Supplement of Atmos. Chem. Phys., 21, 6315–6330, 2021
https://doi.org/10.5194/acp-21-6315-2021-supplement

Atmospheric Chemistry and Physics
Open Access
EGU

Supplement of

Observations of speciated isoprene nitrates in Beijing: implications for isoprene chemistry

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Supplementary Information

S1. Isoprene Nitrate Chemistry

A detailed description of the gas-phase chemistry of isoprene and its major oxidation products is given in the recent review by Wennberg et al. (2018) (hereafter referred to as W2018). In this section a summary of the chemistry relating to IN (largely based on W2018) is provided with a focus on those IN that we are able to measure in the field.

S1.1. Formation of First Generation IN via Oxidation of Isoprene by OH

The OH reaction dominates accounting for around 85 % of the reactive fate of isoprene largely due to concurrent daytime presence of isoprene and OH. On addition of OH to isoprene 6 OH-adducts are formed. Addition at C2 and C3 constitute only very minor channels (<1% (Teng et al., 2017), 8% in the MCM (Jenkin et al., 2015)). The 4 main adducts are formed through C1 and C4 addition (approximately in a 63:37 ratio (Teng et al., 2017), each with a pair of *cis* (Z) and *trans* (E) isomers (approximately 50:50 *cis*:*trans* for 1-OH adducts and 70:30 *cis*:*trans* for 4-OH adducts) (W2018). The MCM uses these branching ratios for C1:C4 addition and *cis*:*trans* isomers (Jenkin et al, 2015), On reaction with O_2 these adducts form peroxy radicals (ISOPOO). These reactions are reversible and have differing rate constants which along with rapid 1,6 H atom shift isomerisation of the Z-δ-ISOPOO leading to hydroperoxyaldeyhyde (HPALD), this leads to interconversion of the peroxy radicals within a sub group (i.e. having a common OH position) and an equilibrated thermal peroxy radical distribution that has a greater β:δ ratio to the kinetic one (Teng et al., 2017; Peeters et al., 2009; Peeters et al., 2014). Note, that this change from the kinetic to thermodynamic equilibrium will be more important when the peroxy radical bimolecular lifetimes exceed around 0.01 – 0.1 s, which is not the case when NO is greater than 10 ppb. Uncertainty in the peroxy distribution remains, but β peroxy radicals (i.e. β-(1-OH, 2-OO)-ISOPOO and β-(4-OH, 3-OO)-ISOPOO) dominate over the δ peroxy radicals (i.e. E/Z δ-(1-OH, 4-OO)-ISOPOO and E/Z δ-(4-OH, 1-OO)-ISOPOO).

These peroxy radicals react with nitric oxide (NO) forming primarily alkoxy radicals and nitrogen dioxide (NO_2), but with a channel leading to the production of isoprene hydroxy nitrates (IHN). The rate constants of these reaction do not seem very sensitive to small changes in the structure of the peroxy radical (W2018). However, there is considerably uncertainty over the branching ratio for the formation of the IHN. This is important since the primary reaction leads to O_3 formation, via NO_2 photolysis, and to radical propagation, whilst the formation of IHN acts as a chain-terminating step, with the IHN being a reservoir for NO_X and radicals.

Estimates of the branching ratio for the formation of IHN from these reactions vary from 0.04 to 0.15 (Tuazon at al., 1990; Chen et al., 1998; Chuong et al., 2002; Sprengnether et al., 2002; Patchen et al., 2007; Paulot et al., 2009; Lockwood et al., 2010; Xiong et al., 2015; Teng et al., 2017), with the most recent estimate being 0.13

(Teng et al., 2017). Moreover, the branching ratio is poorly constrained for individual peroxy radicals, with Paulot et al (2009) estimating that they may vary from 0.067 to 0.24 for different isomers whilst Teng et al., (2017) estimate that they differ by only about 10% (i.e. 0.12 to 0.14). It is thought that some of these discrepancies can be explained by the differing experimental techniques used to derive these branching ratios, but there are also uncertainties associated with the temperature and pressure dependencies of these branching ratios (Piletic et al., 2017; W2018).

These reactions of the peroxy radicals with NO are in competition with reactions with the hydro peroxy radical (HO_2) (Jenkin et al., 1998) , other organic peroxy radicals (RO_2) (Jenkin and Hayman, 1995) and H-shift isomerization (Peeters and Nguyen, 2012; Crounse et al., 2011; Teng et al., 2017), all of which have their own uncertainties, which will consequently affect the yield of IHN.

S1.2. Formation of First Generation IN via Oxidation of Isoprene by NO_3

Addition of NO_3 to the isoprene double bond followed by addition of O_2 produces nitrooxy peroxy radicals (INO_2). The NO_3 addition at C1 dominates over C4 by 6:1 and the subsequent addition of O_2 leads to β-INO_2 and δ-INO_2 in approximately a 50:50 ratio, with the β-(1-ONO_2, 2-OO)-INO_2 and δ-(1-ONO_2, 4-OO)-INO_2 dominating (W2018). The E and Z isomers are presumed to be formed in equal amounts and their subsequent chemistry largely the same. The details of this understanding are based largely on one study (Schwantes et al., 2015) and there remains considerable uncertainty (W2018).

These INO_2 can go on to form different types of isoprene derived nitrates through various reaction pathways: 1) isoprene hydroperoxy nitrates (IPN) following reaction of INO_2 with HO_2; 2) isoprene carbonyl nitrates (ICN) from the δ-nitroxy alkoxy radicals formed from the major channel of the δ-INO_2 reaction with NO; 3) ICN from reaction of δ-INO_2 with NO_3; 4) isoprene dinitrates (IDN) in a minor channel following reaction of INO_2 with NO; and 5) IHN and ICN following reactions of INO_2 with RO_2 (including self-reactions of INO_2) (W2018).

In pathway 5, Schwantes et al (2015) reckon that 80% of IHN formed are δ-IHN and 20% are β-IHN. Note that because the NO_3 addition to isoprene occurs at the C1 and C4 positions, the β-IHN formed are β-(2-OH, 1-ONO_2)-IHN and β-(3-OH, 4-ONO_2)-IHN and not the more common β-IHN formed from the OH oxidation of isoprene (i.e. β-(1-OH, 2-ONO_2)-IHN and β-(4-OH, 3-ONO_2)-IHN). The ICN formed from the δ-INO_2 peroxy radicals (in 3 and 5 above) are the E/Z-δ-(1-ONO_2, 4-CO)-ICN and E/Z-δ-(4-ONO_2, 1-CO)-ICN and as the NO_3 addition to isoprene predominantly occurs in the C1 position the main ICN formed are the E/Z-δ-(1-ONO_2, 4-CO)-ICN.

S1.3. Fate of IN and Formation of Second Generation IN

S1.3.1 Reaction with OH

For the dominant β-IHN (i.e. β-(1-OH, 2-ONO_2)-IHN and β-(4-OH, 3-ONO_2)-IHN) reaction with OH occurs via addition to one of the two carbons in the remaining double bond, giving lifetimes of around 6-10 hours for OH mixing ratios of 0.04 ppt at 298K and 993 hPa (based on the rate constants from Teng et al. (2017), Lee et al. (2014), Jacobs et al. (2014) and W2018). The resulting adduct predominantly reacts with O_2 to form a peroxy radical, but a fraction can undergo unimolecular rearrangement to form an isoprene expoxydiol (IEPOX) releasing NO_2 (Jacobs et al., 2014; St Clair et al., 2016; W2018). The peroxy radicals formed can react with NO or with HO_2, potentially releasing NO_2, and in the case of HO_2 form organic hydroperoxides. In theory (Kurtén et al., 2017) both of these reactions have a branch leading to the formation HO_2 and formaldehyde along with second-generation nitrates: methacrolein nitrate ((2-ONO_2, 3-OH)-MACR) in the case of the β-(1-OH, 2-ONO_2)-IHN, and methyl vinyl ketone nitrate ((3-ONO_2, 4-OH)-MVK)) in the case of the β-(4-OH, 3-ONO_2)-IHN. With respect to β-(1-OH, 2-ONO_2)-IHN, however, W2018 states that there is evidence of only low yields of MACR nitrate. There is also evidence of a small yield of dinitrates (Lee et al., 2014).

The mechanisms for the OH oxidation of the β-(2-OH, 1-ONO_2)-IHN and β-(3-OH, 4-ONO_2)-IHN are less well constrained but are thought to yield peroxy radicals which can react with NO and HO_2 to form a range of products including smaller chained carbonyls and nitrates (i.e. MACR nitrate and propanone nitrate from β-(2-OH, 1-ONO_2)-IHN, and MVK nitrate and ethanal nitrate from β-(3-OH, 4-ONO_2)-IHN), but not direct release of NO_2 (W2018), and when HO_2 is the reactant form organic hydroperoxides.

For δ-IHN the reaction rate constants with OH are 2-3 times faster than for the β-IHN, having lifetimes of around 3-4 hours for OH mixing ratios of 0.04 ppt at 298K and 993 hPa (based on the rate constants from Teng et al. (2017), Lee et al. (2014) and W2018). OH adds to the C2 and C3 positions of the δ-IHN followed primarily by O_2 addition to form peroxy radicals, but a minor pathway is decomposition to form IEPOX and NO_2. Similar to the β-IHN, the peroxy radicals react with NO and HO_2 leading to smaller chained carbonyls and nitrates (i.e. MACR nitrate and propanone nitrate from δ-(4-OH, 1-ONO_2)-IHN, and MVK nitrate and ethanal nitrate from δ-(1-OH, 4-ONO_2)-IHN), but not direct release of NO_2.

As for reactions of ICN with OH, Xiong et al., (2016) only measured the rate constants for (4-ONO2, 1-CO)-ICN so W2018 recommends that the one for the major isomer, (1-ONO_2, 4-CO)-ICN, is scaled based on the rate constants of reactions of the respective IHN isomer counterparts with OH. The OH loss rate constants for δ-ICN are slower than for the δ-IHN, instead being similar to those of the β-IHN. Following OH addition, NO_2 release can occur but the dominant products are peroxy radicals following O_2 addition (W2018). Reaction of the peroxy radicals with NO lead to MVK nitrate, ethanal nitrate (Xiong et al., 2016) and propanone nitrate (MCM (http://mcm.york.ac.uk)). H abstraction is of similar importance to OH addition for reactions of OH with δ-ICN oxidation.

S1.3.2 Reaction with O_3

Reaction rate constants of five IHN with O_3 have been reported: (2-OH, 1-ONO_2)-IHN (Lockwood et al., 2010); (1-OH, 2-ONO_2)-IHN (Lockwood et al., 2010; Teng et al., 2017); E-δ-(1-OH, 4-ONO_2)-IHN (Lockwood et al., 2010; Lee et al., 2014); Z-δ-(1-OH, 4-ONO_2)-IHN (Lee et al., 2014); and (4-OH, 3-ONO_2)-IHN (Lee et al., 2014). However, the reaction rate constants of Lockwood et al. (2010) are 2-3 orders of magnitude faster than those of Lee et al. (2014) and Teng et al. (2017). Due to the observed presence of IHN at night (Beaver et al., 2012), W2018 recommend the lower rate constants of Lee et al. (2014) and Teng et al. (2017) (i.e. β-IHN lifetimes of around 500-1000 hours and δ-IHN lifetimes of around 10 hours for O_3 mixing ratios of 40 ppb at 298K and 993 hPa). The rate constant for the reaction of O_3 with one of the ICN has been measure: (1-CO, 4-ONO_2)-ICN (Xiong et al., 2016), giving a lifetime of around 65 hours for O_3 mixing ratios of 40 ppb at 298K and 993 hPa (W2018). Reaction rate constants for all other IHN, IPN and ICN are extrapolated from these rate constants with that for the δ-IN by O_3 oxidation approximately 2 orders of magnitude faster than those of the β-IN (W2018).

Reactions of O_3 with both δ-(4-OH, 1-ONO_2)-IHN and (1-ONO_2, 4-CO)-ICN can lead to propanone nitrate (MCM (http://mcm.york.ac.uk)), so it can be formed from IN both during the day and during the night.

S1.3.3 Reaction with NO_3

For the reactions of IN with NO_3, there has only been one published study which measured the rate constant for the reaction of NO_3 with bulk IHN (Rollins et al., 2009) and one unpublished study that assessed the reaction of NO_3 with (4-OH, 3-ONO_2)-IHN (W2018). Rate constants for all IN can be constrained by extrapolations from these two studies, with the that for the δ-IN by NO_3 oxidation assumed to be 4 times faster than those of the β-IN (W2018).

Reactions of NO_3 with (1-ONO_2, 4-CO)-ICN can also lead to propanone nitrate (MCM, (http://mcm.york.ac.uk)).

S1.3.4 Photolysis

Very few studies provide information on the photolysis of IN. Xiong et al. (2016) measured the absorption cross-section for (1-CO, 4-ONO_2)-ICN and estimated its ambient photolysis frequency to be 3.1 x 10^{-4} s^{-1} for a solar zenith angle of 45° and 4.6 x 10^{-4} s^{-1} for a solar zenith angle of 0°, with photolysis being a dominant daytime sink. Müller et al. (2014) make recommendations for the photolysis rate constants of second-generation IN such as propane nitrates, ethanal nitrate, MACR nitrates and MVK nitrates, based on published values for nitroxy-ketones. They estimate the photolysis rate constants of key carbonyl nitrates from isoprene to be typically between 3 and 20 times higher than their sink due to reaction with OH in relevant atmospheric conditions. Moreover, since the reaction is expected to release NO_2, photolysis is especially effective in recycling NO_X. Xiong et al. (2015) found that when they enhanced the photolysis rate constants of the IHN in their model to about 30-50% of their total loss, they had better agreement with observed mixing ratios.

S1.3.5 Hydrolysis

Very little is known about this, but hydrolysis lifetimes of 18 h and 2.5 min have been reported for (4-OH, 3-ONO_2)-IHN and (1-OH, 4-ONO_2)-IHN (Jacobs et al., 2014) and a further unpublished study suggests that (1-OH, 2-ONO_2)-IHN has a lifetime of less than 1 second in water (W2018).

S1.3.5 Deposition

Nguyen et al. (2015) measured the deposition velocity of temperate forest and found a string diurnal pattern, with a daytime (10:00-15:00 h) mean of 1.5 ± 0.6 cm s^{-1} and low values during the night-time. They also reported similar daytime means for the second generation IN, MACR and MVK nitrates (1.5 ± 0.5 cm s^{-1}) and propanone nitrate (1.7 ± 0.6 cm s^{-1}).

