27 JUNE, 2025 (UPDATED ON: 16 JULY 2025)

Figure 1: The line chart, created using NOx Analyzer, shows that monthly average concentrations of NO, NO_2 , and NOx in Nairobi remained relatively stable from January to July, peaked sharply in August, and then declined steadily between 2021 and 2025.

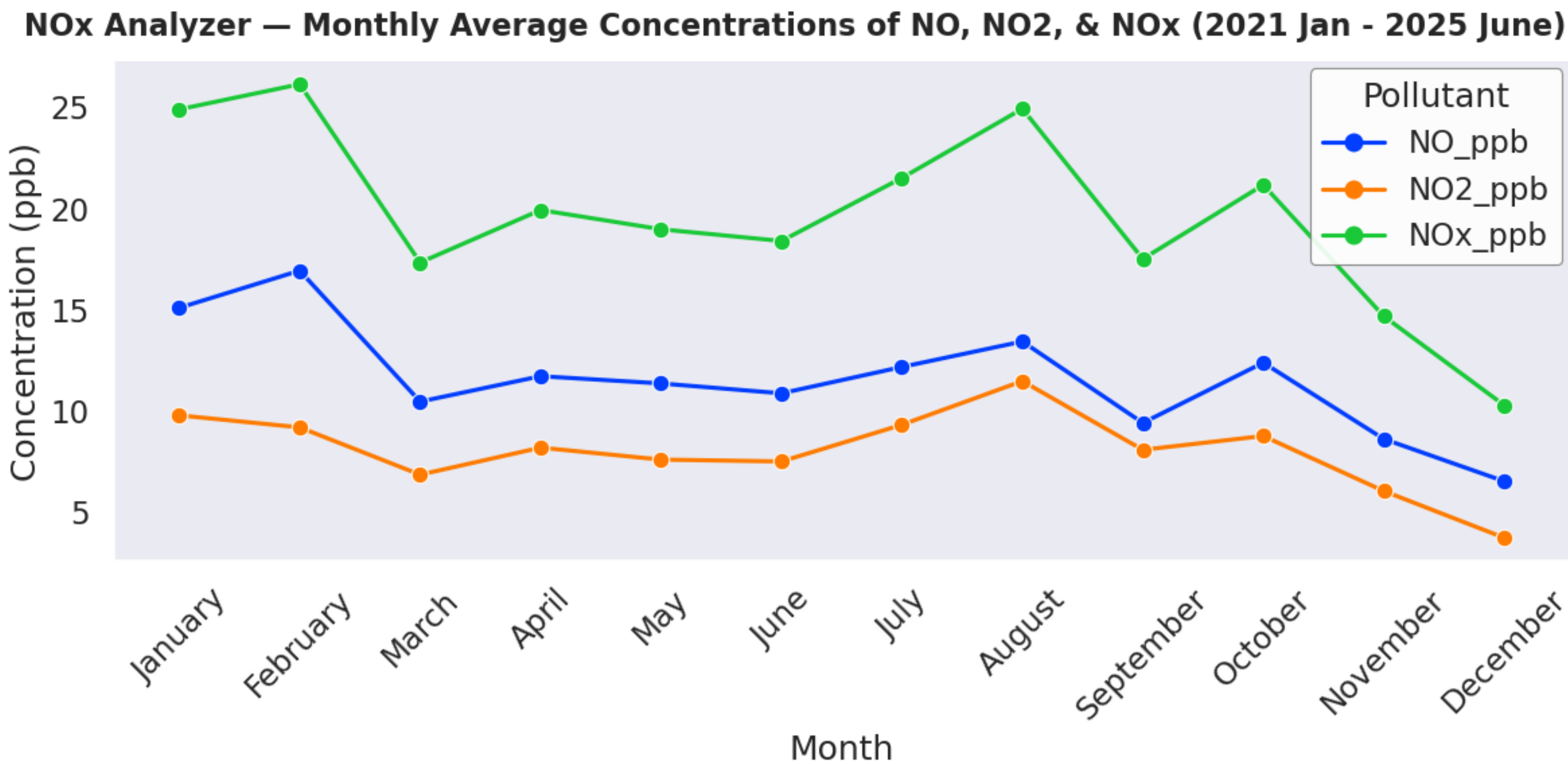


Figure 2: The TROPOMI satellite data shows that monthly average tropospheric NO_2 concentrations generally increased from April to September—peaking in September—before declining through December between 2021 and 2024.

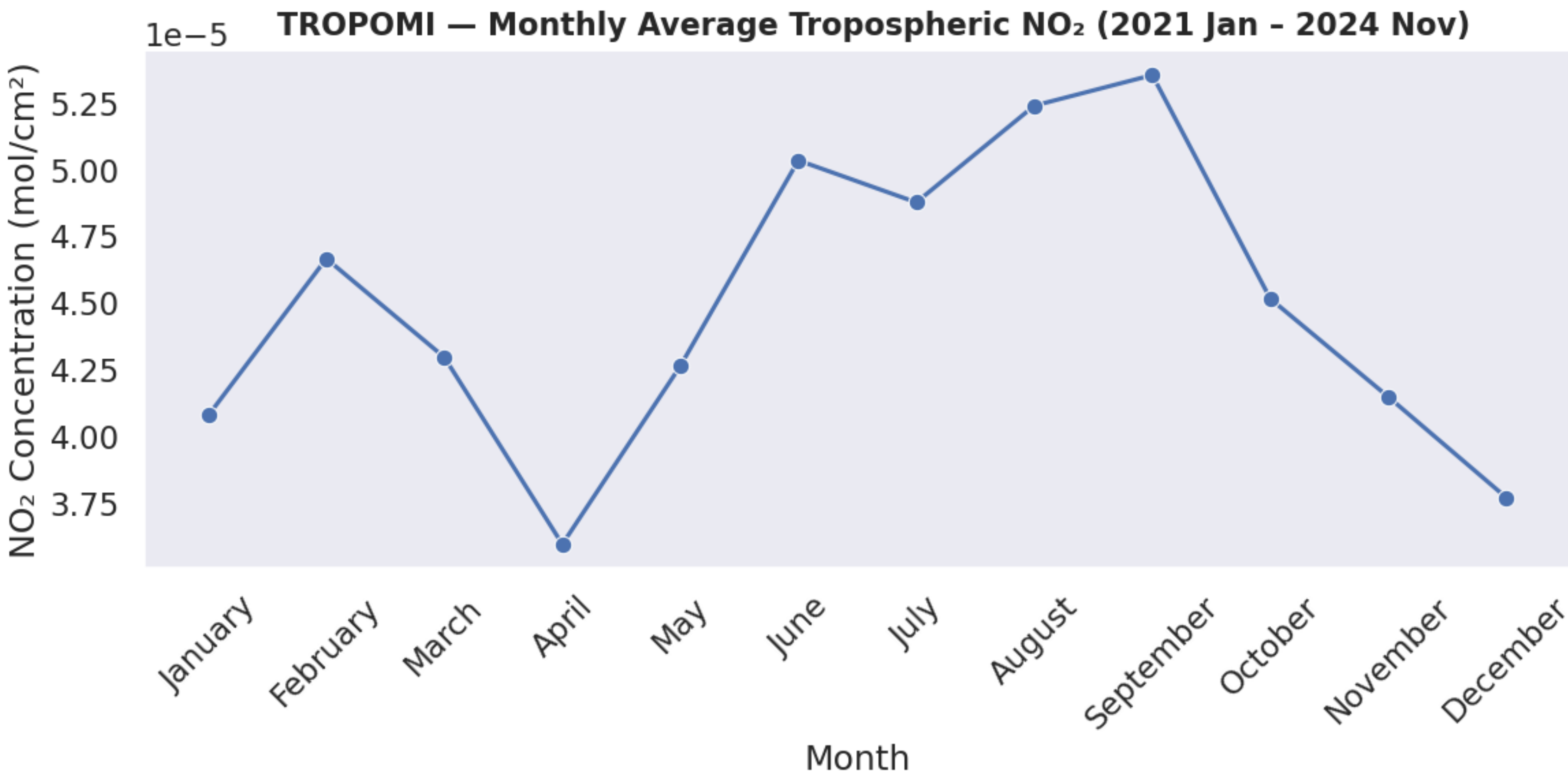


Figure 2B: Data availability chart for Figure 2.

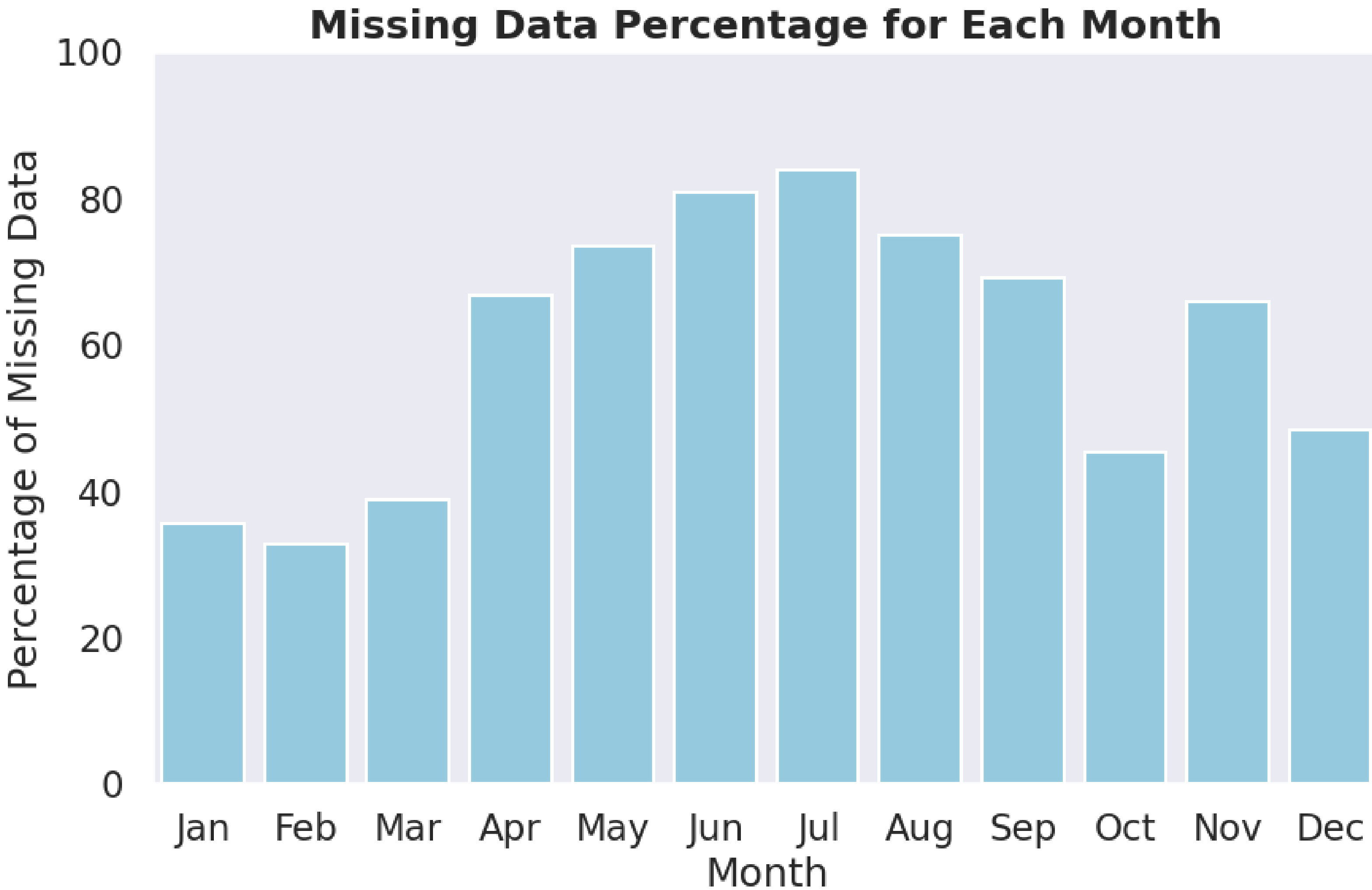


Figure 3: The combined chart shows that both ground-based and satellite NO_2 concentrations follow a similar seasonal pattern—rising from April to a peak around August–September and then declining toward December—highlighting consistency between surface measurements and TROPOMI satellite observations.

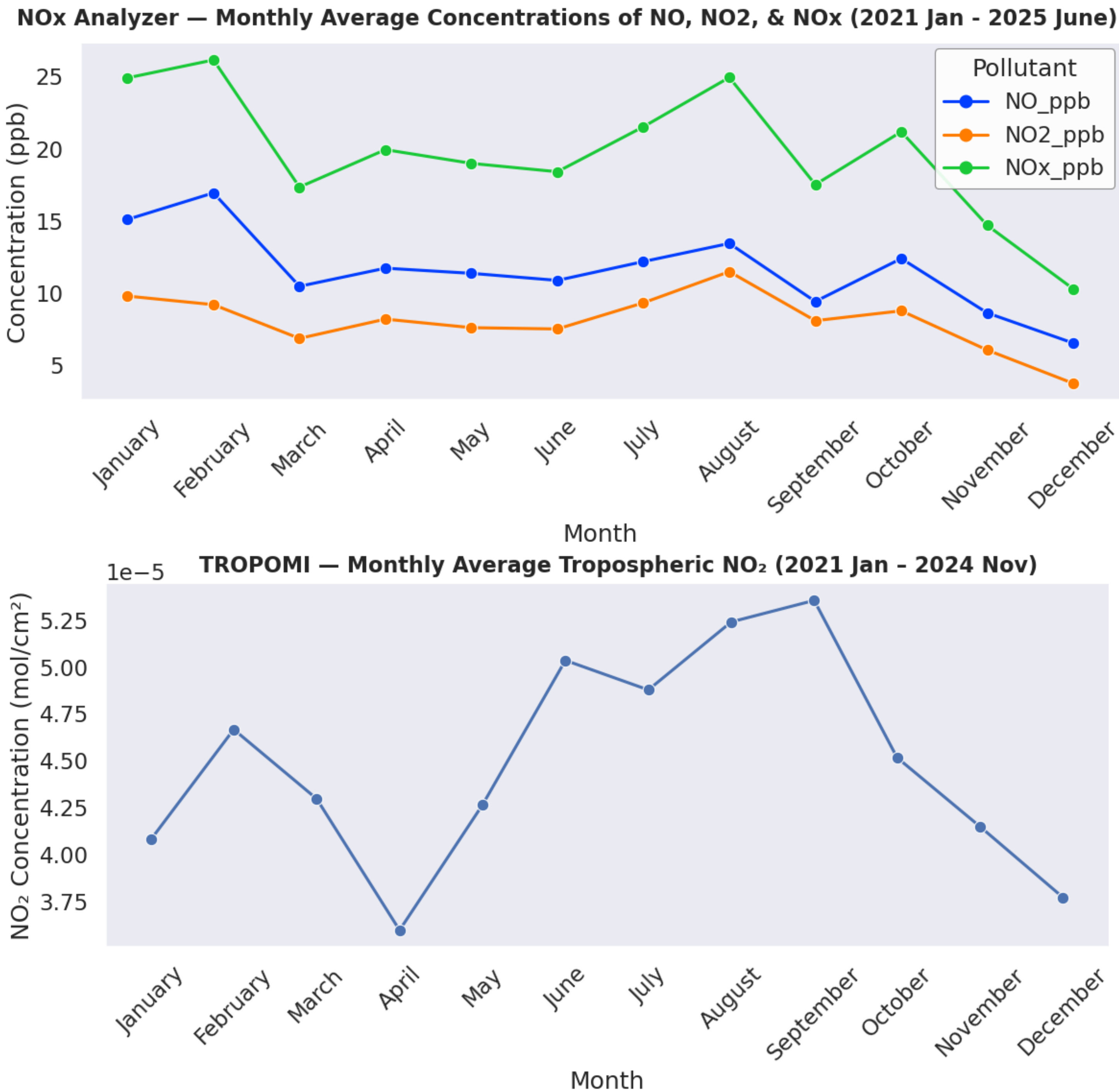


Figure 4: The chart, created using NOx Analyzer, shows that NOx concentrations are generally higher on weekdays than weekends across all years, with a consistent weekday peak around Wednesday and a steady overall decline in NOx levels from 2021 to 2025.

