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Identification of spikes associated with local sources in continuous time series of atmospheric CO, CO_2 and CH_4

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Sites	Species	Contaminated data percentages (%)									
		β =1	β =2	β =3	β =4	β =5	β =6	β =7	β =8	β =9	β =10
AMS	CH_4	15	5.2	2.3	1.2	0.7	0.4	0.3	0.2	0.2	0.1
	CO_2	18.3	10.6	6.9	4.8	3.5	2.7	2	1.5	1.2	1
FKL	CH_4	15.5	8.1	4.8	3.7	2	1.5	1	0.8	0.6	0.4
	CO_2	15.6	7.5	4.2	2.6	1.7	1.2	0.9	0.6	0.5	0.4
	CO	13.4	3.4	1.2	0.6	0.4	0.3	0.2	0.1	0.1	0.1
OPE	CH_4	4.3	2.5	1.8	1.3	1	0.8	0.7	0.5	0.5	0.4
	CO_2	4.1	2.3	1.6	1.2	0.9	0.8	0.7	0.5	0.5	0.4
	CO	3.6	1.6	1	0.7	0.6	0.5	0.4	0.3	0.3	0.3
PDM	CH_4	19.5	11.5	7.8	5.6	4.3	3.4	2.7	2.2	1.9	1.6
	CO_2	18	9.1	5.2	3.6	2.2	1.5	1.1	0.8	0.6	0.4
	CO	14.5	3.9	1.5	0.8	0.5	0.3	0.2	0.2	0.1	0.1

Table S1: Sensitivity of REBS spike detection method for β ranging between 1 and 10 for the four stations and all species during the year 2015.

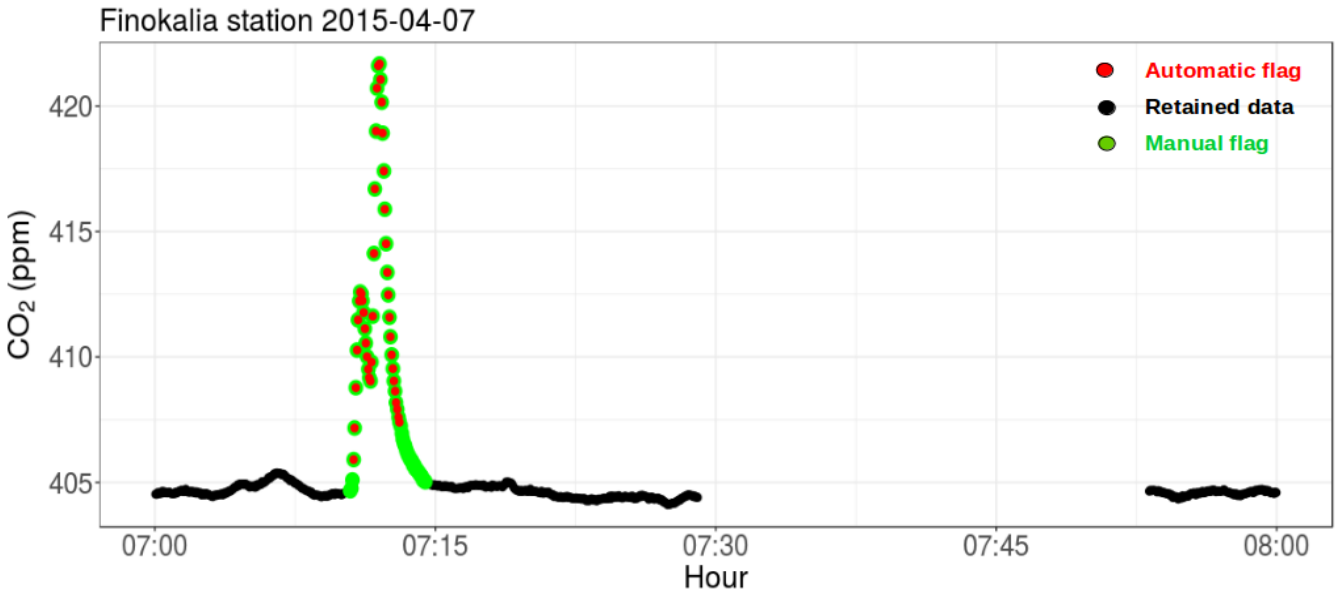


Figure S1: Comparison between manual and automatic flagging (SD method), at Finokalia station. Green and red colors represent data flagged by manual and automatic flagging respectively, black color shows the retained data.

