GHG Soil Daily Analysis Report

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Contents

0.1 1. Load and Process Data

```
## Number of rows in final_data: 30924
```

0.2 2.Checking Valid & Invalid

Table 1: Summary of Invalid or Missing Rows

Row Type	Count	Percentage (%)
Has -9999 Only	21416	69.3
Valid Row	9504	30.7
Has -9999 and Missing	3	0.0

[a] 'Has -9999 Only' indicates rows with placeholder values (-9999), but no other missing data.

```
## Rows after filtering missing and -9999 values: 9504
```

0.3 3.MonthYear Valid & invalid

Table 2: Monthly Summary of Invalid or Missing Rows

Month-Year	Row Type	Count	Percentage (%)
2024-06	Has -9999 Only	1958	99.8
2024-06	Has -9999 and Missing	3	0.2
2024-07	Has -9999 Only	6557	100.0
2024-08	Has -9999 Only	6122	100.0
2024-09	Has -9999 Only	4396	100.0
2024-10	Has -9999 Only	192	100.0
2024-11	Has -9999 Only	721	12.5
2024-11	Valid Row	5031	87.5
2024-12	Has -9999 Only	1366	24.1
2024-12	Valid Row	4300	75.9
2025-04	Has -9999 Only	104	37.5
2025-04	Valid Row	173	62.5

Figure 1:Monthly Distribution of Invalid or Missing Rows

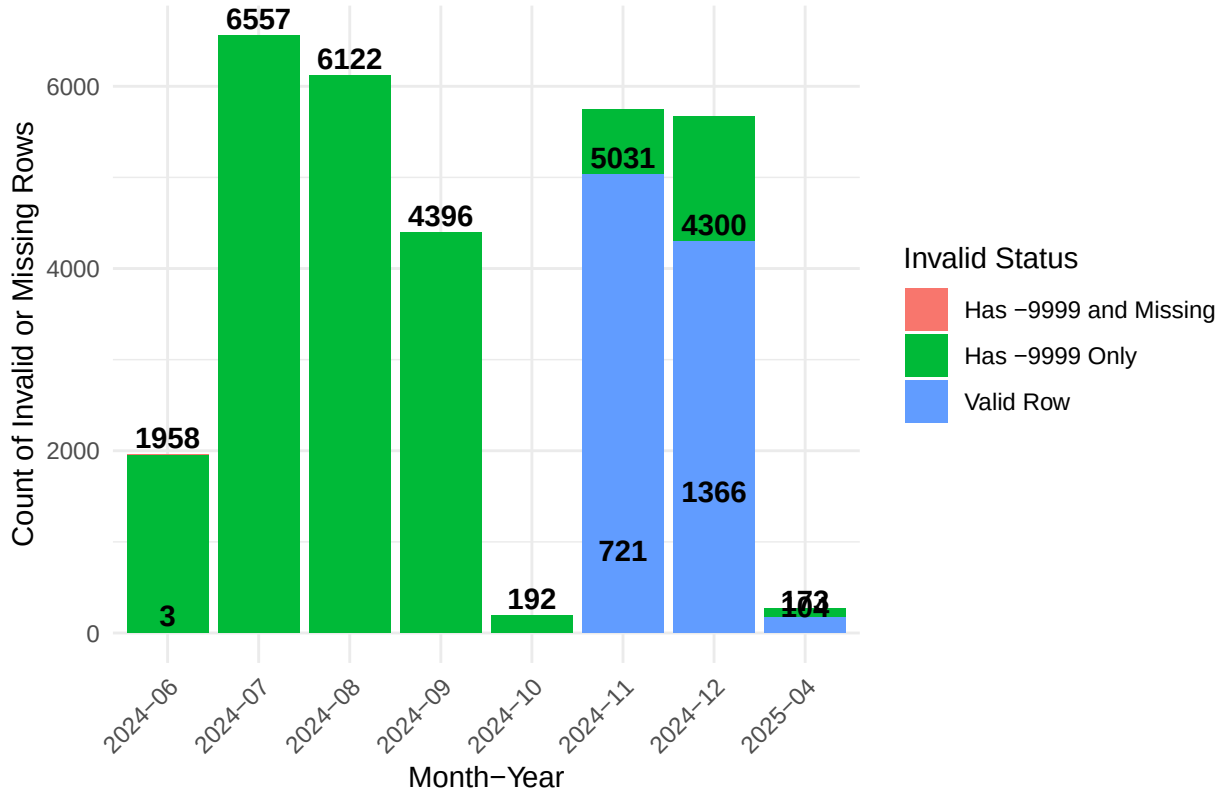
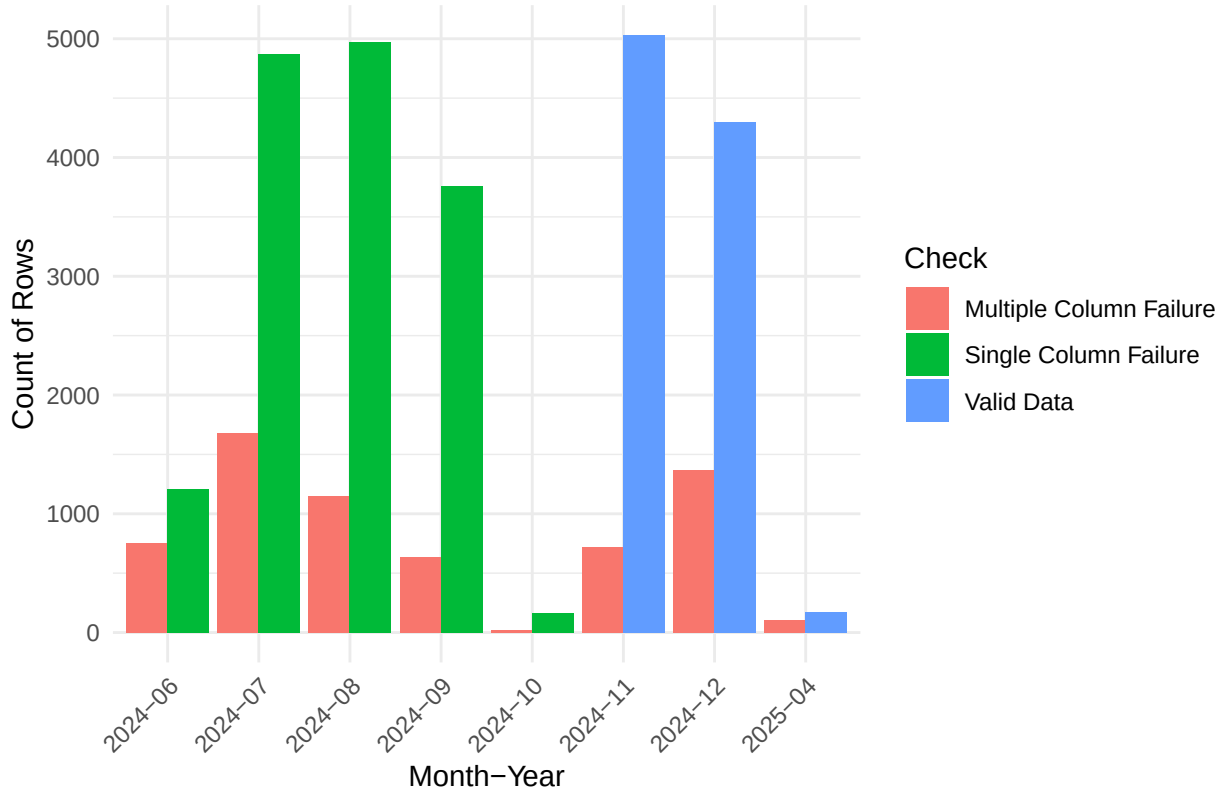


