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REVIEW OF AIR POLLUTION RESEARCH RESULTS ON THE EXAMPLE OF TBILISI

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ABSTRACT

Background: Air pollution is one of the significant environmental challenges facing modern humanity. Atmospheric air is polluted with harmful substances emitted from anthropogenic and natural sources. **Aim**: The presented paper provides an overview of monitoring results conducted in the Capital of Georgia for 2023. Results from air quality monitoring sensors show that particulate matter, sulfur, and nitrogen dioxide represent problematic pollutants in different city areas. **Methods:** The research was carried out through sensors installed in different districts of Tbilisi. The investigation was carried out within the NATO SPS program project REACT. **Results**: Atmospheric air pollution was monitored at four stationary sensor sets on K. Cholokashvili, Nutsubidze Street, Chavchavadze Avenues, and the Old Tbilisi area. The results are presented in the article in the form of tables. **Discussion:** Average indexes of sulfur dioxide and PM particles were observed in all areas. Nitrogen dioxide indices were both low and medium. **Conclusions:** Based on the data obtained, it can be assumed that the air in most districts of Tbilisi is moderately polluted, and in some cases, the data exceeds the maximum allowable norm. There may be several reasons for this.: 1. Unauthorized slashing of Green islands and massive construction of high-rise residential buildings on their place in Tbilisi. 2. Malfunctioning vehicles, the technical inspection of which has recently been made stringent. However, some vehicles still pollute the air. 3. Emissions produced by mini factories and enterprises.

Keywords: *Air monitoring, Air Pollution, Pollutant agents, Air purity Recommendations*.

1. INTRODUCTION

According to a study by the European Environment Agency (https://www.eea.europa), air pollution in European cities causes up to 400,000 premature deaths per year; Noise pollution - up to 12,000 premature deaths dramatically increases stress. All this, more and more painfully, affects the least affluent sections of the cities because they are the ones who live in the heavily polluted urban parts.

According to the report, due to ambient and indoor air pollution in Georgia, 140 people die per 100,000 inhabitants yearly, which is quite a high rate.

The 2018-2023 national action plan (https://test.ncdc.ge/Handlers/GetFile.ashx?ID=951a795c-ab20-4bdd-8f32-57959e3e1728) for the environment and health of Georgia sets "the reduction of the harmful effects of atmospheric and indoor air pollution on the health of the population" as one of its strategic tasks. In 2018-2021, specific steps were taken in this direction; for example, the Parliament of Georgia investigated the causes of air pollution in Tbilisi, expanded the air pollution monitoring network, and approved new standards concerning primary air pollutants. From 2019, the information available at the automatic atmospheric air monitoring stations became available at www.air.gov.ge

In 2021, the Parliament of Georgia adopted the Law on Environmental Liability, the purpose of which is the legal regulation of environmental damage issues following the "polluter pays" principle. The law came into full force on July 1, 2023. However, air pollution remains a severe problem in the country (https://greenalt.org/en/blogs/7635/).

Four sets of sensors were installed at different locations by the REACT research team of Ilia State University in Tbilisi. All four locations belong to Ilia State University. This ensures they function without damage/vandalism. Also, all four sites are of interest for research, and there are no sensors of the National Environment Agency located here. So, it is doubly essential to research the specified locations.

2. MATERIALS AND METHODS

2.1. Materials

The investigation was conducted within the NATO SPS project REACT with the following sensor sets.

- WMO-compliant MicroMET3 multichannel datalogger (8 channels)
- double power supply from 220V and solar panel 30W
- 12Ah buffer battery
- Local data storage 2GB SD card
- GPRS data transmission system
- IP65 box
- Cables, poles, and brackets

- Meteo sensors: temperature, relative humidity, atmospheric pressure, wind speed, wind direction
- Gas sensors: SO_2, NO_2
- Particulate matter sensor PM10-2.5-1
- Phonometer

Key data structure features

• S.D. local data storage (.txt) and frequency setting (5 min)

• Cumulative daily data file

• GSM transmission and frequency setting

Desktop web access/download (.txt/.csv)

• Automatic access

2.2. Methods

2.2.1. Location M188

The Seismology Research Institute, which belongs to Ilia State University, has been selected as this location.

Next to the location of the M188 sensor, there is also construction (Fig. 1). This construction is illegal, and the research institute has filed a lawsuit in court. However, the decision was delayed, and the construction continued.