S2. Supporting data – instrumentation and uncertainties

A large suite of meteorological and chemical measurements was made during the campaigns (Shi et al., 2019). Here we describe briefly those used in this paper. Isoprene was measured using a dual channel GC with a flame ionisation detector (DC-GC-FID) (Hopkins et al. (2011), with an uncertainty of around 5% depending on the mixing ratio calculated following procedures set out in the ACTRIS Measurement Guidelines (Reimann et al, 2018). Measurements of OH, HO_2 and RO_2 were obtained using the fluorescence assay by gas expansion (FAGE) technique equipped with a scavenger inlet for OH, with the OH chem method used to obtain the background OH signal (Whalley et al., 2010; Whalley et al., 2018; Woodward-Massey et al., 2019). The median limit of detection (LOD) during the campaign was 6.1×10^5 molecule cm^{-3} for OH, 2.8×10^6 molecule cm^{-3} for HO_2 and 7.2×10^6 molecule cm^{-3} for CH_3O_2 at a typical laser power of 11 mW for a 5 minute data acquisition cycle (SNR=2). The accuracy of the measurements was ~ 26 % (2 σ) and is derived from the error in the calibration.

A Thermo Environmental Instruments (TEI) 49i UV absorption analyser was used to measure O_3 (uncertainty 4.04%, precision 0.28 ppb). NO was measured using a TEI 42i (uncertainty 4.58%, precision 0.03 ppb), NO_2 by a Teledyne cavity attenuated phase shift (CAPS) instrument (uncertainty 5.73%, precision 0.04 ppb) and CO by a sensor box (uncertainty 9.14%, precision 2.14 ppb) (Smith et al., 2017). The precisions quoted above are 2 σ precisions calculated from the standard deviation of the zero calibration and then divided by square root of the number of measurements during a 15-minute averaging time. The O_3 uncertainty is derived from the uncertainty of its reaction with NO in the sample line. The uncertainties in the NO measurements are calculated as the sum of the uncertainty in calibration cylinder, the standard deviation of the calibration and the uncertainty due to reaction of O_3 with NO in the sample line. Both the NO and NO_2 calibration cylinders are traceable to the National Physics Laboratory NO scale. The CO uncertainty is the sum of the uncertainty in calibration cylinder and the standard deviation of the calibration.

NO_3 and glyoxal were measured using broadband cavity enhanced absorption spectroscopy (Kennedy et al., 2011). The measurement accuracy of NO_3 is around 1 ppt at 5 seconds sampling rate, which can be reduced by

averaging, such that during the early afternoon the hourly mean uncertainties are greatest at around 0.5 ppt, i.e. 20% of the mean mixing ratio. HONO was measured by a long path absorption photometer (LOPAP) (Crilley et al., 2016). A proton transfer reaction-time of flight-mass spectrometer (PTR-ToF-MS) was used to measure multi-functional aromatics and monoterpenes, whilst HCHO was measured by LIF (Cryer, 2016). SO_2 was measured by a TEI 43i instrument. The mixed layer height was determined from the attenuated backscatter measured with a Vaisala CL31 ceilometer (Kotthaus and Grimmond (2018), and photolysis rate constants from spectral radiometer measurements (Bohn et al., 2016).

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S4. Figures

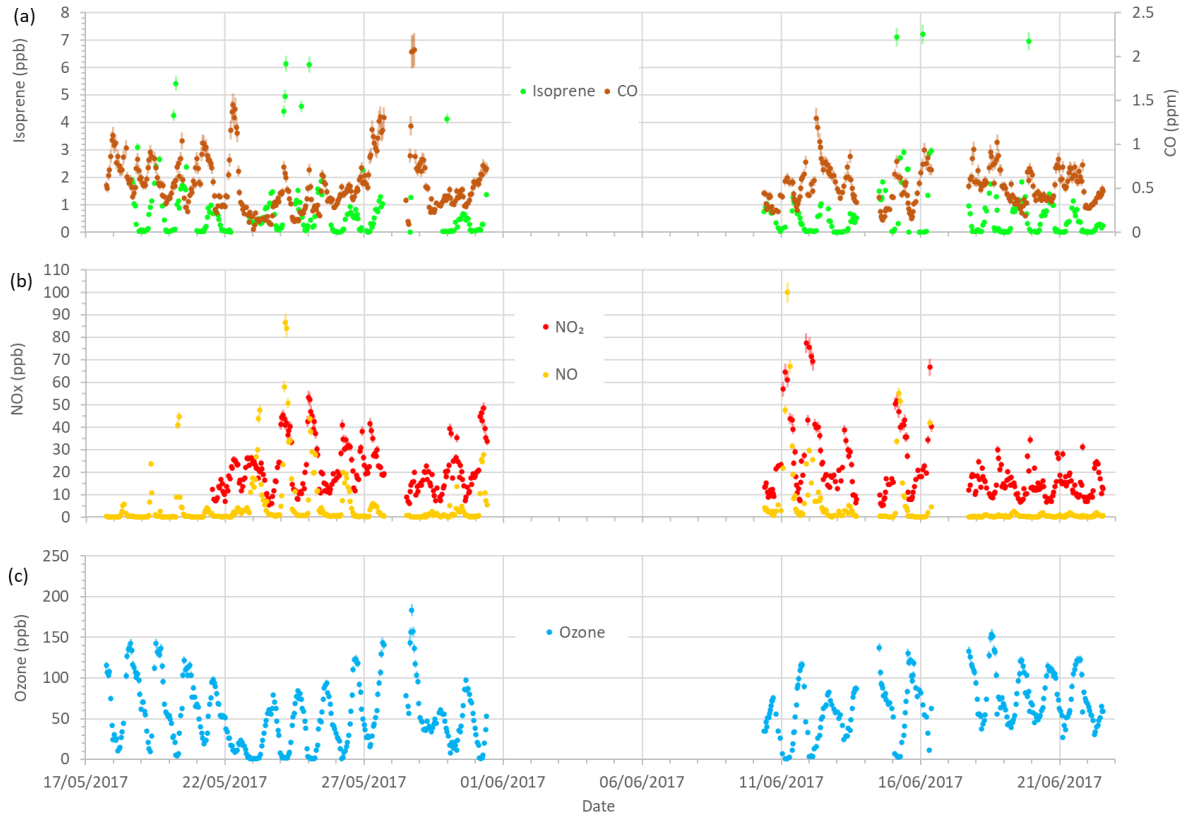

Figure S1: Isoprene, CO, NO, NO_2 and O_3 mixing ratios measured in Beijing for the times corresponding to the IN data shown in Fig. S2. Error bars are the measurement uncertainties (see Sect. S2 for details).

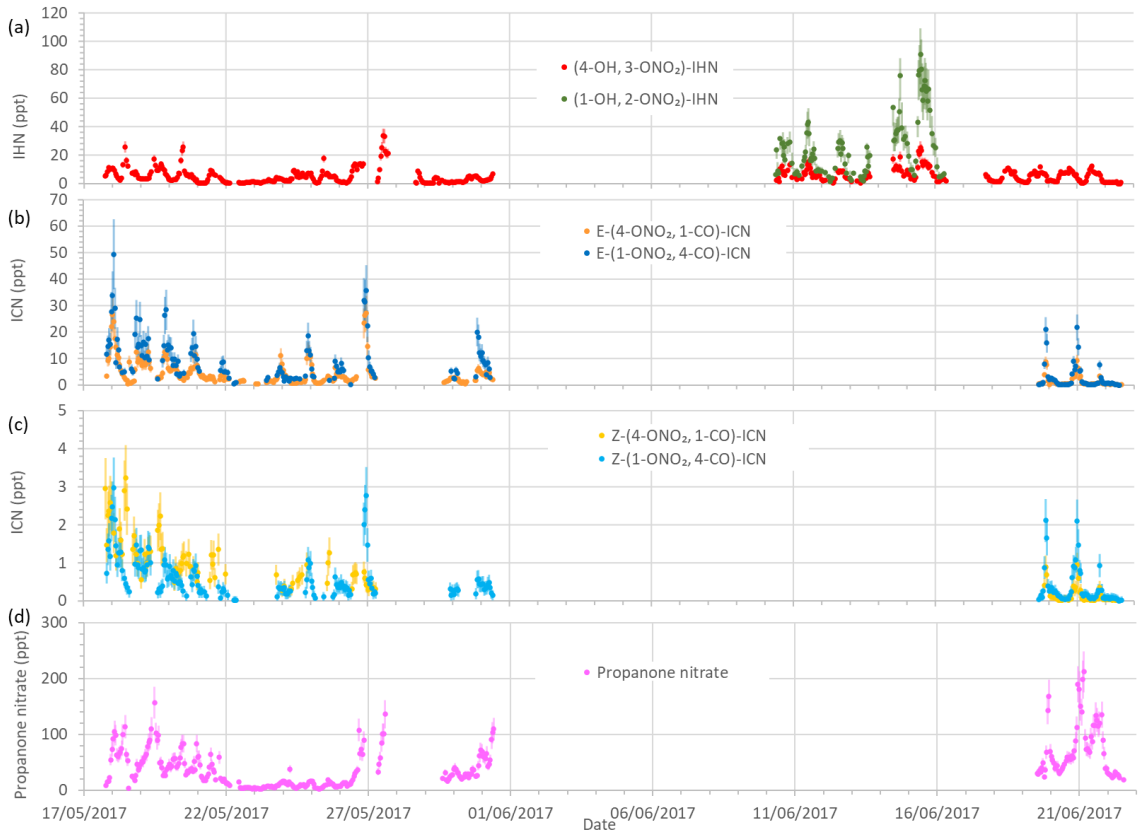

Figure S2: Isoprene nitrates mixing ratios measured in Beijing. Error bars are the measurement uncertainties (see Sect. 3.2 for details).

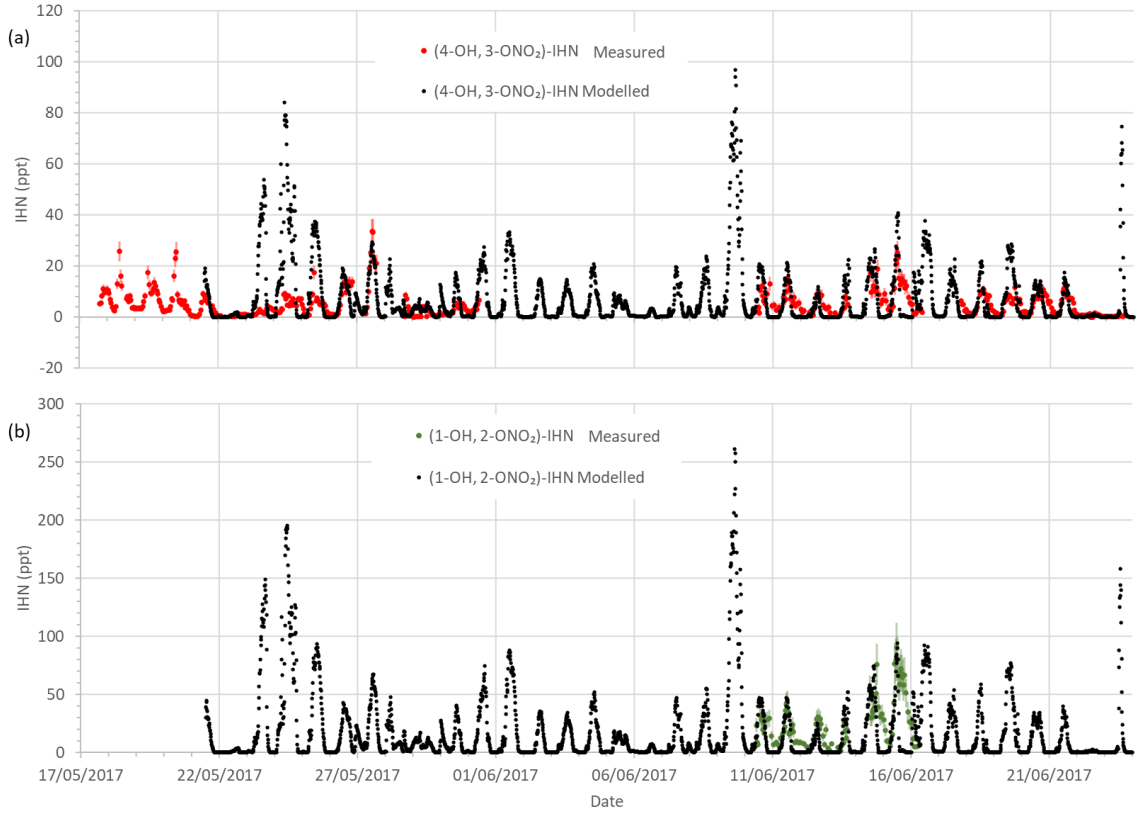

Figure S3: Time series of β-IHN as modelled using the MCM and measured. Error bars are the measurement uncertainties (see Sect. 3.3 for details).

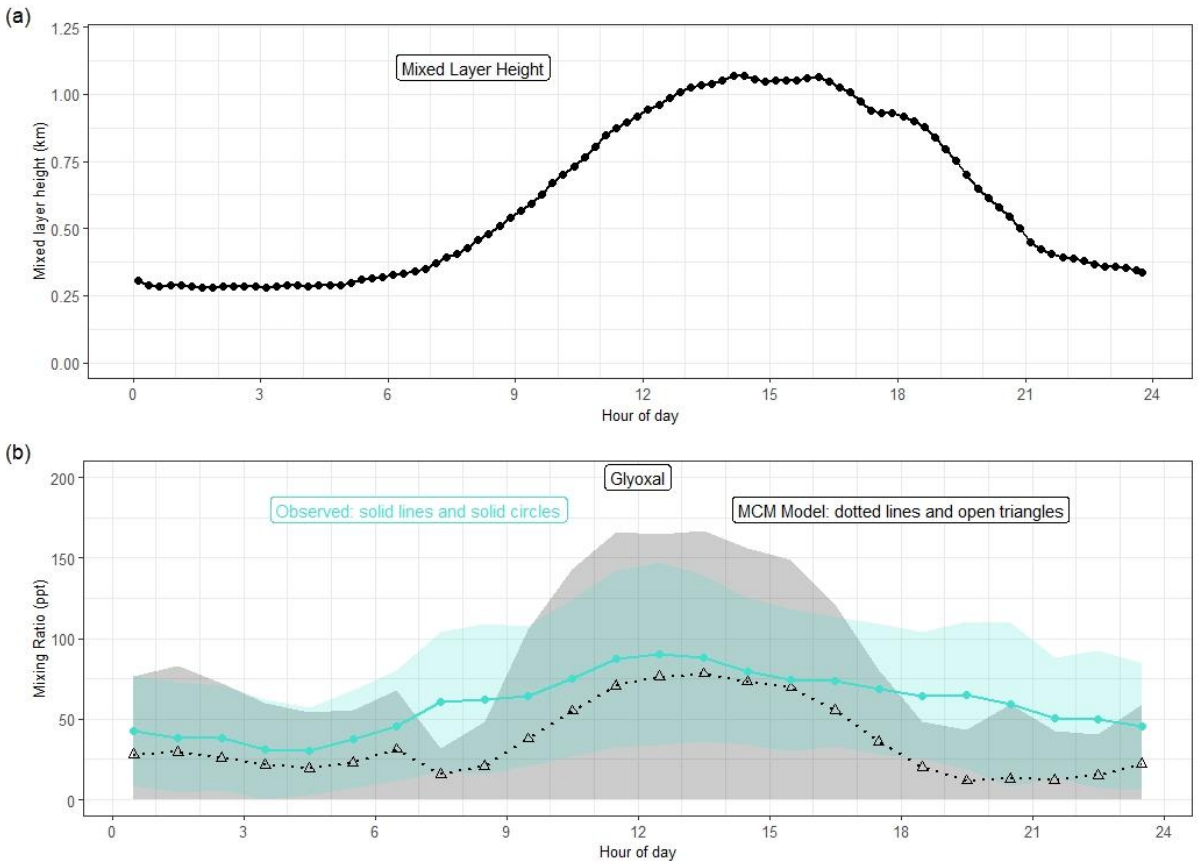

Figure S4: (a) Mean measured mixed layer height for each 15 minute period of the day. (b) Diel pattern of glyoxal as modelled using the MCM and measured. Data points are the means and the shaded areas represent ±1 s.d. in the variability of values for each hour of the day.

