

SUPPLEMENTARY INFORMATION (CAPTIONS)

Figure S1. Correlation between: Top: O₃ measured with the passive dosimeters and an UV photometry analyser. Middle: NO₂ measured with the passive dosimeters and a chemiluminescence analyser. Bottom: O₃ measured with the PO3M sensor and an UV photometry analyser.

Figure S2. Instrumentation pack for tethered balloon measurements.

Figure S3. Comparison between the nano-particle sizer (two units) used in the tethered balloon with the reference scanning mobility particle sizer.

Figure S4. Instrumentation pack for free sounding measurements.

Figure S5. 8-h PM_{2.5} chemical components at VIC station during 10-17/07/2015. White: 16:00-24:00 UTC. Blue: 00:00-08:00 UTC. Yellow: 08:00-16:00 UTC.

Figure S6. Spatial variability of the monthly July O₃ and O_x concentrations recorded in the study area at the XVPCA air quality monitoring network and with the passive dosimeters.

Table S1. Name, acronym, type, coordinates and measurements for each of the stations of the regional air quality network (XVPCA).

Table S2. Details of vertical measurements performed with the balloon and the miniaturised instrumentation at VIC.

Table S3. Location of the meteorological stations.

Table S1.

STATION	TYPE	COORDINATES		HEIGHT	ONLINE MEASUREMENTS	OFFLINE MEASUREMENTS
		Lat (°N)	Long (°E)	(m.a.s.l.)		
Agullana (AGU)	Rural, Background	42.39	2.84	166	O ₃	
Alcover (ALC)	Rural, Industry	41.28	1.18	243	O ₃ , NO, NO ₂ , CO, SO ₂ , H ₂ S	
Amposta (AMP)	Suburban, Background	40.71	0.58	8	O ₃ , NO, NO ₂ , CO, SO ₂ , PM ₁₀	C ₆ H ₆
Badalona (BAD)	Urban, Traffic	41.44	2.23	6	O ₃ , NO, NO ₂ , SO ₂	
Barcelona Gràcia (BCN-G)	Urban, Traffic	41.40	2.15	75	O ₃ , NO, NO ₂ , SO ₂ , C ₆ H ₆	PM ₁₀ , PM _{2.5} , As, B(a)p, Cd, Ni, Pb, C ₆ H ₆
Barcelona Poblenou (BCN-PBN)	Urban, Traffic	41.40	2.20	12	O ₃ , NO, NO ₂ , SO ₂	PM ₁₀ , PM _{2.5} , As, B(a)p, Cd, Ni, Pb, C ₆ H ₆
Barcelona Palau Reial (PLR)	Urban, Background	41.39	2.11	81	O ₃ , NO, NO ₂ , CO, SO ₂	
Barcelona Ciutadella (CTL)	Urban, Background	41.39	2.19	5	O ₃ , NO, NO ₂	
Begur (BEG)	Rural, Background	41.95	3.02	200	O ₃	C ₆ H ₆
Bellver de Cerdanya (BdC)	Rural, Background	42.37	1.78	1060	O ₃ , NO, NO ₂ , PM ₁₀	PM ₁₀ , PM _{2.5} , As, B(a)p, Cd, Ni, Pb, C ₆ H ₆
Berga (VER)	Suburban, background	42.10	1.85	661	O ₃ , NO, NO ₂ , CO, SO ₂ , PM ₁₀	PM ₁₀ , PM _{2.5} , As, B(a)p, Cd, Ni, Pb, C ₆ H ₆
Constantí (CON)	Suburban, Industry	41.16	1.22	87	O ₃ , NO, NO ₂ , CO, SO ₂	PM ₁₀ , PM _{2.5} , As, B(a)p, Cd, Ni, Pb, C ₆ H ₆ , HCl