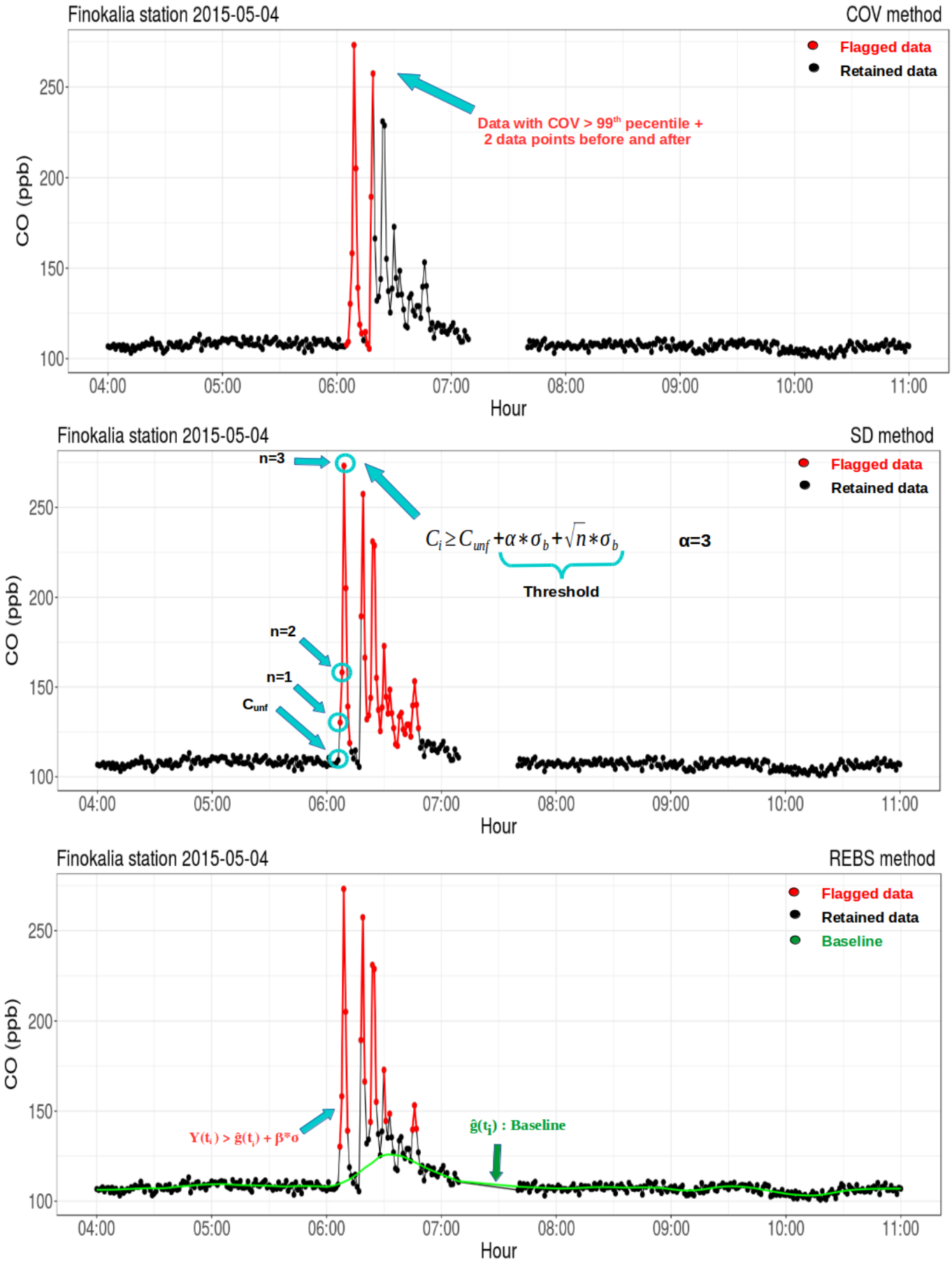


Figure S2: Example of a known contamination episode (between 6:00 a.m and 7:00 a.m) for CO measurements detected by COV method (A), SD method (B), and REBS method (C)