Table 3: Monthly Summary of Rows with -9999 in Specific Columns

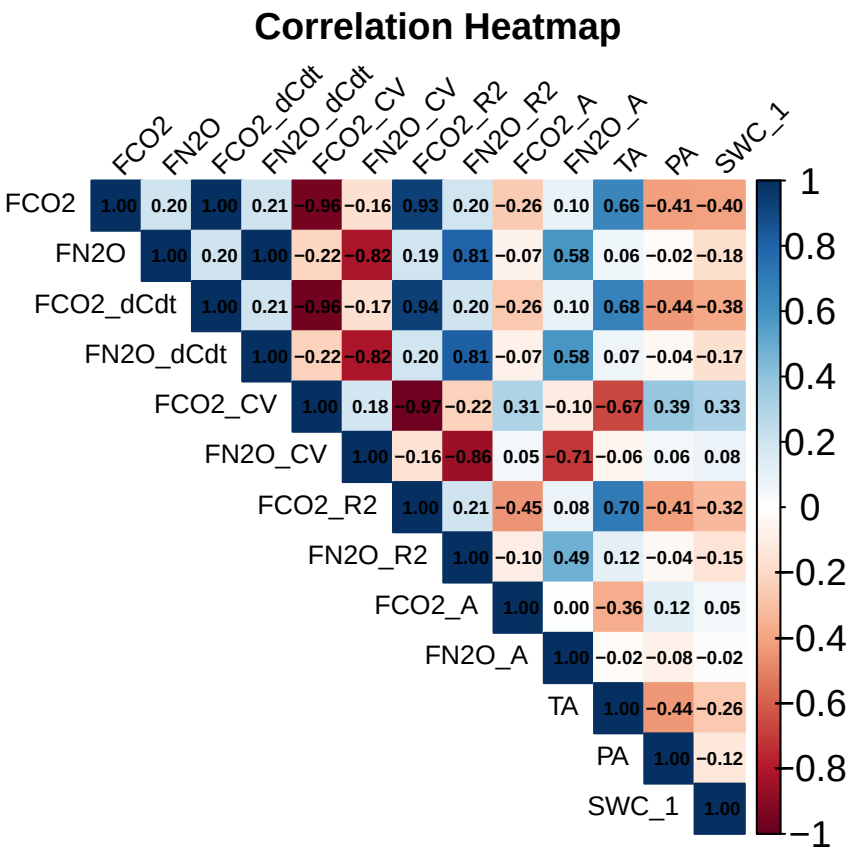
MonthYear	TotalRows	RowsWith_One_Column	RowsWith_Multiple_Columns	RowsWith_All_Columns
2024-06	1961	NA	NA	0
2024-07	6557	4874	1683	0
2024-08	6122	4970	1152	0
2024-09	4396	3763	633	0
2024-10	192	168	24	0
2024-11	5752	0	721	0
2024-12	5666	0	1366	0
2025-04	277	0	104	0