El Prat de Llobregat (EPLL)	Suburban, Traffic	41.32	2.08	7	O ₃ , NO, NO ₂ , SO ₂ , H ₂ S	PM ₁₀ , PM _{2.5} , Pb, C ₆ H ₆
Els Guiamets	Rural, Background	41.10	0.76	220	O ₃	
Gandesa (GAN)	Rural, Background	41.06	0.44	368	O ₃	
Gavà (GAV)	Suburban, Background	41.30	1.99	25	O ₃ , NO, NO ₂ , CO, SO ₂	PM ₁₀ , PM _{2.5} , Pb
Granollers (GRA)	Urban, Traffic	41.60	2.29	140	O ₃ , NO, NO ₂	PM ₁₀ , PM _{2.5} , B(a)p
Igualada (IGU)	Suburban, Industry	41.58	1.63	284	O ₃ , NO, NO ₂ , CO, SO ₂ , H ₂ S	PM ₁₀ , As, B(a)p, Cd, Ni, Pb
Juneda (JUN)	Rural, Background	41.55	0.83	255	O ₃ , NO, NO ₂	PM ₁₀
L'Hospitalet	Urban, Traffic	41.37	2.11	20	NO, NO ₂ , PM ₁₀	PM ₁₀ , PM _{2.5}
La Sènia (LSE)	Rural, Background	40.64	0.29	428	O ₃	PM ₁₀ , PM _{2.5}
Lleida (LLE)	Urban, Traffic	41.62	0.62	220	O ₃ , NO, NO ₂ , CO, SO ₂ , PM ₁₀	PM ₁₀ , PM _{2.5} , As, B(a)p, Cd, Ni, Pb, C ₆ H ₆
Manlleu (MAN)	Suburban, Background	42.01	2.29	460	O ₃ , NO, NO ₂ , SO ₂	PM ₁₀ , As, B(a)p, Cd, Ni, Pb
Manresa (MNR)	Urban, Traffic	41.73	1.83	238	O ₃ , NO, NO ₂ , CO, SO ₂	PM ₁₀ , C ₆ H ₆
Mataró (MAT)	Urban, Background	41.54	2.44	40	O ₃ , NO, NO ₂ , CO, SO ₂	PM ₁₀ , C ₆ H ₆
Montcada (MON)	Suburban, Industry	41.48	2.19	33	O ₃ , NO, NO ₂ , SO ₂ , PM ₁₀	
Montsec (MSC)	Rural, Background	42.05	0.73	1570	O ₃ , NO, NO ₂ , CO, SO ₂ , PM ₁₀ , PM _{2.5}	
Montseny (MSY)	Rural, Background	41.78	2.38	720	O ₃ , NO, NO ₂ , CO, SO ₂	
Pardines (PAR)	Rural, Background	42.31	2.21	1226	O ₃	
Ponts (PON)	Rural, Background	41.91	1.19	370	O ₃	PM ₁₀ , C ₆ H ₆
Reus (REU)	Suburban, Traffic	41.15	1.12	110	O ₃ , NO, NO ₂ , CO, SO ₂ , H ₂ S, PM ₁₀	PM ₁₀ , As, Cd, Ni, Pb, C ₆ H ₆
Rubí (RUB)	Suburban, Background	41.49	2.03	200	O ₃ , NO, NO ₂ , CO, SO ₂ , PM ₁₀	PM ₁₀ , PM _{2.5} , C ₆ H ₆
Sabadell (SAB)	Urban, Traffic	41.56	2.10	190	O ₃ , NO, NO ₂	PM ₁₀ , PM _{2.5} , C ₆ H ₆
Sant Celoni (SCE)	Suburban, Industry	41.69	2.50	155	O ₃ , NO, NO ₂ , CO, SO ₂ , H ₂ S, PM ₁₀	PM ₁₀ , B(a)p, C ₆ H ₆
Sort (SOR)	Rural, Background	42.41	1.13	692	O ₃	PM ₁₀
St Adrià Besòs (SAD)	Suburban, Traffic	41.42	2.22	9	O ₃ , NO, NO ₂ , PM ₁₀	PM ₁₀ , PM _{2.5}
St Cugat del Vallès (SCV)	Urban, Background	41.48	2.09	124	O ₃ , NO, NO ₂	PM ₁₀
St Vicenç dels Horts (SVH)	Suburban, Industry	41.39	2.01	22	O ₃ , NO, NO ₂ , SO ₂	
S.M. Palautordera (SMPT)	Rural, Background	41.70	2.45	208	O ₃	PM _{2.5}
Sta Pau (STP)	Rural, Background	41.96	3.21	496	O ₃	
Tarragona (TARR)	Urban, Background	41.12	1.24	14	O ₃ , NO, NO ₂ , CO, SO ₂ , H ₂ S	C ₆ H ₆