Figure 1. *Sensor 188 and surrounding construction*

2.2.2. Sensor M185

This set of sensors is located directly next to the main buildings of Ilia State University, on the side of the road, where G. Tsereteli Street is connected to Cholokashvili Avenue. There is always much traffic, and besides the fact that the sensors are protected, it is also a significant place for monitoring. Fig. 2.

Figure 2. *Sensor M185 and its surrounding area*

2.2.3. Sensor 186

The sensors are located at Chavchavadze Avenue, #32. It is one of the central and busiest places in Tbilisi. Two large university buildings, cafes, restaurants, and shops are on the avenue. Therefore, it is very interesting for research, Fig. 3.

Figure 3. *Sensor 186 and its surrounding area*

2.2.4. Sensor 187

The sensors are located on the territory of the Scientific Research Institute of Botany (Fig. 4).

The institute is located on the upper side of the old sulfur baths. It is a very touristic place and therefore attractive for research.

Here, the sensor was installed first. Therefore, the investigation has been ongoing since March of 2023.

According to various sources (VanLoon, G.W. 2011; Cichowicz, 2017; Wetchakun, 2011), the permissible norm of NO_2 is up to 40 ppb (emission during one hour). 40-100 is good, 100-200 is average, 200-400 is bad, 400-1000 is alarming. fig. 1 See the action of nitrogen oxides to other air pollutants. Nitrogen dioxide is associated with the formation of PAN, VOC, PM, and nitric acid. In high temperature and humidity conditions, it appears as a precursor of smog (Castanas, 2016; Vallero, 2014). products.

3. RESULTS AND DISCUSSION

3.1. Results

The tables with results are presented in the appendix of the article (Tables 1-4).

3.2. Discussions

3.2.1. Location M187

The results obtained mean that the data is satisfactory. The maximum rate of NO_2 varies between 60-80 in March and April. Within 100-200, it is observed that max. The indicator is in the first half of May and June. fig. 5. According to the given NO_2 cycle, we can assume that the increased amount is due to the construction in the area. The construction was carried out in a small dose in March and April and resumed in May. Also, the traffic of construction vehicles increased. In general, this area has less traffic because it is a tourist and pedestrian area.

Figure 4. *Sensor M187, Its surrounding area and construction*

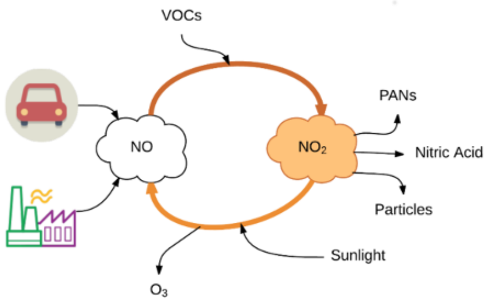

Figure 5. *Simplified cycle of NO_2*

Nitrogen dioxide and surface ozone are smog's primary and secondary triggering factors (Chapman, 2020; Tobiszewski,2015; De Vito,2009). Also, it is very harmful to the respiratory system. The amount of SO_2 in old Tbilisi is natural, as sulfur-enriched water comes in, releasing sulfur dioxide that reacts with hydrogen sulfide in the air to form water and sulfur. Excess dioxide reacts with the released water vapor, forming sulfuric acid. As a result, we get acid precipitation. The characteristic smell of rotten eggs (the smell of hydrogen sulfide) and sulfur can be felt in the area.

SO_2 levels up to 100 ppb pass very well. According to the data, the maximum here does not exceed 60-70.

The amount of PM1, PM2.5, and PM 10 particles is significant. Here, benzopyrene, dioxin, and heavy metal ions can be attracted to the central dust particles. PM1 -0-10 Good condition. According to our data, the number often reaches 15-20, which is undoubtedly due to construction dust.

PM2,5 0-20 is in good condition; 50-800 is very bad. According to our data, 205 indicators were recorded in the second half of March and 120 in the second half of June.

In other cases, it is 50-60 during the day; at night, it can be 0.11-8. In this case, the reason is again the construction and location. Here, we mean the vicinity of the botanical garden. The study period it coincided with the pollination period of various plants. Also, windiness is observed during this period, and we can assume these particles are mixed in the construction dust. Also, in May, there was a trend of increasing the number of PM particles throughout Georgia, especially noted on the National Environment Agency website. The agency cited the movement of large dust masses from the border regions.