0.4 4. Sensor Failures

Figure 2:Monthly Distribution of Data Quality (Single Column Failures)



0.5 5. Corelation Matrix



5. Time Gap Categorization & Flagging

```
##               DateTime TimeDiff_min  GapCategory   TimeGapFlag
## 1  2024-07-12 15:00:41   4720.75000   1 - 5 days Very Long Gap
## 2  2024-07-18 17:00:41   1860.00000   1 - 5 days Very Long Gap
## 3  2024-08-02 11:44:53     92.53333  1 - 6 hours      Long Gap
## 4  2024-08-02 14:00:41     77.36667  1 - 6 hours      Long Gap
## 5  2024-08-07 12:00:41     94.10000  1 - 6 hours      Long Gap
## 6  2024-08-30 17:00:41    514.10000 6 - 12 hours      Long Gap
## 7  2024-09-09 15:00:41    348.90000  1 - 6 hours      Long Gap
## 8  2024-09-09 17:00:41    101.50000  1 - 6 hours      Long Gap
## 9  2024-09-25 18:00:41    585.26667 6 - 12 hours      Long Gap
## 10 2024-09-29 16:07:26   4315.71667   1 - 5 days Very Long Gap
## 11 2024-09-30 11:00:41     94.10000  1 - 6 hours      Long Gap
## 12 2024-11-24 13:00:41    154.20000  1 - 6 hours      Long Gap
## 13 2024-12-12 15:00:42    394.21667 6 - 12 hours      Long Gap
## 14 2024-12-17 16:00:42    120.00000  1 - 6 hours      Long Gap
```

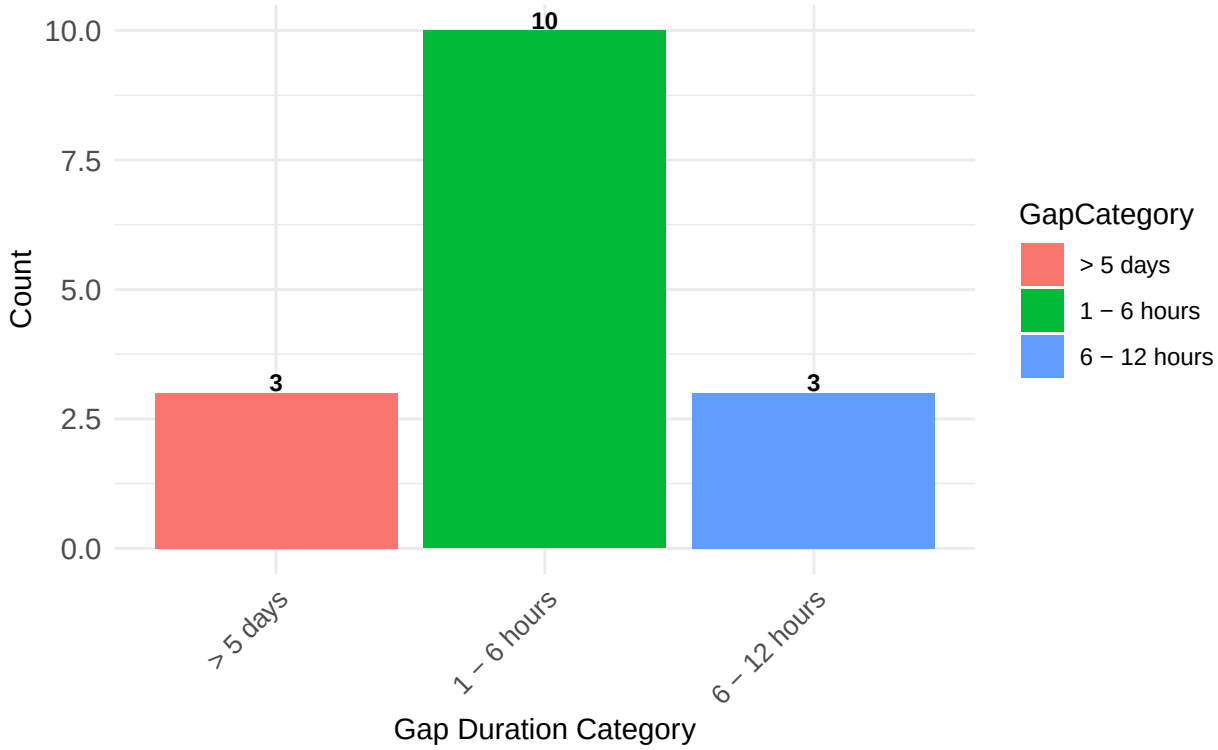
```
## 15 2024-12-19 14:00:41    274.90000  1 - 6 hours      Long Gap
## 16 2025-04-14 15:00:51    136.70000  1 - 6 hours      Long Gap
```

