

Supporting Information

Evolution of gaseous and particulate pollutants in the air: What changed after five lockdown weeks at a Southwest Atlantic European region (Northwest of Spain) due to the SARS-CoV-2 Pandemic?

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Table S1. Meteorological conditions (average \pm SD values) before and during the lockdown period at A Coruña and Vigo cities.

<i>Temperature (°C)</i>				
	Pre-lockdown (February 7 th -March 13 th)	Lockdown (March 14 th -April 20 th)	Variation (%)	p-value
A Coruña	12.8 \pm 2.8	13.2 \pm 3.6	+3	0.024
Vigo	10.4 \pm 2.5	11.1 \pm 3.1	+7	<0.001
<i>Relative humidity (%)</i>				
	Pre-lockdown (February 7 th -March 13 th)	Lockdown (March 14 th -April 20 th)	Variation (%)	p-value
A Coruña	78 \pm 10	77 \pm 13	-1	0.354
Vigo	85 \pm 15	81 \pm 16	-5	<0.001
<i>Atmospheric pressure (hPa)</i>				
	Pre-lockdown (February 7 th -March 13 th)	Lockdown (March 14 th -April 20 th)	Variation (%)	p-value
A Coruña	1016 \pm 7	1008 \pm 5	-1	<0.001
Vigo	971 \pm 6	962 \pm 5	-1	<0.001
<i>Wind speed (m s⁻¹)</i>				
	Pre-lockdown (February 7 th -March 13 th)	Lockdown (March 14 th -April 20 th)	Variation (%)	p-value
A Coruña	0.70 \pm 0.77	0.39 \pm 0.25	-44	<0.001
Vigo	2.4 \pm 1.9	2.4 \pm 1.7	0	0.820
<i>Rainfall (mm)</i>				
	Pre-lockdown (February 7 th -March 13 th)	Lockdown (March 14 th -April 20 th)	Variation (%)	p-value
A Coruña	0.69 \pm 2.9	0.61 \pm 2.5	-12	0.547
Vigo	0.27 \pm 0.92	0.20 \pm 0.75	-26	0.062
<i>Solar radiation (W m⁻²)</i>				
	Pre-lockdown (February 7 th -March 13 th)	Lockdown (March 14 th -April 20 th)	Variation (%)	p-value
A Coruña	99 \pm 154	129 \pm 217	+30	0.001
Vigo	123 \pm 198	180 \pm 258	+46	<0.001

Table S2. Average \pm SD ($\mu\text{g m}^{-3}$, except for CO: mg m^{-3}) values of pollutants during the lockdown stages I and II at studied stations.

NO				NO ₂		
Station code	Lockdown I (March 14 th -March 29 th)	Lockdown II (March 30 th -April 9 th)	p-value	Lockdown I (March 14 th -March 29 th)	Lockdown II (March 30 th -April 9 th)	p-value
AC-T	1.8 \pm 0.81	1.8 \pm 0.88	0.9456	8.1 \pm 4.6	7.7 \pm 5.5	0.8345
AC-L	0.21 \pm 0.19	0.14 \pm 0.09	0.1710	2.2 \pm 1.7	0.91 \pm 1.0	0.0298
V-C	2.8 \pm 1.7	1.9 \pm 0.59	0.0620	15.5 \pm 5.3	12.3 \pm 4.5	0.1115
V-L	6.0 \pm 2.5	4.2 \pm 0.82	0.0150	6.5 \pm 4.4	4.0 \pm 2.5	0.1147
AC-G	5.1 \pm 4.4	5.7 \pm 4.1	0.6926	21.0 \pm 8.2	21.4 \pm 9.1	0.9033
V-PSAE	2.7 \pm 0.87	2.3 \pm 0.40	0.0760	12.7 \pm 4.7	9.1 \pm 3.4	0.0460
V-PSAW	3.4 \pm 2.4	2.1 \pm 0.23	0.0400	12.0 \pm 7.3	6.3 \pm 2.9	0.0100
NO _x				SO ₂		
Station code	Lockdown I (March 14 th -March 29 th)	Lockdown II (March 30 th -April 9 th)	p-value	Lockdown I (March 14 th -March 29 th)	Lockdown II (March 30 th -April 9 th)	p-value
AC-T	10.3 \pm 5.9	10.1 \pm 6.8	0.9422	1.3 \pm 0.29	1.4 \pm 0.35	0.2615
AC-L	2.4 \pm 1.8	1.0 \pm 1.1	0.0325	1.7 \pm 1.2	1.1 \pm 0.27	0.0430
V-C	19.9 \pm 7.7	15.3 \pm 5.3	0.0989	5.7 \pm 2.2	5.3 \pm 2.0	0.6582
V-L	14.2 \pm 8.5	8.8 \pm 4.2	0.0410	3.0 \pm 0.80	2.8 \pm 1.1	0.6042
AC-G	25.9 \pm 12.2	27.1 \pm 12.7	0.8083	2.8 \pm 2.0	2.1 \pm 1.3	0.3865
V-PSAE	14.9 \pm 6.4	10.1 \pm 4.7	0.0468	3.0 \pm 0.09	3.0 \pm 0.01	0.3929
V-PSAW	15.3 \pm 11.3	6.8 \pm 3.4	0.0110	3.2 \pm 0.23	3.0 \pm 0.03	0.0400
CO				O ₃		
Station code	Lockdown I (March 14 th -March 29 th)	Lockdown II (March 30 th -April 9 th)	p-value	Lockdown I (March 14 th -March 29 th)	Lockdown II (March 30 th -April 9 th)	p-value
AC-T	0.31 \pm 0.11	0.32 \pm 0.07	0.6720	84.6 \pm 12.3	77.1 \pm 16.9	0.1943
AC-L	-a	-a		83.2 \pm 14.2	78.3 \pm 14.7	0.3919
V-C	0.10 \pm 0.01	0.11 \pm 0.01	0.1670	74.3 \pm 12.5	69.6 \pm 15.4	0.3998
V-L	0.19 \pm 0.09	0.15 \pm 0.06	0.3210	68.3 \pm 13.1	64.7 \pm 18.4	0.5685
AC-G	-a	-a		-a	-a	
V-PSAE	-a	-a		-a	-a	
V-PSAW	-a	-a		76.9 \pm 12.4	73.3 \pm 13.0	0.4749