PM10 is normal 0-20, 35-50 average, 50-above bad. In our study, two alarming increases are observed, with some days during the hot part

of the day in May with 219 and in June with 120 recorded during the day. The general trend is 10-12.

The maximum noise level is 70 decibels. According to data from various sources (Williams, J. 2012), this type of pollution is caused by construction and light vehicles (Fig.6).

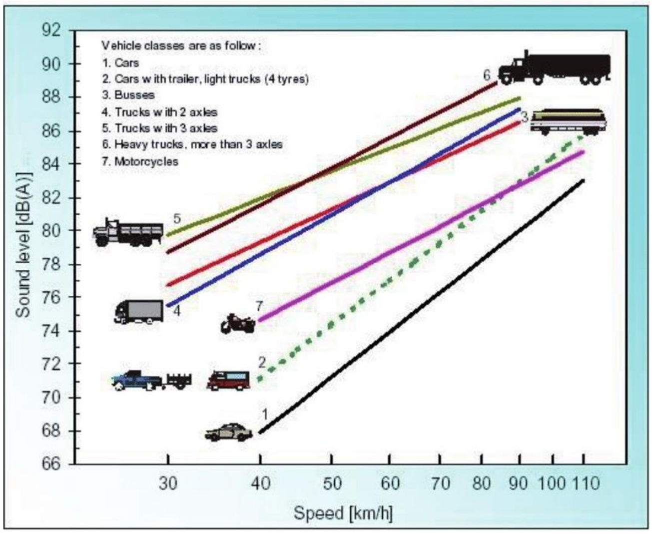

Figure 6. *Noise indicators from vehicles.*

As for July, Tbilisi always has a high temperature. Sulfur dioxide emissions are within normal limits this month. From average to bad, we can characterize the maximum nitrogen dioxide data. PM 1; The highs of 2.5 and 10 are high, but that's average this month. The increased number is also due to windy weather, adjacent construction, and the period of pollination of plants in the botanical garden (every plant has its characteristic period).

In August in Georgia, the so-called "thermal shock" manifested in very high temperatures and humidity. The sensor on location MM 187 shows a maximum temperature of 40 degrees. Humidity is also increased. Max. Nitrogen dioxide is 92.68, the minimum is 5.08, and the average is 43.7. However, even with the maximum indicator, it can still be considered a good indicator on average. The quantitative condition of sulfur dioxide is in the "good" indicator because max. 31.71 is fixed. There is an increase in PM particles, especially PM 2.5-10. Again, this could be due to construction. Also, the seasonal pollination of various plants and allergens has increased, spreading through the wind, and the sensor records this. For example, One of the most allergic weed plants is ambrosia (Ambrozia) (Stefan, 2020; Spinelli, 2017), and its peak of flowering is in August. Various studies (Baldauf, 2008. Solomon, 2008; Kelly,2017) have shown that high temperatures and air pollution contribute to weeds' long flowering and pollen spread.

The noise level varies within the norm.

3.2.2. Location M188

The study of NO_2 showed that the emission is fixed within the allowed norm. The minimum indicator is 15; the maximum is recorded in June at 85. In our opinion, the existence within the norm is since there is a forest around it. The minimum amount of SO_2 is eight, and the maximum is 43. This gas is also within the norm. The amount of PM1, PM2,5, and PM 10 are following:

PM1 min. 0.11, avereg. 7 and max. 69.

PM2,5 min. 0.12, avereg. 5 and max. In the first part of June, it was 167 ppm.

PM 10 min. 0. 10, avereg. 7 and max. 195ppm.

At this location, construction dust affects the amount of PM particles. However, the maximum values are recorded in single days. The rest of the time, we see a relatively low value, which, we think, is also due to the proximity of the forest and many trees. The noise level ranges from 40-70 dB, which fully corresponds to the construction noise, although it does not exceed the norm.

In Georgia, particularly in Tbilisi, the months of July and August are characterized by exceptional heat and high humidity. So, for example, in July, the maximum temperature at this location is 34-36 C^0. This is even though it is an elevated place with a forest park nearby. The maximum nitrogen dioxide is 73-80 ppb, so the situation is not bad. The maximum amount of Sulfur dioxide is 37-40 ppb. According to markers (Davide, A.2018), this condition can be considered very good. Fairly high maximum indicators are recorded for PM1, PM 2.5, and PM10 indicators, which can also be attributed to construction dust.