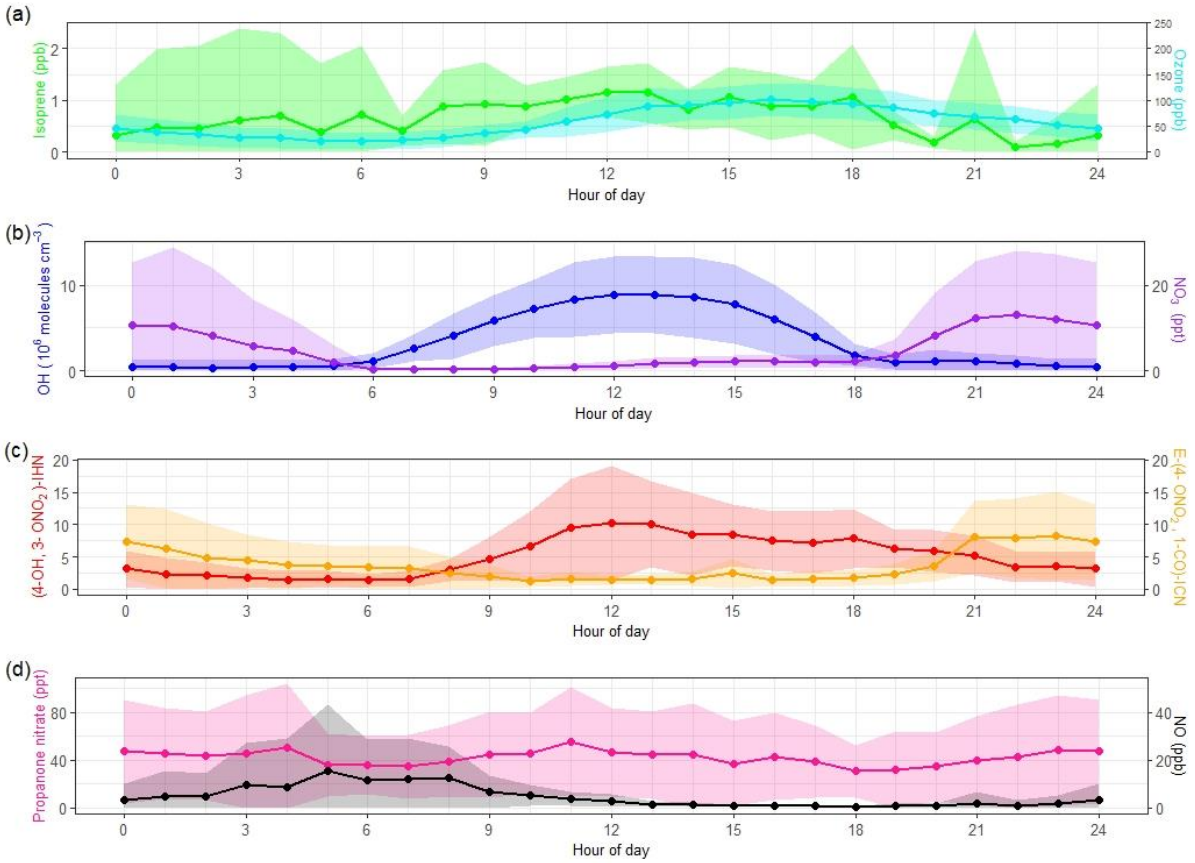

Figure S5: Diel patterns of trace gases derived from the measured mixing ratios for each hour of the day. Data points for the mixing ratios are the means and the shaded areas represent ±1 s.d. in the variability of values for each hour of the day. (a) Green is isoprene and cyan is O_3. (b) Blue is OH and purple is NO_3. (c) Red is (4-OH, 3-ONO_2)-IHN and orange is E-(4-ONO_2, 1-CO)-ICN. (d) Pink is propanone nitrate and black is NO.

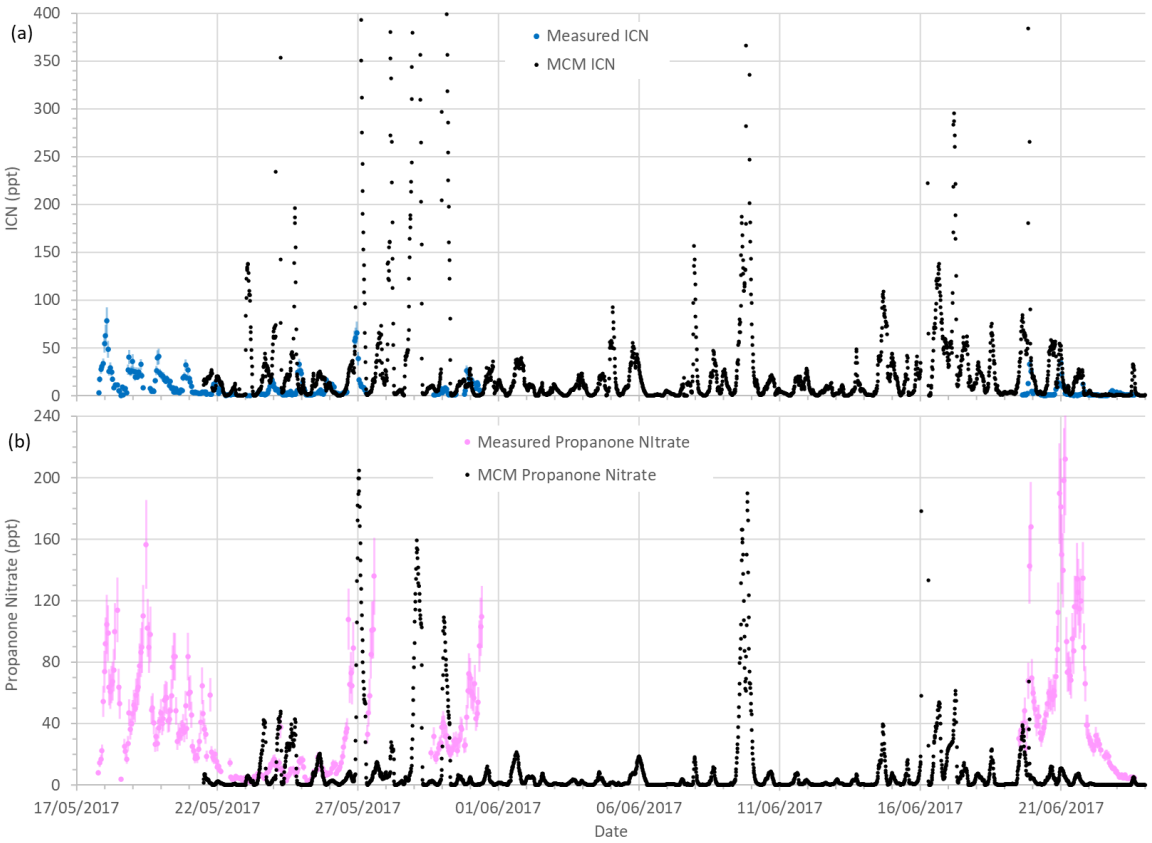

Figure S6: (a) Time series of total δ-ICN as modelled using the MCM and measured. For the MCM this is the species NC4CHO, whilst the measurements are the sum of the four δ-ICN (E and Z-(1-ONO_2, 4-CO)-ICN and E and Z-(4-ONO_2, 1-CO)-ICN). (b) Time series of propanone nitrate as modelled using the MCM and measured. Error bars are the measurement uncertainties (see Sect. 3.3 for details).

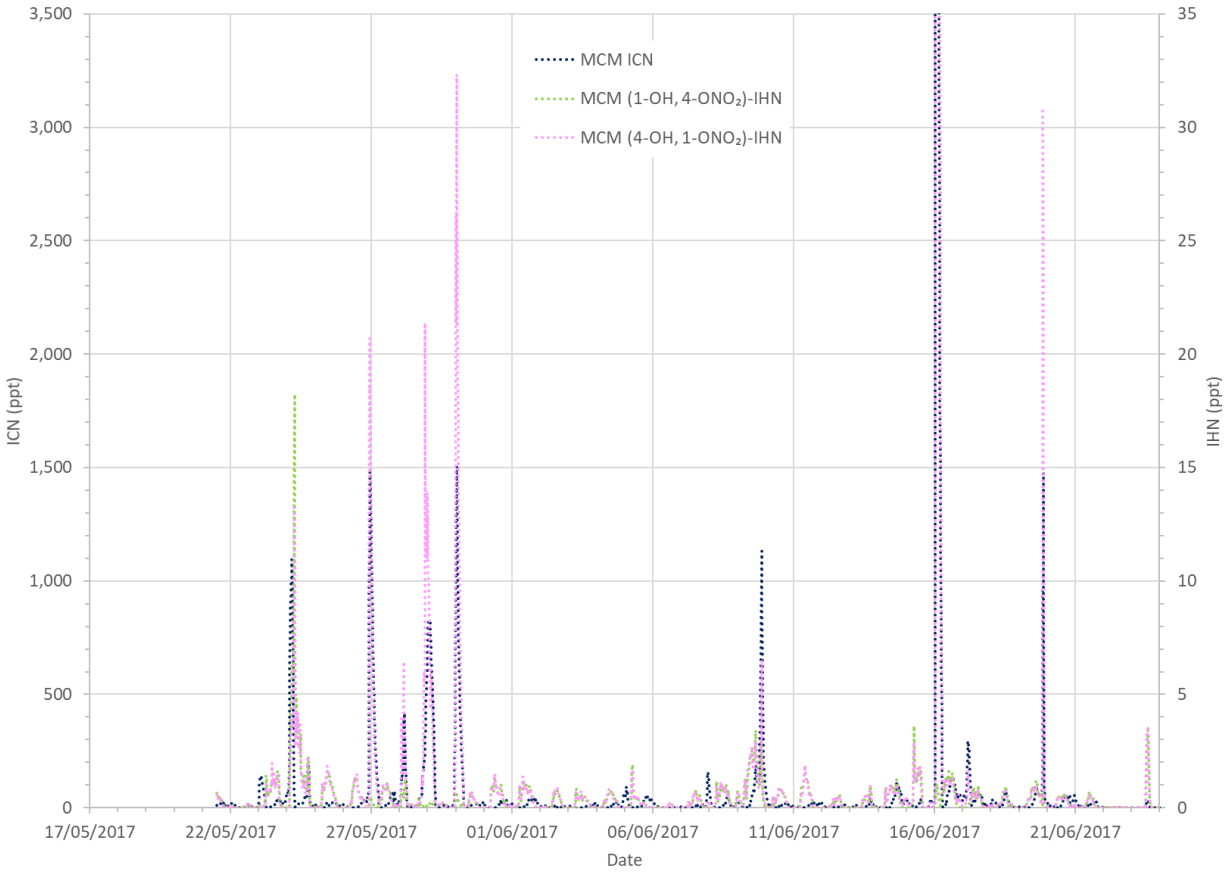

Figure S7: Time series the MCM modelled δ-IHN ((1-OH, 4-ONO_2)-IHN and (4-OH, 1-ONO_2)-IHN) and δ-ICN (NC4CHO).

S5. Tables

Table S1: Data used for plotting Figs. 3, 8, S2, S3 and S6.

Date Time (DD/MM/YYYY hh:mm)	(4-OH, 3-ONO_2)-IHN (ppt)	(1-OH, 2-ONO_2)-IHN (ppt)	E-(4-ONO_2, 1-CO)-ICN (ppt)	Z-(1-ONO_2, 4-CO)-ICN (ppt)	E-(1-ONO_2, 4-CO)-ICN (ppt)	Z-(4-ONO_2, 1-CO)-ICN (ppt)	Propanone nitrate (ppt)
17/05/2017 17:40	5.19						
17/05/2017 18:40	5.56					2.95	8.03
17/05/2017 19:40	8.33		3.27	0.73	11.65	1.46	14.42
17/05/2017 20:40	11.01		9.37	1.36	14.69	2.24	16.69
17/05/2017 21:40	9.66		9.95	1.58	16.91	2.36	22.21
17/05/2017 22:40	10.06		14.27	1.17	15.50	2.57	54.42
17/05/2017 23:40	10.67		22.08	2.18	27.72	2.45	73.78
18/05/2017 00:40	10.53		26.68	2.46	33.86		92.10
18/05/2017 01:40	9.30		23.97	2.98	49.39	1.78	104.52
18/05/2017 02:40	6.94		17.57	2.14	28.93		98.76
18/05/2017 03:40	5.35		14.24	1.45	8.45	1.18	63.62
18/05/2017 04:40	3.70		11.38	0.95	17.16		60.87
18/05/2017 05:40	2.72		10.20	1.27	13.19		65.45
18/05/2017 06:40	2.38		7.68	1.26	6.76	1.89	67.56
18/05/2017 07:40	3.99		5.50	1.28		1.60	74.75
18/05/2017 08:40	13.04		4.17	0.81	4.83	1.23	99.95
18/05/2017 10:44	25.69		2.92	0.59	5.02	2.90	114.00
18/05/2017 11:44	16.09		1.99	0.44		3.23	63.81
18/05/2017 12:44	12.20		1.85	0.35		2.41	52.86
18/05/2017 13:44			0.45				3.66
18/05/2017 14:44			8.85	0.24			
18/05/2017 15:44			0.78				
18/05/2017 16:44	7.16		0.86		6.08		25.31
18/05/2017 17:44	7.95		1.23		4.98	1.36	21.94
18/05/2017 18:44	6.09		1.49			1.71	17.02
18/05/2017 19:44	8.35		5.71	0.96	19.17	1.44	26.92
18/05/2017 20:44	6.44		12.44	1.48	25.31	1.23	47.10
18/05/2017 21:44	3.52		8.71	0.95	14.44	0.99	36.44
18/05/2017 22:44	3.67		9.88	0.88	15.46		40.04
18/05/2017 23:44	3.20		10.19	1.32	24.77		46.70
19/05/2017 00:44	3.35		8.85	1.33	14.87	0.56	52.27
19/05/2017 01:44	3.47		7.35	0.83	11.11		49.96
19/05/2017 02:44	3.28		7.90	0.88	16.14		58.45
19/05/2017 03:44	3.50		7.65	0.77	10.19	1.23	61.74
19/05/2017 04:44	3.35		7.63	0.80	15.51	0.88	63.81
19/05/2017 05:44	3.12		9.24	0.95	10.92	0.98	77.75

