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Source apportionment of NMVOCs in the Kathmandu Valley during the SusKat-ABC international field campaign using positive matrix factorization

Chinmoy Sarkar et al.

Correspondence to: Vinayak Sinha (vsinha@iisermohali.ac.in)

Table S1. Most likely identity of VOCs (having average mixing ratios > 0.2 ppb) detected at specific protonated m/z ratios, molecular formula, likely mass assignment, reference of previous mass assignment, sensitivity, limit of detection (LOD), average ambient mixing ratios (±1 σ)

Protonated m/z or ion	Formula	Most Likely Identity	References of some previously reported studies	Sensitivity (ncps/ppb)	LOD (ppb)	Average (sdev) mixing ratio (ppb)
28.007	HCN	Hydrogen Cyanide	Stockwell et al., 2015; Karl et al., 2003	18.48	0.241	1.56 (0.24)
31.018	HCHO	Formaldehyde	Inomata et al., 2010; Stockwell et al., 2015	18.88	0.103	1.78 (0.50)
33.034	CH_3OH	Methanol	Seco et al., 2011; de Gouw et al., 2003	19.16	0.090	7.42 (1.28)
41.039	C_3H_4	Propyne	Akagi et al., 2011; Stockwell et al., 2015	7.167	0.080	7.67 (1.80)
42.034	CH_3CN	Acetonitrile*	Seco et al., 2011; de Gouw et al., 2003	20.91	0.043	1.08 (0.38)
43.055	C_3H_6	Propene	Stockwell et al., 2015; Park et al., 2013	7.45	0.048	3.98 (1.21)
44.014	NHCO	Isocyanic acid	Warneke et al., 2011	20.64	0.067	0.90 (0.08)
45.033	C_2H_4O	Acetaldehyde*	De Gouw et al., 2003; Seco et al., 2011	20.04	0.262	8.81 (4.58)
45.990	NO_2^+	Nitronium ion from fragmentation of C1-C5 alkyl nitrates	Aoki et al., 2007	20.91	0.094	1.08 (0.24)
46.029	CH_3NO	Methanamide		20.91	0.093	0.76 (0.16)
47.013	CH_2O_2	Formic acid	Jordan et al., 2009; Williams et al., 2001	21.04	0.041	4.96 (1.02)
47.049	C_2H_6O	Ethanol	Park et al., 2013; Seco et al., 2011	21.05	0.361	1.59 (0.85)
51.044	C_4H_2	1,3-Butadiyne$	Yokelson et al., 2013	8.56	0.013	0.67 (0.14)
56.060	C_3H_5N	Propanenitrile$	Yokelson et al., 2013	22.27	0.022	0.21 (0.05)
57.034	C_3H_4O	Acrolein* + Methylketene	Stockwell et al., 2015; Jordan et al., 2009	22.26	0.034	0.80 (0.26)
59.049	C_3H_6O	Acetone* + Propanal	de Gouw et al., 2003; Seco et al., 2011	23.47	0.074	4.21 (0.65)
60.051	C_2H_5NO	Acetamide		22.80	0.069	0.39 (0.05)
61.027	$C_2H_4O_2$	Acetic acid	de Gouw et al., 2007; Stockwell et al., 2015; Seco et al., 2011	22.94	0.440	4.24 (1.21)
62.026	CH_3NO_2	Nitromethane@	Inomata et al., 2014; Akagi et al., 2013	23.07	0.020	0.24 (0.08)
63.026	C_2H_6S	Dimethyl Sulfide	Akagi et al., 2011; Park et al., 2013	23.21	0.049	0.26 (0.03)
67.054	C_5H_6	1,3-Cyclopentadiene	Stockwell et al., 2015	10.78	0.008	0.23 (0.06)
69.033	C_4H_4O	Furan	Stockwell et al., 2015; Jordan et al., 2009	24.02	0.009	0.46 (0.17)
69.070	C_5H_8	Isoprene*	Stockwell et al., 2015; de Gouw et al., 2003; Seco et al., 2011	10.02	0.013	1.11 (0.24)
71.049	C_4H_6O	Methyl vinyl ketone; Methacrolein; Crotonaldehyde*	Seco et al., 2011; Stockwell et al., 2015; de Gouw et al., 2007	27.17	0.017	0.35 (0.10)

73.027	$C_3H_4O_2$	Methylglyoxal	Stockwell et al., 2015; Muller et al., 2012	24.56	0.021	0.31 (0.10)
73.063	C_4H_8O	Methyl ethyl ketone*	de Gouw et al., 2003; Stockwell et al., 2015; Park et al., 2013	21.91	0.036	0.69 (0.12)
75.042	$C_3H_6O_2$	Hydroxyacetone	Christian et al., 2003; Heigenmoser et al., 2013; Stockwell et al., 2015	24.83	0.066	0.63 (0.18)
79.054	C_6H_6	Benzene*	Jordan et al., 2009; de Gouw et al., 2003	13.43	0.013	2.71 (1.17)
83.085	C_6H_{10}	Assorted Hydrocarbons	Stockwell et al., 2015	13.01	0.008	0.45 (0.09)
87.042	$C_4H_6O_2$	2,3-Butanedione	Stockwell et al., 2015; Karl et al., 2007	26.45	0.028	0.35 (0.08)
93.070	C_7H_8	Toluene*	Seco et al., 2011; Jordan et al., 2009	15.78	0.006	1.53 (0.38)
97.031	$C_5H_4O_2$	2-Furaldehyde (furfural)	Ruuskanen et al., 2011; Liu et al., 2012; Li et al., 2013	27.80	0.010	0.26 (0.07)
97.102	C_7H_{12}	Assorted Hydrocarbons	Stockwell et al., 2015	14.96	0.006	0.23 (0.05)
105.070	C_8H_8	Styrene	Jordan et al., 2009; Stockwell et al., 2015	16.07	0.004	0.21 (0.08)
107.086	C_8H_{10}	Xylenes*	Jordan et al., 2009; Stockwell et al., 2015	15.36	0.004	0.97 (0.27)
121.101	C_9H_{12}	Trimethylbenzenes	Muller et al., 2012; Jordan et al., 2009	18.30	0.004	0.38 (0.10)
129.070	$C_{10}H_8$	Naphthalene	Jordan et al., 2009; Stockwell et al., 2015	19.40	0.009	0.33 (0.09)

* VOC sensitivities determined using VOC gas standards in calibration experiments

[$] Observed mass accuracy for 1,3-Butadiyene and Propanenitrile were 21 mDa and 10 mDa, respectively