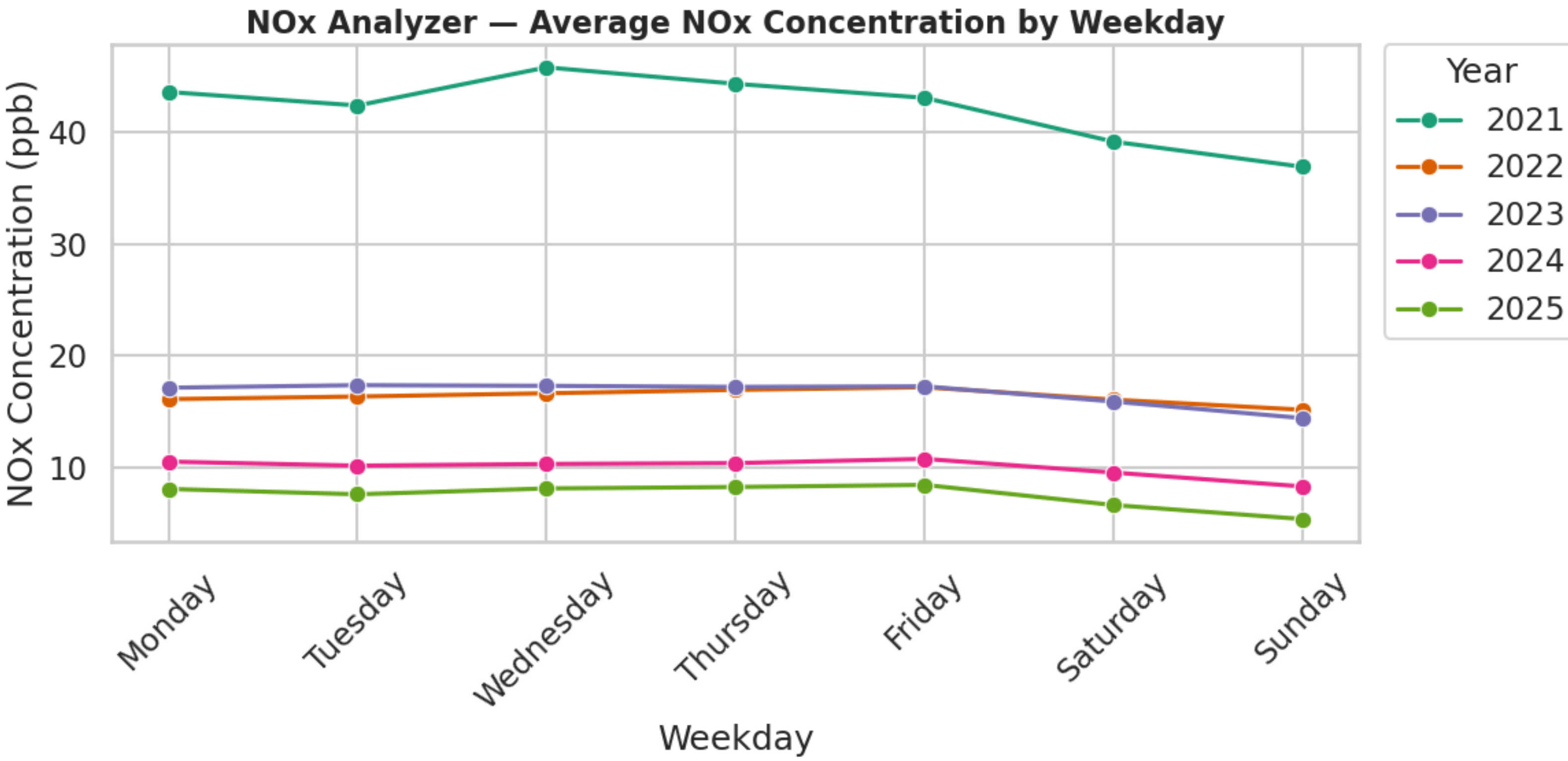


Figure 5: The chart shows that average tropospheric NO_2 levels from TROPOMI vary across weekdays, generally peaking midweek (especially on Wednesdays and Thursdays) and dropping significantly on Sundays, with 2022 exhibiting the highest concentrations.

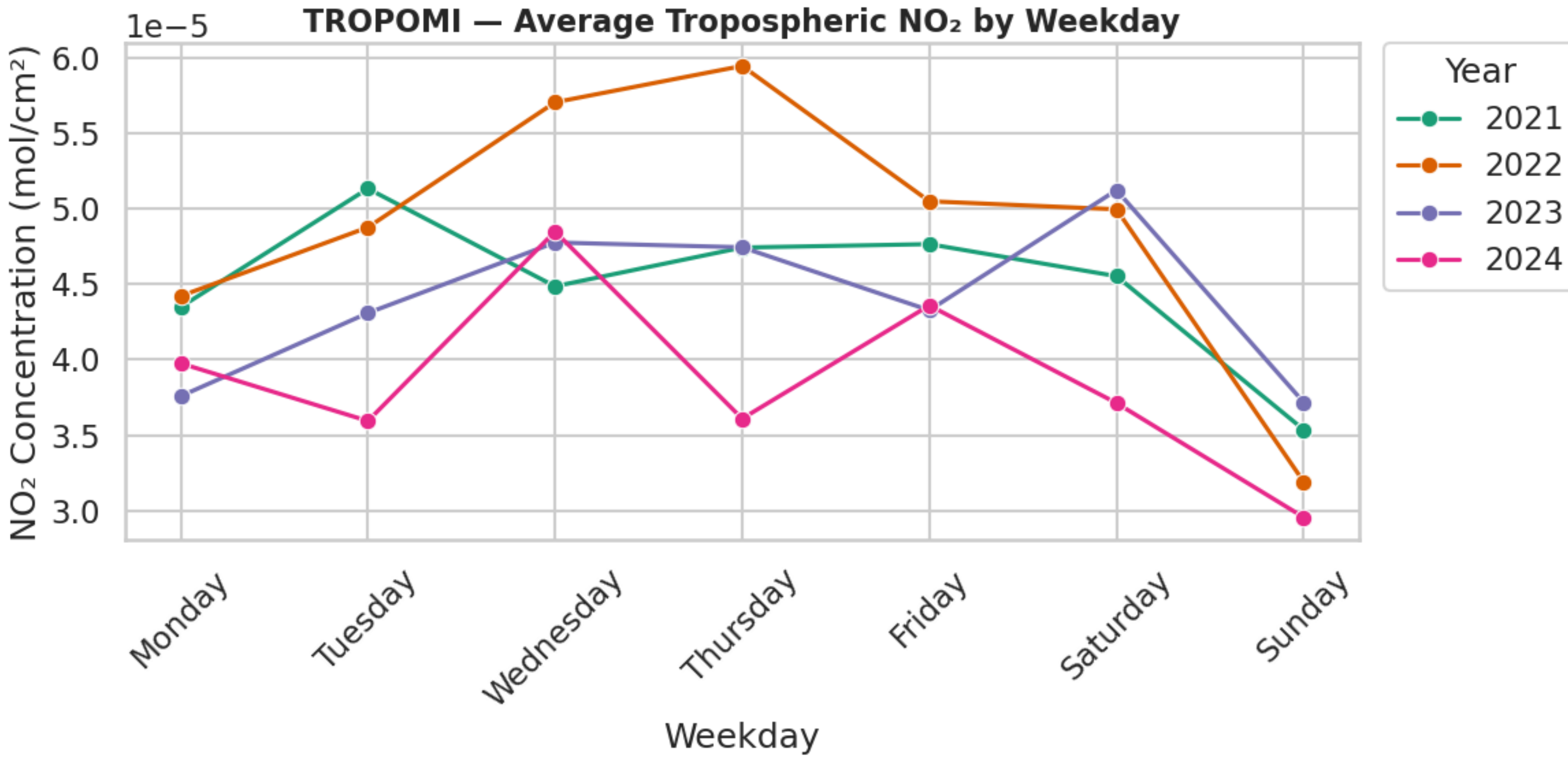


Figure 5B: Data availability chart for Figure 5.

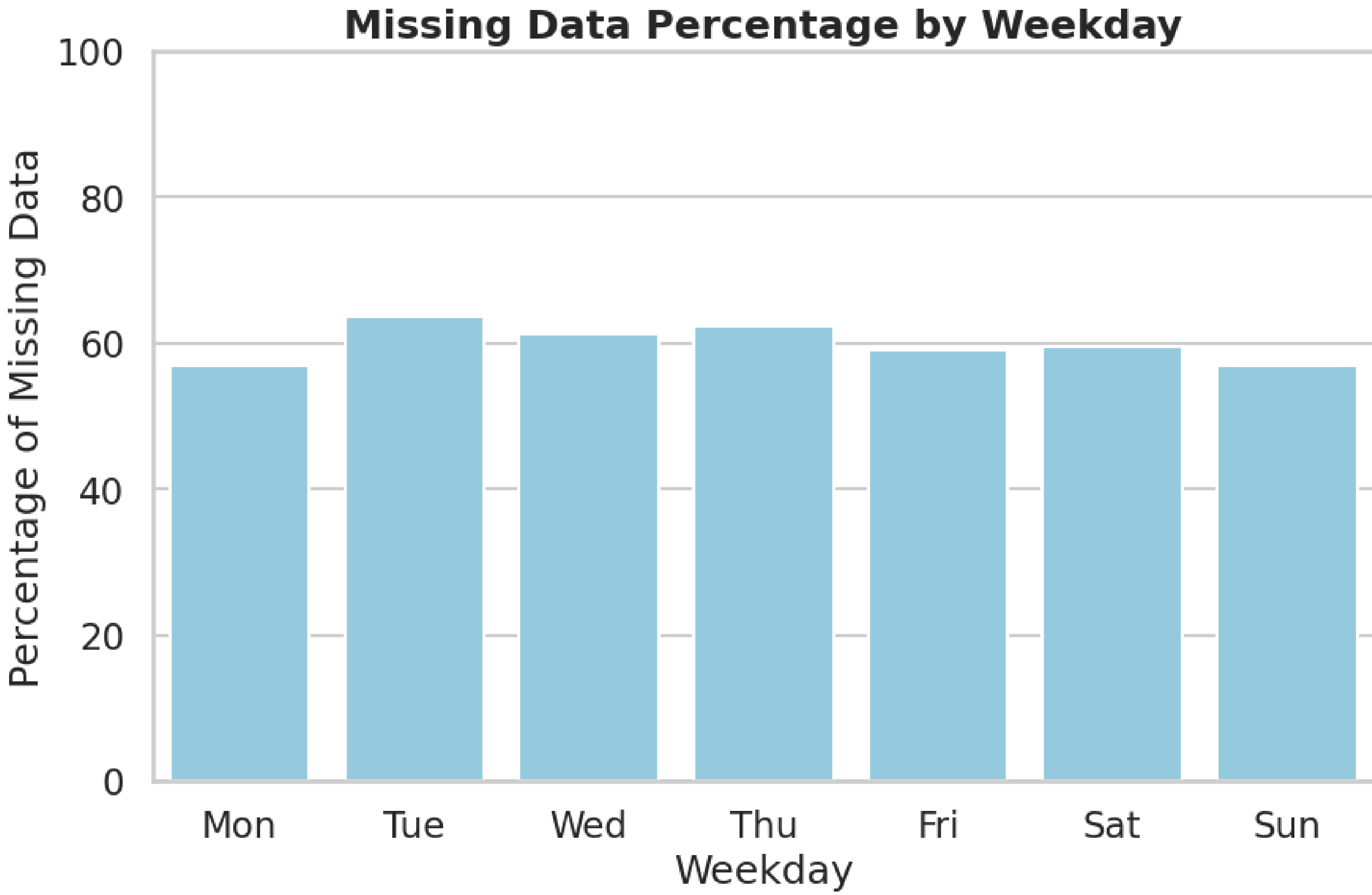
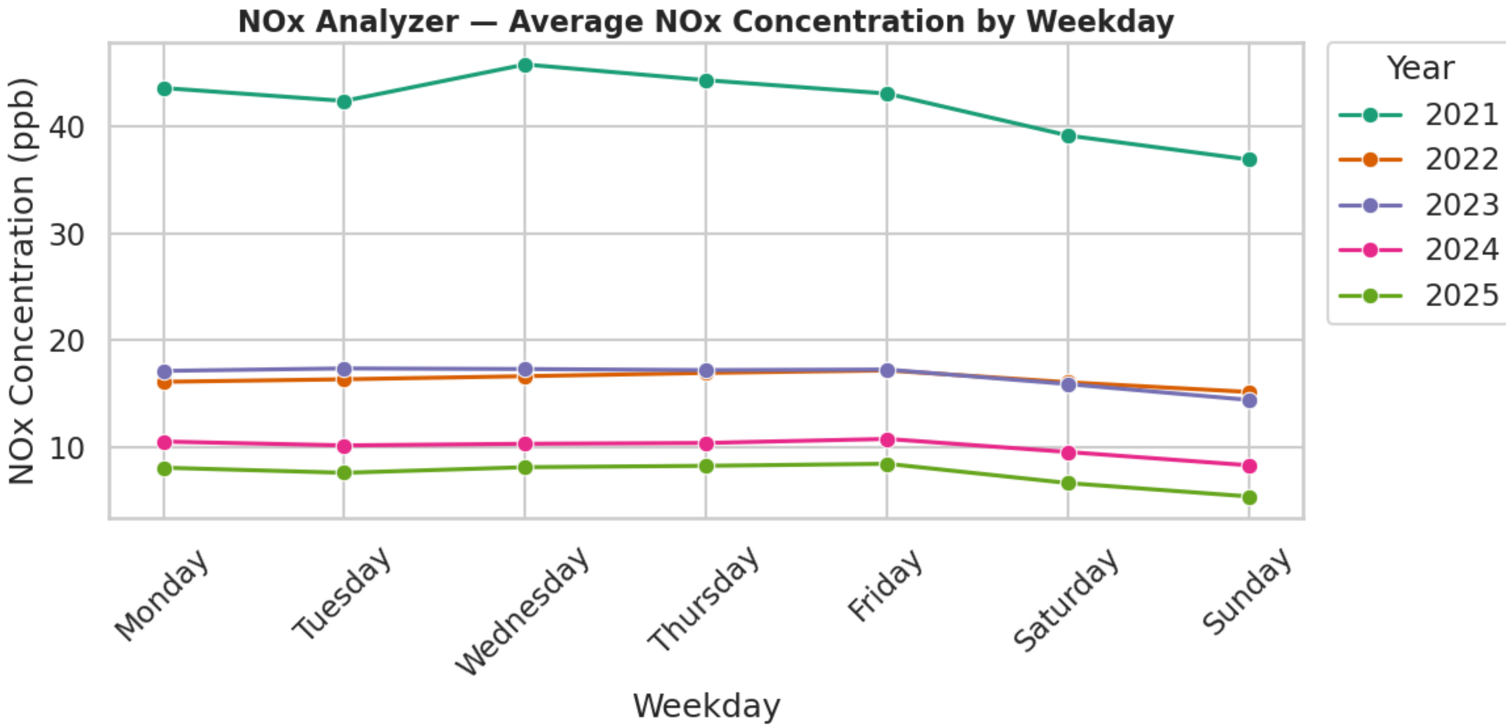