At this location in August, max. temperature is 42 degrees. The maximum nitrogen dioxide was recorded at 87.95, which is considered a good indicator. The amount of sulfur dioxide is within the range of good, max. 43.29ppb. PM particles are also increased in this area, and it can be said that sometimes max. The number reflects a deplorable situation. PM1 0,11/7.9/ 31.66; PM2.5 0.12/4.24/88.53; PM10 0.12/6.42/98.85. There is also illegal construction and forest cover near this location. Therefore, there may have been reasons similar to the MM 187 location. However, in summer, the number of PM particles increases in Tbilisi. The noise is within the norm.

3.2.3. Sensor M185

Despite such traffic, nitrogen dioxide is within normal limits. In recent years, technical transport inspection and emission control rules have been tightened in Tbilisi. All constructions near this area have also been completed, affecting the amount of nitrogen dioxide. Also, the amount of sulfur dioxide is within the norm.

As for PM particles, their increased number is observed, especially in the second half of May and the beginning of June. The National Environment Agency also noted this fact and stated that a sharp increase in PM particles was observed in the entire Tbilisi territory during the specified period. The reason was transboundary pollution. Mainly since this period is characterized by windy weather. I think the rehabilitation works on the slightly higher side of University Street could also be the reason. Wind can spread Many PM particles from there (fig. 7).

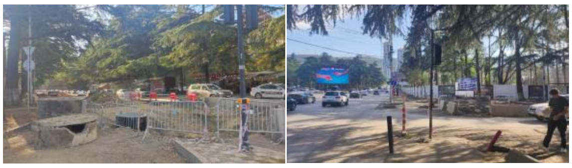

Figure 7. Work at University Street

So, for example, In the second half of May and the beginning of June, the maximum number of PM 1 is 103, and the minimum is 0.23 avg. 35. The average of PM 2.5 and PM 10 The indicator ranges from 40-80, which is, of course, a very high number. The increase is mainly felt during the daytime hours.

The average noise level ranges from 43-70, which is considered a normal indicator.

According to the data for July, the amount of nitrogen dioxide can be considered a regular category and sulfur dioxide is fixed in a relatively small amount. It is holidays, most people are out of the city, and there is less traffic in this section. PM1; PM2.5; PM10 register quite high values only in some sections, but they are mostly within the normal range. The maximum values can be attributed to the dust brought by the wind. The noise level is within acceptable limits.

At this location in August, max. The temperature is 38 degrees. A maximum of 23.45 was recorded for nitrogen dioxide, considered a good indicator. The amount of sulfur dioxide is within the range of excellent, max. 3.52 shows. In this area, too, PM particles range from good to satisfactory. The fact that vehicle emission controls are being tightened reflects the results. The noise is within the norm.

3.2.4. Sensor 186

The amount of nitrogen dioxide is mostly within acceptable limits. Only in the second half of June is the maximum rate of 113.41 recorded, which is still not alarming data. Sulfur dioxide has a maximum value of 43, corresponding to the "very good" value of the air pollution index. The PM1 count is also very good at this stretch.PM2.5 recorded a maximum of 49.5, which qualifies as "poor," according to the index. This is fixed in May. In May, pollution was generally observed in the entire city, which the National Environment Agency noted. PM10 also shows a maximum value of 53 in May, which refers to "bad" conditions.

Special mention should be made of the noise sensor, which did not work at this location until we re-fixed it with a modified method. After that, the data variable was sent again, and the maximum value of 65-67 decibels was recorded.

High temperature is recorded in this location in July. Especially in the second half of the month, when, according to the National Environment Agency, heat waves began to enter Georgia. Increased humidity is recorded. The maximum amount of nitrogen dioxide is quite high. Sulfur dioxide is fixed within the norm. Also, time and time, the increased maximum amount of all PM particles is recorded. The noise level is within the norm.

At this location in August, max. The temperature is recorded at 40 degrees. A maximum of 100 was recorded for nitrogen dioxide, considered an average indicator. The amount of sulfur dioxide is within the excellent range. 82.08 shows. In this area, too, PM particles range from good to satisfactory. The fact that vehicle emission controls are being tightened reflects the results. The noise is within the norm. However, sometimes it is higher than other locations.