Terrassa (TERR)	Urban, Traffic	41.56	2.01	277	O ₃ , NO, NO ₂ , CO, SO ₂	PM ₁₀
Tona (TON)	Rural, Background	41.86	2.23	620	O ₃ , NO, NO ₂	C ₆ H ₆
Vic (VIC)	Suburban, Background	41.92	2.26	498	O ₃	PM _{2.5} , C ₆ H ₆
Viladecans (VLC)	Suburban, Traffic	41.31	2.01	14	O ₃ , NO, NO ₂ , CO, SO ₂	PM ₁₀ , PM _{2.5} , C ₆ H ₆
Vilafranca Penedès (VLP)	Suburban, Background	41.35	1.69	200	O ₃ , NO, NO ₂ , PM ₁₀	C ₆ H ₆
Vilanova i la Geltrú (VLG)	Urban, Traffic	41.22	1.72	22	O ₃ , NO, NO ₂ , PM ₁₀	C ₆ H ₆
Vila-Seca (VSE)	Suburban, Industry	41.11	1.15	60	O ₃ , NO, NO ₂ , CO, SO ₂ , H ₂ S, PM ₁₀ , PM _{2.5}	PM ₁₀ , As, Cd, Ni, Pb, C ₆ H ₆

Table S2.

Date	Start (UTC)	End (UTC)	Direction	Height (m a.s.l.)	Instrumentation
14/07/2015	07:06	08:21	ascending	520-1452	CPC-O ₃
	13:49	15:03	ascending	520-871	SMPS-O ₃
15/07/2015	07:07	07:36	ascending	520-1262	SMPS-O ₃
	07:36	08:22	descending	1262-520	SMPS-O ₃
	08:37	09:04	ascending	520-1069	SMPS-O ₃
16/07/2015	06:28	06:35	ascending	520-736	SMPS-O ₃
	06:35	07:23	constant height	709-736	SMPS-O ₃
	07:23	07:26	ascending	714-859	SMPS-O ₃
	07:26	09:40	constant height	860-870	SMPS-O ₃
	09:40	10:10	ascending	870-1350	SMPS-O ₃
17/07/2015	07:39	07:52	ascending	545-1002	CPC-O ₃
	07:52	08:29	constant height	999-1009	CPC-O ₃
	08:29	08:40	descending	999-607	CPC-O ₃
	08:40	09:25	constant height	599-610	CPC-O ₃
	09:42	10:51	ascending	517-1548	CPC-O ₃

Table S3.

Meteo station	Latitude (°N)	Longitude	Height (m a.s.l.)
Gurb	41.95	2.23	509
Muntanyola	41.88	2.18	816
Parets del Vallès	41.57	2.23	123
Núria	42.40	2.16	1971
Sant Cugat del Vallès	41.48	2.08	158
Barcelona - el Raval	41.38	2.17	33
Barcelona - Zona Universitària	41.38	2.11	79
Castell d'Aro	41.81	3.03	14
Oliola	41.88	1.15	443
Montseny	41.78	2.36	720
Montsec	42.05	0.73	1570
Ponts	41.91	1.19	363