Figure 6: The combined plots show a consistent weekday pattern where both ground-based NOx and satellite-observed NO_2 concentrations are higher during weekdays—especially midweek—and drop notably on Sundays, with peak values occurring around Thursday and Friday across most years.



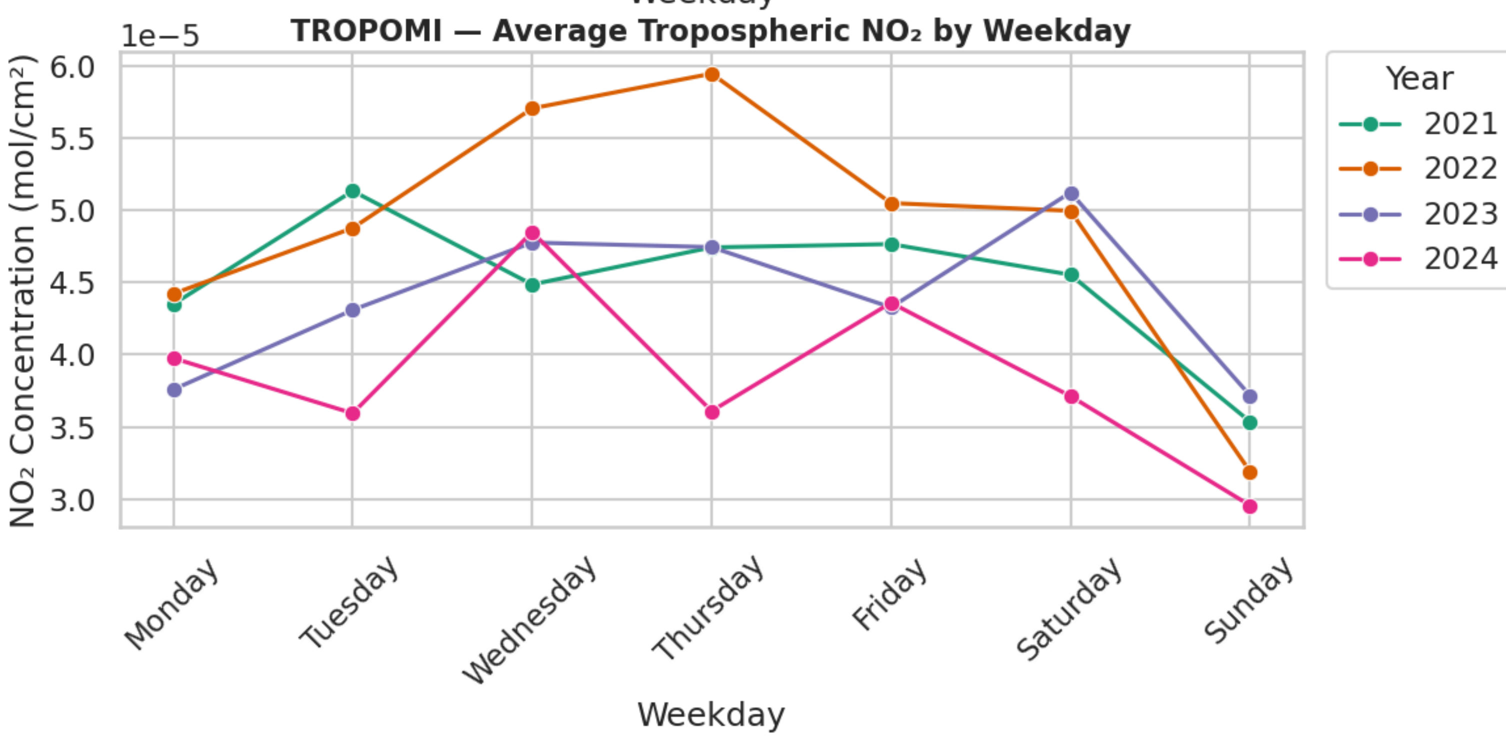


Figure 7: The time series plot shows a period of missing data between December 2021 and mid-2022, likely due to a device issue, followed by resumed measurements that indicate a gradual decline in NO, NO_2, and NOx concentrations in Nairobi through June 2025.

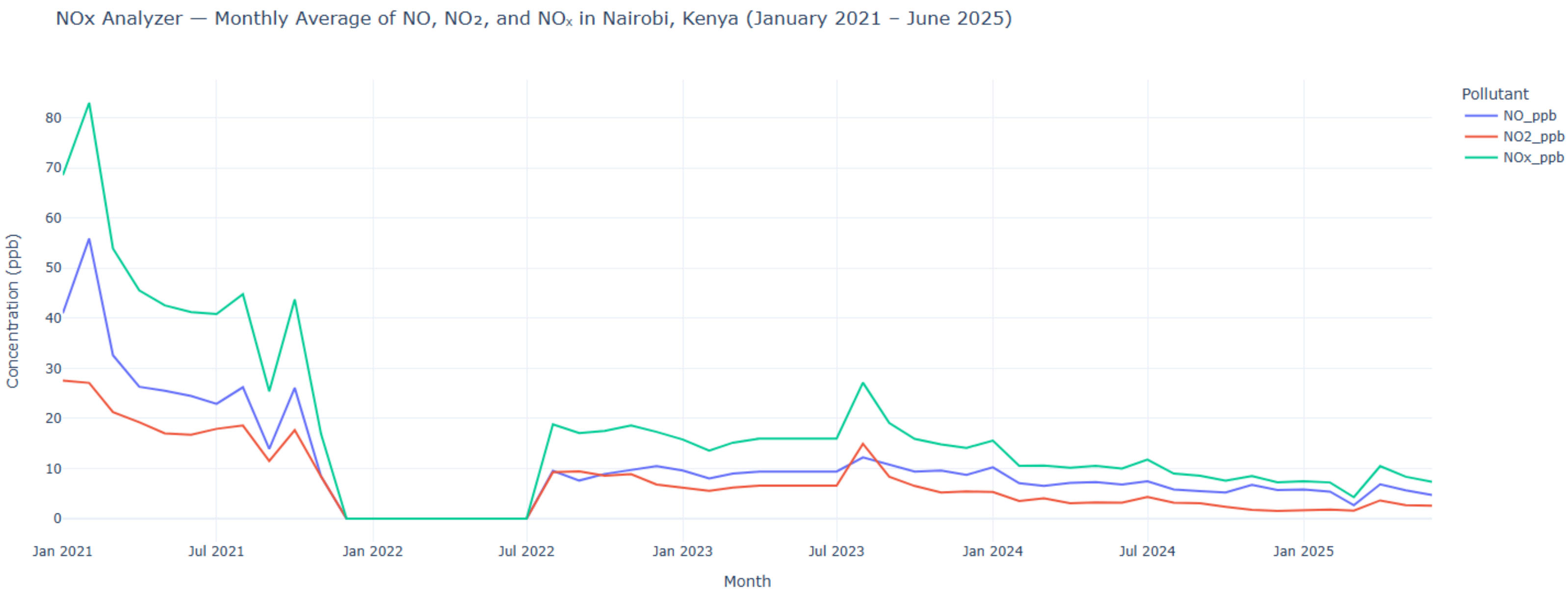


Figure 8: This time series plot of TROPOMI satellite data shows monthly average tropospheric NO_2 concentrations in Nairobi from January 2021 to November 2024, with substantial variability month to month but an overall declining trend, as indicated by the downward-sloping trend line.

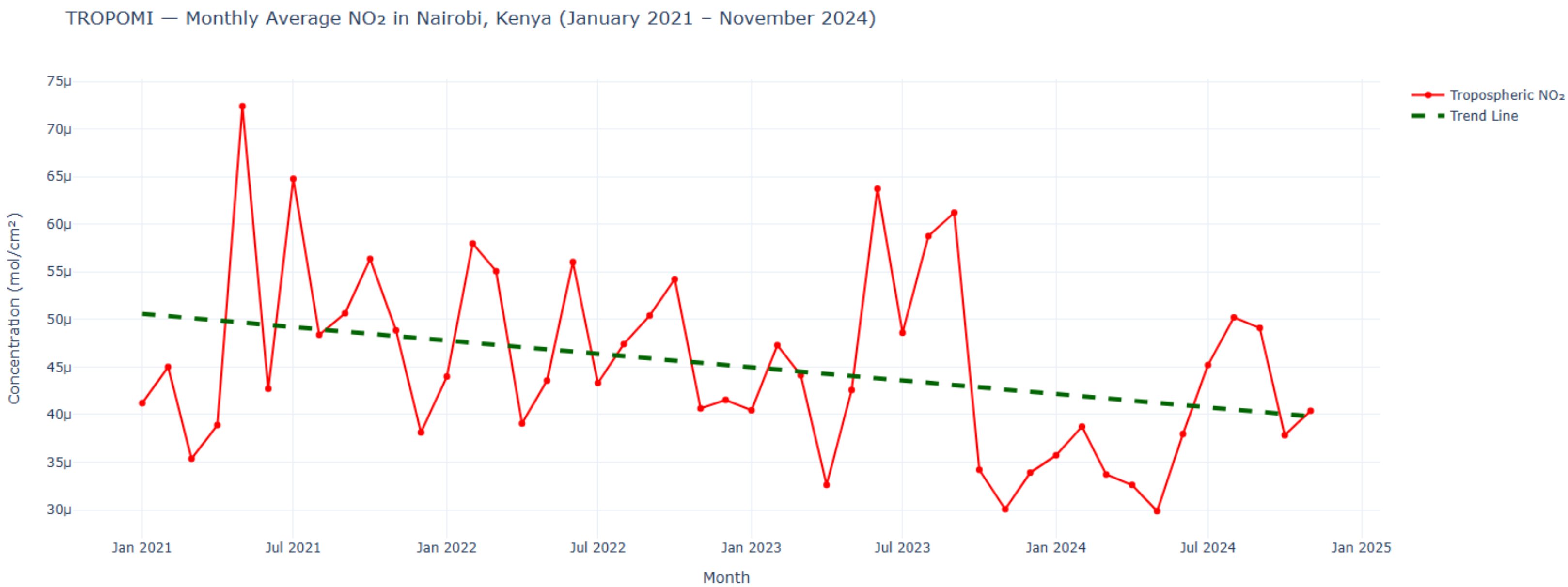


Figure 8B: Data availability chart for Figure 8.