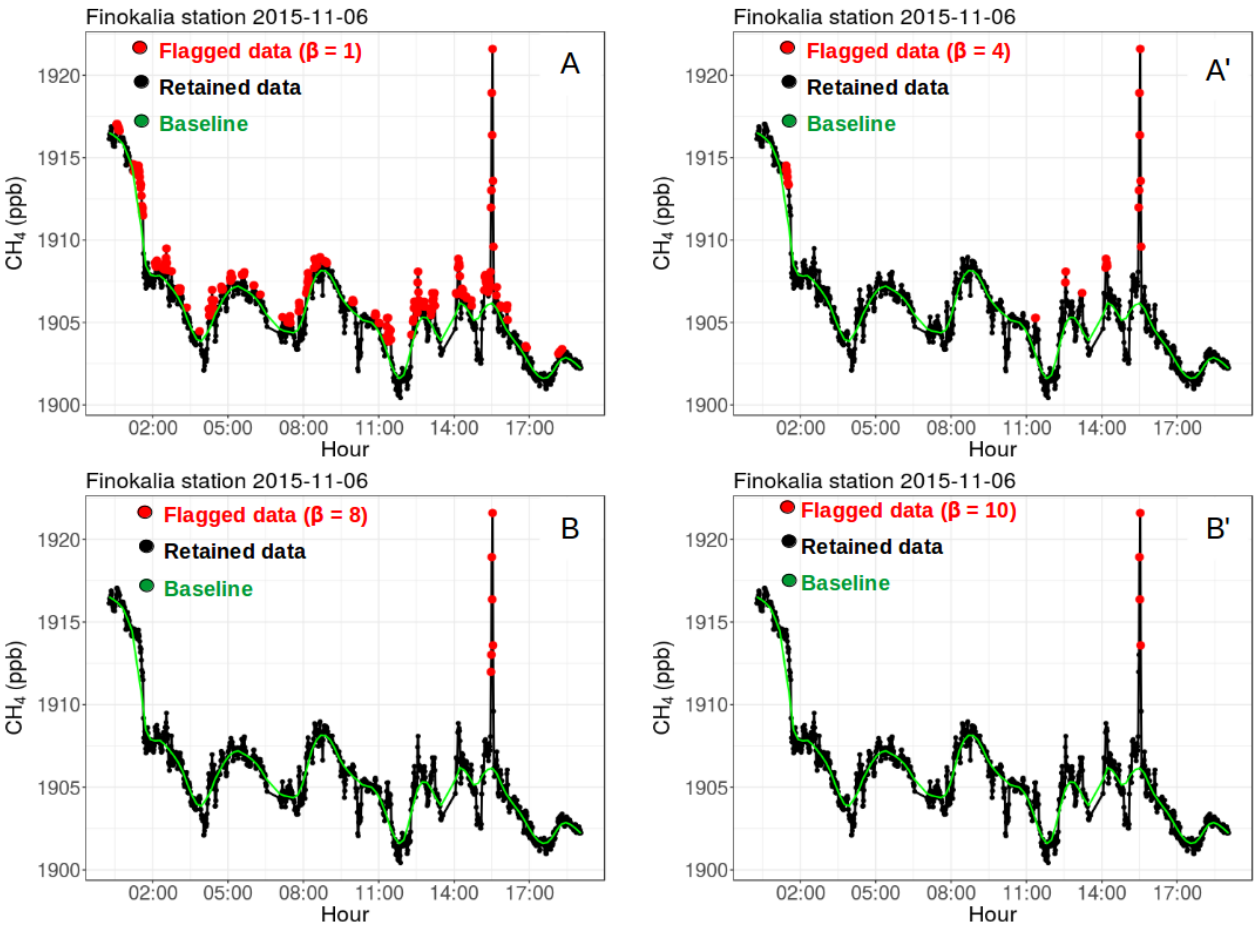


Figure S3: comparison between β =1, 4, 8, and 10 for REBS method. Red represents detected data applied on FKL measurement 6th of November 2014.