[@] Corrected for the ^{13}C isotopologues of acetic acid

Table S2. Statistical parameters for the measured species used as PMF input

VOC Species	**Category**	**S/N**	**Min**	**25th**	**Median**	**75th**	**Max**	**N[1]**	**Nbdl[2]**
Hydrogen Cyanide	Weak	3.10	0.29	0.62	0.90	1.79	12.43	969	0
Formaldehyde	Strong	3.93	0.60	1.43	1.80	2.34	5.39	969	0
Methanol	Strong	4.00	3.31	6.69	8.51	10.32	21.79	969	0
Propyne	Strong	4.00	3.37	8.27	10.95	13.73	37.58	969	0
Acetonitrile	Strong	3.95	0.50	1.00	1.47	2.04	5.60	969	0
Propene	Strong	4.00	1.37	3.99	6.03	7.78	18.34	969	0
Isocyanic acid	Strong	3.91	0.94	1.22	1.36	1.61	2.39	969	0
Acetaldehyde	Strong	3.97	3.46	8.83	11.52	15.46	61.96	969	0
Nitronium ion	Strong	3.86	0.81	1.37	1.65	1.97	5.42	969	0
Formamide	Strong	3.71	0.55	0.93	1.20	1.51	2.67	969	0
Formic acid	Strong	4.00	2.42	6.85	7.92	9.61	17.74	969	0
Ethanol	Strong	2.78	bdl	1.16	2.21	3.49	18.63	969	51
1,3-Butadiyne	Strong	3.99	0.13	0.89	1.20	1.51	3.43	969	0
Propanenitrile	Strong	3.77	0.09	0.32	0.40	0.50	0.98	969	0
Acrolein + Methylketene	Strong	3.95	0.40	1.14	1.51	2.06	4.09	969	0
Acetone + Propanal	Strong	3.99	3.55	6.99	8.71	10.38	23.48	969	0
Acetamide	Strong	3.53	0.51	0.69	0.82	0.97	1.53	969	0
Acetic acid	Strong	3.88	4.69	9.31	11.99	15.56	35.04	969	0
Nitromethane	Strong	3.83	0.16	0.37	0.50	0.69	1.85	969	0
Dimethyl Sulfide	Strong	3.46	0.19	0.50	0.56	0.63	2.35	969	0
1,3-Cyclopentadiene	Strong	3.97	0.14	0.36	0.50	0.70	4.42	969	0
Furan	Strong	3.98	0.19	0.66	1.14	1.52	3.38	969	0
Isoprene	Strong	4.00	0.28	1.76	2.39	3.43	11.25	969	0
Methyl vinyl Ketone + Methacrolein	Strong	3.94	0.18	0.61	0.81	1.11	3.08	969	0
Methylglyoxal	Strong	3.89	0.18	0.56	0.76	1.01	2.27	969	0
Methyl ethyl ketone	Strong	3.93	0.37	1.30	1.73	2.18	4.93	969	0
Hydroxyacetone	Strong	3.74	0.27	1.17	1.54	2.15	4.47	969	0
Benzene	Strong	4.00	0.95	3.98	6.79	10.11	37.35	969	0
Assorted Hydrocarbons	Strong	3.99	0.10	0.78	1.10	1.66	6.88	969	0
2,3-Butanedione	Strong	3.86	0.16	0.80	1.04	1.36	3.35	969	0
Toluene	Strong	4.00	0.51	3.09	4.51	6.54	30.71	969	0
2-Furaldehyde (furfural)	Strong	3.96	0.18	0.61	0.83	1.15	2.23	969	0
Assorted Hydrocarbons	Strong	3.97	0.08	0.48	0.70	1.03	3.03	969	0
Styrene	Strong	3.98	0.09	0.41	0.67	1.06	3.32	969	0
Xylenes	Strong	4.00	0.31	2.12	3.19	4.79	24.73	969	0
Trimethylbenzenes	Strong	3.99	0.17	0.94	1.39	2.14	10.44	969	0
Naphthalene	Strong	3.97	0.28	0.92	1.44	2.00	6.94	969	0

1. Number of valid hourly VOC samples; 2. Number of samples below detection limit

Table S3: Percentage contribution of PMF derived factors obtained from constrained runs with 5-, 6-, 7-, 8- and 9-Factors

PMF solutions	RB + WD	BK	BK2	MCS	TR	MI	UI	BG	MD	SE
5-Factor	19.2	23.7	-	23.9	-	-	-	13.4	19.8	-
6-Factor	15.6	18.4	-	-	20.1	21.5	-	11.7	12.7	-
7-Factor	12.3	14.7	-	-	17	19.5	-	8.2	13.8	14.7
8-Factor	10.9	10.4	-	-	16.8	14	17.9	10	9.2	10.8
9-Factor	10.5	12.2	7.7	-	15.6	9.5	15.5	7	9.8	12.2

RB + WD = Residential biofuel use and waste disposal; BK = Biomass co-fired brick kilns; BK2 = Second brick kiln factor; MCS = Mixed combustion sources; TR = Traffic; MI = Mixed industrial; UI = Unresolved industrial; BG = Biogenic; MD = Mixed daytime; SE = Solvent evaporation

Table S4. Correlation coefficient (r) between the time series of PMF resolved factors and other independent meteorological parameters (solar radiation, ambient temperature, change in solar radiation, change in ambient temperature, wind speed, wind direction, relative humidity and absolute humidity) for a) daytime period (06:00 – 17:00 LT) and b) nighttime period (17:00 – 06:00 LT)

a)	**SE**	**MD**	**BG**	**RB+WD**	**BK**	**MI**	**UI**	**TR**	**SR**	**AT**	**ΔSR**	**ΔAT**	**WS**	**RH**	**AH**
SE	1.00	-													
MD	-0.22	1.00	-												
BG	-0.01	-0.01	1.00	-											
RB+WD	-0.01	-0.35	0.10	1.00	-										
BK	0.23	-0.55	-0.31	0.18	1.00	-									
MI	0.07	-0.68	-0.28	**0.51**	**0.54**	1.00	-								
UI	**0.55**	-0.49	-0.17	-0.24	0.37	0.06	1.00	-							
TR	0.05	-0.33	0.27	0.21	-0.19	0.17	-0.02	1.00	-						
SR	0.23	**0.58**	**0.57**	-0.35	-0.51	-0.65	-0.16	-0.10	1.00	-					
AT	-0.11	**0.74**	0.31	-0.41	-0.74	-0.79	-0.23	-0.07	**0.71**	1.00	-				
ΔSR	**0.62**	-0.47	0.15	0.14	0.38	0.29	0.46	-0.08	0.11	-0.46	1.00	-			
ΔAT	**0.64**	-0.06	0.33	-0.06	0.03	-0.07	0.28	-0.04	**0.50**	0.02	**0.67**	1.00	-		
WS	-0.35	**0.57**	-0.05	-0.23	-0.50	-0.48	-0.39	0.00	0.13	**0.63**	-0.71	-0.45	1.00	-	
RH	0.10	-0.82	-0.31	0.42	**0.65**	**0.74**	0.37	0.10	-0.75	-0.91	0.45	-0.05	-0.62	1.00	-
AH	0.21	-0.27	0.08	0.02	-0.17	-0.11	0.49	0.11	-0.02	0.13	0.20	0.16	-0.11	0.25	1.00
b)	**SE**	**MD**	**BG**	**RB+WD**	**BK**	**MI**	**UI**	**TR**	**SR**	**AT**	**ΔSR**	**ΔAT**	**WS**	**RH**	**AH**
SE	1.00	-													
MD	0.14	1.00	-												
BG	-0.25	-0.18	1.00	-											
RB+WD	0.34	-0.10	**0.58**	1.00	-										
BK	-0.20	-0.38	-0.07	-0.33	1.00	-									
MI	-0.25	-0.60	0.08	0.04	0.32	1.00	-								
UI	0.29	-0.29	-0.58	-0.47	0.38	-0.03	1.00	-							
TR	0.17	-0.36	0.36	0.46	-0.24	0.14	-0.24	1.00	-						
SR	0.10	0.11	0.05	-0.04	-0.17	-0.28	-0.01	0.32	1.00	-					
AT	0.47	0.36	0.15	0.48	-0.59	-0.58	-0.18	0.37	0.44	1.00	-				
ΔSR	-0.17	-0.22	-0.03	-0.02	0.25	0.38	0.04	-0.34	-0.83	-0.59	1.00	-			
ΔAT	-0.12	0.00	-0.06	-0.21	0.09	0.08	0.08	-0.11	-0.09	-0.14	0.21	1.00	-		
WS	0.30	0.43	-0.02	0.07	-0.35	-0.53	-0.09	0.15	**0.55**	**0.70**	-0.78	-0.15	1.00	-	
RH	-0.59	-0.49	-0.07	-0.44	0.40	0.48	0.25	-0.26	-0.44	-0.80	**0.59**	0.16	-0.66	1.00	-
AH	0.04	-0.06	0.18	0.26	-0.43	-0.33	0.03	0.21	0.05	0.55	-0.08	-0.05	0.21	0.04	1.00