19/05/2017 06:44	3.96		12.39	1.41	17.49	1.28	86.20
19/05/2017 07:44	6.12		8.73	1.38	9.52	1.32	89.54
19/05/2017 08:44	8.32		6.33	1.00		1.31	109.90
19/05/2017 11:23	17.43						156.64
19/05/2017 12:37	12.60						102.27
19/05/2017 13:47	9.34						89.48
19/05/2017 14:54	9.37		2.79	0.22	2.42	1.85	98.05
19/05/2017 15:54	10.97		2.24	0.31		1.99	48.87
19/05/2017 16:54	13.61		3.11	0.24		2.23	50.39
19/05/2017 17:54	12.02		2.80	0.36		1.35	40.58
19/05/2017 18:54	10.19		4.54	0.40	9.13	1.38	26.59
19/05/2017 19:55	9.11		10.40	0.94	14.93		31.61
19/05/2017 20:55	6.65		12.49	1.07	26.23		26.95
19/05/2017 21:55	5.74		11.75	0.95	28.35		37.24
19/05/2017 22:55	4.03		9.81	0.58	13.28		41.60
19/05/2017 23:55	2.77		6.18	0.62	15.03		47.19
20/05/2017 00:55	2.16		5.60	0.92	14.30		39.88
20/05/2017 01:55	2.27		5.61	0.66	14.15		43.02
20/05/2017 02:55	2.34		6.11	0.58	9.71		55.37
20/05/2017 03:55	2.58		6.90	0.81	7.39		57.33
20/05/2017 04:55	2.79		7.43	0.52	9.66	0.48	56.61
20/05/2017 05:55	2.83		6.90	0.72	7.25	0.86	41.98
20/05/2017 06:55	4.12		5.48	0.68	4.15		42.67
20/05/2017 07:55	7.12		4.79	0.47	9.03	0.73	48.21
20/05/2017 08:55	6.66		2.85	0.49	3.38	0.79	58.02
20/05/2017 09:55	16.12		2.66	0.51	4.15	0.81	76.71
20/05/2017 10:55	23.07		2.77	0.42		0.98	83.70
20/05/2017 11:54	25.60		2.32	0.25		1.14	83.42
20/05/2017 12:54	8.91		1.76		4.54	1.18	48.23
20/05/2017 13:54	6.70		3.86				28.17
20/05/2017 14:54	5.88		3.52	0.12		0.98	33.63
20/05/2017 15:54	6.48		2.88				31.61
20/05/2017 16:54	4.83		4.64			1.23	35.20
20/05/2017 17:54	5.07		4.39			0.91	35.71
20/05/2017 18:54	6.22		6.28	0.62	11.98		38.99
20/05/2017 19:54	3.53		5.92	0.43	14.00		34.29
20/05/2017 20:54	4.47		11.00	0.81	19.46	0.87	51.66
20/05/2017 21:54	2.46		6.87	0.77	11.01		36.64
20/05/2017 22:54	2.75		11.34	0.93	14.58		83.63
20/05/2017 23:54	0.93		7.33	0.65	9.90	0.49	59.36
21/05/2017 00:54	0.49		6.39	0.42	6.57	0.74	60.23
21/05/2017 01:54	0.45		4.41	0.23	5.17		45.76
21/05/2017 02:54	0.36		3.68	0.29			25.12
21/05/2017 03:54	0.26		3.09	0.23			22.29

21/05/2017 04:54	0.25		3.53				17.48
21/05/2017 05:54	0.32		2.70	0.24			19.34
21/05/2017 06:54	0.47		2.76				17.66
21/05/2017 07:54	1.05		2.17	0.13			23.35
21/05/2017 08:54	2.78		2.44				28.53
21/05/2017 09:54	5.62		2.23				41.00
21/05/2017 10:59	8.98		3.34			0.54	64.62
21/05/2017 11:59	8.57		2.24			1.21	46.71
21/05/2017 12:59	7.15		3.04			0.96	36.48
21/05/2017 13:59	6.24		2.34			1.20	33.05
21/05/2017 14:59	5.60		1.35			0.62	18.84
21/05/2017 15:56							
21/05/2017 16:56							
21/05/2017 18:05				0.37		1.35	58.72
21/05/2017 19:05	4.30		1.92				21.31
21/05/2017 20:05	3.06		3.50	0.08	5.61		18.12
21/05/2017 21:05	1.55		3.52	0.24	8.45		16.79
21/05/2017 22:05	1.66		3.92	0.32	8.71		19.83
21/05/2017 23:05	0.87		1.81	0.26	4.96		15.44
22/05/2017 00:05	0.51		2.43		4.91	0.70	11.82
22/05/2017 01:05	0.55		2.50				12.15
22/05/2017 02:05	0.39		2.21	0.16	4.58		9.80
22/05/2017 03:05	0.27		2.20		2.51		8.73
22/05/2017 04:05							
22/05/2017 05:05							
22/05/2017 06:05							
22/05/2017 07:05				0.02	0.39		
22/05/2017 08:05				0.02	0.59		
22/05/2017 09:05				0.02	0.87		
22/05/2017 10:05							
22/05/2017 10:46	0.57						14.70
22/05/2017 11:46	0.13		1.14				5.27
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22/05/2017 14:46	0.30		1.78				3.81
22/05/2017 15:44	0.47		1.55				5.43
22/05/2017 16:44	0.66						4.85
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22/05/2017 21:45	1.03						2.87
22/05/2017 22:45	1.09						4.10
22/05/2017 23:45	1.02						4.58

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23/05/2017 03:45	0.54		0.48				2.18
23/05/2017 04:45	0.47						2.67
23/05/2017 05:45	0.46						2.38
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23/05/2017 12:51	2.48		1.46				6.58
23/05/2017 13:51	1.96		1.53				6.75
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23/05/2017 15:51	1.26		1.34				4.29
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23/05/2017 21:51	3.48		6.24	0.32	6.62		13.39
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24/05/2017 00:51	2.38		5.49	0.30	3.15		16.76
24/05/2017 01:51	1.96		4.01	0.35	1.54	0.39	12.82
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24/05/2017 08:51	8.87		0.68			0.47	5.96
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24/05/2017 16:51	7.00		1.42			0.69	10.49
24/05/2017 17:51	5.22		1.54				9.26
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25/05/2017 09:51	8.88		1.24				5.91
25/05/2017 10:51	17.47		1.69	0.11			8.92
25/05/2017 11:51							
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25/05/2017 13:50	7.28		2.56			0.47	18.20
25/05/2017 14:50	6.21		3.29			1.00	11.45
25/05/2017 15:50	4.85		2.84		1.85	1.27	14.62
25/05/2017 16:50	4.82		2.52				11.83
25/05/2017 17:50	4.57		2.14				10.69
25/05/2017 18:50	4.62		1.64	0.11			8.72
25/05/2017 19:50	5.29		2.16	0.17	2.52		6.34
25/05/2017 20:50	4.25		6.52	0.63	9.06		7.89
25/05/2017 21:50	2.02		4.23	0.43	7.18		6.40
25/05/2017 22:50	1.60		3.44	0.35	4.96		7.23
25/05/2017 23:50	1.40		3.55	0.42	5.41		7.89
26/05/2017 00:50	1.16		3.68	0.36	5.06		7.93
26/05/2017 01:50	0.97		3.10	0.48	8.16		10.90
26/05/2017 02:50	0.96		3.16	0.37	6.15		13.96
26/05/2017 03:50	1.04		3.20	0.39	5.49		12.13
26/05/2017 04:50	0.88		2.77	0.29			13.66
26/05/2017 05:50	0.49		1.64	0.37			7.32
26/05/2017 06:50	0.63		1.97	0.34			9.43
26/05/2017 07:50	1.29		1.37	0.15			10.37
26/05/2017 08:50	2.57		1.47	0.28			11.72
26/05/2017 09:50	4.58		1.45	0.17	0.16		14.65
26/05/2017 10:50	8.92		1.58			0.33	18.72
26/05/2017 11:50	11.99		2.06			0.68	24.63
26/05/2017 12:50	13.52		2.27			0.71	30.08
26/05/2017 13:50	13.20		2.20			0.74	34.49
26/05/2017 14:50	9.57		3.17			0.71	36.69
26/05/2017 16:02	13.39						107.95

26/05/2017 17:02	13.64						65.58
26/05/2017 18:02	13.68						73.04
26/05/2017 19:02	12.46						64.44
26/05/2017 20:02	13.72						89.41
26/05/2017 21:02			23.27	2.02	31.85	0.75	
26/05/2017 22:02			26.33	2.39	31.35	0.60	
26/05/2017 23:02			27.10	2.77	35.71	0.44	
27/05/2017 00:02			14.62	1.47	22.24	0.40	
27/05/2017 01:02			5.72	0.56	10.28	0.30	
27/05/2017 02:02			5.72	0.45	6.91		
27/05/2017 03:02			4.12	0.59	5.18		
27/05/2017 04:02			3.23	0.33	5.32	0.31	
27/05/2017 05:02			3.67	0.19	4.24	0.35	
27/05/2017 06:02			2.93	0.25	2.81		
27/05/2017 07:02			2.60	0.20		0.32	
27/05/2017 08:02	1.26						32.98
27/05/2017 09:02	3.92						46.78
27/05/2017 10:02	9.85						58.31
27/05/2017 11:02	19.07						84.93
27/05/2017 12:02	25.31						100.82
27/05/2017 13:02	33.39						101.07
27/05/2017 14:02	33.28						135.89
27/05/2017 15:02	22.41						
27/05/2017 16:02	20.76						
27/05/2017 17:02	21.14						
28/05/2017 12:28							
28/05/2017 13:49							
28/05/2017 14:45							
28/05/2017 15:40							
28/05/2017 16:22	0.81						
28/05/2017 17:22	0.29						
28/05/2017 18:22	8.50						
28/05/2017 19:22	7.02						
28/05/2017 20:22	4.15						
28/05/2017 21:22	2.34						
28/05/2017 22:22	0.62						
28/05/2017 23:22	1.00						
29/05/2017 00:22	0.14						
29/05/2017 01:22	0.05						
29/05/2017 02:22	0.10						
29/05/2017 03:22	0.10						
29/05/2017 04:22	0.19						
29/05/2017 05:22	0.14						
29/05/2017 06:22	0.19						

29/05/2017 07:22	0.29						
29/05/2017 08:22	3.44						
29/05/2017 09:22	4.06						
29/05/2017 10:22	3.94						
29/05/2017 11:22	3.71						
29/05/2017 12:22	0.12						
29/05/2017 13:25							
29/05/2017 14:37	2.06						20.75
29/05/2017 16:50	1.12		0.85				31.72
29/05/2017 17:50	0.95		1.20				18.88
29/05/2017 18:50	0.78		1.42				16.74
29/05/2017 19:50	0.55		1.51				20.51
29/05/2017 20:50	0.50		1.77				24.01
29/05/2017 21:50	0.54		2.46	0.31			26.49
29/05/2017 22:50	1.12		2.53	0.15	5.20		27.35
29/05/2017 23:50	0.89		2.57	0.27			37.85
30/05/2017 00:50	0.93		2.55	0.17	2.48		40.57
30/05/2017 01:50	0.74		2.94	0.27	2.27		38.13
30/05/2017 02:50	1.34		2.61	0.31	5.41		31.61
30/05/2017 03:50	1.38		1.94	0.32	4.38		31.99
30/05/2017 04:50	1.51		2.18	0.27			24.51
30/05/2017 05:50	1.02		1.16				22.52
30/05/2017 06:50	1.04		1.28				20.52
30/05/2017 07:50	0.86		0.80				22.18
30/05/2017 08:50	0.93		1.18				23.73
30/05/2017 09:50	1.18		1.10				28.90
30/05/2017 10:50	1.63		0.55				26.62
30/05/2017 11:50	2.77		1.33				29.33
30/05/2017 12:50	4.90						22.59
30/05/2017 13:47	5.37						28.25
30/05/2017 14:47	4.24						29.23
30/05/2017 15:47	3.42						37.52
30/05/2017 16:47	4.98						36.37
30/05/2017 17:47							
30/05/2017 18:47	5.20		1.66				25.58
30/05/2017 19:47	5.06		1.90	0.19	3.20		26.18
30/05/2017 20:47	4.27		5.50	0.57	20.03		43.95
30/05/2017 21:47	3.61		6.31	0.58	17.98		61.32
30/05/2017 22:47	2.81		5.59	0.44	12.29		72.36
30/05/2017 23:47	2.29		4.71	0.42	10.83		69.82
31/05/2017 00:47	1.75		4.30	0.44	12.13		60.93
31/05/2017 01:47	1.60		3.88	0.45	9.35		59.20
31/05/2017 02:47	1.52		4.04	0.31	8.51		56.68
31/05/2017 03:47	2.41		4.62	0.34	7.70		66.02

31/05/2017 04:47	2.04		3.07	0.35	3.90		43.40
31/05/2017 05:47	2.87		4.88	0.43	8.43		46.30
31/05/2017 06:47	2.75		4.81	0.48	5.93		53.77
31/05/2017 07:47	3.02		3.02	0.35	2.86		90.40
31/05/2017 08:47	4.80		2.19	0.21			102.99
31/05/2017 09:47	6.71		1.98	0.15			109.41
10/06/2017 09:16		6.02					
10/06/2017 10:01	2.12	23.54					
10/06/2017 10:46	2.85	8.87					
10/06/2017 11:31	3.81	7.11					
10/06/2017 12:16	1.46						
10/06/2017 13:01	10.43	31.80					
10/06/2017 13:46							
10/06/2017 14:31	12.18	27.98					
10/06/2017 15:16	8.28	28.81					
10/06/2017 15:48	6.18	19.74					
10/06/2017 16:28	8.25	25.83					
10/06/2017 17:09	5.54	16.83					
10/06/2017 19:08	9.04	27.95					
10/06/2017 21:08	13.04	29.30					
10/06/2017 23:07	4.25	14.25					
11/06/2017 01:07	4.54	6.61					
11/06/2017 03:07	2.69	8.43					
11/06/2017 05:06	3.83	5.99					
11/06/2017 07:06	3.25	12.26					
11/06/2017 09:05	7.74	16.11					
11/06/2017 09:50	6.33	18.70					
11/06/2017 10:35	6.73	22.11					
11/06/2017 11:20	9.81	35.83					
11/06/2017 12:05	13.00	41.50					
11/06/2017 12:50	15.14	42.80					
11/06/2017 13:35	13.30	34.87					
11/06/2017 14:20	10.88	16.02					
11/06/2017 15:05	7.20	17.90					
11/06/2017 15:50	7.42	16.27					
11/06/2017 16:35	4.31	20.89					
11/06/2017 17:20	5.76	24.13					
11/06/2017 18:05	7.74	17.72					
11/06/2017 19:35	4.38	8.92					
11/06/2017 21:04	5.09	9.51					
11/06/2017 22:34	5.54	8.51					
12/06/2017 00:04	3.00	8.70					
12/06/2017 01:33	1.92						
12/06/2017 03:03	2.41	7.68					