4. CONCLUSIONS

Based on the results obtained, it can be assumed that the air in most districts of Tbilisi is moderately polluted. However, in some cases, the data exceeds the maximum allowable norm. There may be several reasons for this.

Based on the research, the following recommendations can be made: Avoid parking the vehicle with the engine running; Replace the engine air filter on time; Maintain the recommended air pressure in the tires; Do not continue to refuel after the refueling device (pistol) automatically shuts off after filling up the tank; Use cruise control as much as possible, which itself regulates the speed of movement; Moving at low engine speeds reduces fuel consumption; The gearbox should be switched to high gear as early as possible and to low gear as late as possible; When moving the traffic light in red mode, move in approaching the traffic light using inertia; Plan the movement; Do not preheat the engine. Start the car and drive for a short time at low speeds until the engine warms up.

5. DECLARATIONS

5.1. Acknowledgements

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5.2. Funding source

The investigation is done in the scope of the NATO SPS program project “RACT”.

5.3. Open Access

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Table 1. Data from sensor 187

		Air temperature	**Wind Direction**	**Wind Speed (m/s)**	**NO_2 (ppb)**	**SO_2 (ppb)**	**Humidity (%)**	**Air Pressure (hPa)**	**PM1 (mg/m^3)**	**PM2.5 (mg/m^3)**	**PM10 (mg/m^3)**	**Phonometer (db)**
3-17 Mart	Min	-3.5 (7)	1	0.01	5.58	1.17	17.81	1012.68	0.11	1.12	0.12	41.8
	Max	17	358	3.97	61.56	43.06	99.8	1038.04	53.12	205.56	250.75	63.07
18-31 Mart	Min	1 (11)	1	0.03	9.38	1.18	15.13	989.45	0.12	0.12	0.12	41.79
	Max	24	378	4.28	68.29	34.01	99.6	1019.36	49.06	181.29	219.98	64.18
1-15 April	Min	4.2	1(148)	0.04	21.34	0.59	20.68	944.02	0.12	0.11	0.15	43.69
	Max	24.35	359	10.33	82.67	34.59	95.18	968.57	25.73	61.21	66.49	66.12
16-30 April	Min	8.36	1(153)	2.07	22.28	0.59	20.62	950.7	0.12	0.11 (10)	0.11(12)	43.96
	Max	26.27	359	8.79	81.5	34.15	95.7	972.24	24.15	52.36	62.3	64.98
1-15 May	Min	12.58	1(16)	0.04 (0.17)	5.28	6.71	23.7	1010.93	0.11 (7)	0.12 (8)	0.11 (10)	42.98
	Max	27.77	352	4.49	152.44	31.66	83.85	1022.09	23.8	56.75	62.97	69.59
16-31 May	Min	20.86	0	0	7.12	10.98	32.36	1009.44	0.12 (8)	0.12 (7)	0.12 (8)	45.26
	Max	29.13	0	0	262	32.06	77.92	1027.06	32.95	69.65	73.76	69.66
01-15 June	Min	15.57	1(146)	0.04 (2)	22.28	5.3	28.79	951.28	0,12 (6)	0.11 (3)	0.11 (4)	44.56
	Max	33.01	359	9.25	84.43	31.66	90.66	965.91	15.13	24.62	27.09	65.88
16-30June	Min	15.12	1 (155.27)	0.04 (2)	24.04	2.93	26.68	949.37	0.12 (6)	3.41	4.24	44.2
	Max	33.61	359	10.02	90.85	32.83	95.35	965.39	20.17	120.54	159.47	66.72
1-15 July	Min	15	1(152)	2.59	21.95	0.61	18.39	949	0.12	2.68	3.49	44.12
	Max	34	359	14	84.15	32.83	93.26	966	15.24	28.41	32.44	67.64
16-31 July	Min	16	1(122)	2.95	15.83	0.59	22.12	952	0.11	4.7	5.99	43.68
	Max	36	359	11.63	85.01	57.93	92.04	963	15.36	27.55	29.37	65.55
1-31 August	Min	17	149	0.35	25.21	9.03	20.23	943	0.11/7.9	0.12/4,24	0,12/6.42	46,43
	Max	40	359	3.09	87.95	43.29	99.42	961	31.66	88.53	98,85	65,88
1-30 September	Min	11.50	1/174	0.31	26.99	15.71	22.78	948	9.43	5.42	6.68	55.37
	Max	35.44	324	6.4	113.16	83	97.39	970	45.12	166	205.61	83.12