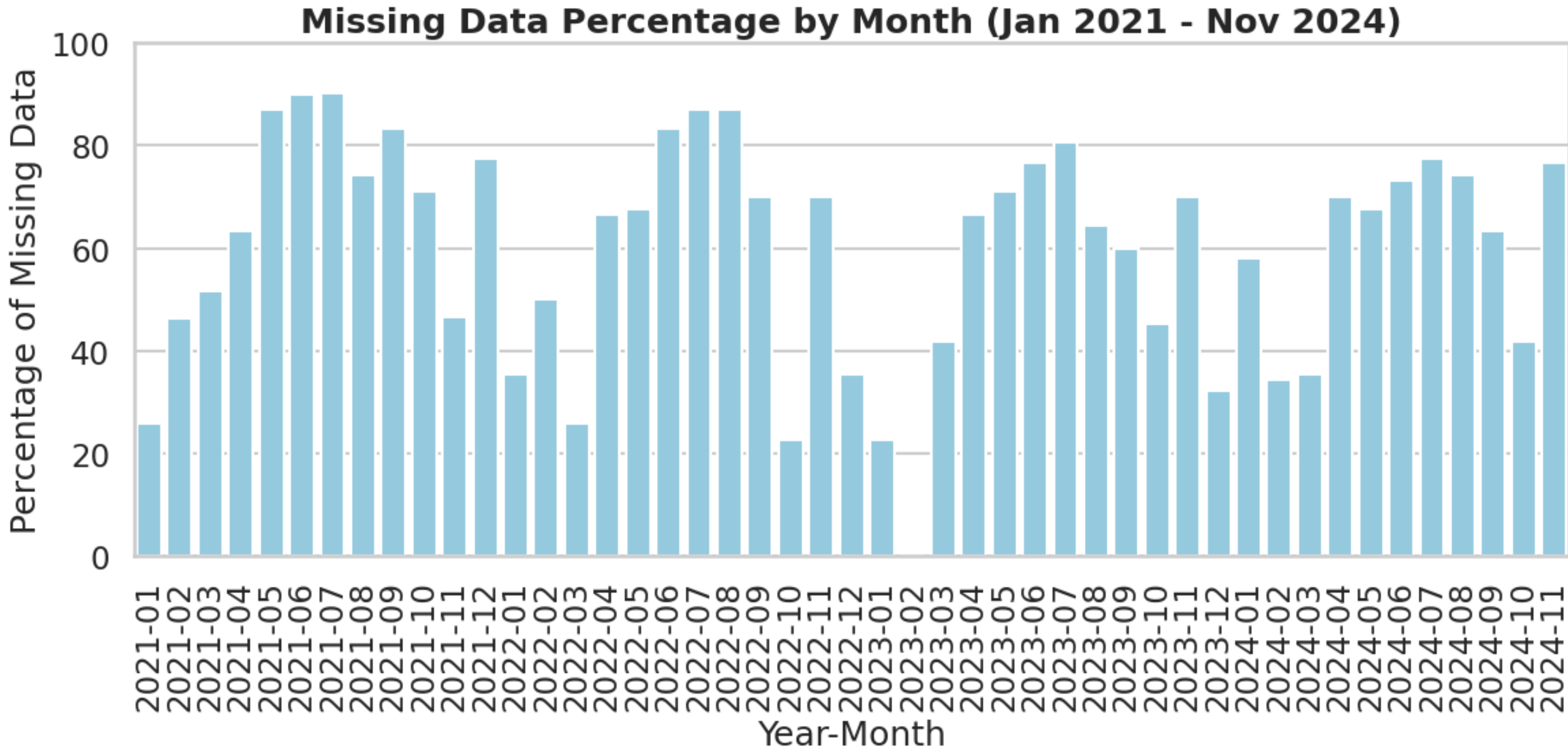
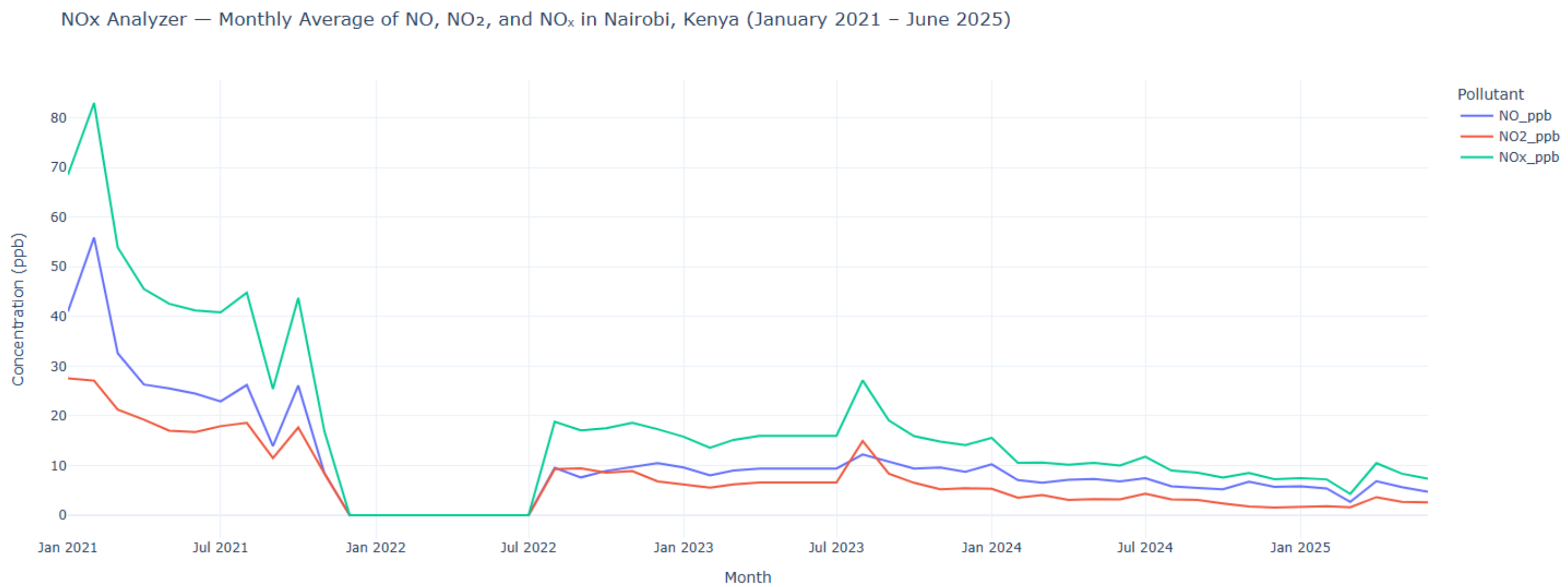
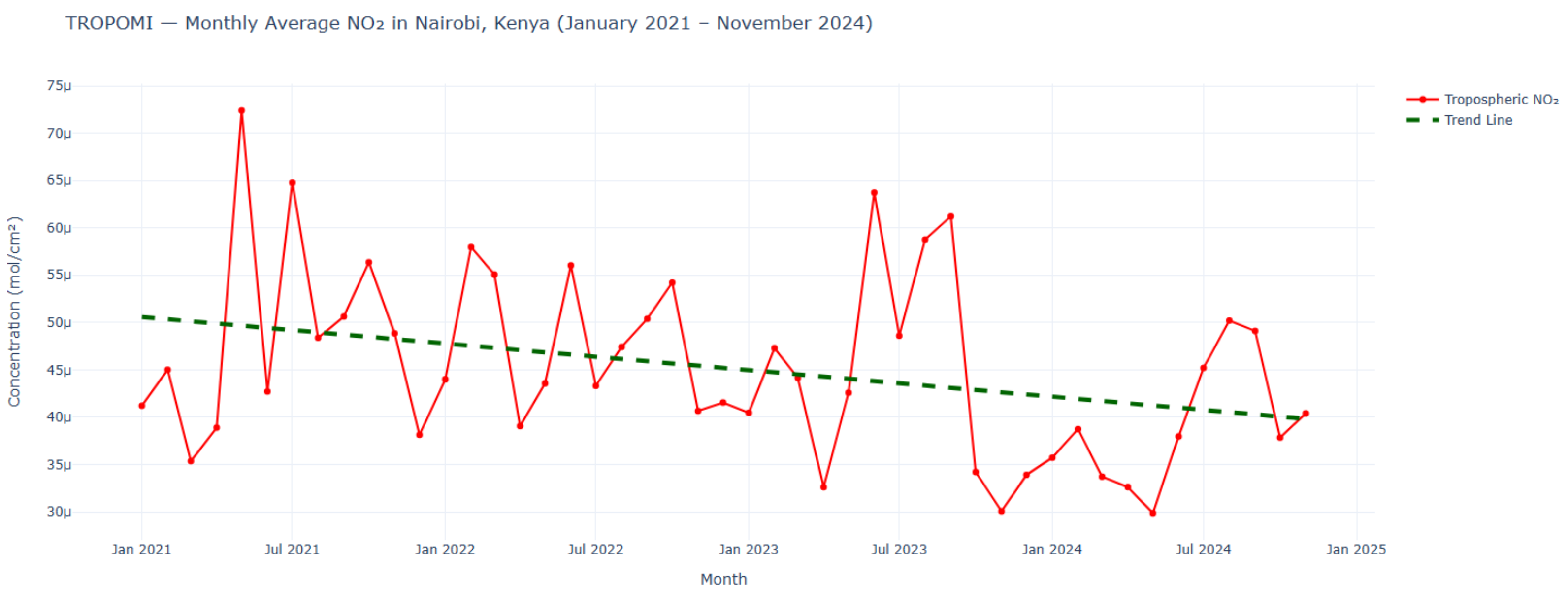
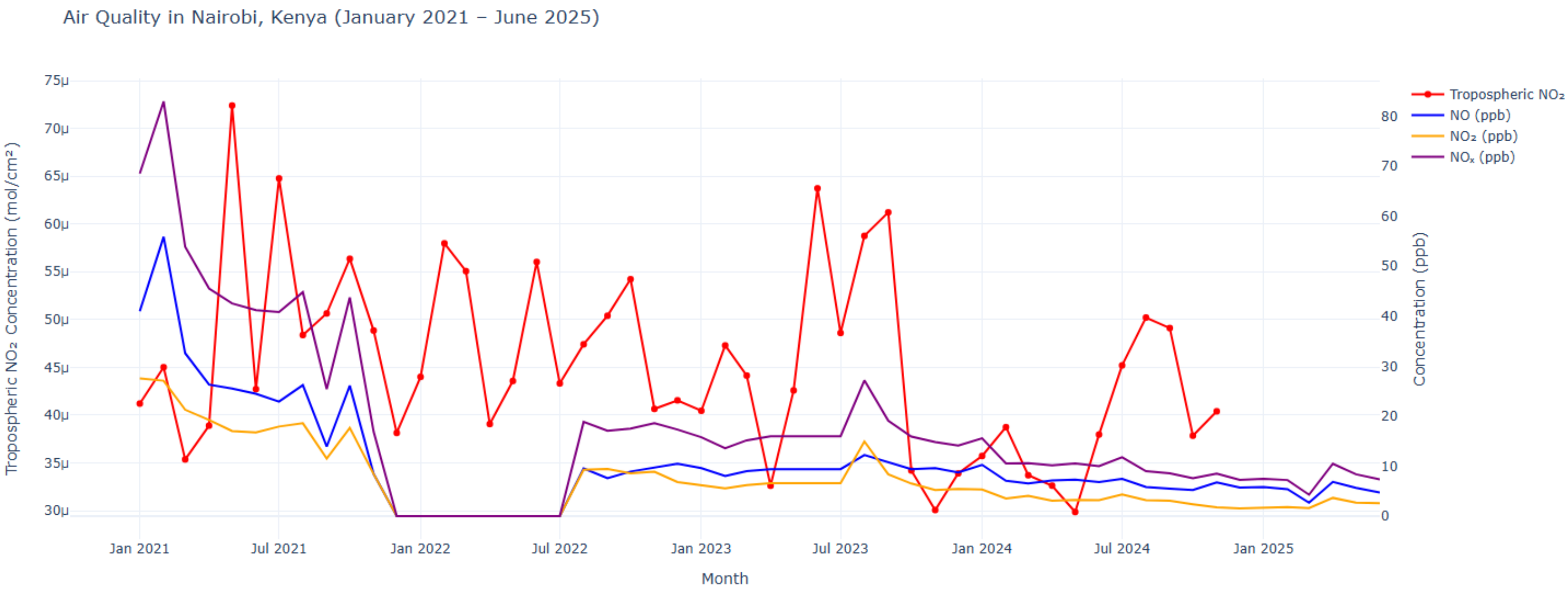


Figure 9 A & B: This combined figure presents monthly average NO, NO_2 , and NO_x concentrations from a ground-based analyzer and satellite-derived tropospheric NO_2 from TROPOMI in Nairobi. The ground data shows the missing data between December 2021 and mid-2022 due to device malfunction. Following recovery, concentrations gradually declined through mid-2025. The satellite data also reflects monthly fluctuations but with an overall declining trend, confirmed by the downward-sloping trend line.







Air Quality in Nairobi, Kenya (January 2021 – June 2025)
Tropospheric NO₂ Concentration (mol/cm²)
Concentration (ppb)
Month
Tropospheric NO₂
NO (ppb)
NO₂ (ppb)
NOₓ (ppb)
75µ
70µ
65µ
60µ
55µ
50µ
45µ
40µ
35µ
30µ
80
70
60
50
40
30
20
10
0
Jan 2021
Jul 2021
Jan 2022
Jul 2022
Jan 2023
Jul 2023
Jan 2024
Jul 2024
Jan 2025

Figure 10: This stacked bar chart displays the monthly mean breakdown of NO and NO_2 concentrations from a ground-based NO_x analyzer in Nairobi, Kenya, covering January 2021 to June 2025. The chart highlights a device-related data gap in 2022, after which both NO and NO_2 levels show a gradual decline. NO consistently dominates the NO_x composition throughout the entire monitoring period.

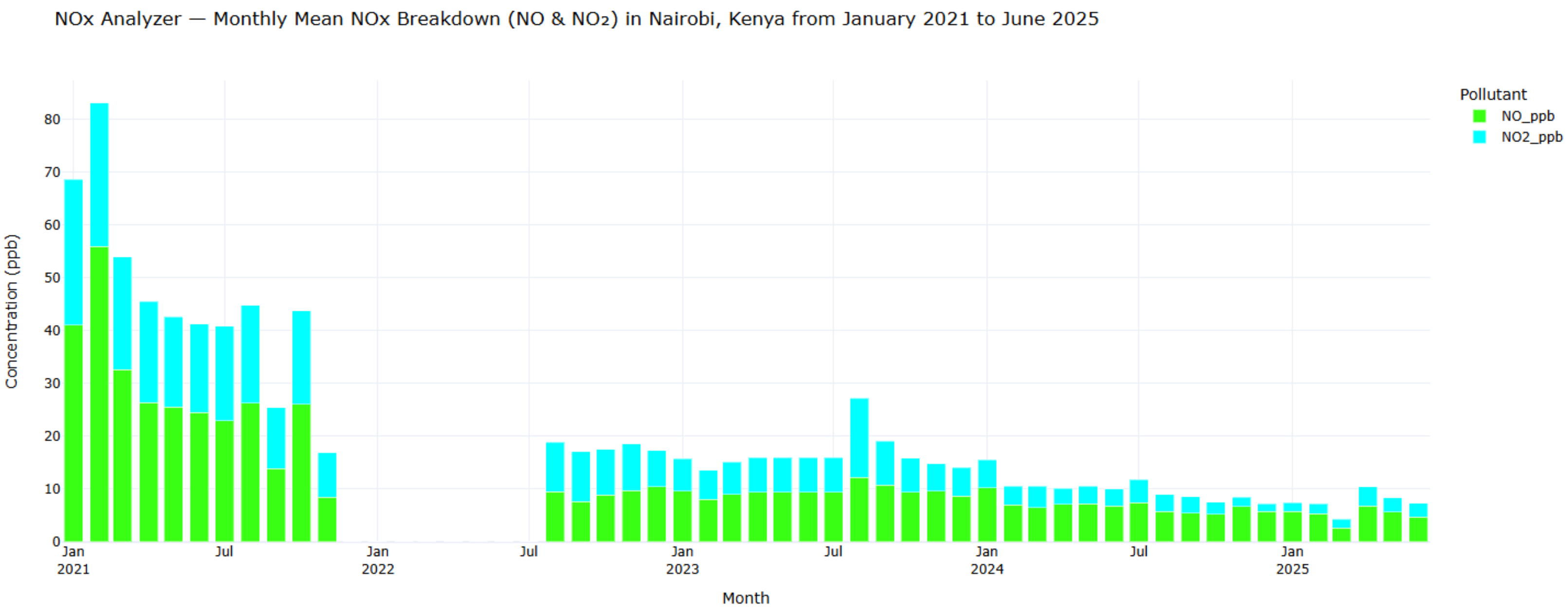


Figure 11: This chart shows monthly mean tropospheric NO_2 over Nairobi (January 2021–November 2024) from TROPOMI. Concentrations show seasonal variation with peaks in mid-2021 and 2023. Data is consistent with no visible gaps.