SE = Solvent evaporation; MD = Mixed daytime; BG = Biogenic; RB+WD = Residential biofuel use and waste disposal; BK = Biomass co-fired brick kilns; MI = Mixed industrial emissions; UI = Unresolved industrial emissions; TR = Traffic; SR = Solar radiation; AT = Ambient temperature; ΔSR = Rate of change in solar radiation (dSR/dt); ΔAT = Rate of change in ambient temperature (dT/dt); WS = Wind speed; RH = Relative humidity; AH = Absolute humidity

Table S5. Correlation coefficient (r) between the time series of the input parameters for the PMF model

	m28.007	*m31.018*	*m33.034*	*m41.039*	*m42.034*	*m43.055*	*m44.014*	*m45.033*	*m45.990*	*m46.029*	*m47.013*	*m47.049*	*m51.044*	*m56.060*	*m57.034*	*m59.049*	*m60.051*	*m61.027*	*m62.026*	*m63.026*	*m67.054*	*m69.033*	*m69.070*	*m71.049*	*m73.027*	*m73.063*	*m75.042*	*m79.054*	*m83.085*	*m87.042*	*m93.070*	*m97.031*	*m97.102*	*m105.070*	*m107.086*	*m121.101*	*m129.070*
m28.007	1.00																																				
m31.018	0.04	1.00																																			
m33.034	0.16	0.35	1.00																																		
m41.039	0.25	0.24	0.79	1.00																																	
m42.034	0.09	0.06	0.79	0.65	1.00																																
m43.055	0.17	0.18	0.84	0.93	0.78	1.00																															
m44.014	-0.02	0.55	0.23	-0.01	0.27	0.03	1.00																														
m45.033	0.04	0.72	0.52	0.37	0.44	0.39	0.51	1.00																													
m45.990	-0.19	0.65	0.05	-0.24	-0.13	-0.18	0.51	0.37	1.00																												
m46.029	-0.22	0.60	0.09	-0.22	0.12	-0.14	0.85	0.59	0.69	1.00																											
m47.013	-0.09	0.77	0.03	-0.14	-0.18	-0.16	0.54	0.52	0.70	0.65	1.00																										
m47.049	0.15	0.15	0.65	0.66	0.70	0.73	0.05	0.43	-0.22	-0.04	-0.20	1.00																									
m51.044	0.09	0.36	0.90	0.73	0.64	0.80	0.12	0.48	0.10	0.05	0.14	0.54	1.00																								
m56.060	0.15	0.36	0.84	0.88	0.71	0.91	0.18	0.47	-0.02	0.02	0.03	0.63	0.86	1.00																							
m57.034	0.15	0.55	0.81	0.80	0.64	0.81	0.25	0.64	0.06	0.11	0.18	0.59	0.82	0.87	1.00																						
m59.049	0.17	0.58	0.68	0.70	0.45	0.66	0.22	0.68	0.24	0.13	0.38	0.42	0.74	0.75	0.79	1.00																					
m60.051	-0.09	0.64	0.24	0.03	0.13	0.05	0.82	0.48	0.68	0.80	0.68	-0.05	0.26	0.28	0.29	0.46	1.00																				
m61.027	0.01	0.86	0.50	0.32	0.26	0.31	0.58	0.82	0.53	0.57	0.75	0.19	0.53	0.46	0.69	0.69	0.63	1.00																			
m62.026	0.08	0.30	0.80	0.65	0.91	0.76	0.38	0.66	0.02	0.25	0.09	0.70	0.68	0.72	0.76	0.61	0.25	0.54	1.00																		
m63.026	0.09	0.52	0.61	0.53	0.54	0.60	0.33	0.65	0.20	0.30	0.39	0.52	0.65	0.66	0.64	0.69	0.38	0.58	0.70	1.00																	
m67.054	0.21	0.27	0.53	0.75	0.39	0.65	0.00	0.34	-0.14	-0.18	0.07	0.43	0.51	0.63	0.65	0.67	0.11	0.35	0.46	0.43	1.00																
m69.033	0.22	0.13	0.77	0.90	0.73	0.90	-0.04	0.29	-0.34	-0.25	-0.25	0.68	0.70	0.85	0.81	0.60	-0.02	0.24	0.69	0.50	0.66	1.00															
m69.070	0.19	0.53	0.37	0.51	0.03	0.37	0.03	0.46	0.15	-0.05	0.46	0.15	0.46	0.46	0.55	0.79	0.27	0.56	0.23	0.49	0.70	0.34	1.00														
m71.049	0.17	0.56	0.70	0.78	0.46	0.73	0.16	0.61	0.03	0.01	0.24	0.47	0.75	0.81	0.95	0.86	0.28	0.68	0.61	0.62	0.73	0.75	0.73	1.00													
m73.027	-0.02	0.84	0.35	0.33	0.00	0.27	0.36	0.55	0.48	0.36	0.70	0.06	0.50	0.48	0.65	0.67	0.57	0.83	0.24	0.49	0.40	0.26	0.66	0.73	1.00												
m73.063	0.21	0.66	0.64	0.70	0.33	0.63	0.17	0.62	0.26	0.08	0.41	0.38	0.71	0.72	0.79	0.95	0.42	0.70	0.50	0.64	0.65	0.59	0.83	0.87	0.75	1.00											
m75.042	0.17	0.74	0.60	0.57	0.26	0.52	0.22	0.60	0.30	0.16	0.50	0.28	0.69	0.66	0.84	0.79	0.41	0.82	0.45	0.56	0.55	0.54	0.72	0.87	0.86	0.87	1.00										
m79.054	0.20	0.01	0.73	0.70	0.89	0.78	0.10	0.36	-0.18	-0.05	-0.22	0.64	0.59	0.69	0.62	0.51	0.05	0.19	0.82	0.50	0.51	0.76	0.17	0.50	-0.01	0.41	0.28	1.00									
m83.085	0.16	0.46	0.32	0.48	-0.01	0.35	-0.03	0.39	0.10	-0.12	0.41	0.13	0.44	0.44	0.51	0.78	0.23	0.50	0.18	0.47	0.67	0.33	0.98	0.71	0.64	0.80	0.66	0.12	1.00								
m87.042	0.13	0.66	0.52	0.60	0.17	0.52	0.14	0.45	0.22	0.04	0.49	0.24	0.65	0.65	0.78	0.78	0.38	0.71	0.36	0.56	0.64	0.56	0.79	0.87	0.87	0.86	0.93	0.22	0.78	1.00							
m93.070	0.17	0.28	0.62	0.77	0.37	0.74	-0.08	0.23	-0.01	-0.23	0.07	0.37	0.69	0.73	0.67	0.76	0.16	0.35	0.45	0.54	0.74	0.68	0.67	0.75	0.50	0.78	0.62	0.52	0.69	0.72	1.00						
m97.031	0.17	0.70	0.61	0.65	0.37	0.58	0.27	0.63	0.13	0.15	0.39	0.39	0.61	0.68	0.86	0.77	0.39	0.75	0.54	0.57	0.63	0.66	0.69	0.89	0.76	0.83	0.91	0.39	0.64	0.89	0.60	1.00					
m97.102	0.23	0.52	0.38	0.55	0.03	0.42	-0.02	0.43	0.09	-0.12	0.42	0.18	0.49	0.50	0.58	0.81	0.24	0.54	0.23	0.50	0.71	0.41	0.98	0.76	0.68	0.86	0.75	0.17	0.97	0.84	0.74	0.73	1.00				
m105.070	0.23	0.18	0.64	0.86	0.52	0.82	-0.10	0.22	-0.27	-0.31	-0.15	0.49	0.64	0.79	0.76	0.66	0.02	0.26	0.52	0.43	0.75	0.87	0.51	0.79	0.39	0.67	0.59	0.66	0.51	0.66	0.85	0.67	0.59	1.00			
m107.086	0.15	0.27	0.54	0.71	0.25	0.67	-0.12	0.15	-0.01	-0.27	0.07	0.28	0.62	0.66	0.61	0.69	0.13	0.32	0.32	0.40	0.68	0.61	0.64	0.70	0.51	0.74	0.61	0.40	0.67	0.71	0.97	0.57	0.73	0.81	1.00		
m121.101	0.16	0.22	0.51	0.73	0.24	0.67	-0.16	0.12	-0.10	-0.33	0.03	0.30	0.60	0.65	0.59	0.68	0.08	0.27	0.31	0.40	0.69	0.64	0.64	0.69	0.48	0.72	0.58	0.39	0.68	0.71	0.96	0.57	0.73	0.84	0.99	1.00	
m129.070	0.29	0.28	0.63	0.73	0.61	0.71	0.02	0.48	-0.12	-0.10	0.06	0.54	0.60	0.69	0.68	0.75	0.14	0.39	0.68	0.63	0.71	0.72	0.59	0.71	0.32	0.71	0.56	0.81	0.56	0.57	0.71	0.65	0.62	0.76	0.59	0.61	1.00