12/06/2017 04:32							
12/06/2017 06:02		4.86					
12/06/2017 07:31	1.75	1.03					
12/06/2017 09:01	1.75	3.83					
12/06/2017 09:46	0.39						
12/06/2017 10:31	0.79						
12/06/2017 11:16	3.08	10.90					
12/06/2017 12:04							
12/06/2017 13:42	8.90	24.61					
12/06/2017 14:27	7.91	28.92					
12/06/2017 15:48	8.62	30.32					
12/06/2017 16:33	8.48	20.47					
12/06/2017 17:19	8.26	28.70					
12/06/2017 18:04	8.60	24.70					
12/06/2017 19:34	4.51	13.89					
12/06/2017 21:03	3.61	7.12					
12/06/2017 22:33	3.31	19.44					
13/06/2017 00:03	3.76	3.75					
13/06/2017 01:32	1.50	2.06					
13/06/2017 03:02		7.19					
13/06/2017 04:31							
13/06/2017 06:01	1.53						
13/06/2017 07:30							
13/06/2017 09:00	0.39	4.54					
13/06/2017 09:45		2.74					
13/06/2017 11:23	1.98	1.55					
13/06/2017 12:06	2.91	5.43					
13/06/2017 12:51	3.78	8.52					
13/06/2017 13:36	3.59	8.13					
13/06/2017 14:21	7.92	25.62					
13/06/2017 15:06	7.18	18.67					
13/06/2017 15:51	7.41	12.02					
13/06/2017 16:36	4.99	19.61					
14/06/2017 12:29	17.25	53.40					
14/06/2017 13:13	9.51	30.26					
14/06/2017 13:58	10.06	30.48					
14/06/2017 14:43	12.24	34.89					
14/06/2017 15:28	11.91	36.67					
14/06/2017 16:13	10.11	37.66					
14/06/2017 16:58	9.93	37.82					
14/06/2017 17:43	11.53	50.48					
14/06/2017 18:28	18.87	75.97					
14/06/2017 19:58	8.77	39.25					
14/06/2017 21:28	5.31	30.86					

14/06/2017 22:57	6.46	32.90					
15/06/2017 00:27	9.13	28.21					
15/06/2017 01:56	6.28	19.03					
15/06/2017 03:26	3.06	9.75					
15/06/2017 04:56	4.10	9.81					
15/06/2017 06:25	2.31	5.52					
15/06/2017 07:55	4.17	15.60					
15/06/2017 09:24	11.28	42.95					
15/06/2017 10:09	22.41	76.29					
15/06/2017 10:54	20.89	79.56					
15/06/2017 11:39	25.20	90.63					
15/06/2017 12:23	23.25	80.38					
15/06/2017 13:08	15.12	65.78					
15/06/2017 13:53	12.75	58.43					
15/06/2017 14:38	14.63	68.35					
15/06/2017 15:23	14.99	72.21					
15/06/2017 16:08	13.85	68.04					
15/06/2017 16:53	13.63	64.99					
15/06/2017 17:38	13.93	58.14					
15/06/2017 18:23	11.38	66.37					
15/06/2017 19:53	12.03	51.40					
15/06/2017 21:22	7.75	35.12					
15/06/2017 22:52	5.46	26.58					
16/06/2017 00:22	4.95	25.23					
16/06/2017 01:51	1.35	11.84					
16/06/2017 03:21	1.34	4.71					
16/06/2017 04:50	2.29	4.90					
16/06/2017 06:20	2.79	5.58					
16/06/2017 07:49	3.16	6.74					
16/06/2017 09:19	2.00						
17/06/2017 17:42							
17/06/2017 18:46	6.31						
17/06/2017 19:46	4.91						
17/06/2017 20:46	4.97						
17/06/2017 21:46	2.37						
17/06/2017 22:46	2.95						
17/06/2017 23:46	1.99						
18/06/2017 00:46	1.97						
18/06/2017 01:46	1.39						
18/06/2017 02:46	1.29						
18/06/2017 03:46	1.19						
18/06/2017 04:46	1.09						
18/06/2017 05:46	1.35						
18/06/2017 06:46	1.28						

18/06/2017 07:46	2.36						
18/06/2017 08:46	3.80						
18/06/2017 11:16	8.67						
18/06/2017 12:16							
18/06/2017 13:16	10.53						
18/06/2017 14:16	10.82						
18/06/2017 15:16	9.09						
18/06/2017 16:16	6.91						
18/06/2017 17:16	6.55						
18/06/2017 18:16	8.27						
18/06/2017 19:16	8.33						
18/06/2017 20:16	4.76						
18/06/2017 21:16	3.09						
18/06/2017 22:16	2.29						
18/06/2017 23:16	2.21						
19/06/2017 00:16	1.69						
19/06/2017 01:16	1.45						
19/06/2017 02:16	1.14						
19/06/2017 03:16	0.95						
19/06/2017 04:16	0.83						
19/06/2017 05:16	0.88						
19/06/2017 06:16	0.83						
19/06/2017 07:16	2.08						
19/06/2017 08:16	5.72						
19/06/2017 09:16	6.67						
19/06/2017 10:16	6.79						
19/06/2017 11:16							
19/06/2017 12:16	8.57						30.45
19/06/2017 13:16	7.85						29.24
19/06/2017 14:16	5.46						35.68
19/06/2017 15:16	5.22		0.35	0.03	0.11		32.48
19/06/2017 16:16	7.06		0.41	0.06	0.16		40.45
19/06/2017 17:16	11.53		0.75	0.16	0.44		48.54
19/06/2017 18:17	7.54		0.47	0.10	0.31		24.14
19/06/2017 19:16	7.24		0.76	0.26	1.06		36.53
19/06/2017 20:16	6.51		3.81	0.88	7.93	0.41	67.83
19/06/2017 21:16	6.98		8.74	2.11	20.91	0.90	142.65
19/06/2017 22:17	5.10		7.61	1.66	15.80	0.69	168.21
19/06/2017 23:16	1.86		1.43	0.39	2.98		69.92
20/06/2017 00:17	1.89		0.24	0.26	1.92		59.92
20/06/2017 01:17	2.26		1.34	0.34	2.50	0.14	54.60
20/06/2017 02:16	2.26		1.50	0.36	2.67	0.12	49.25
20/06/2017 03:17	1.67		1.15	0.26	2.03	0.10	38.48
20/06/2017 04:17	1.60		1.15	0.22	2.01	0.09	44.52

20/06/2017 05:17	1.47		1.08	0.27	1.85	0.08	44.50
20/06/2017 06:16	1.21		0.57	0.20	1.01	0.06	34.15
20/06/2017 07:17	1.47		0.38	0.16	0.56	0.03	30.09
20/06/2017 08:17	3.76		0.31	0.13	0.26	0.02	33.54
20/06/2017 09:17	5.72		0.23	0.11	0.11	0.03	37.38
20/06/2017 10:17	8.01		0.28	0.07	0.07	0.02	41.37
20/06/2017 11:17	7.48		0.30	0.05	0.08	0.03	46.07
20/06/2017 12:49	7.22		0.36	0.06	0.07	0.04	53.18
20/06/2017 13:49	7.34		0.40	0.04	0.09	0.06	59.79
20/06/2017 14:49	7.81		0.45	0.05	0.08	0.04	57.81
20/06/2017 15:49	7.62		0.41	0.06	0.11	0.04	58.83
20/06/2017 16:49	7.23		0.37	0.06	0.13	0.02	55.59
20/06/2017 17:49	10.75		0.57	0.15	0.31	0.05	61.42
20/06/2017 18:49	9.48		0.70	0.24	0.75	0.05	58.17
20/06/2017 19:49	8.86		2.18	0.62	4.15	0.23	70.45
20/06/2017 20:49	8.27		4.04	0.91	8.90	0.40	88.35
20/06/2017 21:49	6.36		3.12	0.88	5.75	0.29	112.38
20/06/2017 22:49	5.31		4.09	1.08	7.02	0.36	189.71
20/06/2017 23:49	6.01		9.28	2.10	21.74	0.95	181.21
21/06/2017 00:49	3.48		6.18	1.46	14.41	0.60	150.17
21/06/2017 01:49	1.64		2.63	0.80	5.26	0.22	139.67
21/06/2017 02:49	2.14		3.40	0.73	5.62	0.29	198.08
21/06/2017 03:49	0.36		0.64	0.18	1.20	0.05	212.10
21/06/2017 04:49	0.30		0.63	0.13	0.81	0.04	93.21
21/06/2017 05:49	0.37		0.52	0.17	0.72	0.03	73.44
21/06/2017 06:49	0.62		0.48	0.18	0.61	0.04	74.17
21/06/2017 07:49	1.91		0.39	0.16	0.41	0.04	71.11
21/06/2017 08:49	4.85		0.39	0.14	0.24	0.04	68.14
21/06/2017 09:49	6.51		0.27	0.10	0.11	0.04	95.44
21/06/2017 10:49	9.89		0.26	0.06	0.05	0.03	87.41
21/06/2017 11:49	11.09		0.37	0.08	0.06	0.03	116.18
21/06/2017 12:52	12.14		0.40	0.09	0.08	0.02	115.90
21/06/2017 13:52	8.07		0.31	0.05	0.06	0.03	134.33
21/06/2017 14:52	7.87		0.38	0.10	0.16	0.03	125.57
21/06/2017 15:52	7.19		0.41	0.11	0.34	0.05	114.89
21/06/2017 16:52	6.81		0.58	0.21	0.68	0.06	119.98
21/06/2017 17:52	7.31		0.74	0.28	0.76	0.06	
21/06/2017 18:52	7.16		3.43	0.93	7.52	0.35	134.83
21/06/2017 19:52	5.57		1.58	0.27	2.73	0.15	89.72
21/06/2017 20:52	2.62		0.97	0.29	1.74	0.09	65.92
21/06/2017 21:52	1.25		0.42	0.08	0.74	0.04	39.02
21/06/2017 22:52	0.91		0.48	0.11	0.68	0.04	38.97
21/06/2017 23:52	0.61		0.36	0.05	0.50	0.03	30.98
22/06/2017 00:52	0.57		0.36	0.08	0.63	0.03	29.04

22/06/2017 01:52	0.53		0.41	0.09	0.66	0.04	27.03
22/06/2017 02:52	0.65		0.34	0.06	0.57	0.03	25.85
22/06/2017 03:52	0.59		0.28	0.06	0.56	0.03	22.61
22/06/2017 04:52	0.61		0.40	0.10	0.62	0.04	25.67
22/06/2017 05:52	0.61		0.37	0.08	0.59	0.03	32.20
22/06/2017 06:52	0.62		0.39	0.08	0.43	0.03	28.87
22/06/2017 07:52	0.68		0.28	0.07	0.27	0.03	29.04
22/06/2017 08:52	0.95		0.20	0.06	0.20	0.02	26.33
22/06/2017 09:52	1.28		0.17	0.05	0.12		22.94
22/06/2017 10:50	0.00		0.00	0.00	0.00		
22/06/2017 11:50	0.00		0.00	0.00	0.00		
22/06/2017 12:50	0.00						
22/06/2017 13:27	0.77		0.06	0.02			18.83
22/06/2017 14:27	1.49		0.08	0.03	0.03		19.58
22/06/2017 15:27	1.06		0.01	0.00	0.00		19.50
22/06/2017 16:44	0.85		0.41	0.03	0.70		18.67
22/06/2017 17:44	1.16		0.85	0.02	0.75		14.54
22/06/2017 18:44	0.43		1.07	0.02	2.91		12.85
22/06/2017 19:44	0.41		1.25	0.01	4.31		11.32
22/06/2017 20:44	0.31		0.95	0.01	3.36		10.85
22/06/2017 21:44	0.25		1.05	0.01	2.16		10.86
22/06/2017 22:44	0.13		0.95	0.02	1.08		8.57
22/06/2017 23:44	0.14		0.91	0.02	3.05		9.06
23/06/2017 00:44	0.12		1.10	0.02	0.51		6.87
23/06/2017 01:44	0.11		1.17	0.01	0.11		5.19
23/06/2017 02:44	0.11		0.95	0.03	2.35		5.10
23/06/2017 03:44	0.10		1.08	0.03	0.26		6.81
23/06/2017 04:44	0.08		0.86	0.01	0.64		4.61
23/06/2017 05:44	0.08		0.59	0.02	0.52		4.68
23/06/2017 06:44	0.08		0.82	0.01	0.37		6.56
23/06/2017 07:44	0.07		0.51	0.01	0.38		4.91
23/06/2017 08:44	0.09		0.28	0.03	0.54		4.10
23/06/2017 09:44	0.14		0.60	0.01	0.41		
23/06/2017 10:44	0.14		0.53	0.02	0.28		4.27
23/06/2017 11:44	0.42		0.96	0.01	0.36		5.43
23/06/2017 12:44	0.33		0.80	0.02	0.42		4.42
23/06/2017 13:44	0.43		0.83	0.02	0.10		5.03
23/06/2017 14:57	0.27		0.47	0.04	0.17		4.70

Table S2: Data plotted in Figs. 6 and S1.