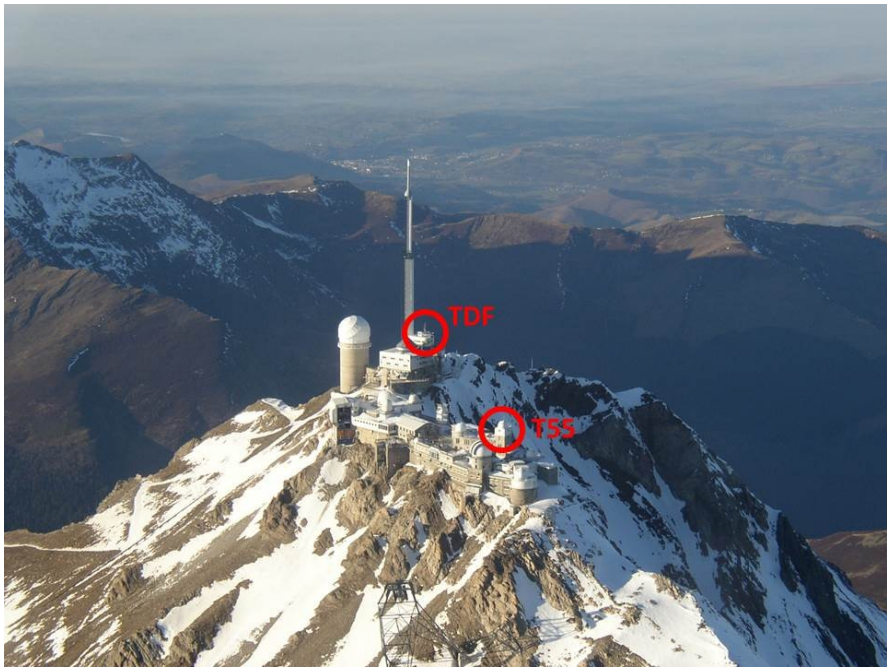


Figure S4: Image of PDM station showing the location of AN-1 site (T55 building), and AN-2 (TDF building). 200 m separate the two buildings.