0.6 6. Summary & Visualization

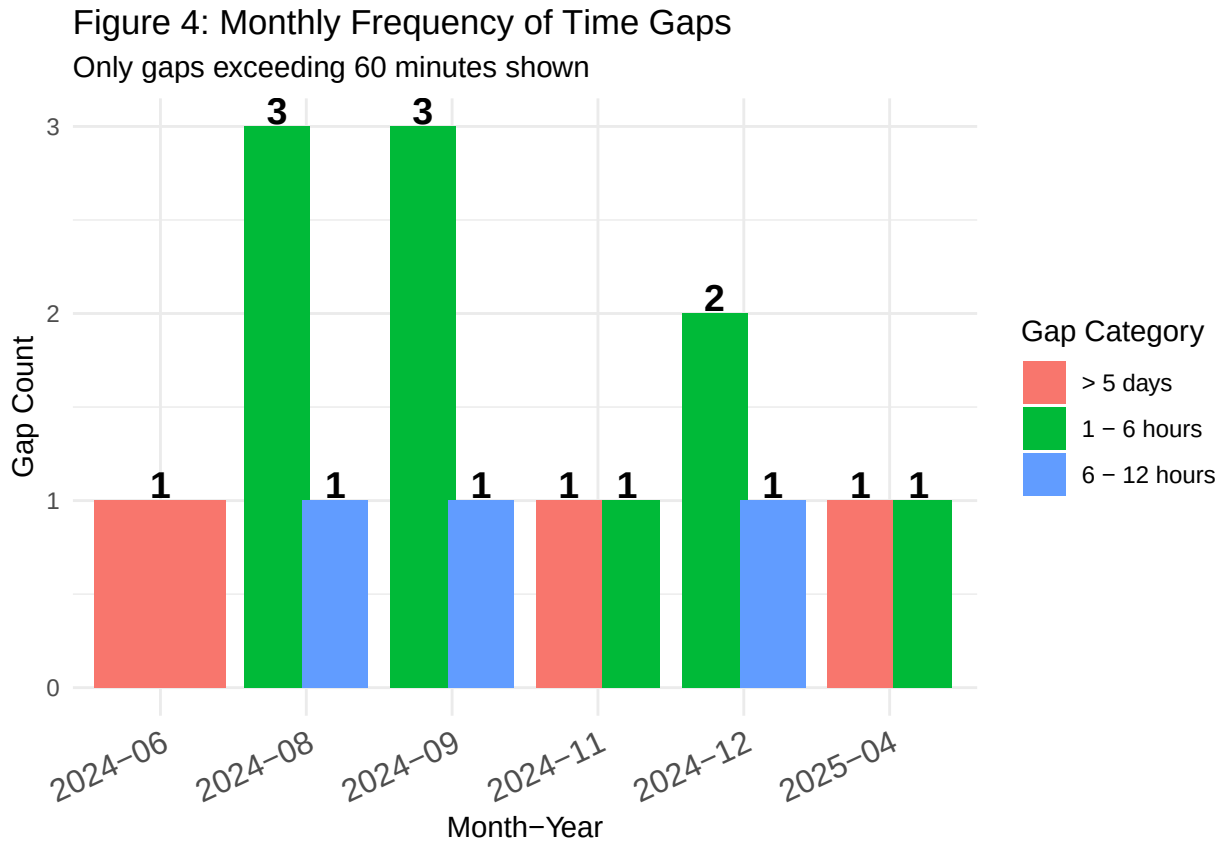
```
## [1] "Skewness of TimeDiff_min: 45.61"
```

Figure 3: Distribution of Time Gap Durations

Filtered to gaps > 1 hour across sampling period



0.7 7. Monthly Trends & Power Outages



0.8 8. R2 Analysis

Table 4: Summary of R^2 Values for CO2 Flux (FCO2)

Total Records	$R^2 >= 0.75$	$R^2 < 0.75$	Percentage ≥ 0.75	Percentage < 0.75
9504	7669	1835	80.7	19.3