Date Time (DD/MM/YYYY hh:mm)	Isoprene (ppb)	O_3 (ppb)	CO (ppm)	NO (ppb)	NO_2 (ppb)
17/05/2017 17:40		115	0.532	0.38	
17/05/2017 18:40		107	0.497	0.17	
17/05/2017 19:40		103	0.649	0.09	
17/05/2017 20:40		108	0.708	0.10	
17/05/2017 21:40		75	0.862	0.10	
17/05/2017 22:40		42	1.048	0.21	
17/05/2017 23:40		25	1.101	0.16	
18/05/2017 00:40		30	0.989	0.13	
18/05/2017 01:40		24	1.015	0.14	
18/05/2017 02:40		26	0.786	0.12	
18/05/2017 03:40		10	0.862	0.13	
18/05/2017 04:40		13	0.758	0.14	
18/05/2017 05:40		15	0.701	1.07	
18/05/2017 06:40		27	0.711	2.69	
18/05/2017 07:40		34	0.709	5.18	
18/05/2017 08:40		44	0.851	5.85	
18/05/2017 10:44		103	0.959	1.76	
18/05/2017 11:44		127	0.631	0.53	
18/05/2017 12:44		136	0.599	0.30	
18/05/2017 13:44		137	0.557	0.32	
18/05/2017 14:44		142	0.597	0.31	
18/05/2017 15:44	1.92	134	0.512	0.35	
18/05/2017 16:44	1.81	117	0.402	0.32	
18/05/2017 17:44	1.05	113	0.442	0.18	
18/05/2017 18:44	0.95	107	0.511	0.16	
18/05/2017 19:44	0.30	101	0.723	0.12	
18/05/2017 20:44	3.10	106	0.827	0.11	
18/05/2017 21:44	0.04	97	0.701	0.11	
18/05/2017 22:44	0.06	80	0.605	0.12	
18/05/2017 23:44	0.07	62	0.624	0.17	
19/05/2017 00:44	0.09	70	0.561	0.10	
19/05/2017 01:44	0.03	71	0.529	0.09	
19/05/2017 02:44	0.04	59	0.549	0.09	
19/05/2017 03:44	0.06	55	0.536	0.10	
19/05/2017 04:44	0.09	35	0.604	0.17	
19/05/2017 05:44	0.14	21	0.732	0.80	
19/05/2017 06:44	0.66	13	0.824	6.60	
19/05/2017 07:44	0.92	9	0.911	23.81	
19/05/2017 08:44	1.14	29	0.864	10.79	
19/05/2017 11:23	1.79	112	0.842	1.06	

19/05/2017 12:37	2.39	143	0.736	0.51	
19/05/2017 13:47		132	0.621	0.33	
19/05/2017 14:54		133	0.559	0.35	
19/05/2017 15:54	2.67	129	0.534	2.65	
19/05/2017 16:54	1.72	137	0.551	0.26	
19/05/2017 17:54	0.95	114	0.416	0.18	
19/05/2017 18:54		95	0.533	0.16	
19/05/2017 19:55	0.43	68	0.401	0.17	
19/05/2017 20:55	0.07	58	0.325	0.18	
19/05/2017 21:55	0.04	57	0.338	0.14	
19/05/2017 22:55	0.04	53	0.375	0.13	
19/05/2017 23:55		54	0.404	0.10	
20/05/2017 00:55	0.03	49	0.390	0.12	
20/05/2017 01:55	0.05	45	0.446	0.10	
20/05/2017 02:55	0.07	27	0.515	0.37	
20/05/2017 03:55	4.26	29	0.559	0.13	
20/05/2017 04:55	0.10	21	0.521	0.12	
20/05/2017 05:55	5.42	5	0.592	8.89	
20/05/2017 06:55	1.00	4	0.746	40.92	
20/05/2017 07:55	1.14	7	0.784	44.72	
20/05/2017 08:55	0.89	32	0.638	8.86	
20/05/2017 09:55	1.58	54	0.837	4.51	
20/05/2017 10:55	1.72	62	1.041	4.09	
20/05/2017 11:54	1.69	104	0.601	1.47	
20/05/2017 12:54	1.64	122	0.388	0.51	
20/05/2017 13:54	1.56	110	0.286	0.48	
20/05/2017 14:54	2.38	111	0.281	0.43	
20/05/2017 15:54		103	0.237	0.46	
20/05/2017 16:54		114	0.350	0.28	
20/05/2017 17:54		116	0.423	0.26	
20/05/2017 18:54		104	0.493	0.21	
20/05/2017 19:54		77	0.452	0.26	
20/05/2017 20:54		88	0.577	0.27	
20/05/2017 21:54		77	0.538	0.18	
20/05/2017 22:54		65	0.738	0.13	
20/05/2017 23:54	0.05	68	0.838	0.20	
21/05/2017 00:54	0.04	64	0.726	0.14	
21/05/2017 01:54	0.03	50	0.566	0.14	
21/05/2017 02:54	0.02	40	0.550	0.16	
21/05/2017 03:54	0.02	32	0.888	0.17	
21/05/2017 04:54	0.03	26	1.019	0.24	
21/05/2017 05:54	0.04	19	1.010	2.04	
21/05/2017 06:54	0.13	23	0.951	3.04	
21/05/2017 07:54	0.21	24	0.971	4.06	

21/05/2017 08:54	0.56	32	0.874	3.45	
21/05/2017 09:54	0.88	53	0.822	2.17	
21/05/2017 10:59	0.74	68	0.817	1.81	
21/05/2017 11:59	0.98	75	0.781	1.73	
21/05/2017 12:59		95	0.730	0.89	12.23
21/05/2017 13:59	0.68	99	0.576	0.56	7.99
21/05/2017 14:59		94	0.415	0.50	7.50
21/05/2017 15:56	0.83	90	0.260	0.44	7.33
21/05/2017 16:56	0.73	81	0.220	0.45	8.73
21/05/2017 18:05	0.63	69	0.299	0.41	13.72
21/05/2017 19:05	0.47	68	0.415	0.41	13.16
21/05/2017 20:05	0.27	54	0.403	0.10	16.74
21/05/2017 21:05	0.10	52	0.294	0.16	14.89
21/05/2017 22:05	0.05	54	0.308	0.27	11.59
21/05/2017 23:05	0.05	53	0.306	0.44	10.11
22/05/2017 00:05	0.05	51	0.293		7.00
22/05/2017 01:05	0.03	38	0.416	0.30	13.72
22/05/2017 02:05	0.04	34	0.401	0.10	11.71
22/05/2017 03:05	0.03	26	0.651	0.24	18.27
22/05/2017 04:05	0.08	26	0.819	0.10	17.07
22/05/2017 05:05	0.01	17	1.164	0.24	22.47
22/05/2017 06:05		16	1.370	0.94	21.96
22/05/2017 07:05		12	1.449	2.38	25.71
22/05/2017 08:05		10	1.304	1.24	25.41
22/05/2017 09:05		9	1.404	2.14	24.74
22/05/2017 10:05		10	1.196	3.84	23.25
22/05/2017 10:46		12	1.131	4.17	23.37
22/05/2017 11:46		20	0.697	3.03	15.31
22/05/2017 12:46		18	0.454	3.36	16.48
22/05/2017 13:46		24	0.335	1.57	11.66
22/05/2017 14:46		21	0.315	2.57	13.63
22/05/2017 15:44		18	0.262	2.99	16.79
22/05/2017 16:44		17	0.212	3.14	17.56
22/05/2017 17:44		12	0.284	2.91	22.10
22/05/2017 18:44		7	0.284	4.18	26.26
22/05/2017 19:44		2	0.196	2.61	26.15
22/05/2017 20:45		3	0.113	2.01	23.15
22/05/2017 21:45	0.48	1	0.230	10.99	26.08
22/05/2017 22:45		1	0.175	14.74	26.31
22/05/2017 23:45	0.36	1	0.180	17.50	24.08
23/05/2017 00:45	0.32	1	0.037	13.25	24.58
23/05/2017 01:45	0.32	1	0.080	16.82	23.19
23/05/2017 02:45	0.35	1	0.221	26.91	21.74
23/05/2017 03:45		1	0.150	29.86	21.52

23/05/2017 04:45	0.42	2	0.148	43.76	17.36
23/05/2017 05:45	0.49	2	0.122	47.62	20.13
23/05/2017 06:45	0.32	6		14.71	24.14
23/05/2017 07:45	0.35	17		9.84	21.55
23/05/2017 08:45	0.52	24	0.156	7.71	19.08
23/05/2017 10:05	0.54	32		5.45	16.62
23/05/2017 10:51	0.84	42	0.137	2.85	10.33
23/05/2017 11:51	0.92	48	0.173	7.01	10.53
23/05/2017 12:51	0.91	56	0.175	1.74	8.24
23/05/2017 13:51		61	0.114	1.30	5.50
23/05/2017 14:51	1.06	61	0.095	0.98	6.03
23/05/2017 15:51	1.42	56	0.094	1.06	6.09
23/05/2017 16:51	1.47	63	0.185	1.02	9.31
23/05/2017 17:51	1.03	79	0.291	0.66	11.80
23/05/2017 18:51	0.64	71	0.343	0.48	16.19
23/05/2017 19:51	0.24	62	0.306	0.30	15.85
23/05/2017 20:51	0.10	47	0.346	1.06	22.24
23/05/2017 21:51	0.08	36	0.389	0.73	24.32
23/05/2017 22:51	0.09	30	0.350	1.04	24.27
23/05/2017 23:51	0.17	8	0.444	4.81	41.27
24/05/2017 00:51	0.16	4	0.433	9.39	44.41
24/05/2017 01:51	0.27	2	0.464	23.52	45.31
24/05/2017 02:51	4.41	2	0.742	58.06	43.94
24/05/2017 03:51	4.96	2	0.667	86.67	40.98
24/05/2017 04:51	6.13	1	0.621	84.02	41.81
24/05/2017 05:51		1	0.486	50.71	36.48
24/05/2017 06:51		6	0.467	33.58	38.58
24/05/2017 07:51		9	0.379	33.94	40.23
24/05/2017 08:51		21	0.320	17.04	33.59
24/05/2017 09:51		42	0.171	3.43	14.71
24/05/2017 10:51		52	0.136	2.74	12.52
24/05/2017 11:51		57	0.121	11.44	11.84
24/05/2017 12:51	1.04	69	0.144	1.81	11.65
24/05/2017 13:51	1.16	78	0.127	0.87	8.16
24/05/2017 14:51	1.52	84	0.149	0.78	7.99
24/05/2017 15:51	0.83	75	0.134	0.83	10.60
24/05/2017 16:51	1.09	81	0.226	0.77	11.33
24/05/2017 17:51	4.59	74	0.211	0.67	10.61
24/05/2017 18:51	0.54	63	0.232	0.63	14.92
24/05/2017 19:51	0.27	60	0.222	0.66	12.78
24/05/2017 20:51	0.08	47	0.266	0.84	20.00
24/05/2017 21:51	0.06	38	0.302	0.61	23.43
24/05/2017 22:51	0.12	13	0.379	1.71	42.69
24/05/2017 23:51	0.24	3	0.497	7.78	53.25

25/05/2017 00:51	6.11	2	0.713	43.72	52.43
25/05/2017 01:51	0.44	1	0.515	38.02	46.93
25/05/2017 02:51		1	0.372	29.11	45.07
25/05/2017 03:51	0.17	1	0.242	19.62	39.01
25/05/2017 04:51	0.23	1	0.276	19.84	42.48
25/05/2017 05:51	0.57	2	0.303	27.72	37.06
25/05/2017 06:51	0.92	12	0.263	11.32	30.45
25/05/2017 07:51	1.58	17	0.306	11.87	27.68
25/05/2017 08:51	1.44	38	0.207	2.98	12.52
25/05/2017 09:51	1.50	48	0.189	1.97	10.71
25/05/2017 10:51	1.86	47	0.464	4.23	20.06
25/05/2017 11:51	1.36	59	0.654	3.04	19.41
25/05/2017 12:51		74	0.635	1.67	15.12
25/05/2017 13:50		88	0.562	1.01	11.81
25/05/2017 14:50		91	0.547	1.31	14.46
25/05/2017 15:50		94	0.459	0.86	11.43
25/05/2017 16:50		82	0.352	0.84	13.11
25/05/2017 17:50		77	0.377	0.49	10.76
25/05/2017 18:50		68	0.391	0.32	12.34
25/05/2017 19:50	0.26	57	0.345	0.50	14.44
25/05/2017 20:50	0.11	42	0.374	0.62	19.39
25/05/2017 21:50	0.04	40	0.281	0.59	16.08
25/05/2017 22:50	0.03	37	0.281	0.48	16.56
25/05/2017 23:50	0.02	32	0.310	0.88	17.51
26/05/2017 00:50	0.00	27	0.334	0.81	20.12
26/05/2017 01:50	0.00	26	0.367	0.43	18.46
26/05/2017 02:50	0.00	22	0.397	0.54	19.13
26/05/2017 03:50		13	0.429	0.94	28.43
26/05/2017 04:50	0.04	1	0.513	7.48	41.12
26/05/2017 05:50	0.11	2	0.427	19.84	34.74
26/05/2017 06:50	0.10	9	0.427	15.31	30.38
26/05/2017 07:50	0.47	10	0.455	19.18	34.49
26/05/2017 08:50		16	0.460	17.50	31.06
26/05/2017 09:50	0.65	21	0.489	13.19	31.97
26/05/2017 10:50	0.66	30	0.530	11.29	31.60
26/05/2017 11:50	0.92	44	0.528	6.92	31.21
26/05/2017 12:50	0.73	59	0.466	3.79	25.62
26/05/2017 13:50	0.66	79	0.393	2.06	20.41
26/05/2017 14:50	0.57	111	0.372	0.86	13.13
26/05/2017 16:02	0.51	122	0.404	0.43	11.68
26/05/2017 17:02	0.82	123	0.464	0.62	18.56
26/05/2017 18:02	0.65	119	0.498	0.33	17.51
26/05/2017 19:02	0.49	118	0.476	0.25	16.93
26/05/2017 20:02	0.11	92	0.596	0.51	29.48

26/05/2017 21:02	0.06	83	0.629	0.37	30.79
26/05/2017 22:02	0.17	62	0.731	0.49	38.30
26/05/2017 23:02	2.28	50	0.558	0.28	26.55
27/05/2017 00:02		43	0.575	0.54	23.01
27/05/2017 01:02		36	0.644	0.41	19.28
27/05/2017 02:02	0.06	27	0.547	0.16	21.47
27/05/2017 03:02	0.02	29	0.510	0.12	19.75
27/05/2017 04:02	0.00	27	0.653	0.57	22.47
27/05/2017 05:02	0.03	15	0.853	3.41	41.68
27/05/2017 06:02	0.32	19	0.878	4.81	38.50
27/05/2017 07:02	0.17	28	1.168	6.24	35.04
27/05/2017 08:02	0.32	41	1.084	4.74	27.35
27/05/2017 09:02	0.52	44	1.013	5.56	28.28
27/05/2017 10:02	0.84	51	0.955	4.74	27.28
27/05/2017 11:02	0.82	60	0.926	4.63	30.07
27/05/2017 12:02	0.76	80	1.069	2.43	22.76
27/05/2017 13:02	1.14	94	1.266	1.88	22.59
27/05/2017 14:02	1.29	107	1.312	1.38	22.07
27/05/2017 15:02	0.93	130	1.137	0.89	18.87
27/05/2017 16:02	1.03	144	1.160	0.59	18.61
27/05/2017 17:02		141	1.304	0.42	19.42
28/05/2017 12:28		78	0.367	0.73	8.86
28/05/2017 13:49		65	0.121	0.70	6.88
28/05/2017 14:45		57	0.094	0.69	6.20
28/05/2017 15:40	0.00	144	0.873	0.27	11.58
28/05/2017 16:22	1.27	156	1.211	0.25	14.36
28/05/2017 17:22		184	2.055		15.65
28/05/2017 18:22		157	2.057	0.11	15.98
28/05/2017 19:22		137	2.077	0.12	20.00
28/05/2017 20:22		117	0.860	0.13	9.97
28/05/2017 21:22		104	0.727	0.12	13.50
28/05/2017 22:22		95	0.705	0.15	11.30
28/05/2017 23:22		69	0.753	0.10	14.25
29/05/2017 00:22		51	0.784	0.10	15.13
29/05/2017 01:22		47	0.696	0.11	14.32
29/05/2017 02:22		46	0.831	0.55	16.52
29/05/2017 03:22		37	0.820	0.08	20.25
29/05/2017 04:22		38	0.734	0.95	20.04
29/05/2017 05:22		36	0.519	0.16	22.60
29/05/2017 06:22		47	0.507	0.34	16.88
29/05/2017 07:22		39	0.499	1.30	20.26
29/05/2017 08:22		41	0.281	1.52	15.07
29/05/2017 09:22		39	0.225	1.46	13.94
29/05/2017 10:22		34	0.377	2.48	18.94