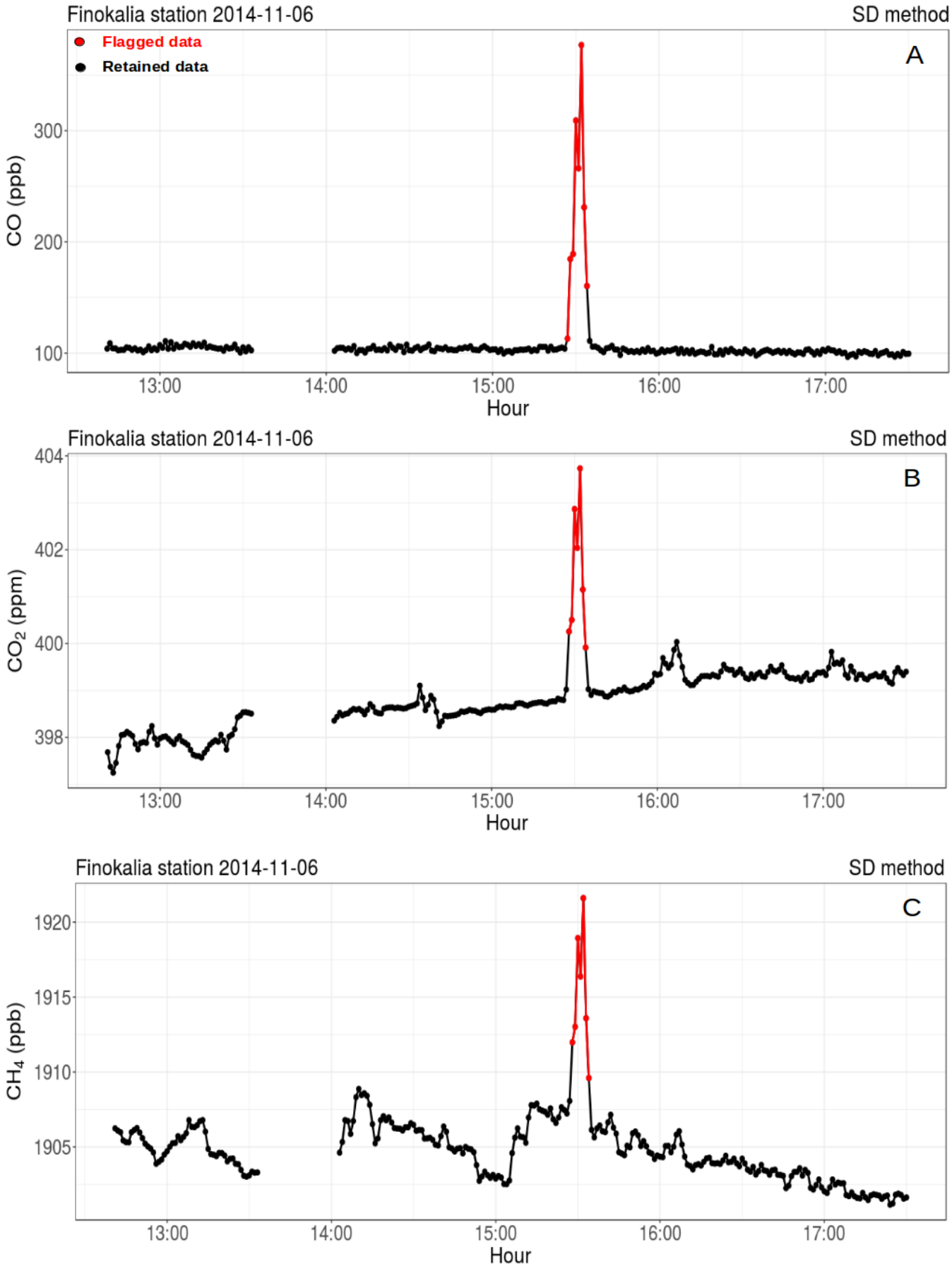


Figure S5: CO, CO_2 and CH_4 (A, B, and C) measurements during a waste burning episode (red points) at Finokalia from 1 p.m. to 5:30 p.m. on the 6th of November 2014.