PM ₁₀				PM _{2.5}		
Station code	Lockdown I (March 14 th -March 29 th)	Lockdown II (March 30 th -April 9 th)	p-value	Lockdown I (March 14 th -March 29 th)	Lockdown II (March 30 th -April 9 th)	p-value
AC-T	48.0 ±15.1	32.6±12.5	0.0102	19.2±5.4	12.8±3.9	0.0023
AC-L	24.9±7.8	16.2±7.4	0.0078	–a	–a	
V-C	20.6±6.1	12.9±3.5	0.0009	11.9±3.8	7.0±2.4	0.0008
V-L	22.5±6.1	13.8±4.0	0.0005			
AC-G	21.6±5.8	14.7±3.8	0.0019	13.5±4.2	8.9±2.1	0.0010
V-PSAE	–a	–a		13.6±3.5	8.2±2.5	0.0002
V-PSAW	24.3±7.1	15.1±4.9	0.0010	–a	–a	
eBC _T				eBC _F		
Station code	Lockdown I (March 14 th -March 29 th)	Lockdown II (March 30 th -April 9 th)	p-value	Lockdown I (March 14 th -March 29 th)	Lockdown II (March 30 th -April 9 th)	p-value
AC-T	–a	–a		–a	–a	
AC-L	0.61±0.21	0.40±0.19	0.0125	0.33±0.13	0.20±0.12	0.0121
V-C	1.0±0.37	0.65±0.25	0.0056	0.51±0.20	0.40±0.19	0.1713
V-L	–a	–a		–a	–a	
AC-G	–a	–a		–a	–a	
V-PSAE	–a	–a		–a	–a	
V-PSAW	–a	–a		–a	–a	
eBC _B						
Station Code	Lockdown I (March 14 th - March 29 th)		Lockdown II (March 30 th -April 9 th)		p-value	
AC-T	–a		–a			
AC-L	0.38±0.16		0.26±0.12		0.0414	
V-C	0.63±0.26		0.32±0.15		0.0015	
V-L	–a		–a			
AC-G	–a		–a			
V-PSAE	–a		–a			
V-PSAW	–a		–a			
–a Pollutant not measured						

Table S3. Average \pm SD ($\mu\text{g m}^{-3}$, except for CO: mg m^{-3}) values of pollutants during the lockdown stages II and III at studied stations.