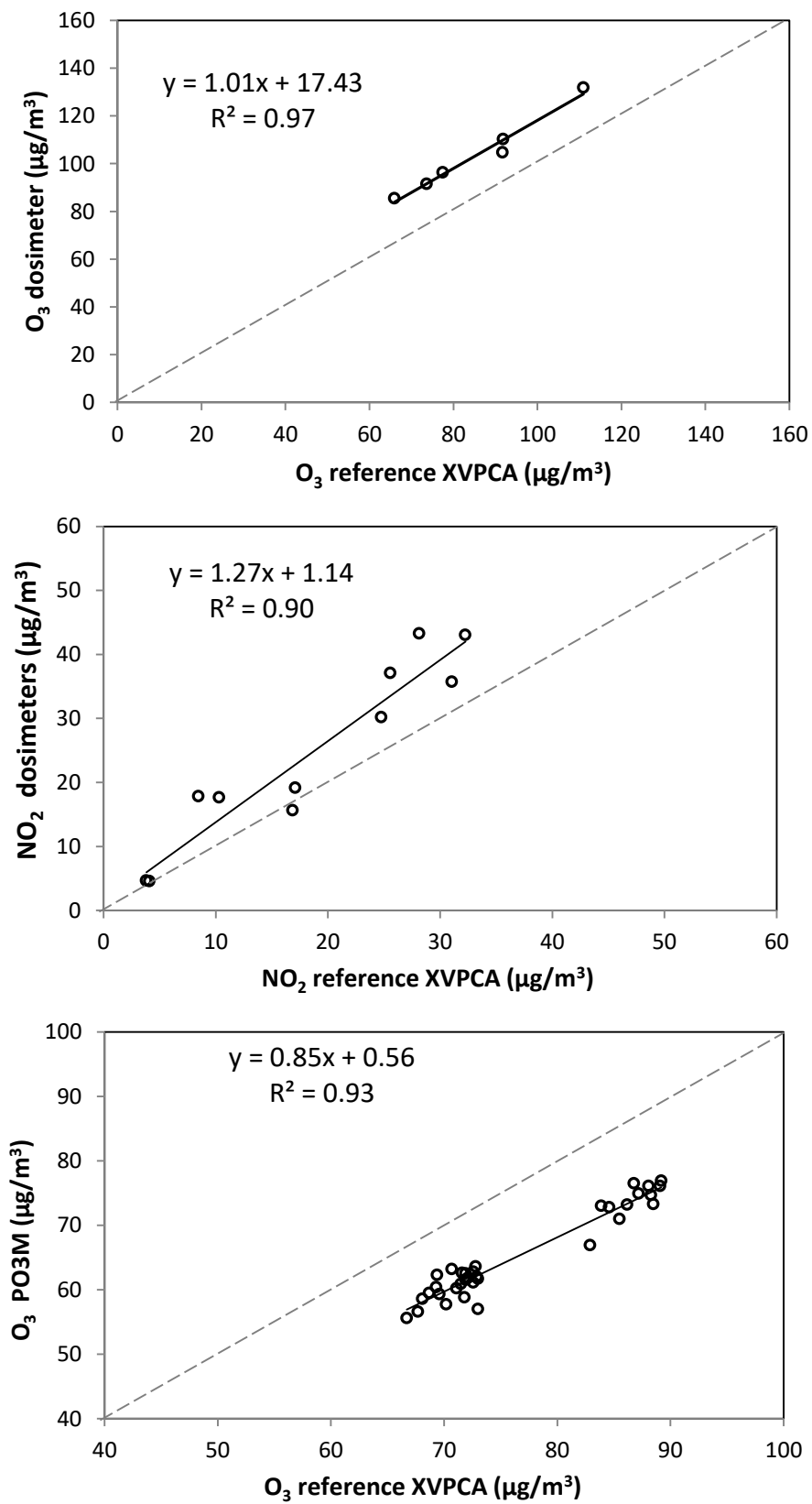


Figure S1.