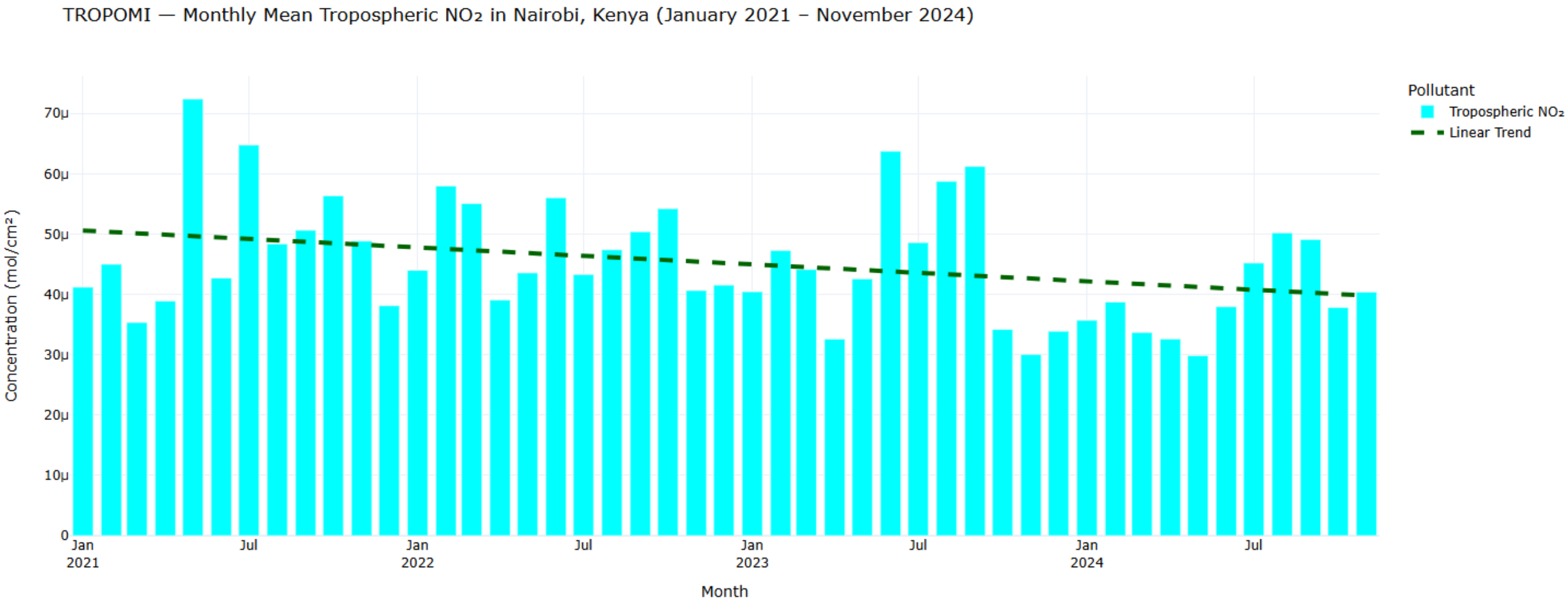


Figure 11B: Data availability chart for Figure 11.

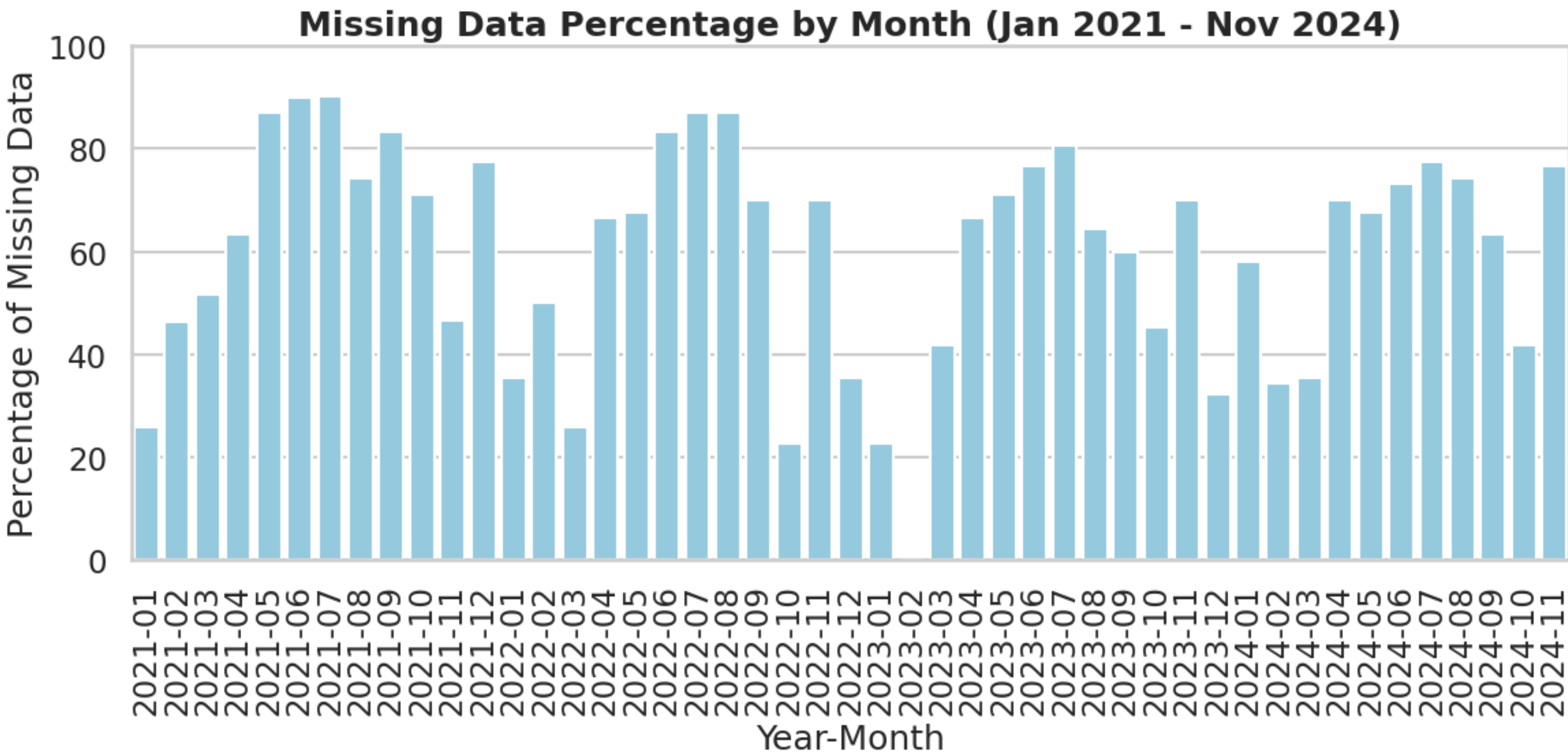


Figure 12: This figure compares ground-based and satellite NO_2 data in Nairobi. The top panel shows monthly NO and NO_2 levels from a ground analyzer, with a noticeable drop after 2021. This drop/gap reflects missing data due to device issues. The bottom panel presents tropospheric NO_2 from TROPOMI, which displays seasonal variability but continuous coverage. Overall, both datasets suggest a downward trend in NOx concentrations over time.

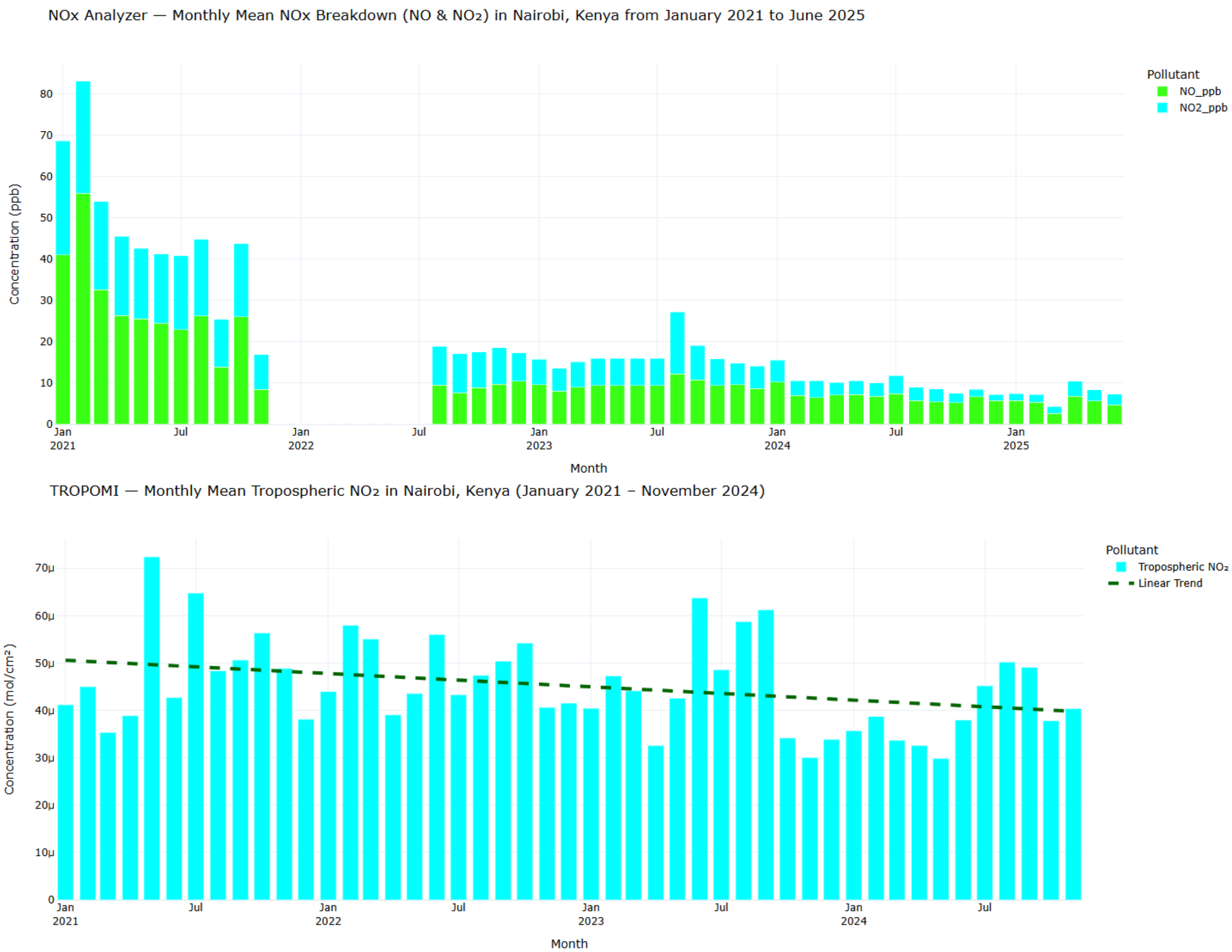


Figure 13: This scatter plot compares ground-level NO_2 (ppb) with satellite-derived NO_2 column density (mol/m²). A slight upward trend is visible from the regression line, indicating a weak positive correlation between surface measurements and satellite observations.

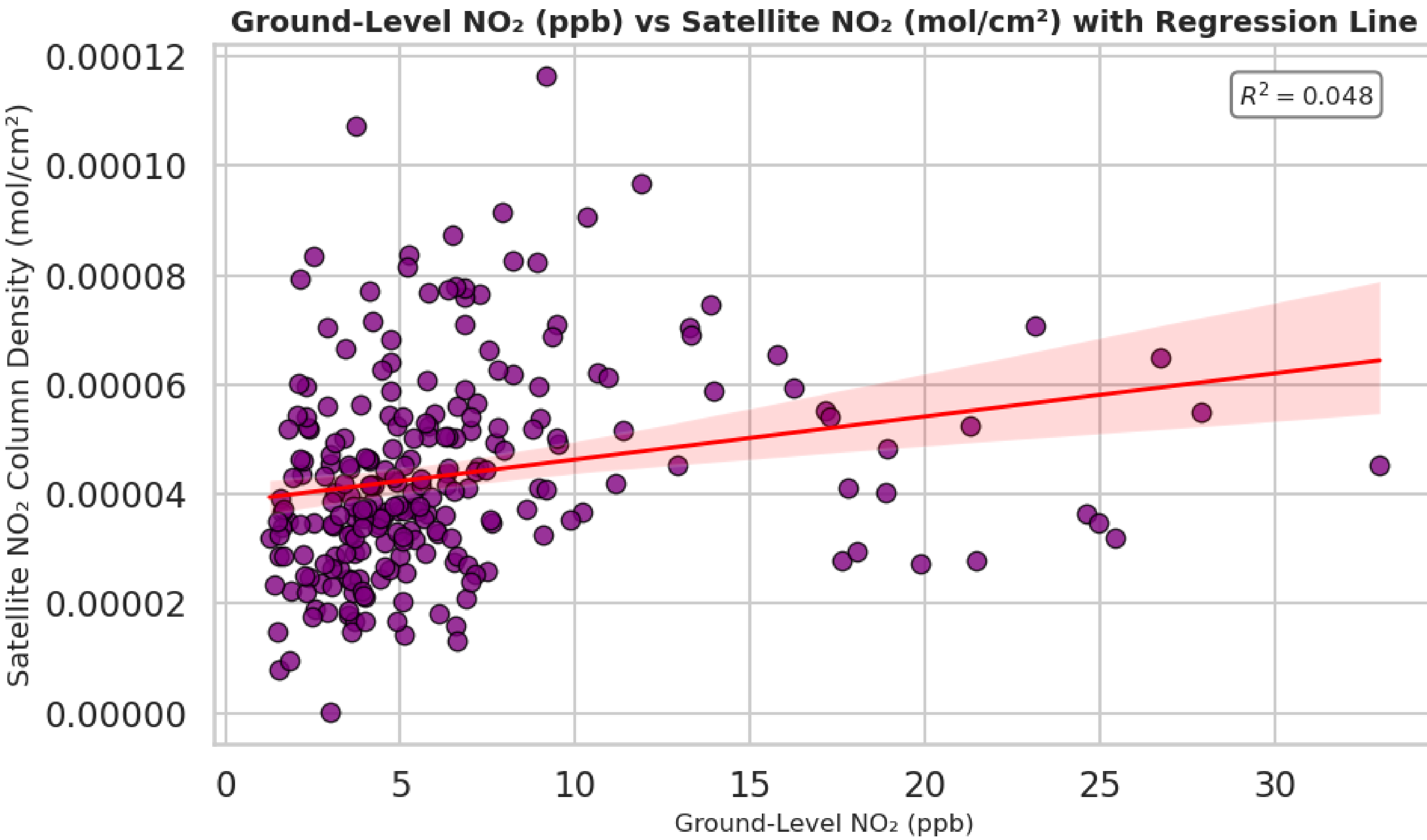


Figure 14: This scatter plot shows a weak relationship ($R^2 = 0.020$) between ground-level and satellite NO_2 in Nairobi, Kenya, based on monthly averages. Each point is color-coded by month, and the regression line indicates little overall correlation.