NO				NO ₂		
Station code	Lockdown II (March 30 th -April 9 th)	Lockdown III (April 10 th -April 20 th)	p-value	Lockdown II (March 30 th -April 9 th)	Lockdown III (April 10 th -April 20 th)	p-value
AC-T	1.8 \pm 0.88	1.6 \pm 0.65	0.5517	7.7 \pm 5.5	7.1 \pm 3.6	0.7687
AC-L	0.14 \pm 0.09	0.14 \pm 0.03	0.9420	0.91 \pm 1.0	0.61 \pm 0.84	0.4615
V-C	1.9 \pm 0.59	1.9 \pm 1.1	0.9652	12.3 \pm 4.5	9.0 \pm 4.9	0.1223
V-L	4.2 \pm 0.82	3.5 \pm 0.8	0.0509	4.0 \pm 2.5	3.3 \pm 2.0	0.4941
AC-G	5.7 \pm 4.1	4.4 \pm 2.4	0.3614	21.4 \pm 9.1	18.3 \pm 6.3	0.3725
V-PSAE	2.3 \pm 0.40	2.2 \pm 0.32	0.6904	9.1 \pm 3.9	6.6 \pm 3.4	0.1167
V-PSAW	2.1 \pm 0.23	2.2 \pm 0.59	0.6539	6.3 \pm 2.9	4.9 \pm 2.8	0.2505
NO _x				SO ₂		
Station code	Lockdown II (March 30 th -April 9 th)	Lockdown III (April 10 th -April 20 th)	p-value	Lockdown II (March 30 th -April 9 th)	Lockdown III (April 10 th -April 20 th)	p-value
AC-T	10.1 \pm 6.8	9.2 \pm 4.7	0.7175	1.4 \pm 0.35	1.1 \pm 0.13	0.0129
AC-L	1.0 \pm 1.1	0.72 \pm 0.86	0.4796	1.1 \pm 0.27	1.7 \pm 1.2	0.1193
V-C	15.3 \pm 5.3	12.0 \pm 6.4	0.2041	5.3 \pm 2.0	3.3 \pm 2.5	0.0485
V-L	8.8 \pm 4.2	7.3 \pm 3.6	0.4096	2.8 \pm 1.1	2.3 \pm 0.46	0.2085
AC-G	27.1 \pm 12.7	22.5 \pm 8.3	0.3349	2.1 \pm 1.3	4.1 \pm 6.4	0.3312
V-PSAE	10.1 \pm 4.7	7.3 \pm 4.1	0.1466	3.0 \pm 0.01	3.0 \pm 0.01	0.4496
V-PSAW	6.8 \pm 3.4	5.5 \pm 3.8	0.4032	3.0 \pm 0.03	3.0 \pm 0.04	0.7949
CO				O ₃		
Station code	Lockdown II (March 30 th -April 9 th)	Lockdown III (April 10 th -April 20 th)	p-value	Lockdown II (March 30 th -April 9 th)	Lockdown III (April 10 th -April 20 th)	p-value
AC-T	0.32 \pm 0.07	0.18 \pm 0.08	0.0002	77.1 \pm 16.9	79.2 \pm 6.6	0.7075
AC-L	–a	–a		78.3 \pm 14.7	78.1 \pm 7.7	0.9715
V-C	0.11 \pm 0.01	0.10 \pm 0.01	0.1669	69.6 \pm 15.4	72.3 \pm 8.1	0.6230
V-L	0.15 \pm 0.06	0.13 \pm 0.04	0.2752	64.7 \pm 18.4	64.3 \pm 8.6	0.9539
AC-G	–a	–a		–a	–a	
V-PSAE	–a	–a		–a	–a	
V-PSAW	–a	–a		73.3 \pm 13.0	76.7 \pm 7.6	0.4582
PM ₁₀				PM _{2.5}		

Station code	Lockdown II (March 30 th -April 9 th)	Lockdown III (April 10 th -April 20 th)	p-value	Lockdown II (March 30 th -April 9 th)	Lockdown III (April 10 th -April 20 th)	p-value
AC-T	32.6±12.5	25.2±13.2	0.1919	12.8±3.9	8.2±4.0	0.0135
AC-L	16.2±7.4	10.0±3.3	0.0242	–a	–a	
V-C	12.9±3.5	10.5±3.1	0.1070	7.0±2.4	5.3±2.0	0.0845
V-L	13.8±4.0	12.1±3.1	0.2801	–a	–a	
AC-G	14.6±3.8	9.7±3.5	0.0052	8.9±2.1	6.8±2.1	0.0253
V-PSAE	–a	–a		8.2±2.5	6.8±1.1	0.1144
V-PSAW	15.1±4.9	12.3±3.3	0.1288	–a	–a	
eBC _T			eBC _F			
Station code	Lockdown II (March 30 th -April 9 th)	Lockdown III (April 10 th -April 20 th)	p-value	Lockdown II (March 30 th -April 9 th)	Lockdown III (April 10 th -April 20 th)	p-value
AC-T	–a	–a		–a	–a	
AC-L	0.40±0.19	0.31±0.14	0.2156	0.20±0.12	0.15±0.09	0.2747
V-C	0.65±0.25	0.55±0.31	0.4237	0.40±0.19	0.37±0.23	0.7268
V-L	–a	–a		–a	–a	
AC-G	–a	–a		–a	–a	
V-PSAE	–a	–a		–a	–a	
V-PSAW	–a	–a		–a	–a	
eBC _B						
Station Code	Lockdown II (March 30th-April 9th)		Lockdown III (April 10th-April 20th)		p-value	
AC-T	–a		–a			
AC-L	0.26±0.12		0.21±0.13		0.3188	
V-C	0.32±0.15		0.24±0.13		0.1748	
V-L	–a		–a			
AC-G	–a		–a			
V-PSAE	–a		–a			
V-PSAW	–a		–a			
–a Pollutant not measured						