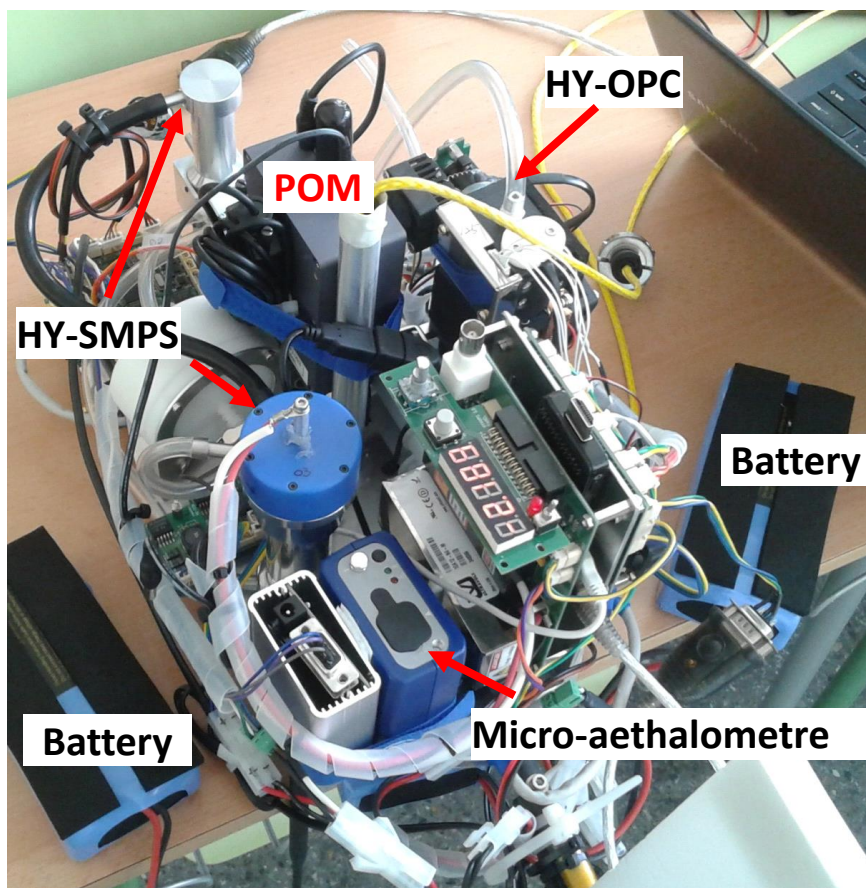


Figure S2.

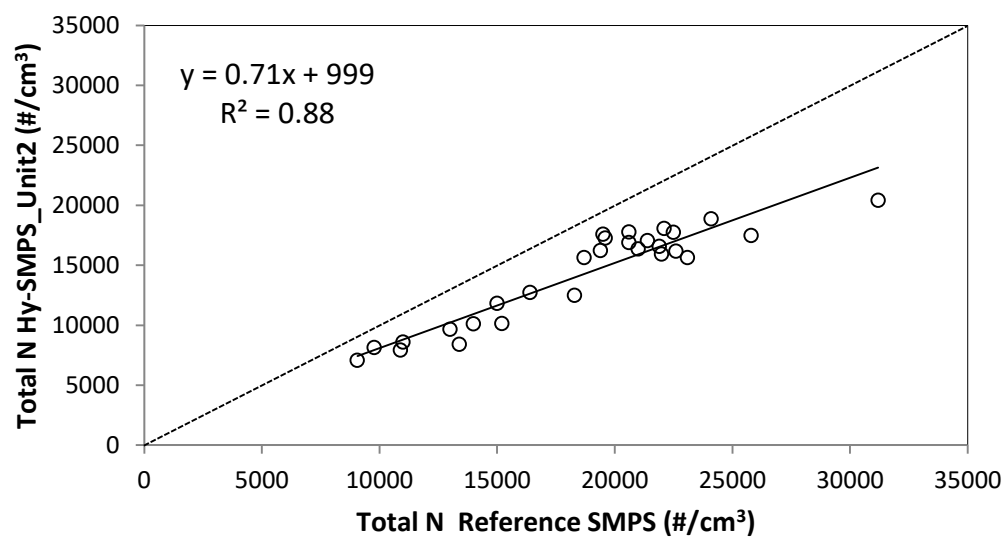


Figure S3.