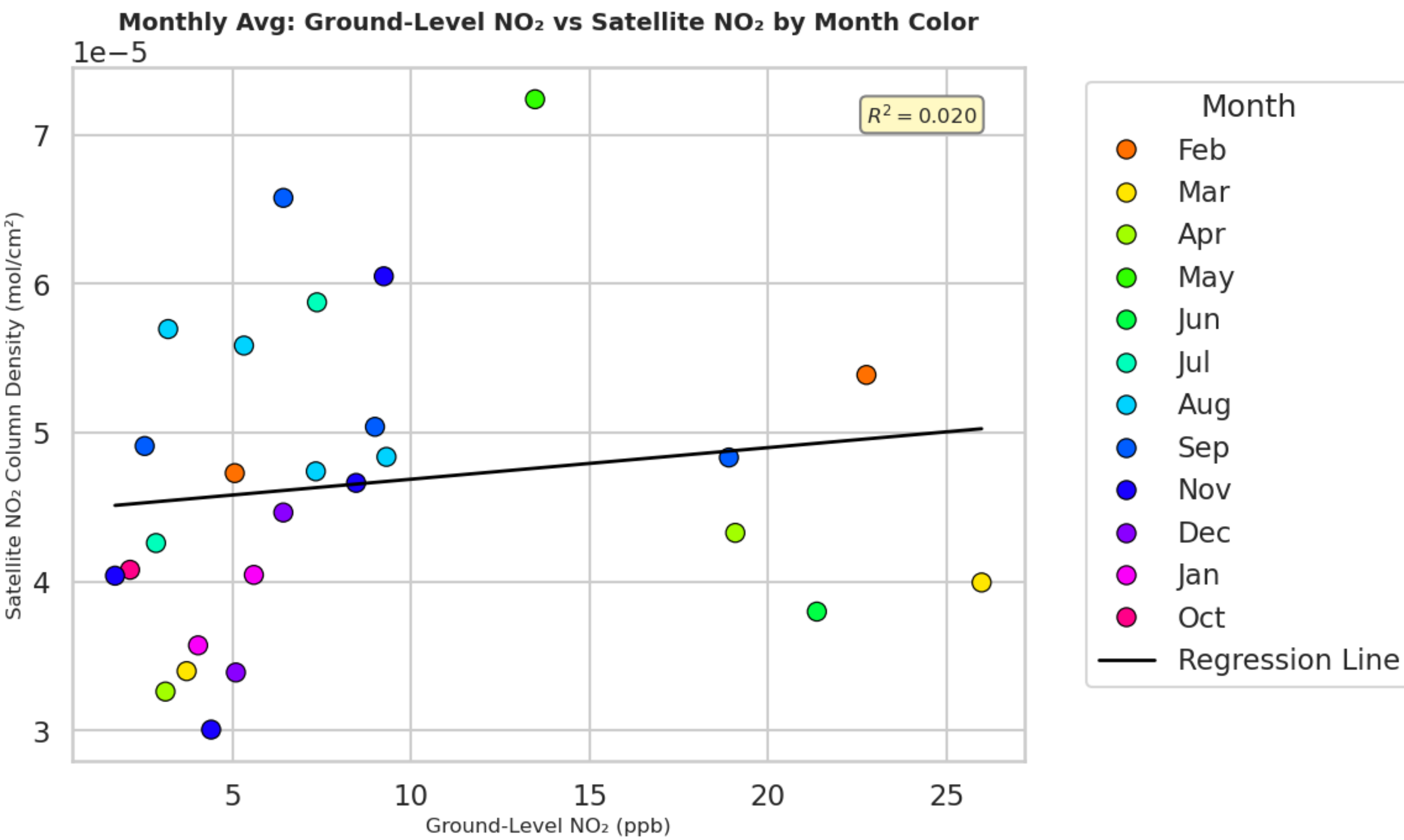


Figure 15: This plot shows monthly averages of ground-level NO_2 vs satellite NO_2 in Nairobi, Kenya, with separate trend lines for each month. Although individual months show varied patterns, the overall R^2 value (0.020) indicates a weak general correlation.

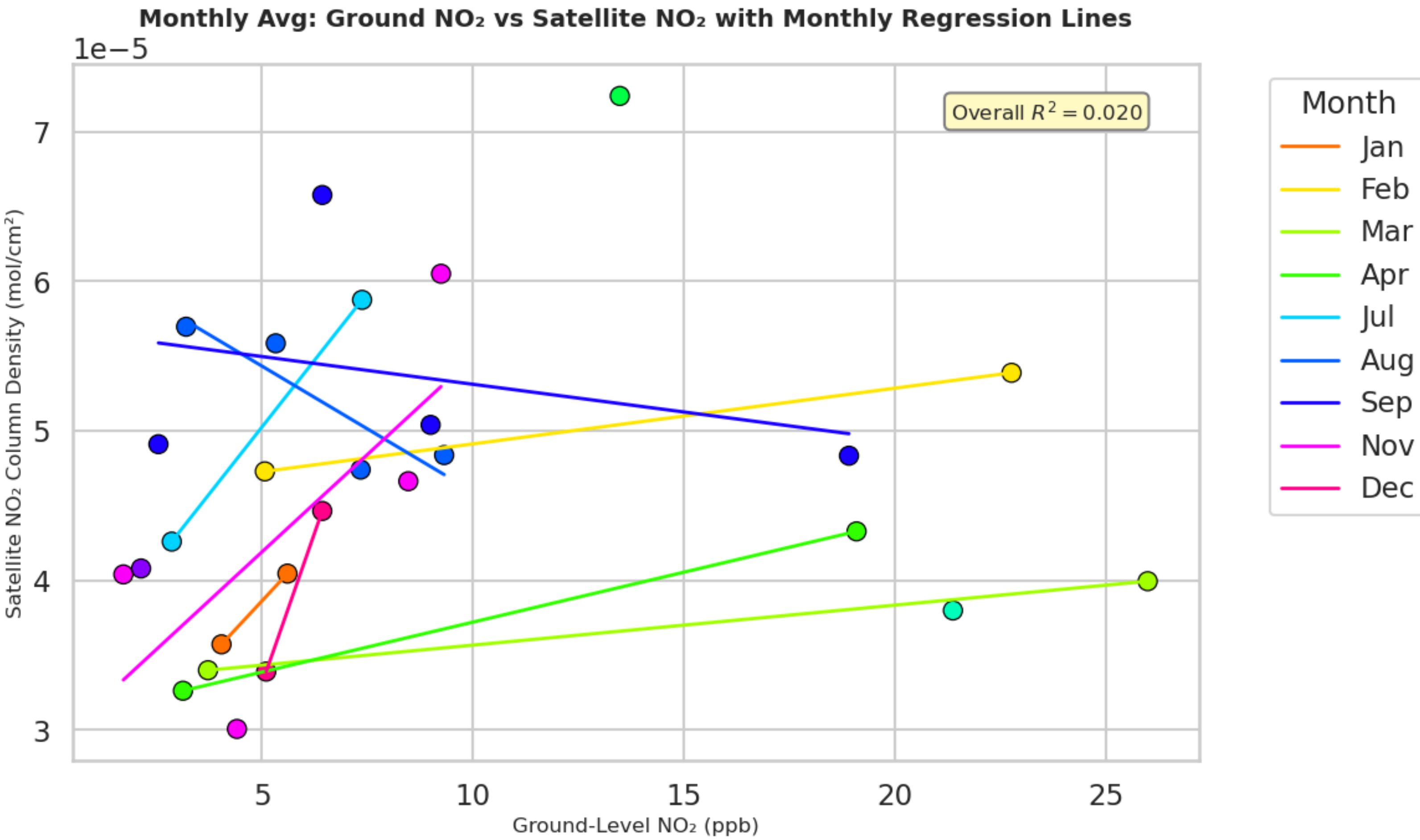
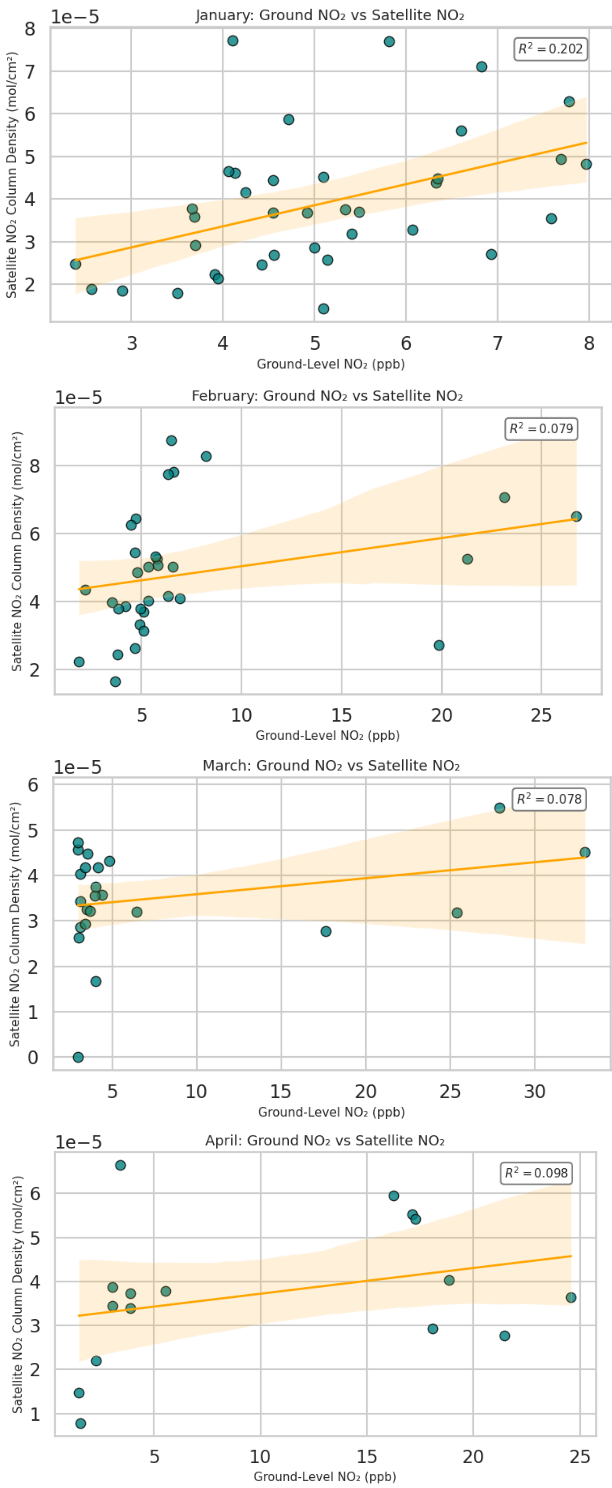
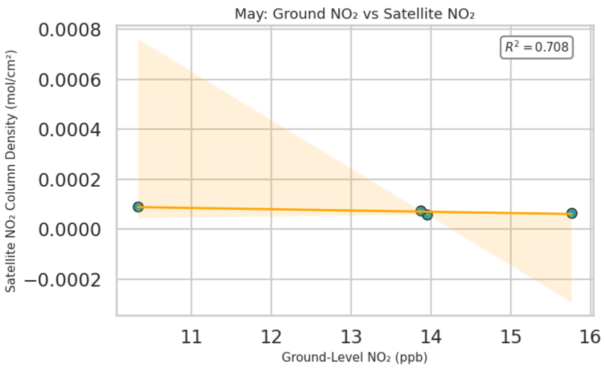
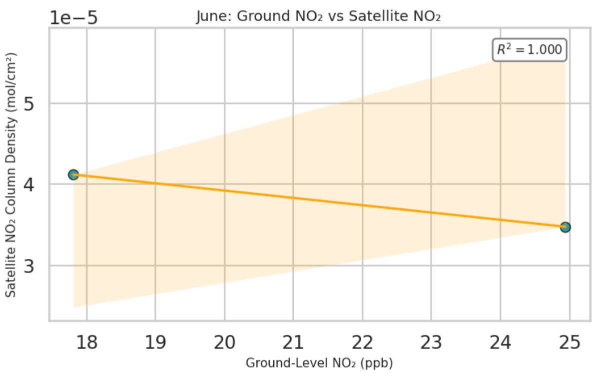
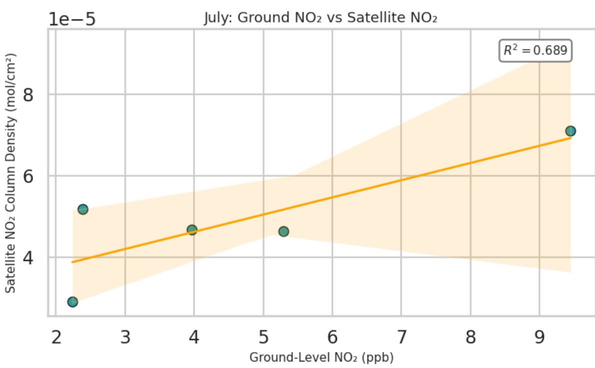


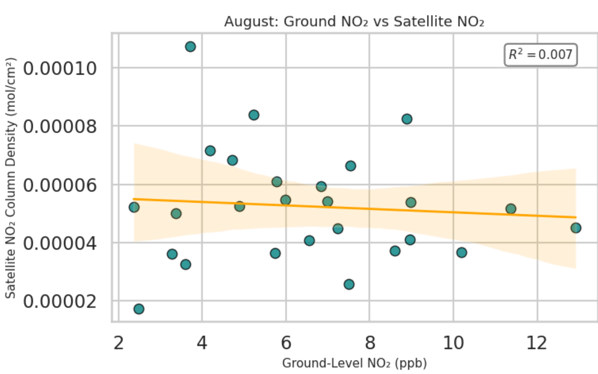
Figure 16: This plot shows the the correlation between the NO_2 data from the satellite and ground-level instruments by each month of the year. The correlation varies significantly by month, while the overall level of correlation is weak.