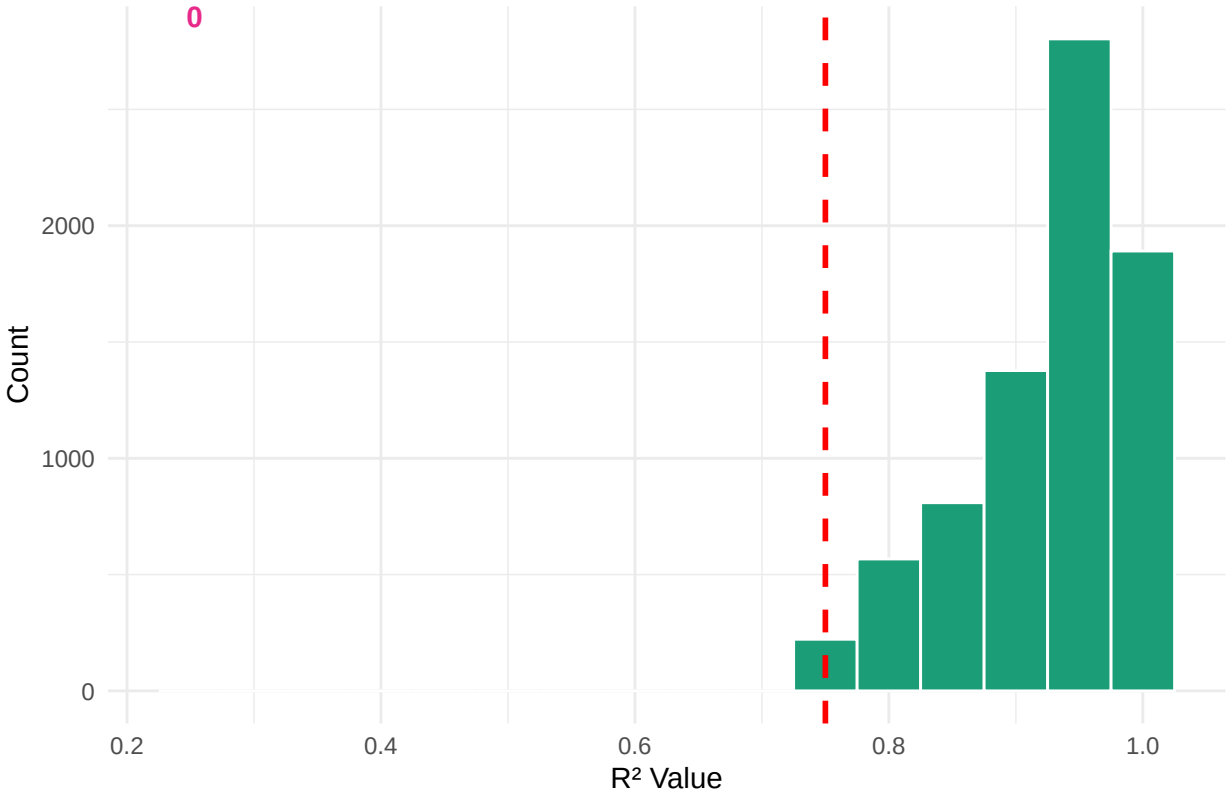
Table 5: Summary of CO2 Flux CV Flags

CO2 Flux CV Flag	Count	Percentage
Acceptable	2165	22.8
Issue	4430	46.6
Plausible	2909	30.6

Table 6: Summary of N2O Flux CV Flags

N2O Flux CV Flag	Count	Percentage
Acceptable	163	1.7
Issue	9296	97.8
Plausible	45	0.5