Table S4. Pearson's correlations of NO_x, SO₂, CO, O₃, PM₁₀, PM_{2.5}, and eBC concentrations with meteorological parameters (wind speed, rainfall and solar radiation) at studied stations. Significant correlations at $p < 0.05$ are in italic.

	AC-T	AC-L	V-C	V-L	AC-G	V-PSAE	V-PSAW
<i>Wind Speed</i>							
NO _x	-0.3352 (0.0052)	-0.2206 (0.0707)	-0.3698 (0.0070)	-0.3968 (0.0007)	-0.2753 (0.0231)	-0.3892 (0.0009)	-0.3942 (0.0007)
SO ₂	-0.3154 (0.0088)	0.0339 (0.4296)	-0.1585 (0.1901)	0.0705 (0.5617)	0.5195 (0.0000)	0.0929 (0.4411)	-0.2672 (0.0253)
CO	0.0072 (0.9253)	-a	-0.1055 (0.3995)	-0.0699 (0.5733)	-a	-a	-a
O ₃	0.1431 (0.2338)	0.2983 (0.0115)	-a	-a	-a	-a	0.0480 (0.7019)
PM ₁₀	0.2166 (0.0670)	0.2133 (0.0720)	-0.2055 (0.0878)	-0.2097 (0.0815)	0.2273 (0.0548)	-a	-0.2633 (0.0276)
PM _{2.5}	0.1656 (0.1805)	-a	-0.3558 (0.0019)	-a	0.0097 (0.9381)	-0.3925 (0.0005)	-a
eBC	-a	-0.2751 (0.0203)	-0.3953 (0.0005)	-a	-a	-a	-a
<i>Rainfall</i>							
NO _x	-0.2077 (0.0273)	-0.2931 (0.0153)	-0.3585 (0.0023)	-0.2459 (0.0402)	-0.2637 (0.0298)	-0.3051 (0.0102)	0.3097 (0.0091)
SO ₂	0.0276 (0.8231)	-0.1401 (0.2543)	-0.1170 (0.0271)	0.0259 (0.8317)	0.3149 (0.0089)	0.1726 (0.1532)	-0.2612 (0.0271)
CO	-0.0725 (0.5511)	-a	-0.1952 (0.1134)	-0.1050 (0.3979)	-a	-a	-a
O ₃	-0.0121 (0.9203)	-0.0022 (0.9856)	0.0873 (0.4358)	0.0812 (0.5167)	-a	-a	0.0567 (0.6510)
PM ₁₀	-0.0986 (0.4273)	-0.0744 (0.5994)	-0.1582 (0.1910)	-0.1631 (0.1774)	-0.1125 (0.3646)	-a	-0.1938 (0.1079)
PM _{2.5}	-0.0242 (0.8461)	-a	-0.3063 (0.0099)	-a	-0.0818 (0.5106)	-0.3401 (0.0040)	-a
eBC	-a	-0.2826 (0.0178)	-0.3844 (0.0013)	-a	-a	-a	-a
<i>Solar radiation</i>							
NO _x	0.1288 (0.3027)	-0.0287 (0.8192)	0.1019 (0.4011)	0.0999 (0.4106)	0.1946 (0.1173)	0.1014 (0.4037)	0.1330 (0.2725)
SO ₂	-0.0218 (0.8619)	0.0122 (0.9225)	0.1543 (0.2023)	0.1998 (0.0973)	-0.2445 (0.0392)	-0.3794 (0.0012)	0.3124 (0.0084)
CO	0.0327 (0.7914)		-0.0192 (0.8774)	0.0666 (0.5921)	-a	-a	-a
O ₃	0.4467 (0.0001)	0.4545 (0.0001)	0.3310 (0.0016)	0.2808 (0.0224)	-a	-a	0.3555 (0.0034)
PM ₁₀	-0.0657 (0.6030)	0.1027 (0.3929)	0.1719 (0.1547)	0.1511 (0.2117)	0.1046 (0.4069)	-a	0.2113 (0.0791)
PM _{2.5}	-0.0418 (0.7410)	-a	0.3024 (0.0110)	-a	0.1791 (0.1534)	0.2476 (0.0387)	-a
eBC	-a	0.2048 (0.0940)	0.1193 (0.3363)	-a	-a	-a	-a
-a Pollutant not measured							

Figure S1. Localization of A Coruña and Vigo cities air quality monitoring stations in Spain. Source: Google Maps (satellite maps, without annotations) and Mapchart.net (<https://mapchart.net/spain.html>).