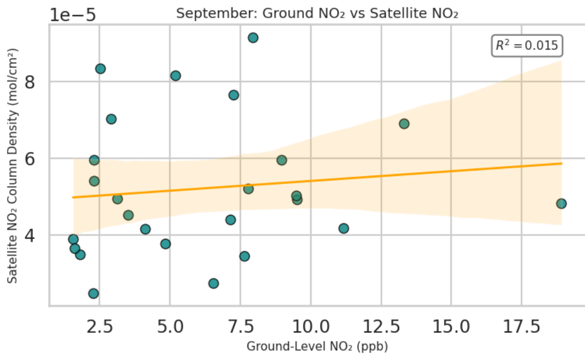


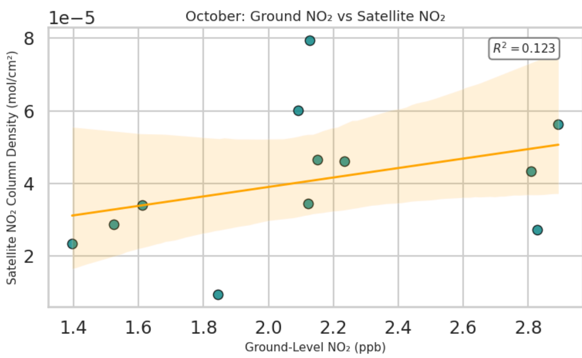

May: Ground NO₂ vs Satellite NO₂
$R^2 = 0.708$
Satellite NO₂ Column Density (mol/cm²)
Ground-Level NO₂ (ppb)

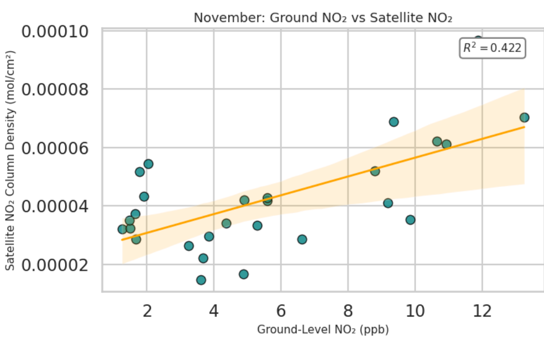

June: Ground NO₂ vs Satellite NO₂
1e−5
$R^2 = 1.000$
Satellite NO₂ Column Density (mol/cm²)
Ground-Level NO₂ (ppb)


July: Ground NO₂ vs Satellite NO₂
1e−5
$R^2 = 0.689$
Satellite NO₂ Column Density (mol/cm²)
Ground-Level NO₂ (ppb)


August: Ground NO₂ vs Satellite NO₂
$R^2 = 0.007$
Satellite NO₂ Column Density (mol/cm²)
Ground-Level NO₂ (ppb)


September: Ground NO₂ vs Satellite NO₂
1e−5
$R^2 = 0.015$
Satellite NO₂ Column Density (mol/cm²)
Ground-Level NO₂ (ppb)
2.5
5.0
7.5
10.0
12.5
15.0
17.5
4
6
8


October: Ground NO₂ vs Satellite NO₂
1e−5
$R^2 = 0.123$
Satellite NO₂ Column Density (mol/cm²)
Ground-Level NO₂ (ppb)
1.4
1.6
1.8
2.0
2.2
2.4
2.6
2.8
2
4
6
8


November: Ground NO₂ vs Satellite NO₂
$R^2 = 0.422$
Satellite NO₂ Column Density (mol/cm²)
Ground-Level NO₂ (ppb)
0.00002
0.00004
0.00006
0.00008
0.00010
2
4
6
8
10
12

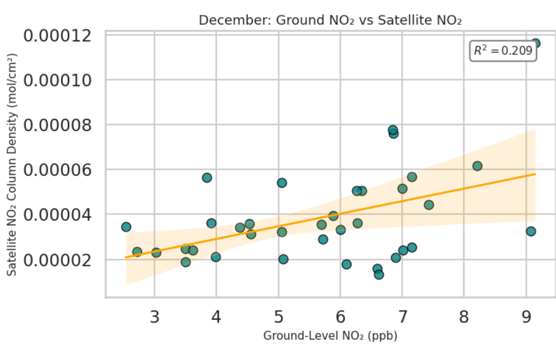

December: Ground NO₂ vs Satellite NO₂
$R^2 = 0.209$
Satellite NO₂ Column Density (mol/cm²)
Ground-Level NO₂ (ppb)
0.00002
0.00004
0.00006
0.00008
0.00010
0.00012
3
4
5
6
7
8
9

Figure 17: This plot compares ground-level NO_2 and satellite NO_2 in Nairobi by season. Both dry and wet seasons show weak correlations ($R^2 = 0.028$ for dry, $R^2 = 0.075$ for wet), with slightly stronger association in the wet season.

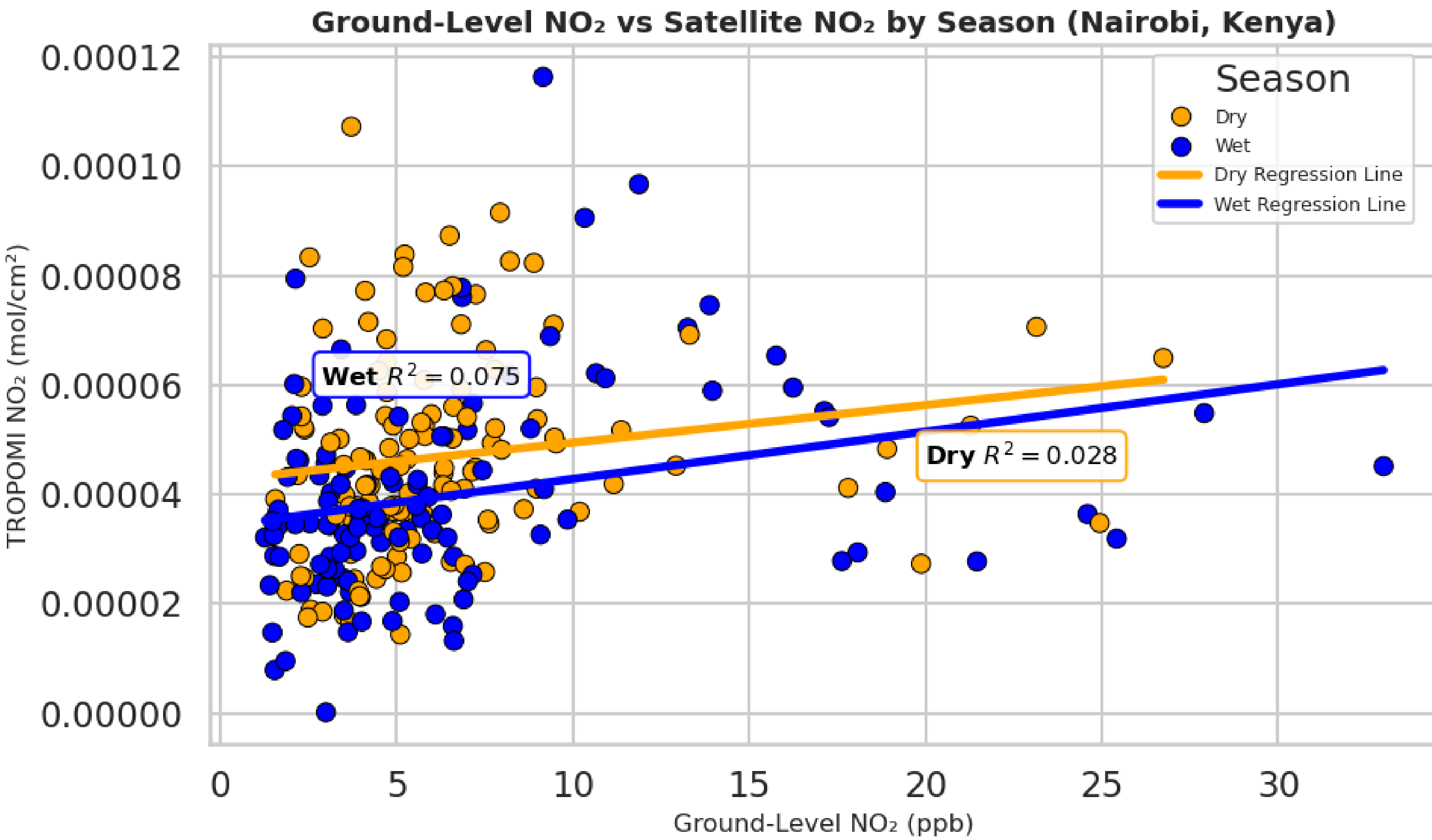


Figure 18: The box plot shows that NO_x levels in Nairobi are highest during Early Morning and gradually decrease throughout the day, reaching the lowest levels in Late Night. This trend reflects increased human and traffic activity during morning hours and reduced emissions at night.

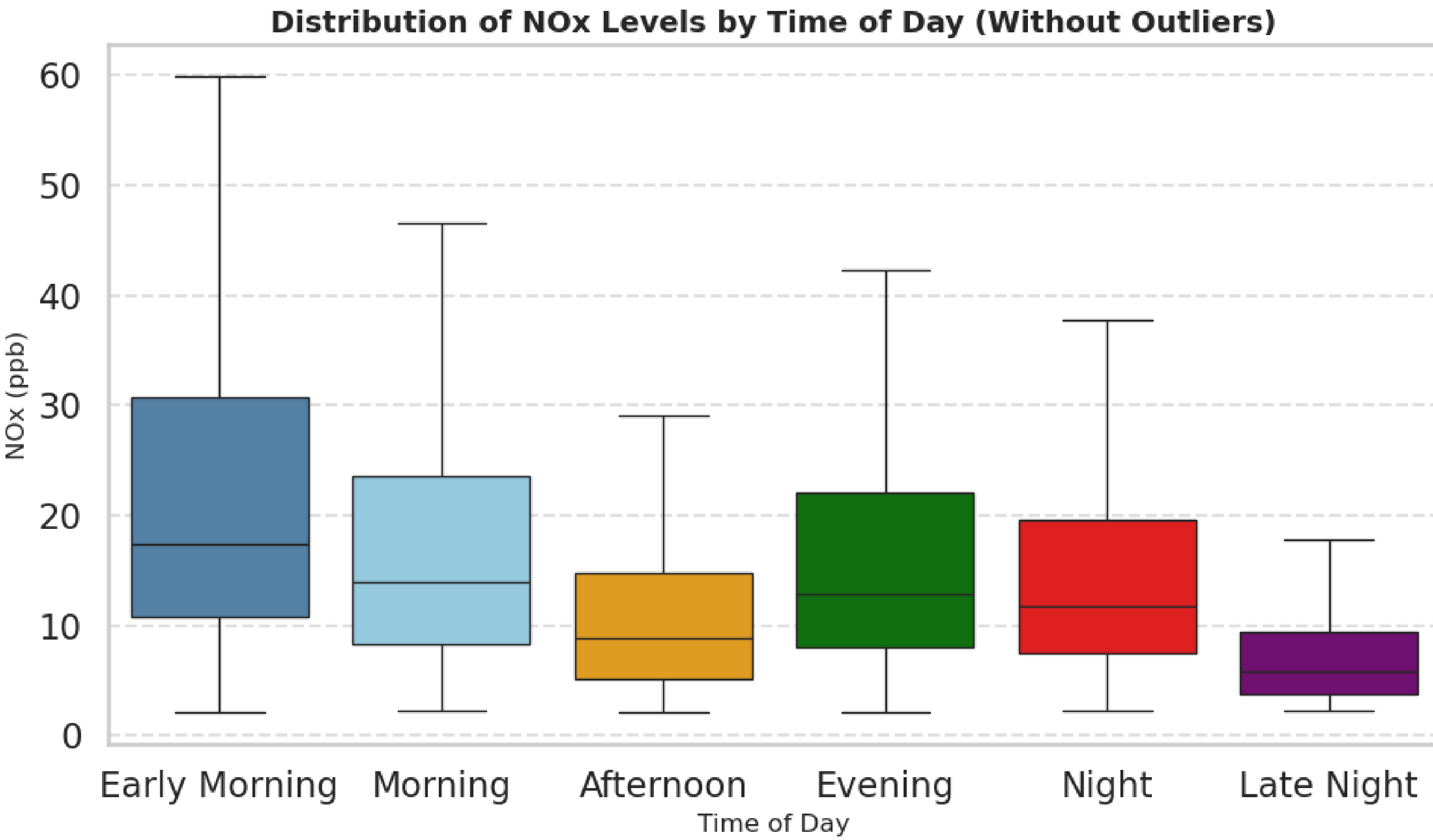


Figure 19: The box plot shows that NO_x levels in Nairobi are highest during Early Morning and gradually decrease throughout the day, reaching the lowest levels in Late Night. It also indicates that the NO_x level gradually decreased from 2021 to 2025.