Figure S1. Collection of garbage burning grab samples in the Kathmandu Valley (on left) and the instrumental setup for the analysis (on right)

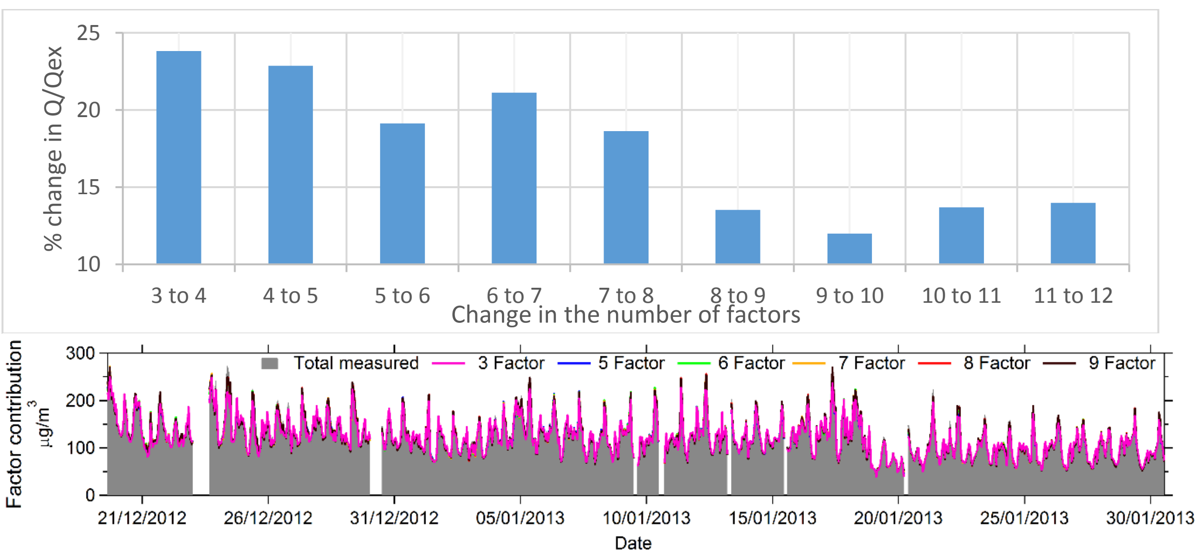

Figure S2. Relative change in the Q/Qexpected ratio with change in factor number (top) and time series of the total measured VOC mass (grey filled) and the modelled VOC mass for different number of factors in the PMF solution (bottom).