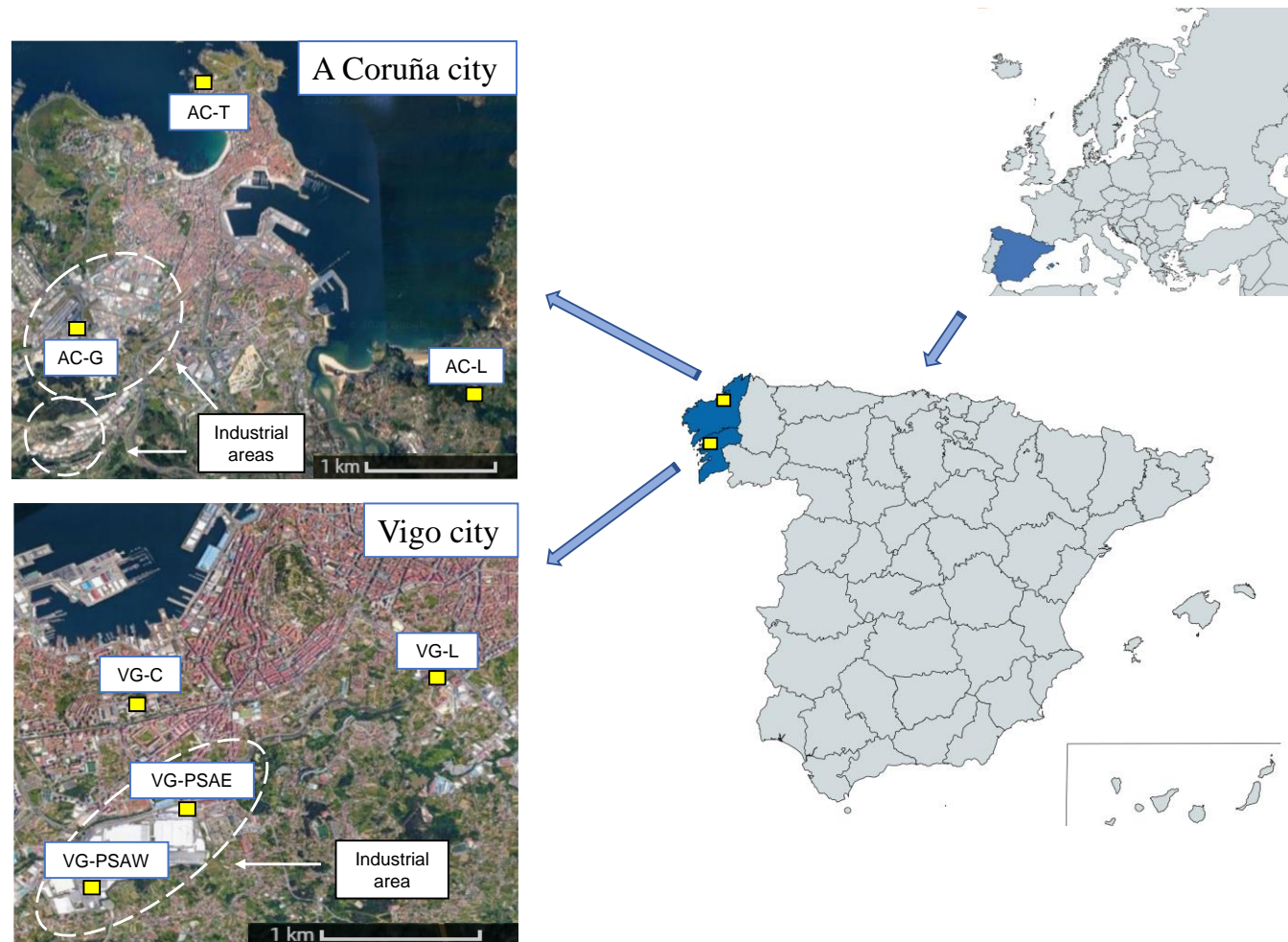


Figure S2. Daily mean values of meteorological conditions at A Coruña and Vigo cities, without smoothing. Highlighted gray and yellow shadows show days with biomass combustion and Saharan dust intrusion, respectively. Time periods of lockdown stages (I, II and III) are also delimited by vertical black lines.