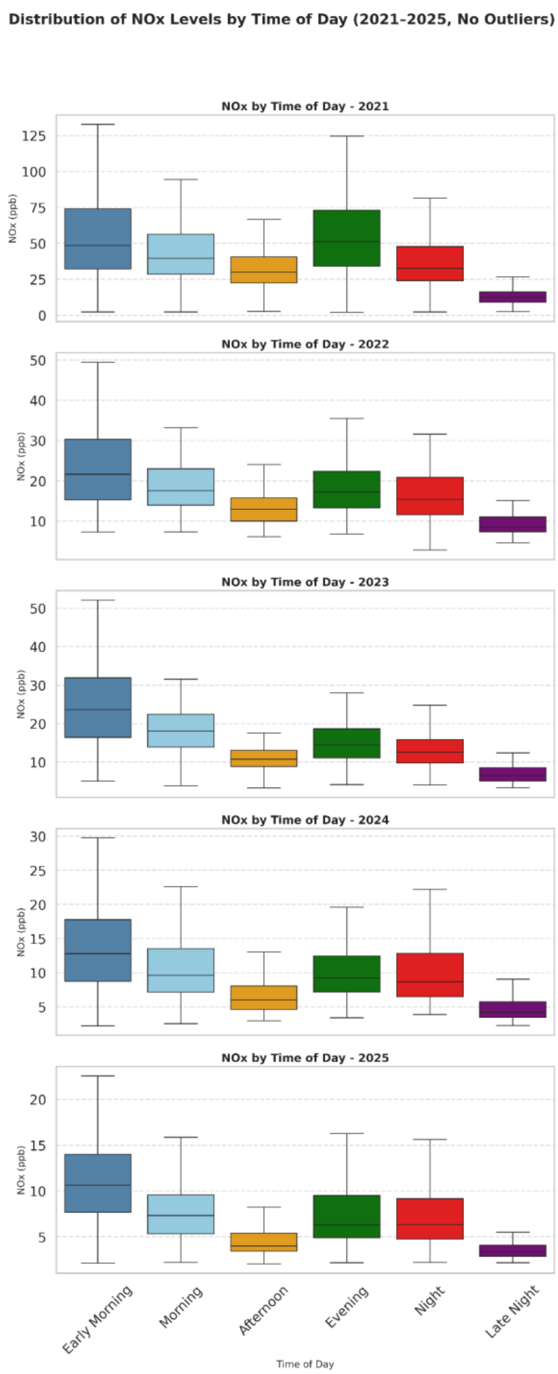


Figure 20: The graphs shows that NO, NO_2 , and NO_x concentrations in Nairobi peak around 7-8 AM each year, with a secondary rise in the evening, especially in 2021. Over time, from 2021 to 2025, the overall pollutant levels have significantly declined, indicating possible improvements in air quality or emission control measures.

Figure 21: The plot shows the daily average BC6 concentration (in µg/m³) from May 7 to May 16, 2025. The concentration peaked on May 9 & 14 at around 22-24 µg/m³ and then generally declined, dropping to nearly 0 by May 16.

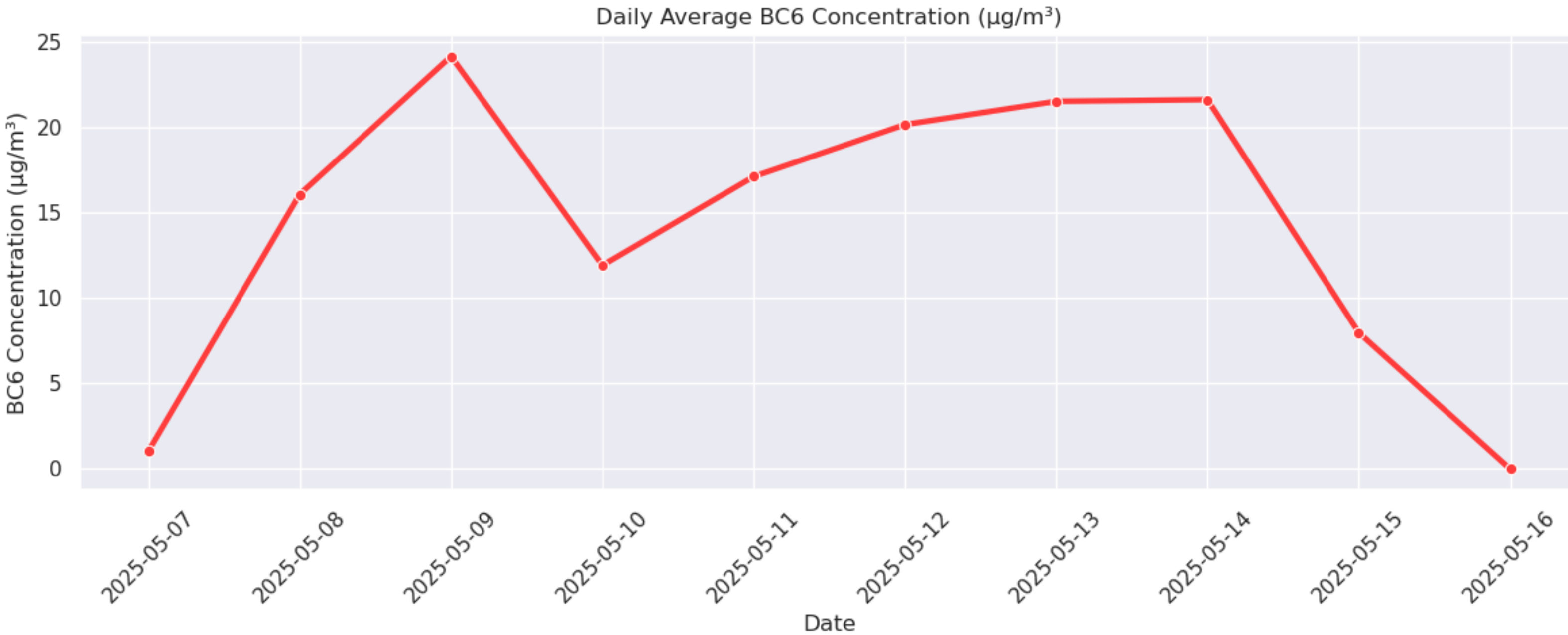


Figure 22: The plot displays average hourly BC6 concentration levels, showing a sharp peak at 6 AM with nearly 47 µg/m³, likely due to early morning traffic or activities. A smaller evening peak occurs around 8 PM, while concentrations remain low during midday and overnight hours.

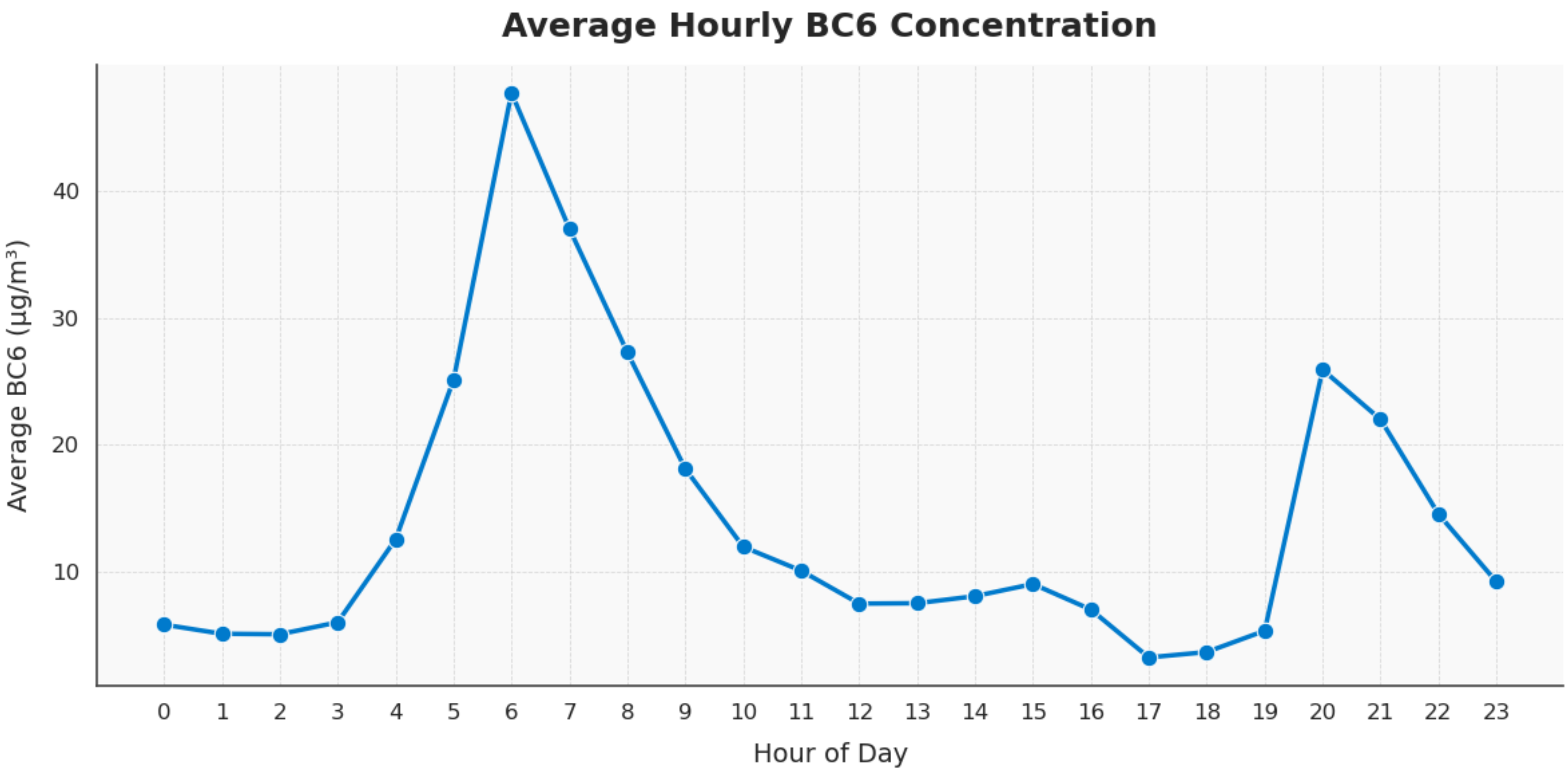


Figure 23: The chart shows the average hourly wood combustion indicator, with a sharp peak in the evening between 8:00 PM and 10:00 PM, suggesting increased wood burning activity at night. A smaller peak also appears in the early morning around 6:00 AM to 7:00 AM, while levels remain lower during the afternoon hours.

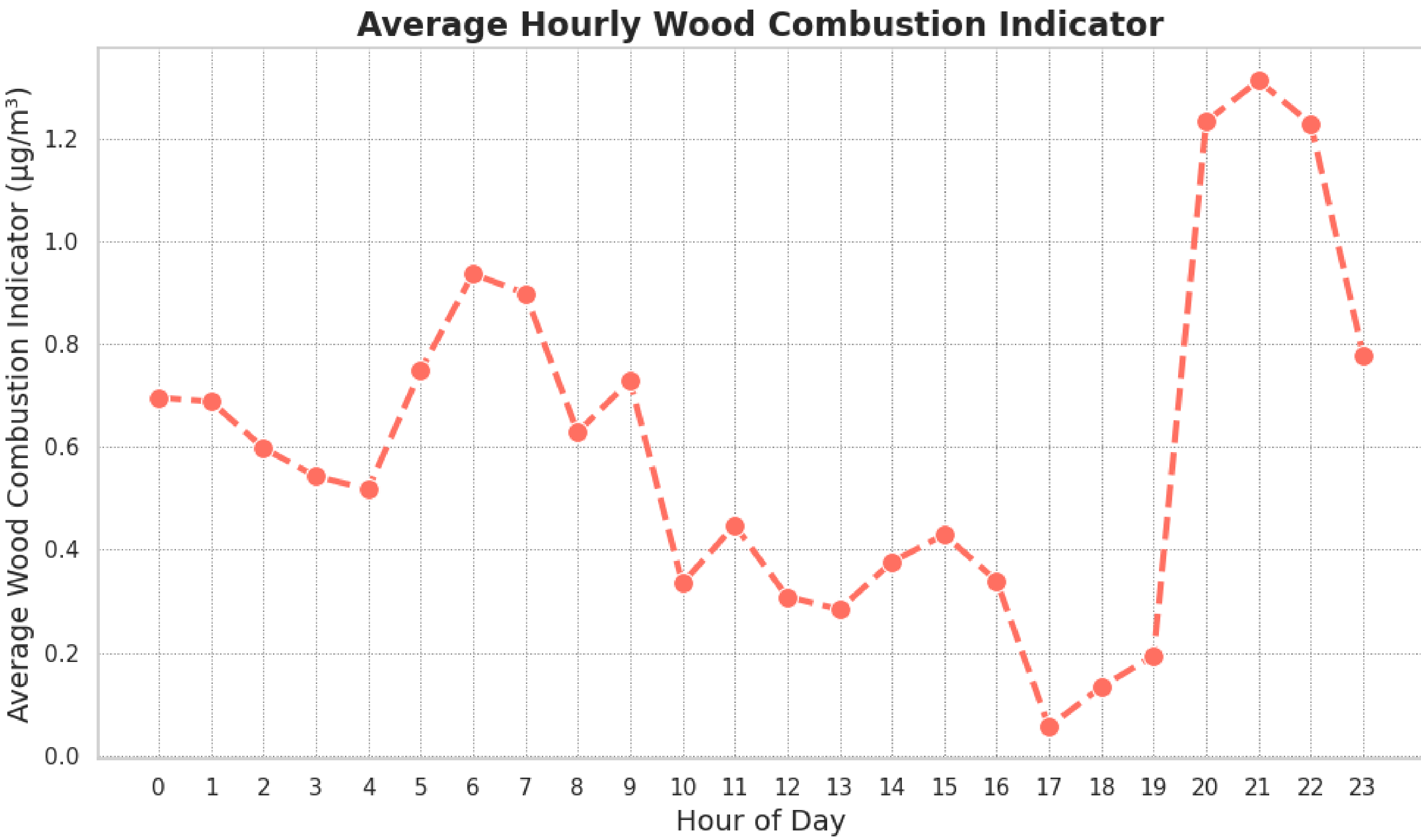


Figure 24: The chart shows that the average BB (%) is highest during the early morning hours, peaking around 1:00 AM to 2:00 AM, and then decreases steadily until about 8:00 AM. After fluctuating through the day, there is a noticeable spike again at 5:00 PM (17:00), followed by smaller increases in the evening between 6:00 PM and 11:00 PM.