Figure 4: Distribution of R² Values for CO2 Flux



9. CV Analysis

Figure 5:Distribution of CO2 Flux CV Flags

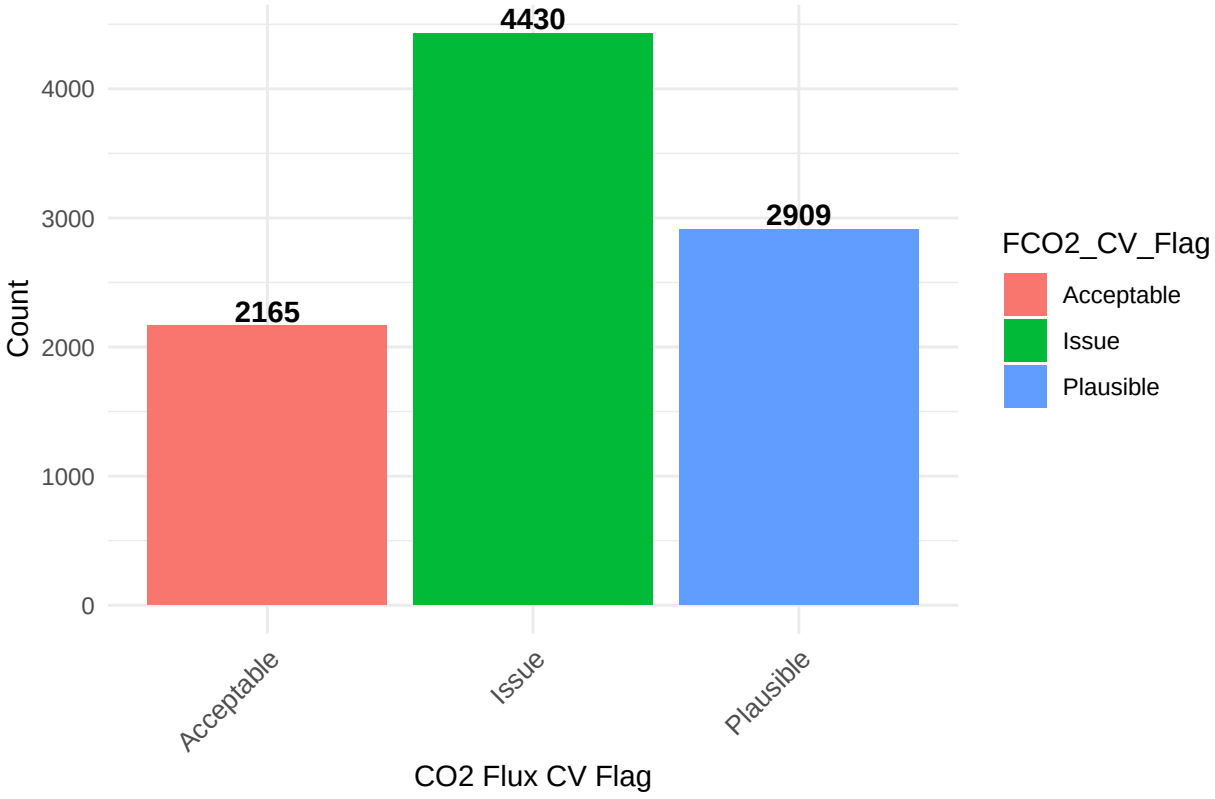


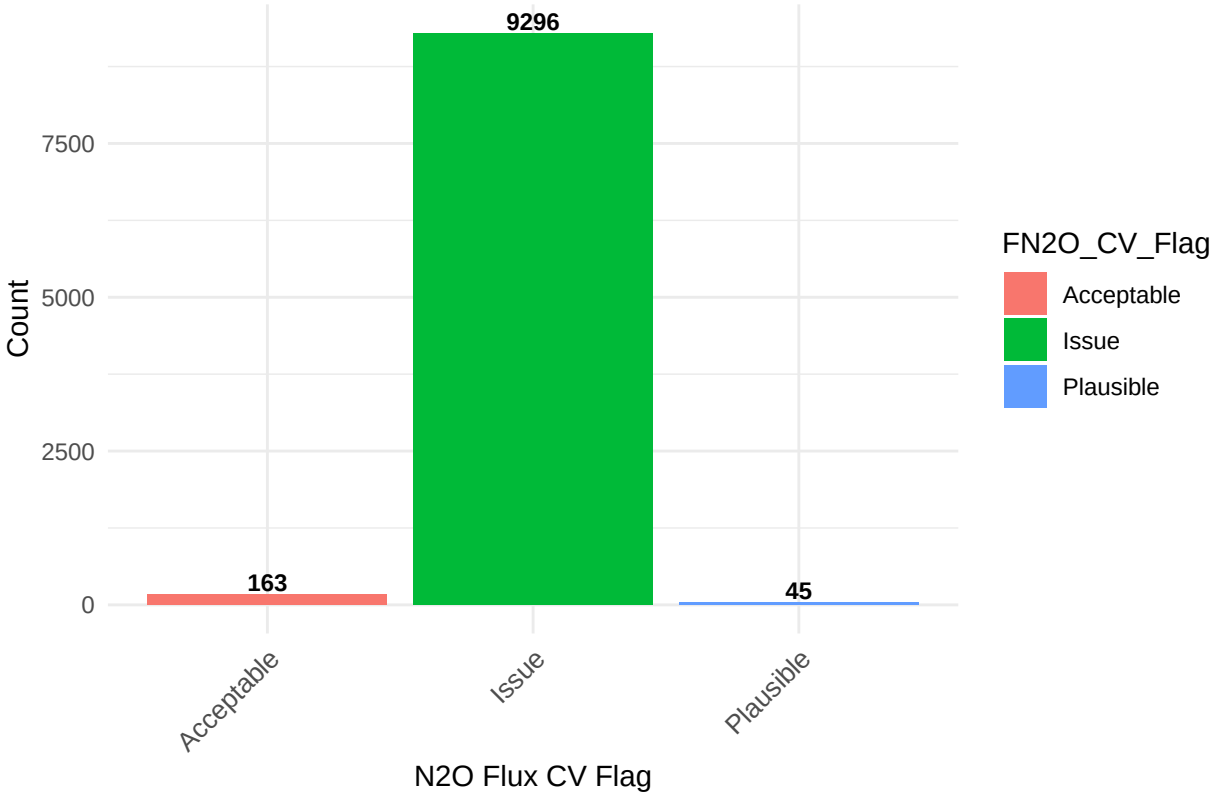
Table 7: Summary of CO2 Flux Flags

CO Flux Flag	Count	Percentage
Very Low (<100)	7669	100

Table 8: Summary of N2O Flux Flags

NO Flux Flag	Count	Percentage
Below Detection (<0.01)	760	9.9
Extremely High (>5)	4	0.1
Negative	693	9.0
Plausible	6212	81.0