Table 2. Data from sensor 188

		Air temperature	Wind Direction	Wind Speed (m/s)	NO_2 (ppb)	SO_2 (ppb)	Humidity (%)	Air Pressure (hPa)	PM1 (mg/m^3)	PM2.5 (mg/m^3)	PM10 (mg/m^3)	Phonometer (db)
4-18 Mart	Min	9	1(161)	1.24	15.24	9.3	15.36	1013.56	0.11 (15)	0.12(32)	1.02 (14)	40.81
	Max	18	359	4.43	43.83	71.77	99.53	1040.85	51.71	158	188	64.38
19-31 Mart	Min	11	1(185)	1.28	30.49	15.24	15.23	989.72	0.11(18)	0.11 (40)	0.12 (51)	41.34
	Max	22.53	350	4.62	76.29	45.73	99.9	1040.85	60.15	180	205	63.65
1-15 April	Min	11	1(190)	1.21	15.48	12.22	25.99	990.23	0.11(12)	0.11 (16)	0.10 (21)	40.92
	Max	23	360	9.26	76.22	45.73	99.55	1022.79	35.65	106.26	128.84	64.43
16-30 April	Min	4.7	1(190)	1.27	15.22	15.11	23.31	998.36	0.12 (8)	0.11 (5)	0.11 (7)	41.55
	Max	24.19	359	5.92	106.71	45.70	99.9	1028.45	24	49.57	58.38	70.53
1-15 May	Min	4.17 (15)	1(130)	0.67	18.56	8.79	24.1	950.26	0.11 (7)	0(2.85)	0(3.87)	45.55
	Max	26.29	359	3.51	69.18	43.39	97.51	963.88	24	69.65	74.23	66.19
16-31 May	Min	6 (20)	1(143)	0.22	19.35	7.04	22.43	949.4	0.11(8)	0.9 (5.13)	0.12 (7)	45.48
	Max	33	355	2.59	77.44	43.97	97.7	959.33	48.4	135	160	66.12
01-15 June	Min	14.33	1(140)	0.30	25.21	10.37	29.89	945.72	0.11 (7)	0.11 (2.36)	0.11 (3.94)	45.78
	Max	33.84	359	2.52	85.11	39.42	97.46	960.28	69.07	167.8	195.12	65.93
16-30June	Min	14.24	1(132)	0.32	24.62	7.93	25.39	943.76	0.11 (7)	0 (2.35)	0(3.52)	45.87
	Max	33	359	2.76	73.29	39.63	99.15	959.44	37.05	120.54	132.74	66.38
1-15 July	Min	13	1 (142)	0.47	24	9.97	21	943	0.12 (7)	1.84	2.91	46.28
	Max	34	359	3.33	80.32	40	97	960	78	27.42	308.4	67.08
16-31 July	Min	14	1 (126)	0.55	29.9	10.43	25.32	946	7.89	2.37	3.85	45.99
	Max	36	359	3.55	73.87	37.52	95.34	957	29.2	63.19	71.53	65.19
1-31 August	Min	17.13	149	0.35	25.21	9.03	20.23	943	0.11/7.9	0.12/4.2 4	0.12/6.42	46.43
1-30 September	Max	11.73	1(133)	0.27	18.18	9.76	28.87	948	7.61	4.12	5.93	45.35
	Min	34.61	340	3.04	71.34	41.78	97.39	963	45.12	166	205.61	64.11