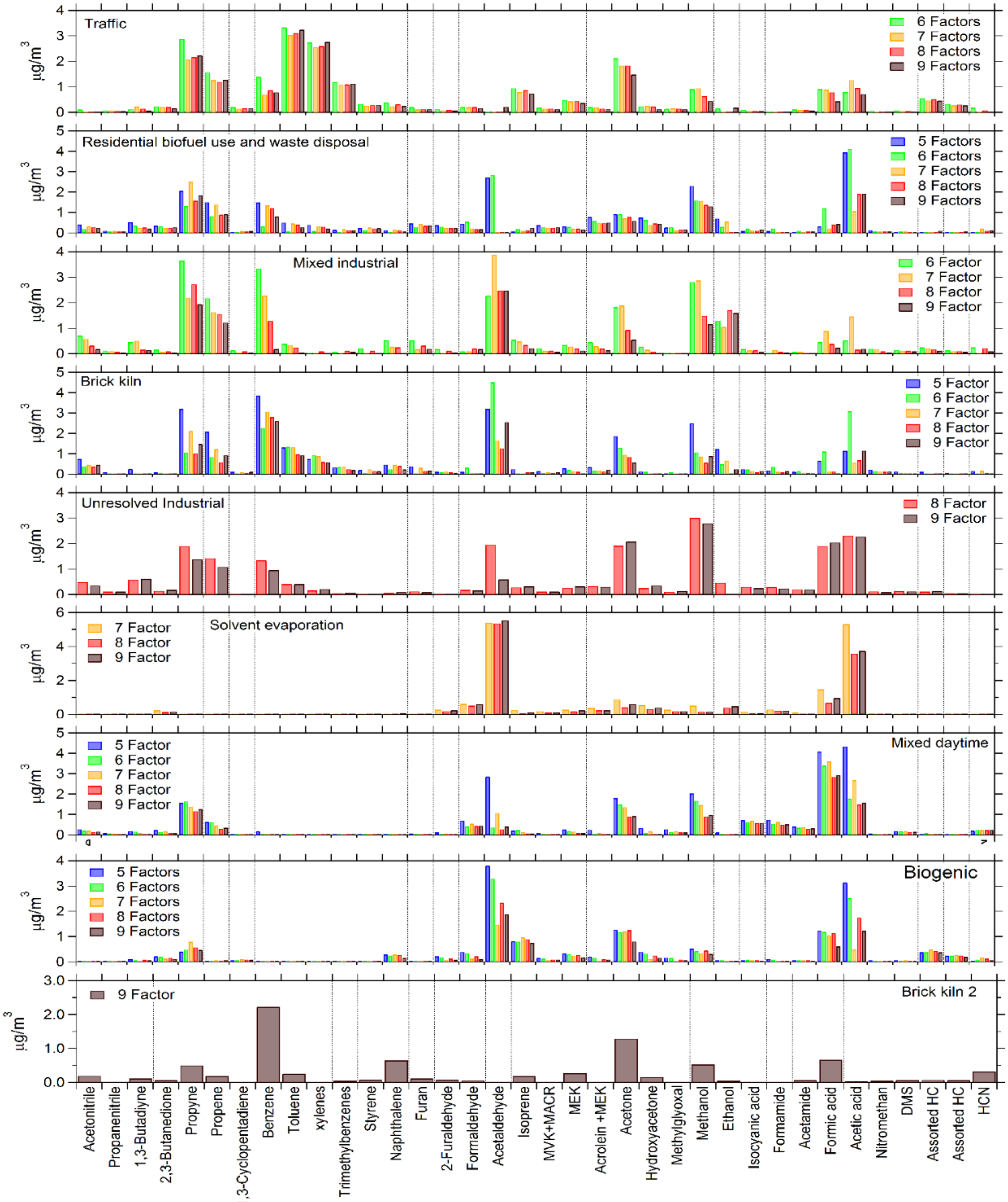

Figure S3a. Evolution of the factor profiles of the eight sources identified, and the 9th source which is considered to arise due to splitting of the brick kiln factor, from the 5 Factor to the 9 Factor solution.

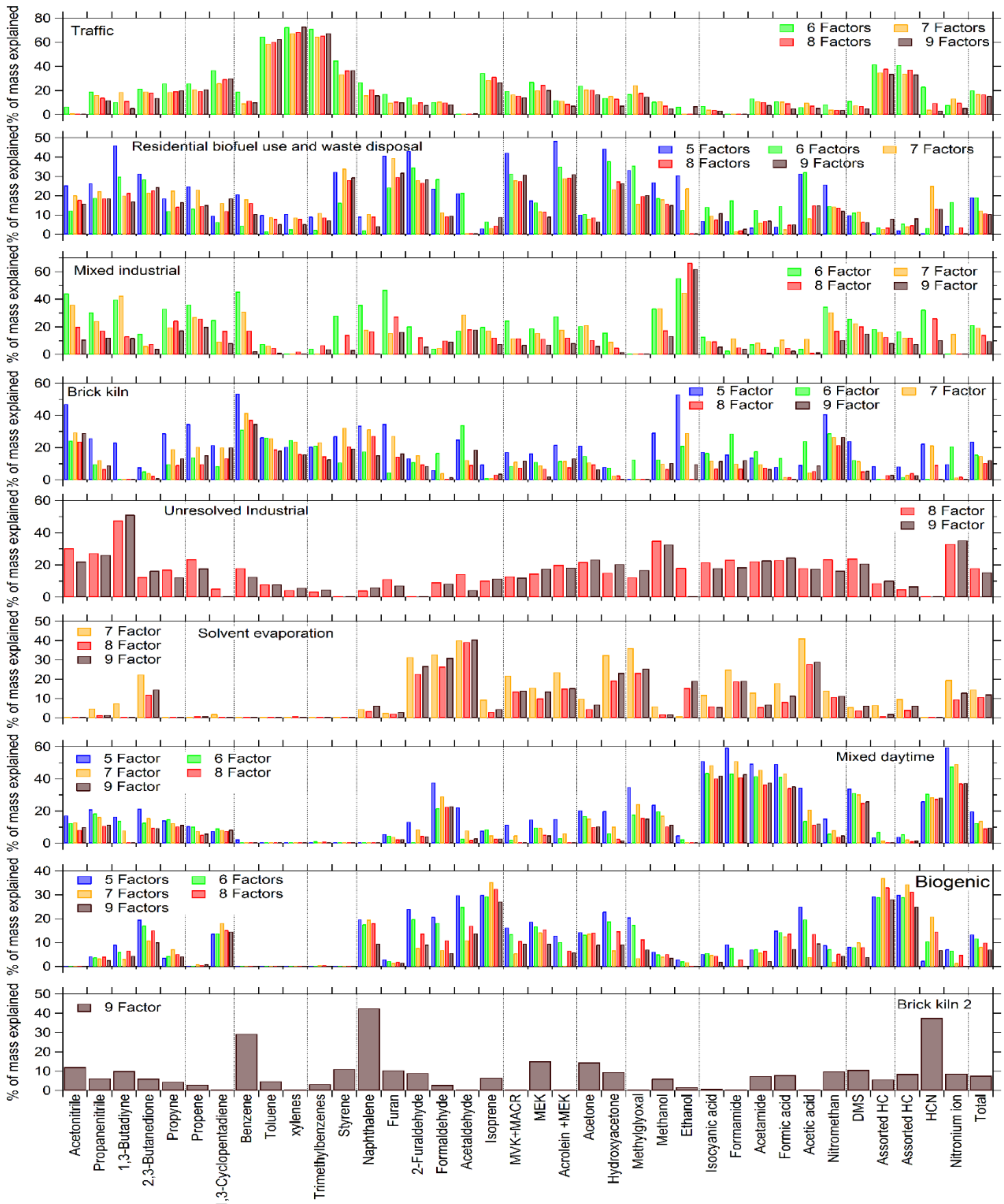

Figure S3b. Evolution of the percentage of the mass of each compound explained by the eight sources identified, and the 9th source which is considered to arise due to splitting of the brick kiln factor, from the 5 Factor to the 9 Factor solution.