29/05/2017 11:22		39	0.262	0.90	11.72
29/05/2017 12:22		44	0.223	0.93	9.62
29/05/2017 13:25		49	0.257	1.03	7.45
29/05/2017 14:37		44	0.335	1.75	12.87
29/05/2017 16:50		58	0.307	0.41	9.02
29/05/2017 17:50		61	0.303	0.22	7.46
29/05/2017 18:50		58	0.324	0.37	10.32
29/05/2017 19:50	0.03	55	0.344	1.07	13.10
29/05/2017 20:50	0.03	56	0.378	0.69	13.81
29/05/2017 21:50	0.04	47	0.408	0.85	20.25
29/05/2017 22:50	0.04	38	0.367	0.44	18.00
29/05/2017 23:50	4.13	34	0.407	0.18	20.42
30/05/2017 00:50	0.03	29	0.410	0.14	23.12
30/05/2017 01:50	0.04	17	0.484	5.29	39.37
30/05/2017 02:50	0.05	8	0.389	1.01	37.30
30/05/2017 03:50	0.04	21	0.323	1.24	17.45
30/05/2017 04:50	0.05	14	0.334	0.66	25.02
30/05/2017 05:50	0.05	21	0.313	1.09	25.28
30/05/2017 06:50	0.37	17	0.358	3.98	26.62
30/05/2017 07:50		11	0.469	13.61	35.26
30/05/2017 08:50	0.19	23	0.393	3.09	24.71
30/05/2017 09:50	0.46	36	0.394	2.24	17.80
30/05/2017 10:50	0.47	34	0.427	3.36	23.04
30/05/2017 11:50	0.48	41	0.474	4.86	20.13
30/05/2017 12:50	0.62	54	0.483	3.34	16.91
30/05/2017 13:47	0.68	66	0.406	2.27	14.06
30/05/2017 14:47	0.65	86	0.301	0.95	7.37
30/05/2017 15:47	0.44	98	0.295	0.83	8.87
30/05/2017 16:47	0.53	86	0.326	0.79	13.26
30/05/2017 17:47	0.49	87	0.331	0.41	10.88
30/05/2017 18:47	0.30	80	0.362	0.21	11.56
30/05/2017 19:47	0.09	73	0.425	0.38	17.54
30/05/2017 20:47	0.04	70	0.440	0.22	14.64
30/05/2017 21:47	0.06	57	0.511	0.32	19.15
30/05/2017 22:47		48	0.574	0.23	17.58
30/05/2017 23:47		39	0.554	0.29	18.45
31/05/2017 00:47	0.07	30	0.563	0.49	19.97
31/05/2017 01:47	0.09	21	0.574	0.41	20.67
31/05/2017 02:47	0.08	17	0.550	0.73	20.93
31/05/2017 03:47	0.10	1	0.596	10.62	44.81
31/05/2017 04:47	0.09	1	0.665	25.60	46.45
31/05/2017 05:47	0.28	2	0.656	24.66	42.85
31/05/2017 06:47	0.29	5	0.761	27.65	48.40
31/05/2017 07:47		20	0.741	10.78	39.56

31/05/2017 08:47		36	0.712	7.24	35.36
31/05/2017 09:47	1.37	53	0.727	5.48	33.83
10/06/2017 09:16	0.76	34	0.446	4.27	13.40
10/06/2017 10:01	0.91	35	0.437	3.25	13.71
10/06/2017 10:46	0.91	46	0.323	3.91	15.16
10/06/2017 11:31	1.03	40	0.259	2.83	11.21
10/06/2017 12:16		52	0.289	2.18	8.97
10/06/2017 13:01		51	0.392	2.16	10.10
10/06/2017 13:46		57	0.424	2.38	11.39
10/06/2017 14:31	0.81	61	0.402	2.34	12.08
10/06/2017 15:16	0.70	67	0.285	1.41	9.53
10/06/2017 15:48	0.70	72	0.294	2.68	12.39
10/06/2017 16:28		72	0.224	1.67	10.56
10/06/2017 17:09		76	0.227	0.78	9.22
10/06/2017 19:08	0.33	56	0.253	2.65	21.39
10/06/2017 21:08	0.15	35	0.232	5.31	22.86
10/06/2017 23:07	0.03	26	0.421	3.08	23.30
11/06/2017 01:07	0.13	7	0.403	21.86	56.96
11/06/2017 03:07	0.19	1	0.580	47.73	64.59
11/06/2017 05:06		1	0.620	99.96	61.24
11/06/2017 07:06		3	0.565	66.99	43.97
11/06/2017 09:05	0.78	11	0.570	31.70	43.20
11/06/2017 09:50	1.27	19	0.569	19.09	39.15
11/06/2017 10:35	1.14	33	0.439	8.29	24.00
11/06/2017 11:20	1.06	34	0.377	9.60	29.13
11/06/2017 12:05	1.06	52	0.349	3.60	18.02
11/06/2017 12:50	0.97	67	0.294	3.09	14.16
11/06/2017 13:35	0.68	88	0.250	1.93	10.68
11/06/2017 14:20	0.70	91	0.326	2.11	12.61
11/06/2017 15:05	0.70	99	0.362	1.11	8.10
11/06/2017 15:50	0.51	110	0.401	0.75	7.35
11/06/2017 16:35	0.34	116	0.499	1.10	15.41
11/06/2017 17:20	0.28	115	0.604	1.93	24.98
11/06/2017 18:05	0.28	117	0.618	1.31	18.64
11/06/2017 19:35	0.10	90	0.658	6.12	27.40
11/06/2017 21:04	0.04	46	0.796	23.84	77.41
11/06/2017 22:34	0.04	33	0.426	9.81	43.07
12/06/2017 00:04	0.06	4	0.424	29.68	75.62
12/06/2017 01:33	0.05	5	0.552	15.19	71.39
12/06/2017 03:03	0.04	4	0.466	25.46	69.21
12/06/2017 04:32	0.02	13	0.586	7.17	41.40
12/06/2017 06:02	0.05	15	1.299	7.04	39.75
12/06/2017 07:31	0.58	26	1.190	11.15	40.20
12/06/2017 09:01	0.62	30	1.032	7.29	36.29

12/06/2017 09:46	0.96	39	0.967	8.65	29.57
12/06/2017 10:31	1.04	50	0.840	4.25	23.84
12/06/2017 11:16		53	0.793	3.42	24.31
12/06/2017 12:04		63	0.712	2.31	16.83
12/06/2017 13:42		65	0.794	3.22	18.43
12/06/2017 14:27		67	0.782	2.97	18.83
12/06/2017 15:48		80	0.768	1.21	14.21
12/06/2017 16:33	0.87	82	0.691	0.76	13.78
12/06/2017 17:19	0.41	82	0.667	0.42	13.36
12/06/2017 18:04	0.39	72	0.727	0.47	18.39
12/06/2017 19:34	0.21	67	0.640	0.11	17.71
12/06/2017 21:03	0.00	62	0.644	0.60	18.65
12/06/2017 22:33	0.00	58	0.574	0.70	15.86
13/06/2017 00:03	0.00	58	0.492	0.85	12.58
13/06/2017 01:32	0.00	50	0.457	2.72	21.00
13/06/2017 03:02	0.01	55	0.387	0.63	15.99
13/06/2017 04:31	0.00	41	0.448	0.85	22.00
13/06/2017 06:01	0.04	24	0.522	2.92	38.80
13/06/2017 07:30		29	0.621	2.66	33.95
13/06/2017 09:00	0.06	28	0.739	1.78	30.00
13/06/2017 09:45	0.14	38	0.629	5.08	27.05
13/06/2017 11:23	0.68	35	0.864	4.81	29.18
13/06/2017 12:06	0.40	49	0.596	2.92	23.40
13/06/2017 12:51	0.40	63	0.502	2.71	15.78
13/06/2017 13:36	0.53	77	0.432	1.21	9.84
13/06/2017 14:21	0.62	82	0.391	1.09	9.85
13/06/2017 15:06	0.38	84	0.415	0.89	9.43
13/06/2017 15:51	0.38	87	0.360	0.44	6.56
13/06/2017 16:36	0.53	87	0.340	0.48	7.87
14/06/2017 12:29	1.51	137	0.395	0.52	9.87
14/06/2017 13:13	1.20	107	0.234	0.42	6.17
14/06/2017 13:58	1.20	93	0.179	0.46	5.97
14/06/2017 14:43	1.28	92	0.154	0.33	5.08
14/06/2017 15:28	1.84	88	0.139	0.35	5.50
14/06/2017 16:13		78	0.167	0.58	7.83
14/06/2017 16:58		77	0.182	0.33	8.59
14/06/2017 17:43	1.52	81	0.245	0.38	11.14
14/06/2017 18:28		73	0.271	0.31	17.15
14/06/2017 19:58		68	0.268	0.11	14.67
14/06/2017 21:28		70	0.260	0.10	14.62
14/06/2017 22:57	0.02	63	0.402	0.12	17.17
15/06/2017 00:27	0.03	52	0.400	0.10	15.41
15/06/2017 01:56	0.10	7	0.659	1.76	50.51
15/06/2017 03:26	7.11	4	0.803	33.70	51.79

15/06/2017 04:56	0.32	3	0.627	55.14	46.81
15/06/2017 06:25	2.70	3	0.620	51.52	39.93
15/06/2017 07:55	1.80	21	0.429	15.34	40.96
15/06/2017 09:24	2.92	29	0.450	9.50	40.83
15/06/2017 10:09		41	0.557	9.00	43.33
15/06/2017 10:54		57	0.529	4.86	35.53
15/06/2017 11:39		71	0.566	4.25	35.72
15/06/2017 12:23	2.29	83	0.422	2.79	27.27
15/06/2017 13:08	2.29	130	0.334	0.56	11.01
15/06/2017 13:53	0.00	119	0.268	0.45	7.86
15/06/2017 14:38		121	0.218	0.39	8.13
15/06/2017 15:23		122	0.195	0.40	8.06
15/06/2017 16:08		102	0.151	0.35	8.06
15/06/2017 16:53		96	0.179	0.36	9.01
15/06/2017 17:38		104	0.232	0.37	11.04
15/06/2017 18:23		118	0.320	0.23	13.77
15/06/2017 19:53		88	0.350	0.22	16.87
15/06/2017 21:22		77	0.446	0.25	20.89
15/06/2017 22:52	0.00	86	0.560	0.18	18.07
16/06/2017 00:22	0.02	82	0.679	0.21	18.04
16/06/2017 01:51	7.21	67	0.771	0.13	21.24
16/06/2017 03:21	0.00	55	0.931	0.12	22.90
16/06/2017 04:50	0.02	52	0.779	0.43	19.69
16/06/2017 06:20	1.35	32	0.843	1.95	34.41
16/06/2017 07:49	2.88	11	0.716	42.07	66.62
16/06/2017 09:19	2.96	62	0.711	4.61	40.29
17/06/2017 17:42	0.95	133	0.526	0.15	12.05
17/06/2017 18:46	0.66	126	0.607	0.12	14.30
17/06/2017 19:46	0.22	117	0.626	0.25	17.94
17/06/2017 20:46	0.04	114	0.837	0.34	18.94
17/06/2017 21:46		110	0.944	0.11	18.32
17/06/2017 22:46	0.03	107	0.574	0.38	10.13
17/06/2017 23:46	0.02	94	0.570	0.25	11.52
18/06/2017 00:46	0.07	74	0.572	0.11	18.21
18/06/2017 01:46	0.09	55	0.705	0.29	24.75
18/06/2017 02:46	0.03	56	0.558	0.13	16.66
18/06/2017 03:46	0.03	53	0.486	0.11	13.20
18/06/2017 04:46	0.03	37	0.523	0.16	21.90
18/06/2017 05:46	0.27	43	0.550	0.31	18.15
18/06/2017 06:46	0.38	48	0.544	0.69	16.44
18/06/2017 07:46	0.88	55	0.588	1.18	15.84
18/06/2017 08:46	0.79	74	0.563	0.96	13.12
18/06/2017 11:16	1.41	128	0.730	0.47	10.43
18/06/2017 12:16	1.76	149	0.912	0.33	9.37

18/06/2017 13:16		154	0.864	0.31	8.87
18/06/2017 14:16		151	0.765	0.26	8.68
18/06/2017 15:16	0.16	135	0.559	0.11	10.63
18/06/2017 16:16	0.06	132	0.787	0.22	11.26
18/06/2017 17:16	1.30	104	0.833	0.53	14.38
18/06/2017 18:16	0.81	56	1.020	0.31	30.11
18/06/2017 19:16	0.14	77	0.869	1.00	26.26
18/06/2017 20:16	0.03	74	0.707	0.28	21.20
18/06/2017 21:16	0.03	64	0.708	0.44	23.42
18/06/2017 22:16	0.02	76	0.526	0.46	13.70
18/06/2017 23:16	0.03	68	0.507	0.44	14.78
19/06/2017 00:16	0.02	65	0.530	0.18	12.96
19/06/2017 01:16	0.00	61	0.497	0.79	13.66
19/06/2017 02:16	0.03	52	0.437	0.24	16.51
19/06/2017 03:16	0.02	43	0.430	0.18	20.20
19/06/2017 04:16	0.03	45	0.390	0.15	17.09
19/06/2017 05:16	0.14	45	0.353	0.54	14.37
19/06/2017 06:16		40	0.551	1.25	17.71
19/06/2017 07:16	0.74	45	0.423	1.88	14.58
19/06/2017 08:16	0.86	49	0.400	2.57	15.28
19/06/2017 09:16	0.76	54	0.325	2.13	13.48
19/06/2017 10:16	1.13	68	0.325	1.61	10.04
19/06/2017 11:16	0.87	81	0.369	1.19	10.43
19/06/2017 12:16	1.19	97	0.358	0.74	8.16
19/06/2017 13:16	1.17	105	0.302	0.47	7.51
19/06/2017 14:16		121	0.270	0.31	6.76
19/06/2017 15:16	1.83	122	0.222	0.35	7.24
19/06/2017 16:16	1.04	115	0.297	0.38	7.96
19/06/2017 17:16		107	0.374	0.36	12.77
19/06/2017 18:17	1.30	82	0.184	0.47	10.08
19/06/2017 19:16	0.67	104	0.331	0.21	10.52
19/06/2017 20:16	0.31	77	0.684	0.21	27.00
19/06/2017 21:16	6.96	83	0.590	0.28	20.65
19/06/2017 22:17	0.10	59	0.726	0.18	34.49
19/06/2017 23:16	0.02	69	0.683	0.15	13.06
20/06/2017 00:17		67	0.650	0.22	13.37
20/06/2017 01:17		57	0.526	0.22	11.97
20/06/2017 02:16	0.02	45	0.421	0.17	21.87
20/06/2017 03:17	0.00	55	0.360	0.10	13.06
20/06/2017 04:17	0.00	51	0.444	0.27	12.00
20/06/2017 05:17	0.00	48	0.462	0.21	15.34
20/06/2017 06:16	0.08	52	0.383	0.38	12.51
20/06/2017 07:17	0.28	54	0.428	1.38	14.27
20/06/2017 08:17	0.60	60	0.367	1.61	13.44