Figure 6:Distribution of N2O Flux CV Flags



0.9 10. Flux Control

Figure 7: Distribution of CO2 Flux Flags

Flagging based on FCO2 flux values

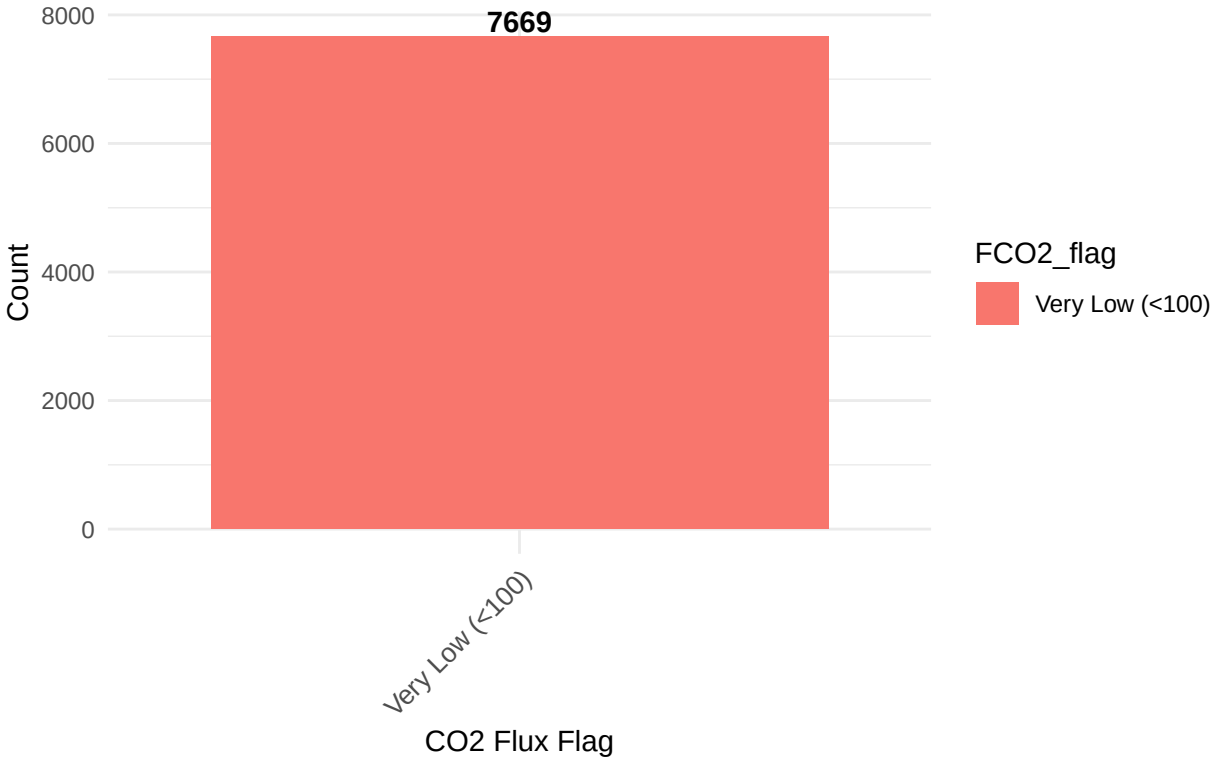


Figure 8: Distribution of N2O Flux Flags

Flagging based on FN2O flux values