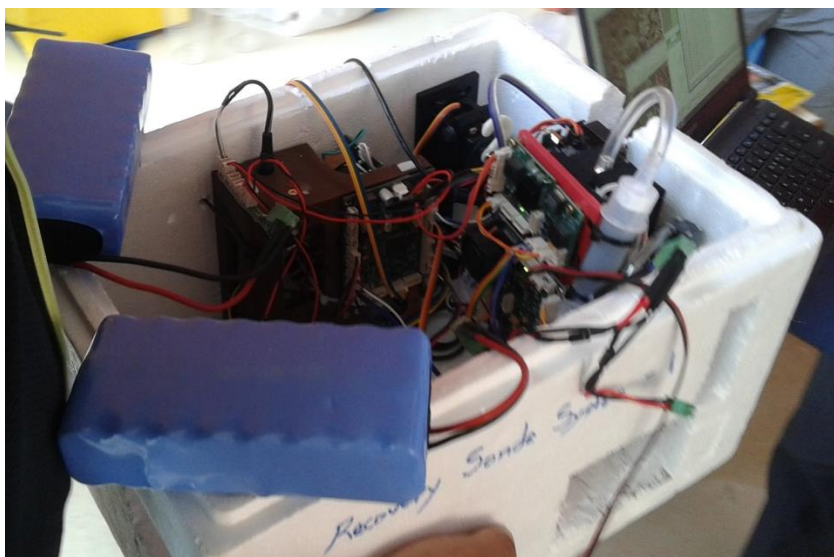


Figure S4.