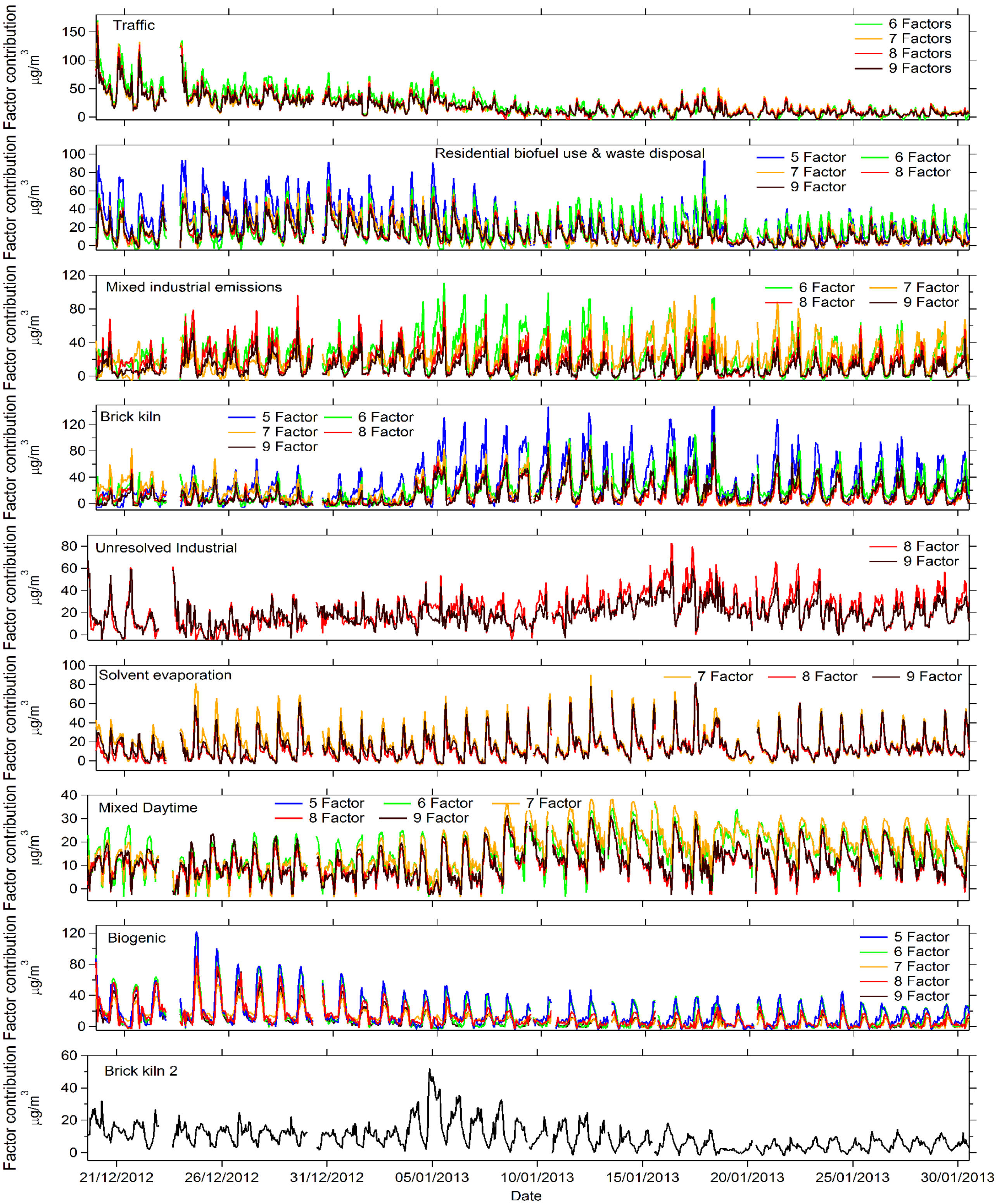

Figure S3c Evolution of the factor contribution of the eight sources identified, and the 9th source which is considered to arise due to splitting of the brick kiln factor, from the 5 Factor to the 9 Factor solution.