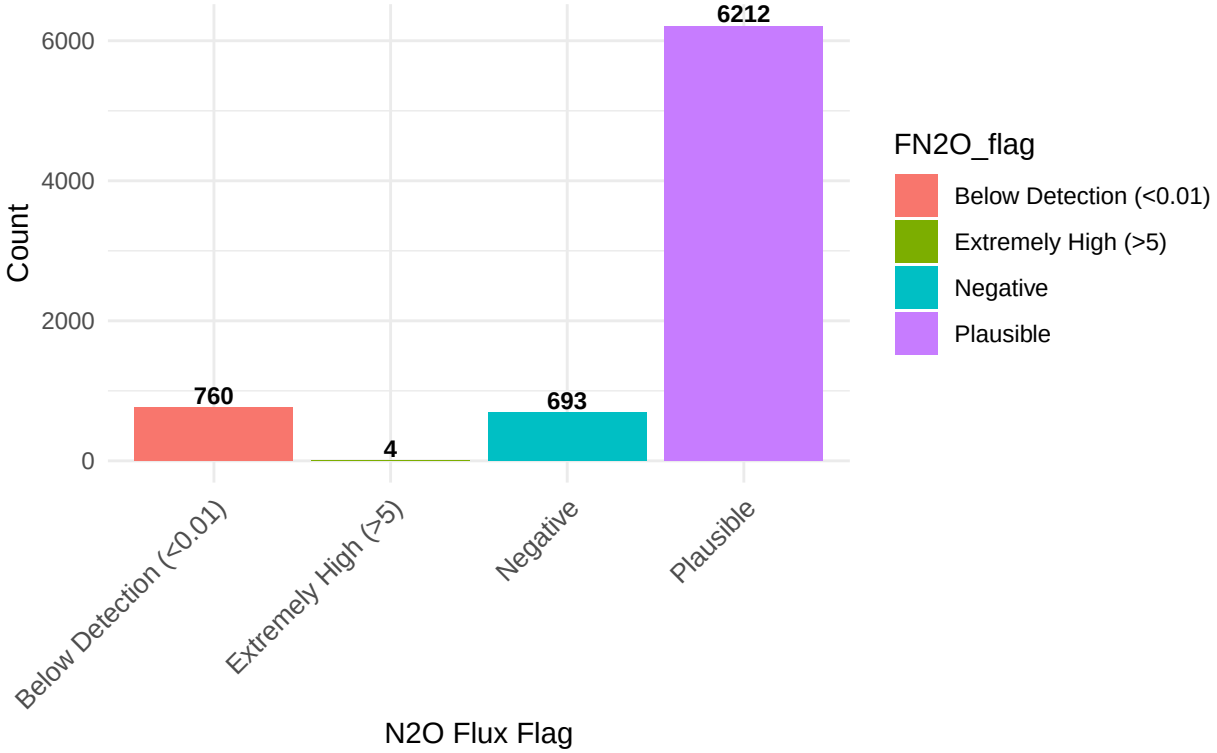


Figure 9:Monthly Distribution of Negative Fluxes

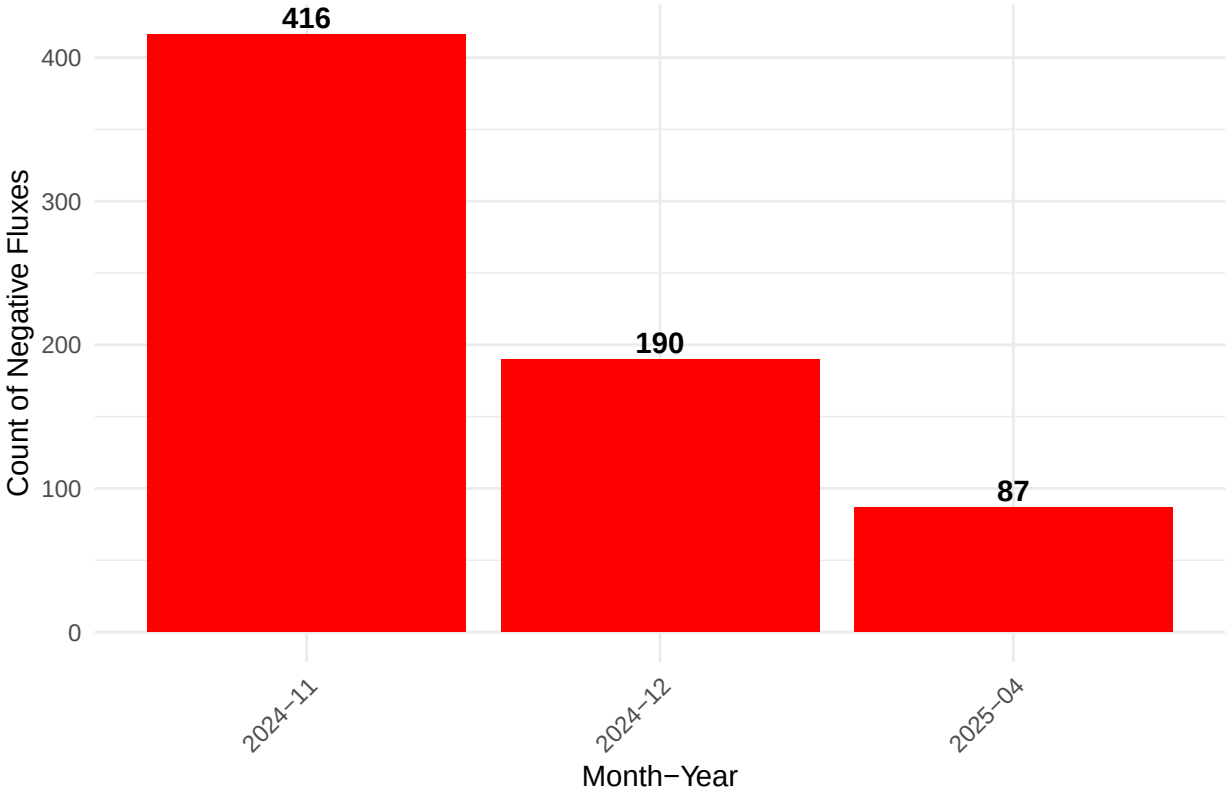


Figure 10:Monthly Distribution of CO2 Flux Flags

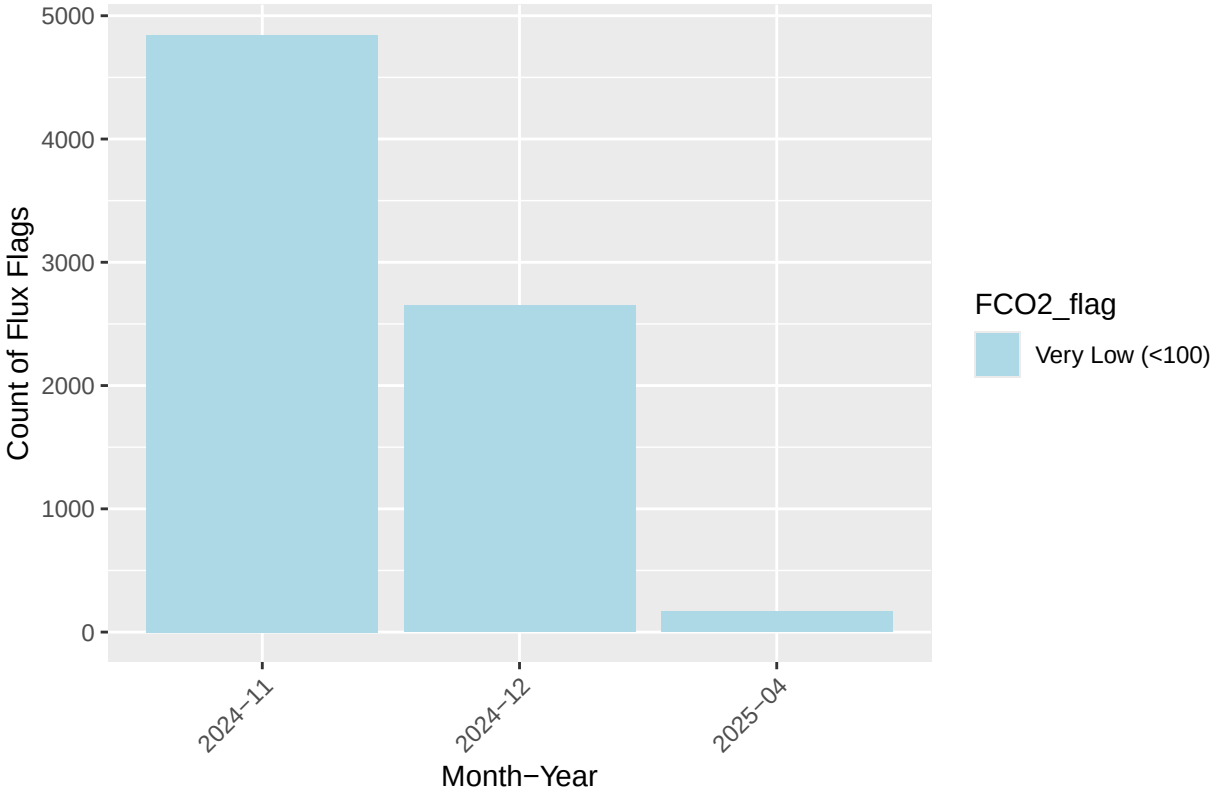


Figure 11:Monthly Distribution of N2O Flux Flags