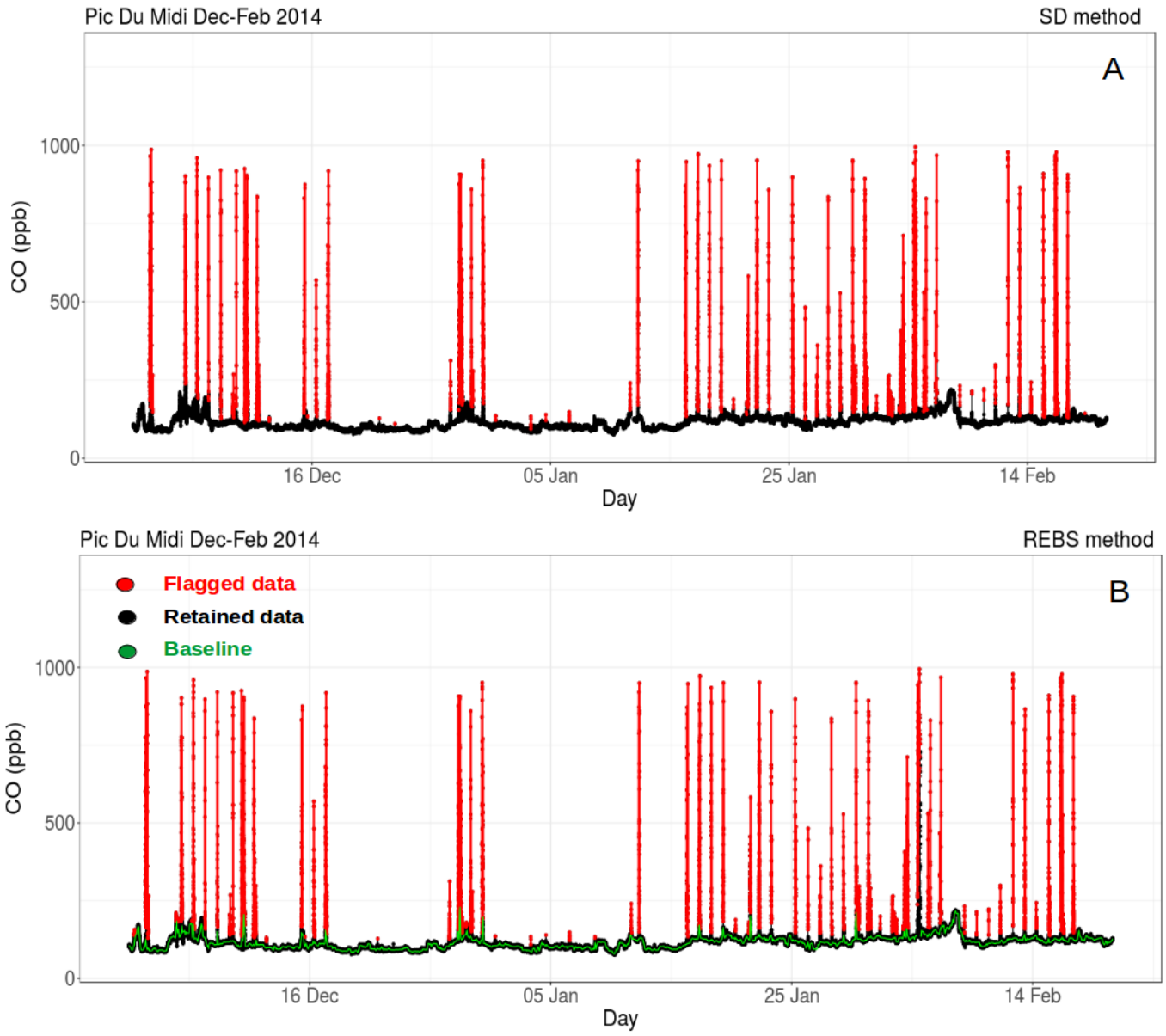
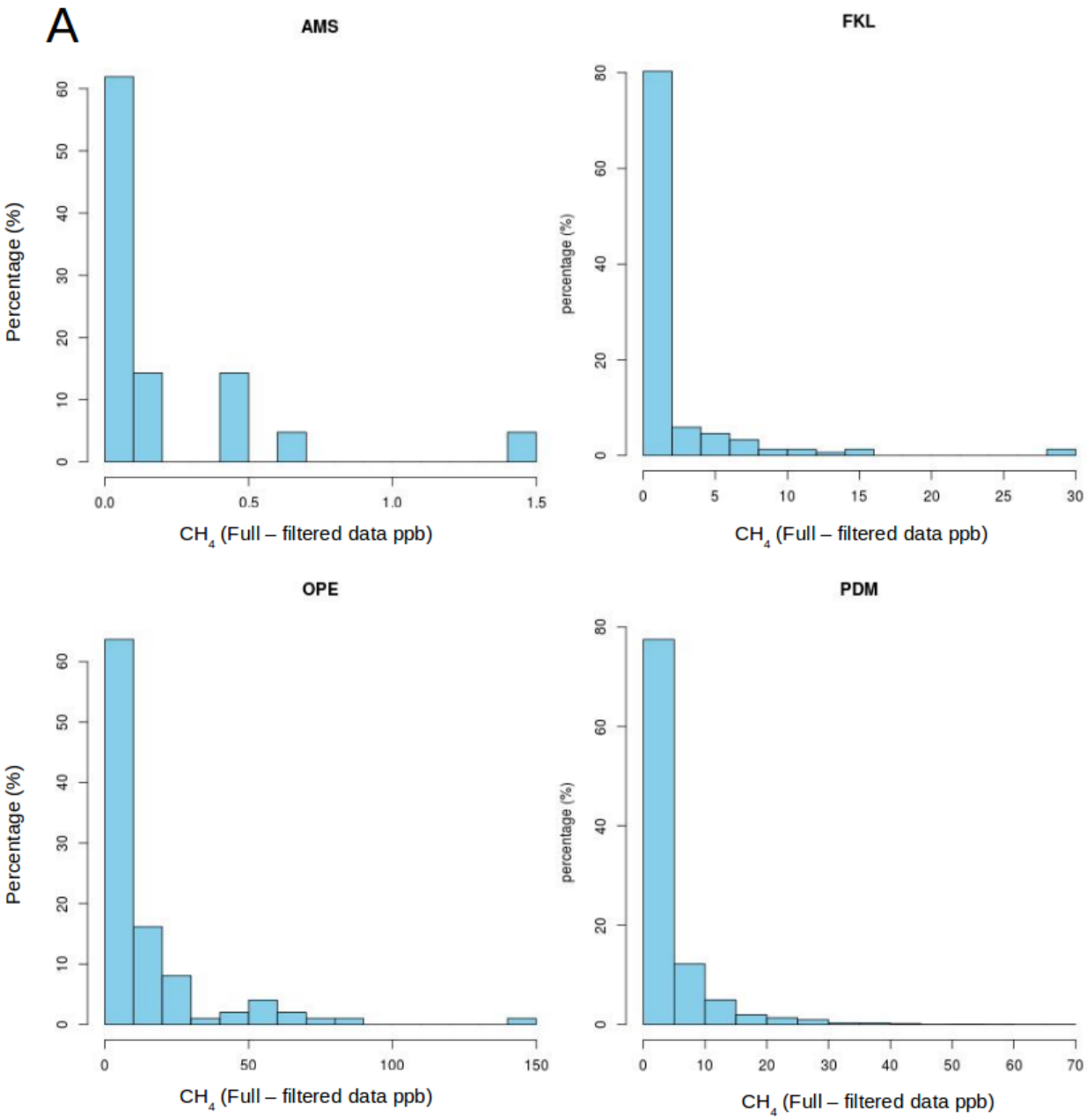