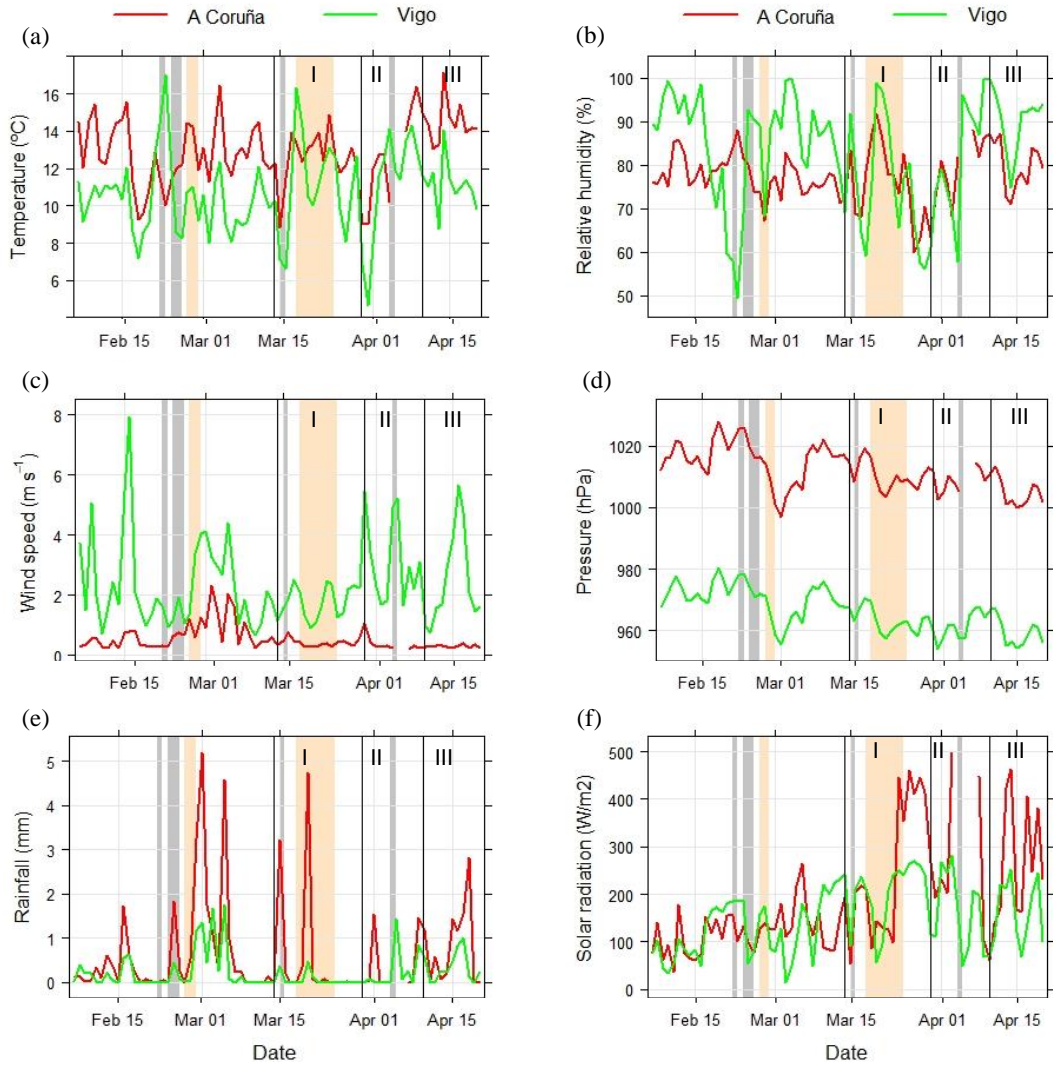


Figure S3. Air mass origin during pre-lockdown period (February 7th – March 13th) and lockdown period (March 14th – April 20th). *NA* North Atlantic, *NWA* Northwest Atlantic, *SWA* Southwest Atlantic, *WA* West Atlantic, *EU* Europe, *MED* Mediterranean, *NAF* North Africa, *RE* regional.

