 46% | | | | | 33°C | 33°C | 33°C | 43 | 40 | 47 |
| 3:40 | 443 | 482 | 419 | 0.005 | 0.005 | 0.003 | 0.21 | 0.017 | 0.022 | 50% | 40% | 45% | | | | | 31°C | 34°C | 33°C | 42 | 41 | 46 |
| 3:50 | 403 | 407 | 421 | 0.003 | 0.004 | 0.004 | 0.031 | 0.019 | 0.18 | 51% | 41% | 45% | | | | | 32°C | 34°C | 33°C | 42 | 42 | 47 |
| 4:00 | 404 | 470 | 420 | 0.004 | 0.004 | 0.004 | 0.008 | 0.030 | 0.021 | 49% | 45% | 45% | | | | | 32°C | 33°C | 31°C | 43 | 42 | 46 |

| Time/Day | Co/Co2 | | | HCHO | | | TVOC | | | Relative Humidity | | | Cloud Formation | | | Weather | Air Temperature | | | Surface Temperature | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day 3 | | | | | | | | | | | | | | | | | | | | | | |
| 3:00 | 402 | 490 | 411 | 0.003 | 0.005 | 0.004 | 0.015 | 0.014 | 0.016 | 49% | 44% | 45% | stratus | stratus | stratus | sunny | 31°C | 33 | 32 | 44 | 46.3 | 47 |
| 3:10 | 401 | 441 | 415 | 0.005 | 0.004 | 0.003 | 0.010 | 0.011 | 0.018 | 50% | 44% | 44% | | | | | 30°C | 33 | 32 | 45 | 47.7 | 46 |
| 3:20 | 401 | 447 | 401 | 0.005 | 0.004 | 0.004 | 0.010 | 0.015 | 0.010 | 50% | 45% | 45% | | | | | 33°C | 33 | 32 | 43 | 47.3 | 46 |
| 3:30 | 402 | 445 | 417 | 0.004 | 0.003 | 0.004 | 0.015 | 0.015 | 0.020 | 47% | 44% | 45% | | | | | 32°C | 32 | 32 | 44 | 46.8 | 46 |
| 3:40 | 402 | 446 | 428 | 0.005 | 0.00 | 0.005 | 0.017 | 0.011 | 0.017 | 46% | 41% | 44% | | | | | 30°C | 32 | 32 | 42 | 46.6 | 48 |
| 3:50 | 402 | 441 | 438 | 0.004 | 0.004 | 0.004 | 0.028 | 0.015 | 0.010 | 49% | 42% | 43% | | | | | 31°C | 32 | 32 | 43 | 47.7 | 48 |
| 4:00 | 403 | 464 | 475 | 0.005 | 0.005 | 0.004 | 0.020 | 0.020 | 0.014 | 42% | 43% | 44% | | | | | 31°C | 31 | 32 | 42 | 46.8 | 48 |
| Day 4 | | | | | | | | | | | | | | | | | | | | | | |
| 3:00 | 401 | 490 | 410 | 0.004 | 0.005 | 0.003 | 0.010 | 0.016 | 0.010 | 50% | 45% | 44% | stratus | stratus | stratus | cloudy | 30°C | 30 | 31 | 42 | 42 | 46 |
| 3:10 | 400 | 443 | 414 | 0.004 | 0.005 | 0.003 | 0.011 | 0.015 | 0.017 | 44% | 44% | 44% | | | | | 31°C | 33 | 33 | 41 | 41 | 47 |
| 3:20 | 400 | 443 | 400 | 0.003 | 0.005 | 0.003 | 0.010 | 0.015 | 0.017 | 49% | 45% | 44% | | | | | 31°C | 34 | 33 | 40 | 40 | 47 |
| 3:30 | 461 | 445 | 415 | 0.003 | 0.004 | 0.003 | 0.016 | 0.015 | 0.010 | 50% | 44% | 44% | | | | | 30°C | 34 | 33 | 40 | 41 | 48 |
| 3:40 | 461 | 481 | 429 | 0.004 | 0.004 | 0.005 | 0.018 | 0.014 | 0.017 | 45% | 43% | 43% | | | | | 34°C | 33 | 31 | 41 | 40 | 46 |
| 3:50 | 462 | 460 | 439 | 0.004 | 0.003 | 0.005 | 0.021 | 0.021 | 0.014 | 44% | 42% | 44% | | | | | 34°C | 31 | 31 | 42 | 40 | 44 |
| 4:00 | 402 | 463 | 470 | 0.004 | 0.005 | 0.005 | 0.019 | 0.023 | 0.010 | 45% | 42% | 45% | | | | | 35°C | 31 | 31 | 42 | 41 | 47 |