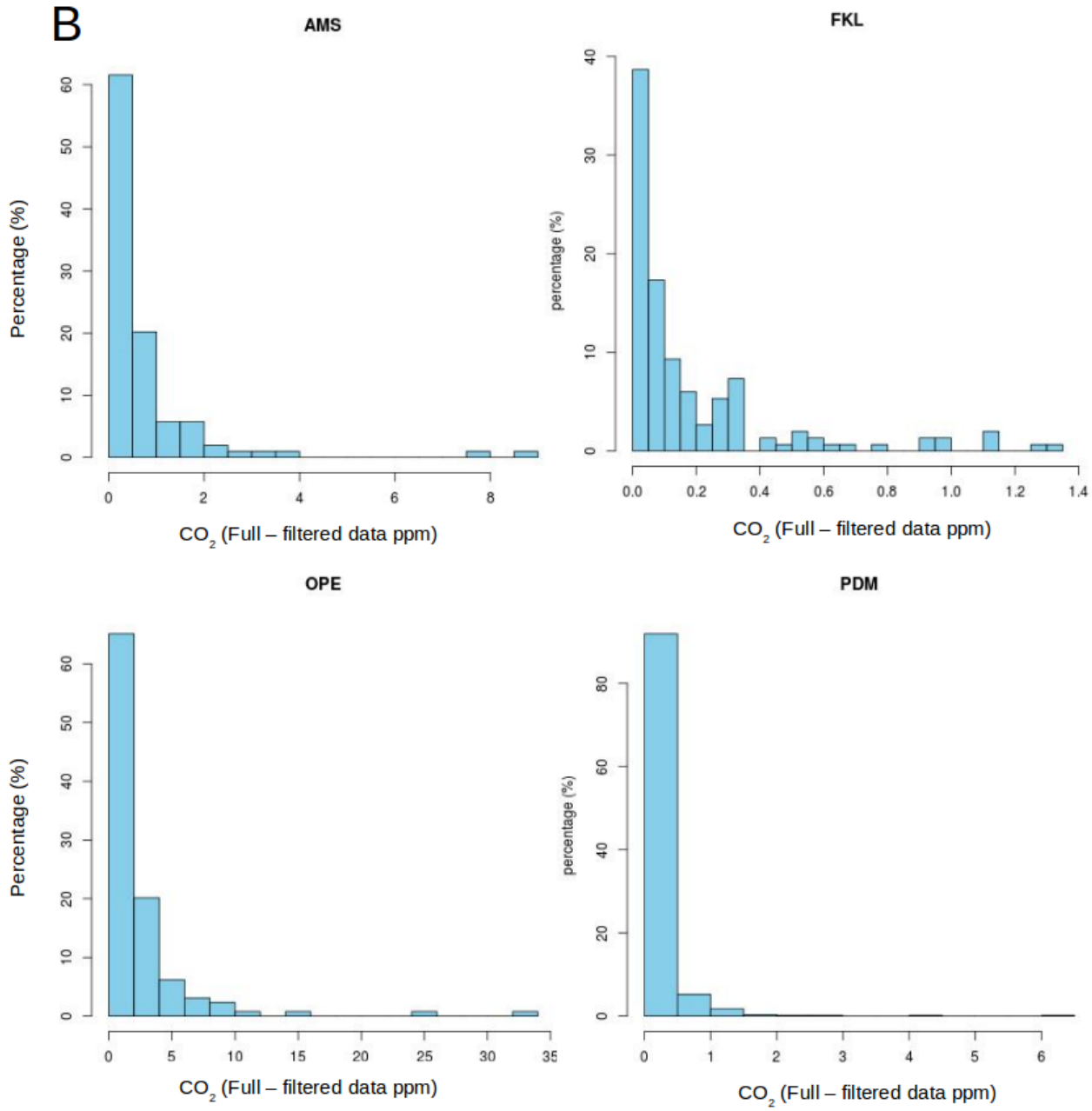