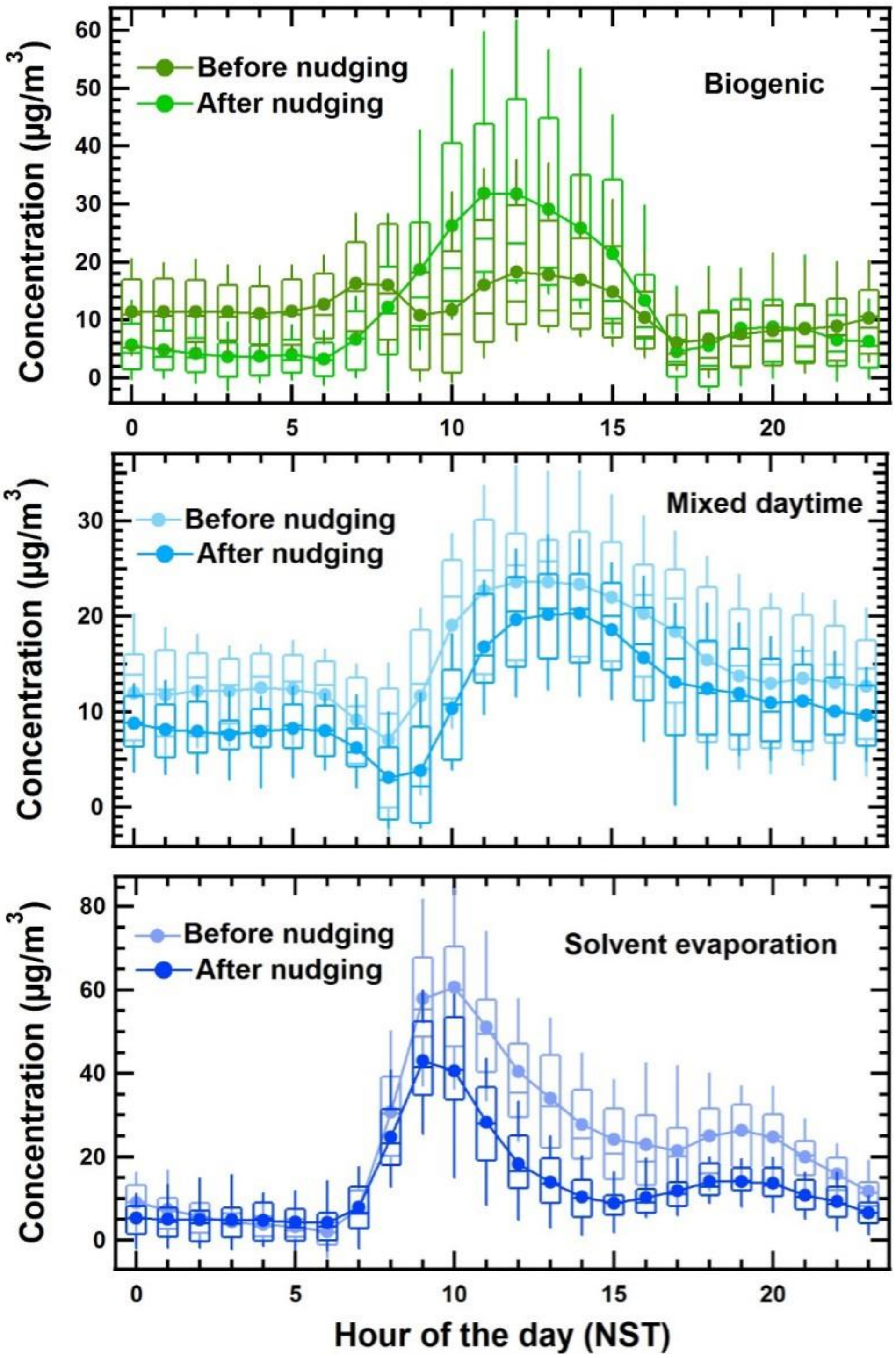

Figure S4. Comparison of the diel profiles of biogenic emissions, mixed daytime and solvent evaporation factors before and after nudging

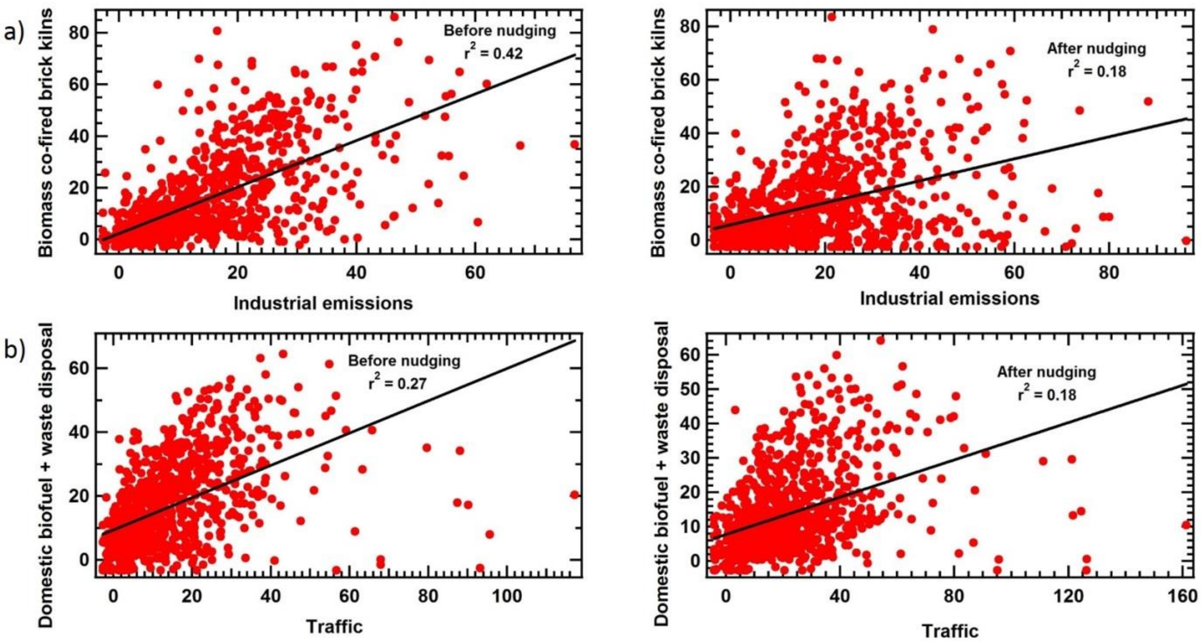

Figure S5. Comparison of the G-space plots between a) biomass co-fired brick kilns and mixed industrial emissions and b) residential biofuel use and waste disposal and traffic before and after nudging