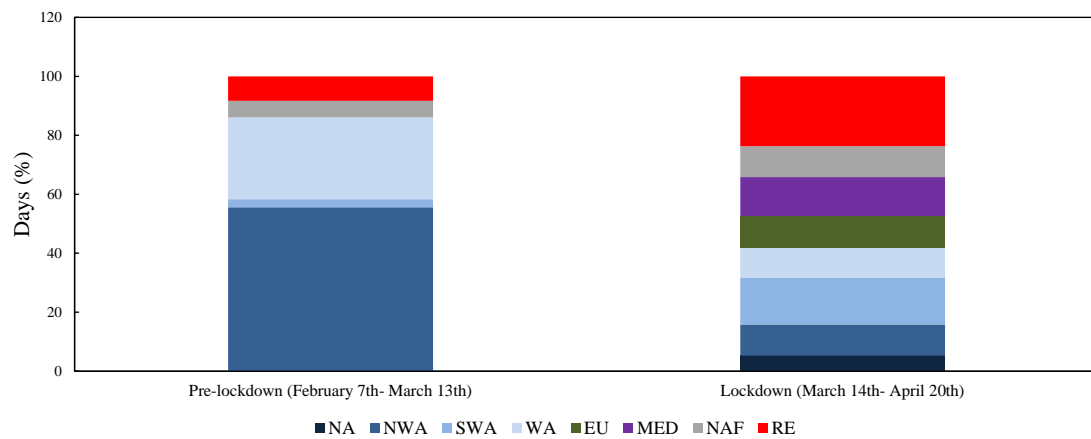


Figure S4. Wind roses for pre-lockdown period (February 7th – March 13th) and lockdown I-III period (March 14th – April 20th). The plots show the proportion of time that the wind is from a certain angle and wind speed range.