Figure S6: CO measurements from December to February 2014 at Pic Du Midi. Black (red) data points are the retained (flagged) measurements detected by SD method (A), and REBS method (B). The contaminated data linked to the snow removal are characterized by very high CO concentrations up to 1000 ppb.


A
AMS
Percentage (%)
0
10
20
30
40
50
60
0.0
0.5
1.0
1.5
CH4 (Full – filtered data ppb)
FKL
percentage (%)
0
20
40
60
80
0
5
10
15
20
25
30
CH4 (Full – filtered data ppb)
OPE
Percentage (%)
0
10
20
30
40
50
60
0
50
100
150
CH4 (Full – filtered data ppb)
PDM
percentage (%)
0
20
40
60
80
0
10
20
30
40
50
60
70
CH4 (Full – filtered data ppb)


B
AMS
Percentage (%)
0
10
20
30
40
50
60
0
2
4
6
8
CO2 (Full – filtered data ppm)
FKL
percentage (%)
0
10
20
30
40
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
CO2 (Full – filtered data ppm)
OPE
Percentage (%)
0
10
20
30
40
50
60
0
5
10
15
20
25
30
35
CO2 (Full – filtered data ppm)
PDM
percentage (%)
0
20
40
60
80
0
1
2
3
4
5
6
CO2 (Full – filtered data ppm)

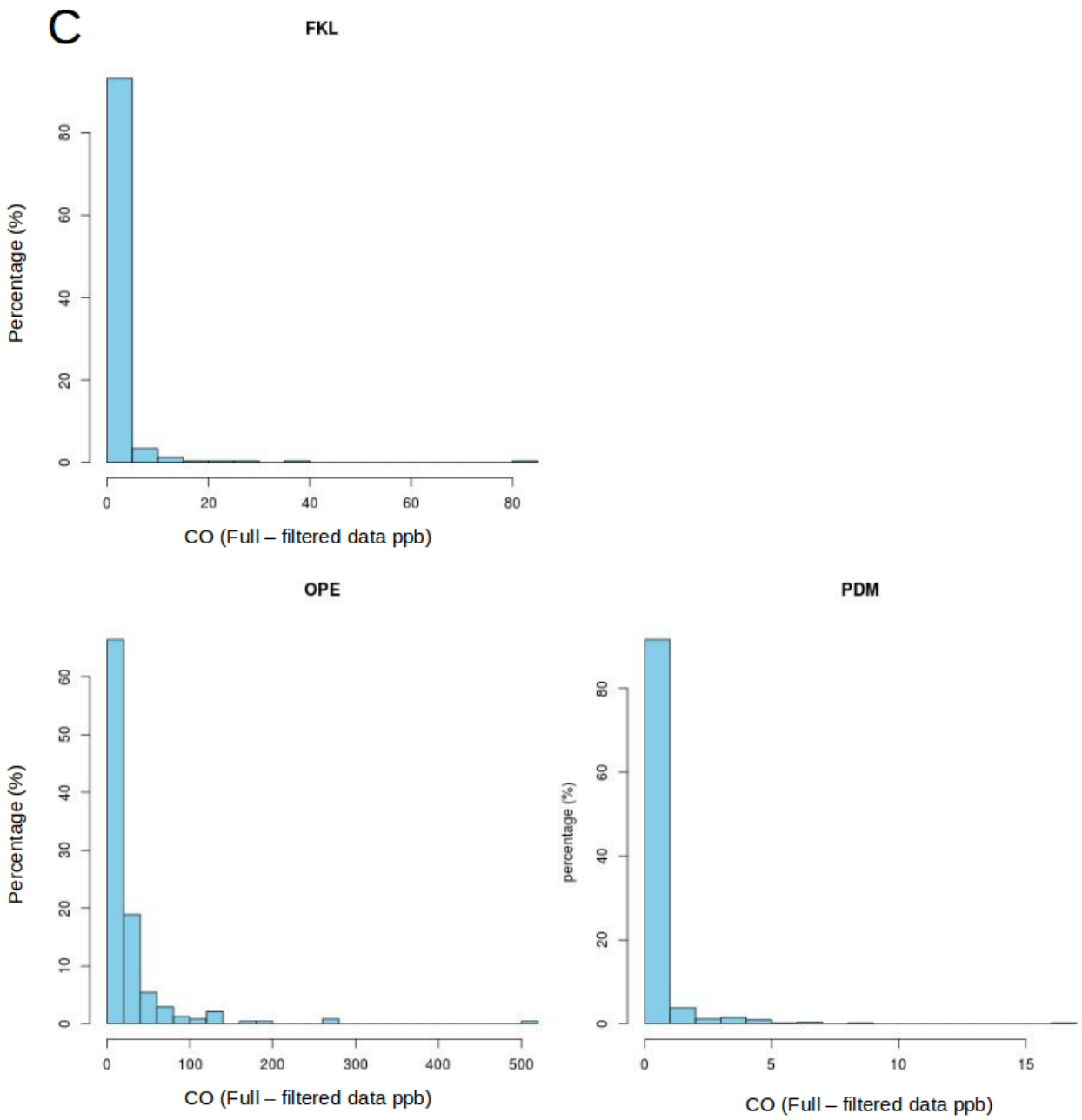


Figure S7: Histograms of differences between filtered and the non-filtered time-series averaged at a hourly scale at OPE for CH_4 (plot A), CO_2 (Plot B), and CO (plot C). The x axis represents the value of differences in (ppm) for CO2 and (ppb) for CH4 and CO. The y axis represents the percentage of the impacted hours.