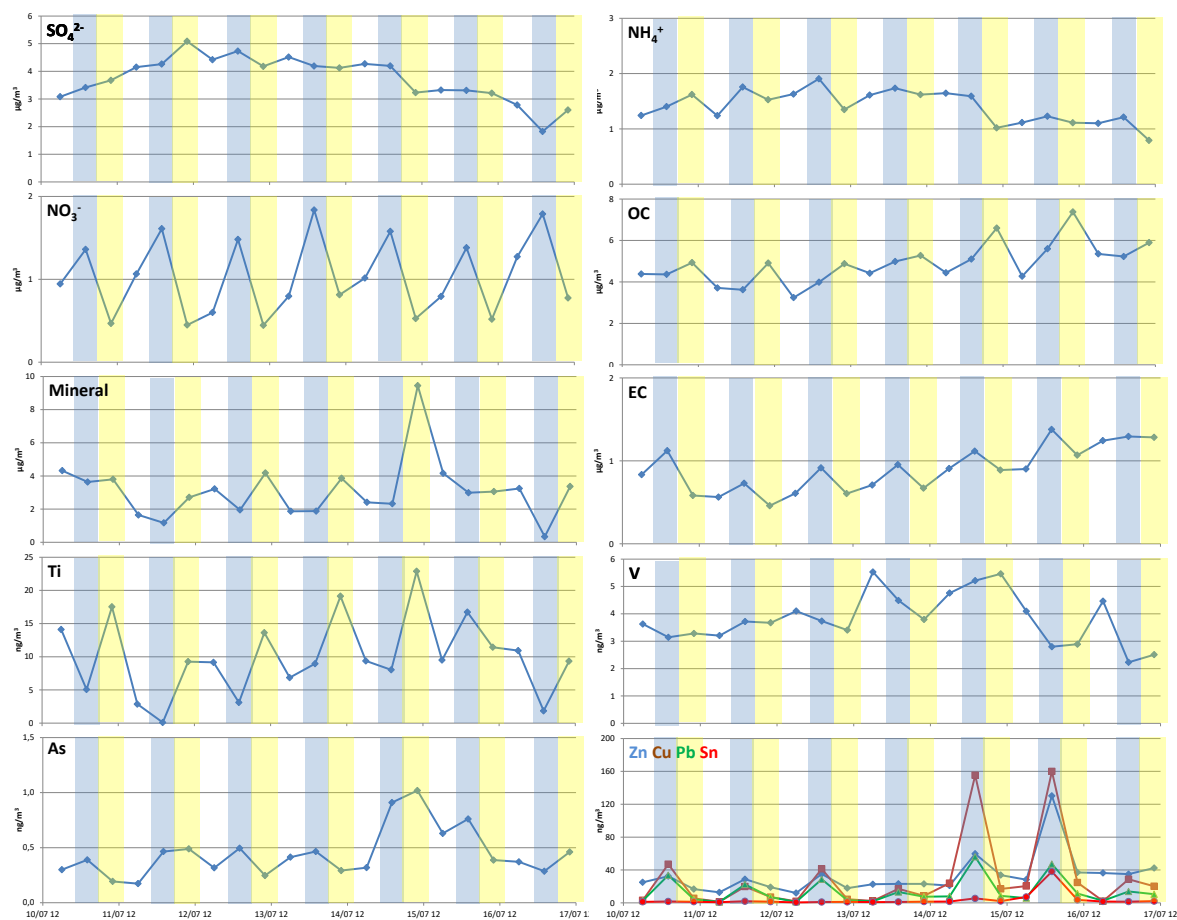


Figure S5

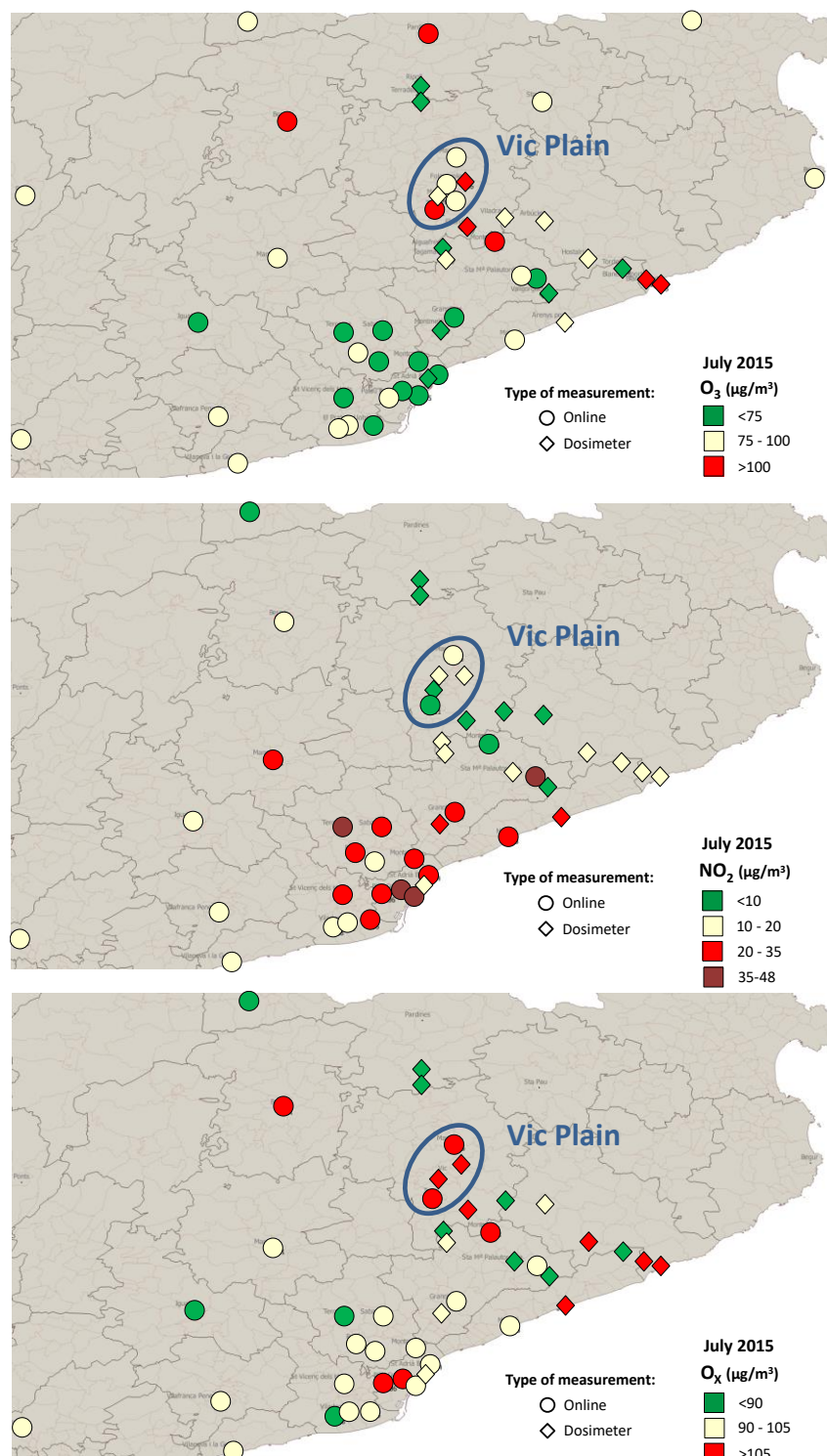


Figure S5.