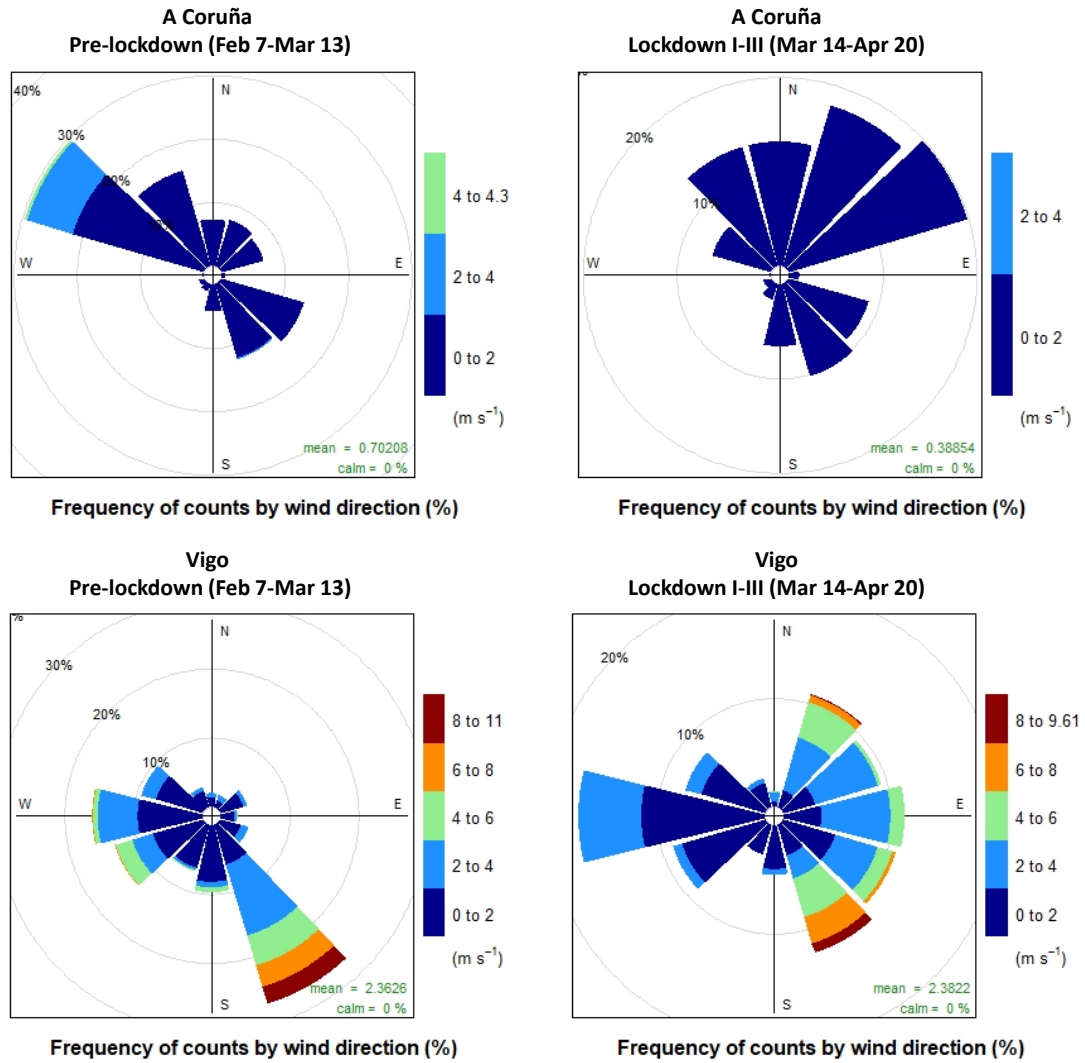


Figure S5. Concentration evolution of NO (a-b) and NO₂ (c-d) (24 h mean) before and during the lockdown period. The left and right panels correspond with data obtained for air quality monitoring stations of A Coruña and Vigo cities, respectively. Time periods of lockdown stages (I, II and III) are also delimited by vertical black lines.

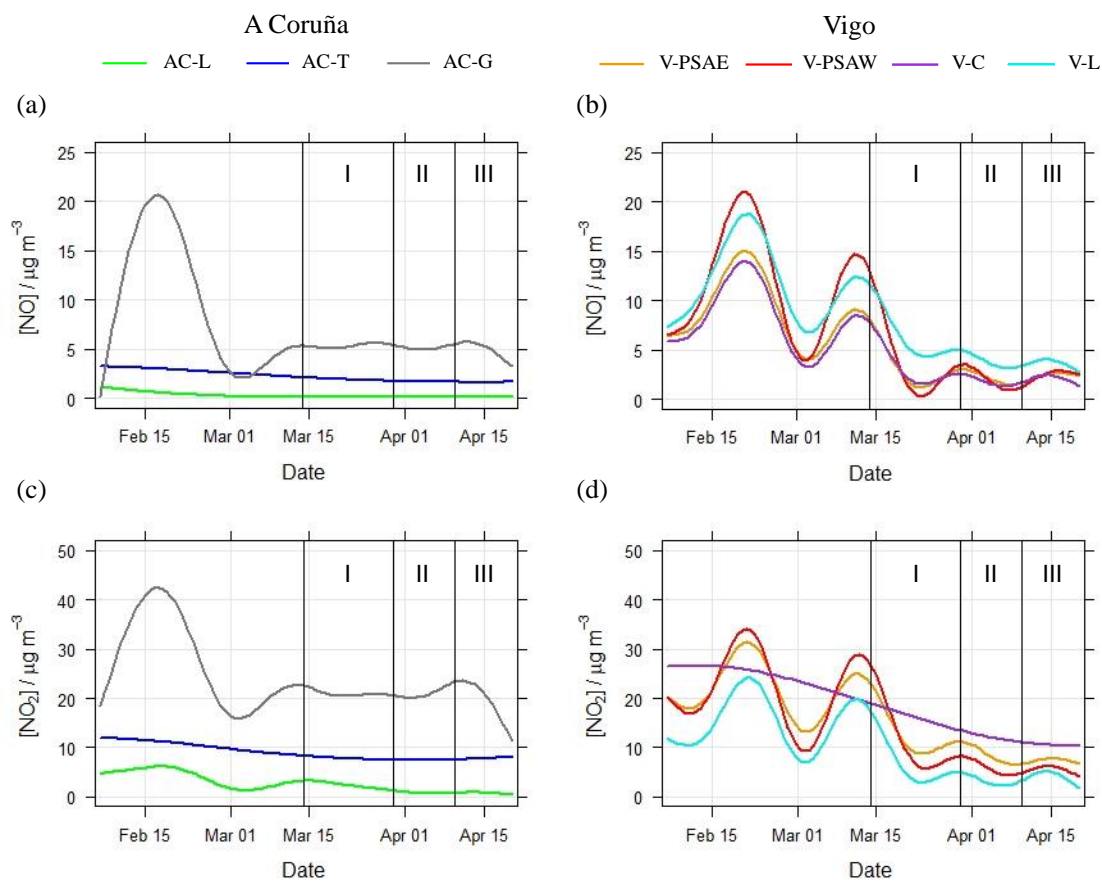


Figure S6. Concentration evolution of NO_x and O₃ concentrations ($\mu\text{g m}^{-3}$), temperature and relative humidity (smoothed hourly data), before and during the lockdown period at air quality monitoring stations of A Coruña and Vigo cities. Highlighted gray and yellow shadows show days with biomass combustion and Saharan dust intrusion, respectively. Time periods of lockdown stages (I, II and III) are also delimited by vertical black lines.