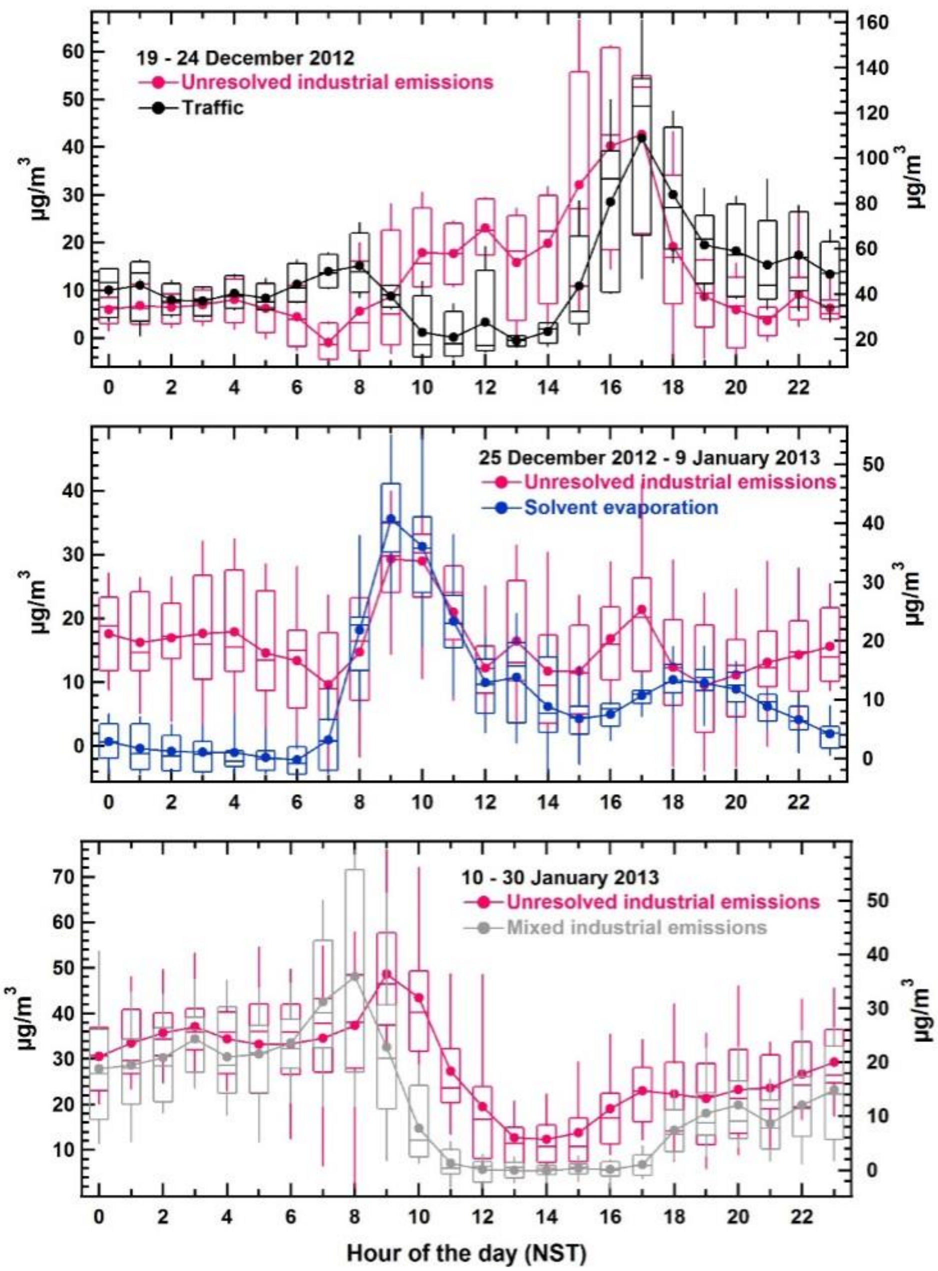

Figure S6. Comparison of the diel profile of the unresolved industrial emissions with that of traffic (19 – 24 December 2012), solvent evaporation (25 December 2012 – 9 January 2013) and mixed industrial emissions (10 – 30 January 2013)

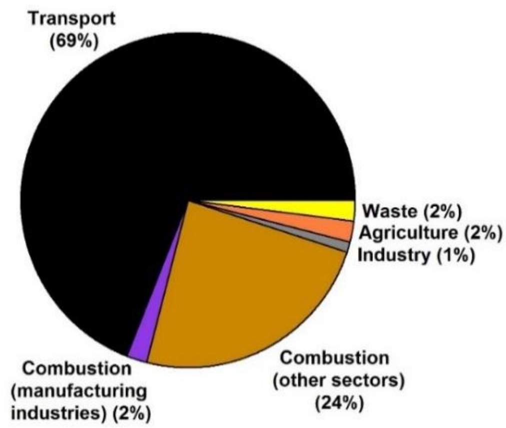

Figure S7. Emissions of particulate matter (sum of PM10 and PM2.5) and CO from different sectors in Kathmandu and Lalitpur (Pradhan et al, 2012)

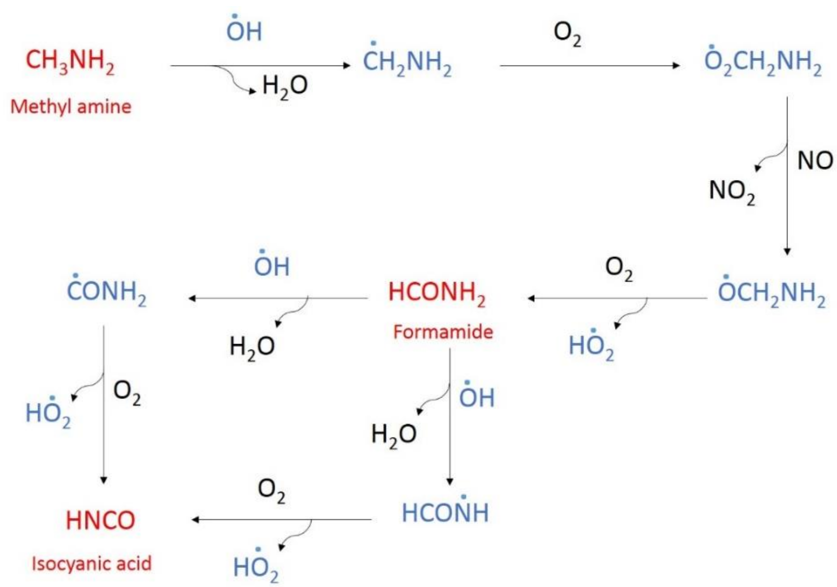

Figure S8. Reaction schematic for the formation of formamide and isocyanic acid (blue colored species represents radicals)

Figure S8 represents the reaction schematic of the proposed mechanism for the formation of formamide, acetamide and isocyanic acid based on the previous laboratory experiments which shows that photooxidation of alkyl amines leads to the formation of formamide and acetamide which undergoes further photooxidation to form isocyanic acid which can have severe health impact at concentration thresholds above 1 ppb (Roberts et al., 2011;Roberts et al., 2014). This study provides the first ever ambient evidence of the photochemical source of isocyanic acid by quantification of both the amides (the precursor) and isocyanic acid (the product) collectively and the source apportionment of these compounds in the Kathmandu Valley.

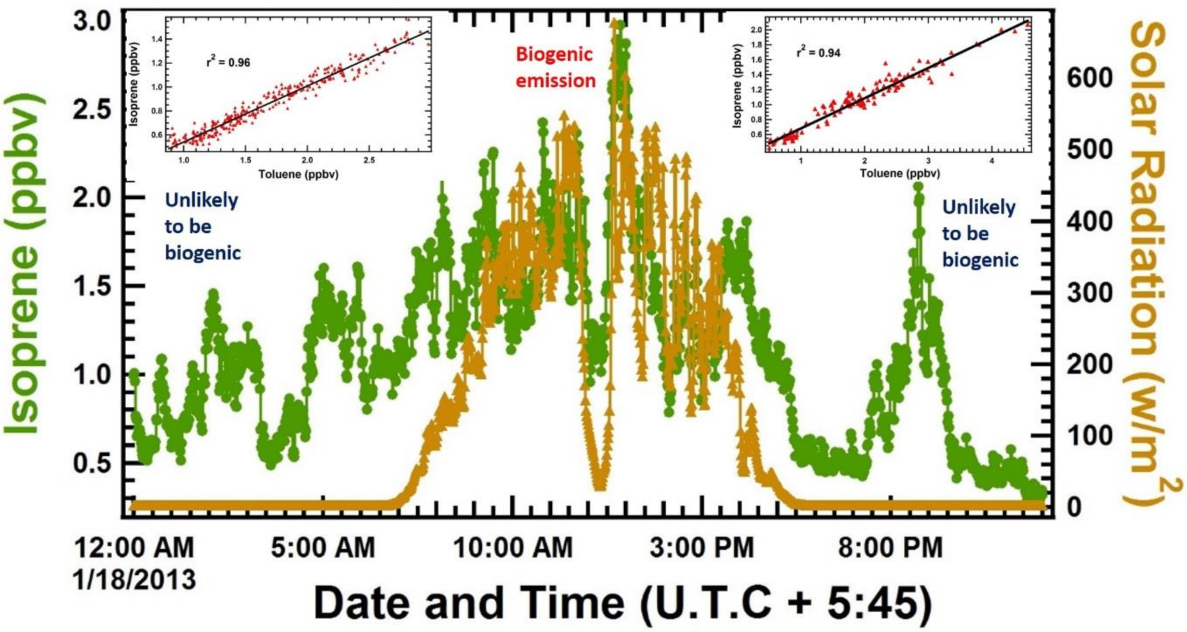

Figure S9. Shows a representative day's (18 January 2013) isoprene data against solar radiation. It can be observed from the figure that the daytime isoprene emission correlates very nicely with solar radiation which indicates biogenic emission while during evening hours and night time, isoprene showed high peaks that shows excellent correlation with toluene.

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