Table 3. Data from sensor 185

		Air tempe ratue	**Wind Directio n**	**Wind Spee d (m/s)**	**NO_2 (ppb)**	**SO_2 (ppb)**	**Humi dity (%)**	**Air Pressure (hPa)**	**PM1 (mg/m 3)**	**PM2.5 (mg/m 3)**	**PM10 (mg/m 3)**	**Phonomet er (db)**
21.04-30.04.2023	Min	7.09		0.03	0(3.8)	0(0.07)	21.44	945.23	0.82	0.12	0.12	45.91
	Max	25.66		4.6	19.35	2.44	95.74	956.06	25.8	53.94	56.52	69.18
1.05-15.05.2023	Min	4.15		0.03	0.59	0(0.05)	21.45	950.23	0.49	0.12	0.11	46.73
	Max	25.63		6.5	22.28	3.66	95.39	964.09	28.54	47.93	49.02	68.78
16.05-31.05.2023	Min	7.37		0(0.68)	0.56	0(0.08)	20.15	949.11	0.59	0.12	0.12	43.94
	Max	33.67		4.27	25.21	4.1	93.45	959.1	34.01	91.82	100.14	69.02
1.06-15.06.2023	Min	14		0.03	0.59	0(0.08)	29.18	945.02	0.42	0.11	0.11	45.48
	Max	21.59		5.27	21.95	4.69	96.25	959.74	30.84	39.52	42.21	70.89
16.06-30.06.2023	Min	14.27		0.03	0.56	0(0.1)	24.2	943.64	0.35	0.11	0.11	45.39
	Max	33.29		7.86	26.22	3.05	95.32	959.22	25.56	29.08	30.14	70.04
1.-15 July	Min	14.3	1 (224)	0.03	0.59	0.07	19.22	943.25	0.12	0.11	0.11	44.85
	Max	33.97	359	5.4	24.04	3.39	93.63	960.39	25.09	37.52	40.92	68.1
16 -31 July	Min	15	1(248)	1.10	7.03	0.07	22.91	946	0.23	7.78	0.11	44.76
	Max	36	359	6.39	29.27	3.18	92.99	957	25.33	35.8	36.7	68.27
1-31 August	Min	17.18	1/216	0.03	0.59	0.072	20.06	942	1.99	0.12	0.15	44.31
	Max	38.36	359	7.77	23.45	3.52	97.67	960	25.8	31.95	32.8	69.61
1-30 September	Min	11.49	1/167	0.48	0.56/26	0.56	24.08	948	0.11/10	5.13	6.15	43.43
	Max	35.32	351	6.4	71.34	41.78	97.39	963	45.12	166.1	205.61	69.03

Table 4. Data from sensor 186

		Air temperature	Wind Direction	Wind Speed (m/s)	NO_2 (ppb)	SO_2 (ppb)	Humidity (%)	Air Pressure (hPa)	PM1 (mg/m³)	PM2.5 (mg/m³)	PM10 (mg/m³)	Phonometer (db)
21.04-30.04.2023	Min	9.54		0.03	35.18	2.82	23.91	951.13	0.12	0.11	0.12	30
	Max	26.46		3.07	99.67	31.1	97.81	961.49	26.38	44.56	55.46	30
1.05-15.05.2023	Min	6.37		0.03	28.23	4.52	20.36	955.65	0.11	0.11	0.11	30
	Max	27.62		2.83	102.6	42.21	97.37	970.33	22.99	46.22	53.54	30
16.05-31.05.2023	Min	9.66		0.03	29.32	4.1	21.98	954.38	0.11	0.11	0.12	30
	Max	35.32		3.6	85.01	39.28	94.28	965.08	27.91	49.95	56.64	30
1.06-15.06.2023	Min	16.64		0.03	34.01	4.1	28.69	950.98	0.11	0.11	0.11	30
	Max	34.66		4.02	88.53	43.19	94.9	965.21	21.47	24.39	29.43	64.98
16.06-30.06.2023	Min	15.46		0.03	24.28	3.52	23.25	949.1	0.11	0.11	0.11	42.66
	Max	34.37		4.53	113.41	42.21	97.48	964.74	22.16	25.68	30.72	67.89
1.07-15.07.2023	Min	16.44	1(179)	0.03	18.29	6.35	20.13	949	0.11(11.3)	3.72	5	45.28
	Max	35.77	359	2.96	97.33	58.63	95.98	965	21.46	30.61	34	67.18
16.07-31.07.2023	Min	16	1(166)	0.56	29.32	6.45	23.42	951	0.11/11.3	5.36	7.1	45.26
	Max	41	359	3.26	97.11	41.63	94.4	962	29.08	38.23	45.97	65.68
1-31August	Min	19	1/205	0.36	18.18	4.69	19.53	948	0.11	0.20	0.17	42.36
	Max	40	359	4.02	100	82.08	99.2	965	28.96	38.66	46.22	73.66
1-30 September	Min	11.49	1/177	0.41	35.24	15.29	24.08	948	10.38	5.48	6.75	43.12
	Max	35.46	359	6.4	113.16	53.94	97.39	963	45.12	166.1	178.08	70.03

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