20/06/2017 09:17	0.63	64	0.417	2.12	16.07
20/06/2017 10:17	0.75	75	0.432	1.51	13.53
20/06/2017 11:17	0.63	88	0.396	0.89	9.38
20/06/2017 12:49	0.78	103	0.362	0.56	6.57
20/06/2017 13:49	1.22	115	0.393	0.61	8.24
20/06/2017 14:49	1.40	109	0.381	0.43	7.46
20/06/2017 15:49	1.07	110	0.368	0.41	8.25
20/06/2017 16:49		111	0.350	0.33	7.01
20/06/2017 17:49	0.99	108	0.385	0.27	9.41
20/06/2017 18:49	0.99	103	0.410	0.19	11.27
20/06/2017 19:49	0.13	105	0.539	0.26	13.54
20/06/2017 20:49	0.04	100	0.730	0.11	15.77
20/06/2017 21:49	0.08	80	0.765	0.35	28.32
20/06/2017 22:49	0.03	73	0.830	0.31	26.08
20/06/2017 23:49	0.02	62	0.738	1.01	18.67
21/06/2017 00:49	0.00	59	0.599	0.35	16.07
21/06/2017 01:49	0.00	54	0.608	0.10	14.94
21/06/2017 02:49	0.00	27	0.741	0.31	28.11
21/06/2017 03:49	0.00	42	0.526	0.12	15.63
21/06/2017 04:49	0.03	37	0.499	0.15	17.92
21/06/2017 05:49	0.30	51	0.515	0.92	14.02
21/06/2017 06:49	0.37	53	0.579	0.69	15.62
21/06/2017 07:49	0.39	56	0.677	1.49	18.65
21/06/2017 08:49		60	0.737	2.07	19.46
21/06/2017 09:49		74	0.723	1.64	16.26
21/06/2017 10:49	0.88	90	0.610	1.14	12.05
21/06/2017 11:49	1.14	105	0.645	0.65	10.88
21/06/2017 12:52	0.76	111	0.738	0.65	14.18
21/06/2017 13:52	0.59	116	0.645	0.47	10.35
21/06/2017 14:52	0.84	122	0.577	0.31	9.55
21/06/2017 15:52	0.39	122	0.574	0.30	9.02
21/06/2017 16:52	0.40	123	0.691	0.21	9.72
21/06/2017 17:52	0.36	122	0.631	0.21	15.44
21/06/2017 18:52	0.04	104	0.581	0.66	14.13
21/06/2017 19:52	0.09	59	0.763	0.15	31.26
21/06/2017 20:52	0.03	82	0.460	0.76	9.05
21/06/2017 21:52	0.02	75	0.280	0.52	6.96
21/06/2017 22:52	0.00	72	0.303	0.26	8.58
21/06/2017 23:52	0.03	69	0.275	0.33	6.93
22/06/2017 00:52	0.00	64	0.279	0.12	9.09
22/06/2017 01:52		60	0.275	0.22	8.98
22/06/2017 02:52	0.00	54	0.296	0.12	9.99
22/06/2017 03:52	0.02	54	0.313	0.17	8.88
22/06/2017 04:52	0.02	47	0.318	0.72	11.68

22/06/2017 05:52	0.05	31	0.349	0.50	21.88
22/06/2017 06:52	0.11	34	0.342	1.60	23.94
22/06/2017 07:52	0.24	40	0.391	2.10	24.58
22/06/2017 08:52	0.26	42	0.404	0.93	23.82
22/06/2017 09:52	0.28	48	0.442	0.95	19.78
22/06/2017 10:50	0.29	52	0.401	0.74	17.01
22/06/2017 11:50	0.17	65	0.431	0.52	10.61
22/06/2017 12:50	0.23	59	0.496	0.38	13.39
22/06/2017 13:27	0.23	59	0.466	0.60	12.54
22/06/2017 14:27	0.41	60	0.530	0.47	12.70
22/06/2017 15:27	0.21	57	0.543	0.38	12.80
22/06/2017 16:44	0.41	40	0.714	0.31	20.77
22/06/2017 17:44		39	0.965	0.32	26.32
22/06/2017 18:44		48	0.892	0.15	20.33
22/06/2017 19:44	0.11	44	0.965	0.12	19.31
22/06/2017 20:44	0.10	43	1.108	0.14	18.74
22/06/2017 21:44	0.07	40	1.191	0.14	16.56
22/06/2017 22:44	0.04	53	0.716	0.13	11.19
22/06/2017 23:44	0.03	54	0.589	0.11	9.43
23/06/2017 00:44	0.02	48	0.566	0.12	10.17
23/06/2017 01:44	0.03	56	0.512	0.12	5.16
23/06/2017 02:44	0.03	56	0.422	0.13	4.31
23/06/2017 03:44	0.01	58	0.343	0.10	4.07
23/06/2017 04:44	0.00	57	0.338	0.10	3.82
23/06/2017 05:44	0.02	55	0.307	0.10	5.71
23/06/2017 06:44	0.04	47	0.383	0.13	11.26
23/06/2017 07:44	0.05	41	0.446	0.19	16.59
23/06/2017 08:44	0.17	43	0.403	0.98	13.25
23/06/2017 09:44	0.25	43	0.373	1.06	11.30
23/06/2017 10:44		47	0.384	0.62	7.06
23/06/2017 11:44	0.28	43	0.476	1.08	11.51
23/06/2017 12:44	7.50	43	0.583	1.19	11.53
23/06/2017 13:44	7.29	37	0.649	0.96	15.50
23/06/2017 14:57	0.23	34	0.494	0.74	12.36

Table S3: Data plotted in Fig. S5.

Hour of Day (h)	Isoprene (ppb)	O_3 (ppb)	OH (cm^{-3})	NO (ppb)	NO_3 (ppt)	(4-OH, 3-ONO_2)-IHN (ppt)	E-(1-ONO_2, 4-CO)-ICN (ppt)	Propanone nitrate (ppt)
0	0.33	47	4.72E+05	3.1	10.7	3.2	7.3	47
1	0.47	40	3.82E+05	4.9	10.5	2.4	6.2	45
2	0.47	34	3.58E+05	4.8	8.3	2.1	4.8	43
3	0.62	28	3.65E+05	9.8	5.8	1.7	4.4	45
4	0.70	28	3.92E+05	8.4	4.8	1.5	3.7	51
5	0.39	22	5.93E+05	15.3	1.9	1.5	3.6	36
6	0.72	21	1.16E+06	11.7	0.3	1.4	3.4	36
7	0.42	23	2.65E+06	12.3	0.2	1.7	3.3	35
8	0.88	27	4.05E+06	12.5	0.2	3.0	2.4	39
9	0.93	36	5.82E+06	6.7	0.3	4.7	1.9	45
10	0.88	44	7.24E+06	5.0	0.5	6.7	1.2	45
11	1.03	59	8.34E+06	3.7	0.8	9.4	1.5	55
12	1.17	73	8.90E+06	2.9	1.2	10.2	1.5	47
13	1.15	89	8.91E+06	1.5	1.7	10.1	1.5	44
14	0.83	91	8.55E+06	1.2	2.0	8.5	1.6	44
15	1.07	95	7.78E+06	0.8	2.2	8.3	2.4	37
16	0.89	102	6.04E+06	0.9	2.3	7.5	1.4	43
17	0.88	98	3.92E+06	0.7	2.1	7.2	1.6	39
18	1.07	94	1.83E+06	0.5	2.2	7.9	1.7	31
19	0.52	87	1.04E+06	0.7	3.6	6.3	2.3	32
20	0.19	76	1.14E+06	0.7	8.2	5.9	3.6	35
21	0.65	69	1.09E+06	1.7	12.2	5.2	8.1	40
22	0.09	63	8.81E+05	1.0	13.1	3.5	7.9	43
23	0.16	54	5.94E+05	1.5	12.1	3.5	8.2	48
24	0.33	47	4.72E+05	3.1	10.7	3.2	7.3	47

Table S4: Mixing layer height data plotted in Fig. S4.

Hour of Day (h)	Mixed Layer Height (m*10)
0.125	30.7
0.375	28.7
0.625	28.6
0.875	29.0
1.125	29.0
1.375	28.2
1.625	27.9
1.875	28.0
2.125	28.3
2.375	28.3
2.625	28.3
2.875	28.3
3.125	28.1
3.375	28.3
3.625	28.8
3.875	28.7
4.125	28.6
4.375	28.9
4.625	29.1
4.875	29.0
5.125	29.8
5.375	30.9
5.625	31.4
5.875	31.9
6.125	32.7
6.373	33.3
6.625	33.9
6.875	35.0
7.125	37.1
7.375	39.3
7.625	40.6
7.875	42.9
8.125	45.7
8.375	48.1
8.625	50.8
8.875	53.8
9.125	56.8
9.375	59.4
9.625	62.9
9.875	66.9
10.125	69.9

10.375	73.1
10.625	76.6
10.875	80.5
11.125	84.7
11.375	87.5
11.625	89.5
11.877	91.8
12.125	94.1
12.375	96.2
12.625	98.4
12.875	100.8
13.125	102.5
13.375	103.4
13.625	103.9
13.875	105.2
14.125	107.0
14.375	106.8
14.625	105.4
14.875	104.5
15.125	104.9
15.375	105.3
15.625	105.3
15.875	105.9
16.125	106.3
16.375	104.6
16.625	102.6
16.875	100.6
17.125	97.1
17.375	94.1
17.625	93.0
17.875	92.8
18.125	91.6
18.375	90.1
18.625	87.7
18.875	83.9
19.125	79.4
19.375	75.3
19.625	70.2
19.875	64.8
20.125	61.2
20.375	57.7
20.625	54.3
20.875	49.9
21.125	45.0

21.375	42.1
21.625	40.4
21.875	39.1
22.125	38.7
22.375	38.0
22.625	36.7
22.875	36.0
23.125	35.8
23.375	35.3
23.625	34.3
23.750	33.7

Table S5: Data plotted in Fig. 2.

Hour of Day (h)	Modelled (4-OH, 3-ONO_2)-IHN (ppt)	Modelled (1-OH, 2-ONO_2)-IHN (ppt)	Observed mean (4-OH, 3-ONO_2)-IHN (ppt)	Observed mean (1-OH, 2 -ONO_2)-IHN (ppt)
0	0.9	0.7	3.2	16.5
1	1.3	3.9	2.4	6.6
2	1.5	7.4	2.1	11.0
3	1.4	5.0	1.7	7.6
4	1.4	2.9	1.5	
5	1.5	2.0	1.5	6.9
6	4.3	8.7	1.4	5.3
7	3.2	5.2	1.7	12.3
8	4.3	8.5	3.0	7.8
9	9.0	17.2	4.7	14.7
10	12.7	28.3	6.7	30.3
11	16.6	38.0	9.4	26.5
12	18.6	48.2	10.2	46.4
13	19.2	44.4	10.1	35.8
14	17.9	38.0	8.5	28.4
15	16.4	37.7	8.3	38.2
16	13.2	32.7	7.5	30.0
17	9.4	24.7	7.2	29.2
18	5.6	12.3	7.9	48.9
19	2.5	3.1	6.3	28.0
20	2.1	0.4	5.9	28.4
21	1.2	0.2	5.2	22.4
22	0.5	0.2	3.5	
23	0.7	0.2	3.5	20.3
24	0.9	0.7	3.2	16.5

Table S6: Observed and Modelled data plotted in Fig. 4.

	(1-OH, 2-ONO_2)-IHN / (4-OH, 3-ONO_2)-IHN ratio	
Hour of Day (h)	**Observed**	**Modelled**
0	3.02	2.36
1	1.45	2.29
2	4.38	2.23
3	3.25	2.21
4		2.11
5	2.03	1.98
6	2.19	1.96
7	3.77	1.97
8	2.15	2.00
9	4.94	2.05
10	5.82	2.14
11	3.03	2.26
12	2.85	2.47
13	3.13	2.78
14	2.95	2.63
15	3.29	2.57
16	3.18	2.51
17	3.81	2.53
18	3.93	2.57
19	3.09	2.57
20	3.47	2.57
21	3.29	2.51
22		2.51
23	4.14	2.45
24	3.02	2.36

Table S7: Observed data plotted in Figs. 7 and 9.

Hour of Day (h)	Observed ICN Total (ppt)	Observed Propanone Nitrate (ppt)	Modelled ICN Total (ppt)	Modelled Propanone Nitrate (ppt)	Modelled (1-OH, 4-ONO_2)-IHN (ppt)	Modelled (4-OH, 1-ONO_2)-IHN (ppt)
0	18.9	47	105.1	14.2	0.06	1.30
1	15.1	45	108.6	16.2	0.08	1.36
2	13.1	43	93.5	15.2	0.11	0.93
3	11.3	45	88.8	13.3	0.18	0.75
4	7.7	51	87.6	12.0	0.22	0.62
5	7.7	36	62.2	10.5	0.29	0.46
6	7.1	36	25.2	9.9	0.83	0.77
7	6.1	35	3.3	2.1	0.49	0.46
8	4.4	39	1.5	0.3	0.48	0.48
9	2.9	45	3.1	0.8	0.61	0.65
10	2.0	45	5.2	1.7	0.68	0.71
11	2.5	55	9.3	3.6	0.76	0.76
12	2.5	47	14.3	6.2	0.76	0.73
13	2.4	44	19.6	9.1	0.74	0.69
14	1.7	44	22.5	10.7	0.69	0.62
15	2.9	37	27.4	12.9	0.62	0.55
16	2.0	43	30.3	14.5	0.50	0.44
17	2.7	39	28.7	11.0	0.37	0.33
18	2.6	31	31.1	6.9	0.24	0.23
19	5.1	32	30.4	4.5	0.11	0.14
20	11.0	35	48.9	5.9	0.09	0.41
21	22.8	40	69.4	7.0	0.05	0.76
22	21.0	43	52.6	5.5	0.02	0.78
23	18.8	48	82.2	9.9	0.04	0.89
24	18.9	47	105.1	14.2	0.06	1.30

Table S8: Chemical data plotted in Fig. S4.

Hour of Day (h)	Observed Glyoxal (ppt)	Modelled Glyoxal (ppt)
0.5	42.8	27.8
1.5	38.7	29.4
2.5	38.2	25.8
3.5	31.2	21.6
4.5	30.2	19.5
5.5	37.8	23.2
6.5	45.9	31.3
7.5	60.8	15.6
8.5	62.4	21.0
9.5	64.2	37.7
10.5	75.4	55.1
11.5	87.7	70.9
12.5	90.6	76.2
13.5	87.9	78.2
14.5	79.3	73.1
15.5	74.1	69.5
16.5	73.5	55.7
17.5	68.6	35.9
18.5	64.5	20.0
19.5	65.0	11.8
20.5	59.2	12.8
21.5	50.9	12.3
22.5	49.7	14.9
23.5	45.2	22.1