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Supplement of

Dynamic and timing properties of new aerosol particle formation and consecutive growth events

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Table S1. Relative contributions of particle number concentration increment ($dN_{\text{nuc}}/dt=dN_{6-25}/dt-dN_{\text{Ai},<25}/dt$), coagulation scavenging loss (F_{coag}) and growth out of particles from the diameter interval of 6–25 nm (F_{growth}) relative to the formation rate J_6 in the near-city background and city centre separately for 1-year long measurement time intervals. The measurement year and number of quantifiable NPF and growth events (n) are also shown.

Environment and year/ statistics	Contribution in %		
	dN_{nuc}/dt	F_{coag}	F_{growth}
Background, 2012–2013, $n=43$			
Minimum	45	4	2
Maximum	93	38	26
Mean	76	14	10
St. deviation	12	9	5
Centre, 2008–2009, $n=31$			
Minimum	32	13	3
Maximum	84	44	38
Mean	54	29	18
St. deviation	13	8	9
Centre, 2013–2014, $n=48$			
Minimum	43	9	3
Maximum	86	37	30
Mean	63	22	15
St. deviation	11	7	7
Centre, 2014–2015, $n=56$			
Minimum	45	6	2
Maximum	91	46	32
Mean	70	17	14
St. deviation	12	7	8
Centre, 2015–2016, $n=17$			
Minimum	50	4	2
Maximum	92	43	30
Mean	74	14	11
St. deviation	11	9	8
Centre, 2017–2018, $n=52$			
Minimum	44	4	3
Maximum	93	41	31
Mean	70	17	13
St. deviation	11	8	7

Table S2. Ranges, averages and standard deviations of condensation sink value during the nucleation process, daily maximum gas-phase H₂SO₄ proxy, daily mean air temperature and daily mean relative humidity on quantifiable NPF and growth events in the near-city background and city centre separately for the 1-year long measurement time intervals and for the joint 5-year long city centre data set.

Environment	Background		Centre				
	2012– 2013	2008– 2009	2013– 2014	2014– 2015	2015– 2016	2017– 2018	All 5 years
Condensation sink, CS (10 ⁻³ s ⁻¹)							
Minimum	1.63	3.1	2.0	2.4	1.69	2.1	1.69
Median	5.6	9.5	9.9	8.6	5.0	8.4	8.9
Maximum	14.6	21	17.8	21	18.4	18.5	21
Mean	6.2	11.0	10.4	9.4	6.8	8.7	9.4
St. deviation	3.1	4.9	3.7	4.2	4.2	4.6	4.3
Gas-phase H ₂ SO ₄ proxy (10 ⁴ μg m ⁻⁵ W s)							
Minimum	40	10.9	12.2	5.8	34	7.3	5.8
Median	93	39	40	38	79	46	41
Maximum	163	96	139	135	190	134	190
Mean	93	39	45	42	82	50	48
St. deviation	32	17	27	23	38	31	29
Air temperature, <i>T</i> (°C)							
Minimum	-5.2	-0.46	-1.78	-1.19	-1.07	1.21	-1.78
Median	11.5	17.1	16.8	15.3	14.2	16.7	16.1
Maximum	27	23	28	28	28	27	28
Mean	11.5	16.3	15.7	15.0	13.6	16.4	15.5
St. deviation	8.1	5.6	6.9	7.2	8.3	6.5	6.8
Relative humidity, RH (%)							
Minimum	41	32	41	31	39	36	31
Median	63	49	60	50	55	52	53
Maximum	91	74	78	77	89	73	89
Mean	64	51	60	50	56	52	54
St. deviation	12	11	10	9	12	9	11

Table S3. Ranges, averages and standard deviations of daily median concentrations of SO₂, O₃, NO_x and CO gases on quantifiable NPF and growth event days in the near-city background and city centre separately for the 1-year long measurement time intervals and for the joint 5-year long city centre data set.

Environment	Background		Centre				
	2012– 2013	2008– 2009	2013– 2014	2014– 2015	2015– 2016	2017– 2018	All 5 years
SO ₂ concentration (µg m ⁻³)							
Minimum	4.4	3.4	2.0	0.90	3.3	0.80	0.80
Median	6.2	5.3	5.1	3.9	5.2	3.7	4.8
Maximum	11.7	8.3	8.2	10.4	11.4	7.0	11.4
Mean	6.5	5.4	5.1	4.4	5.9	3.9	4.7
St. deviation	1.4	1.2	1.8	2.4	2.4	1.8	2.1
O ₃ concentration (µg m ⁻³)							
Minimum	8.7	1.80	0.80	10.3	13.0	3.7	0.80
Median	61	44	25	35	36	29	31
Maximum	85	93	67	66	61	68	93
Mean	55	39	28	33	37	31	33
St. deviation	21	28	19	14	14	17	19
NO _x concentration (µg m ⁻³)							
Minimum	4.9	13.0	34	32	30	17.8	13.0
Median	12.2	49	72	87	72	75	74
Maximum	66	213	143	186	120	167	213
Mean	15.8	62	77	96	76	79	81
St. deviation	12.1	42	28	41	24	33	38
CO concentration (mg m ⁻³)							
Minimum	0.167	0.26	0.30	0.26	0.29	0.20	0.198
Median	0.31	0.48	0.56	0.54	0.42	0.52	0.51
Maximum	0.87	0.76	0.79	0.95	0.88	0.86	0.95
Mean	0.38	0.47	0.54	0.55	0.46	0.51	0.52
St. deviation	0.18	0.13	0.14	0.16	0.16	0.15	0.15

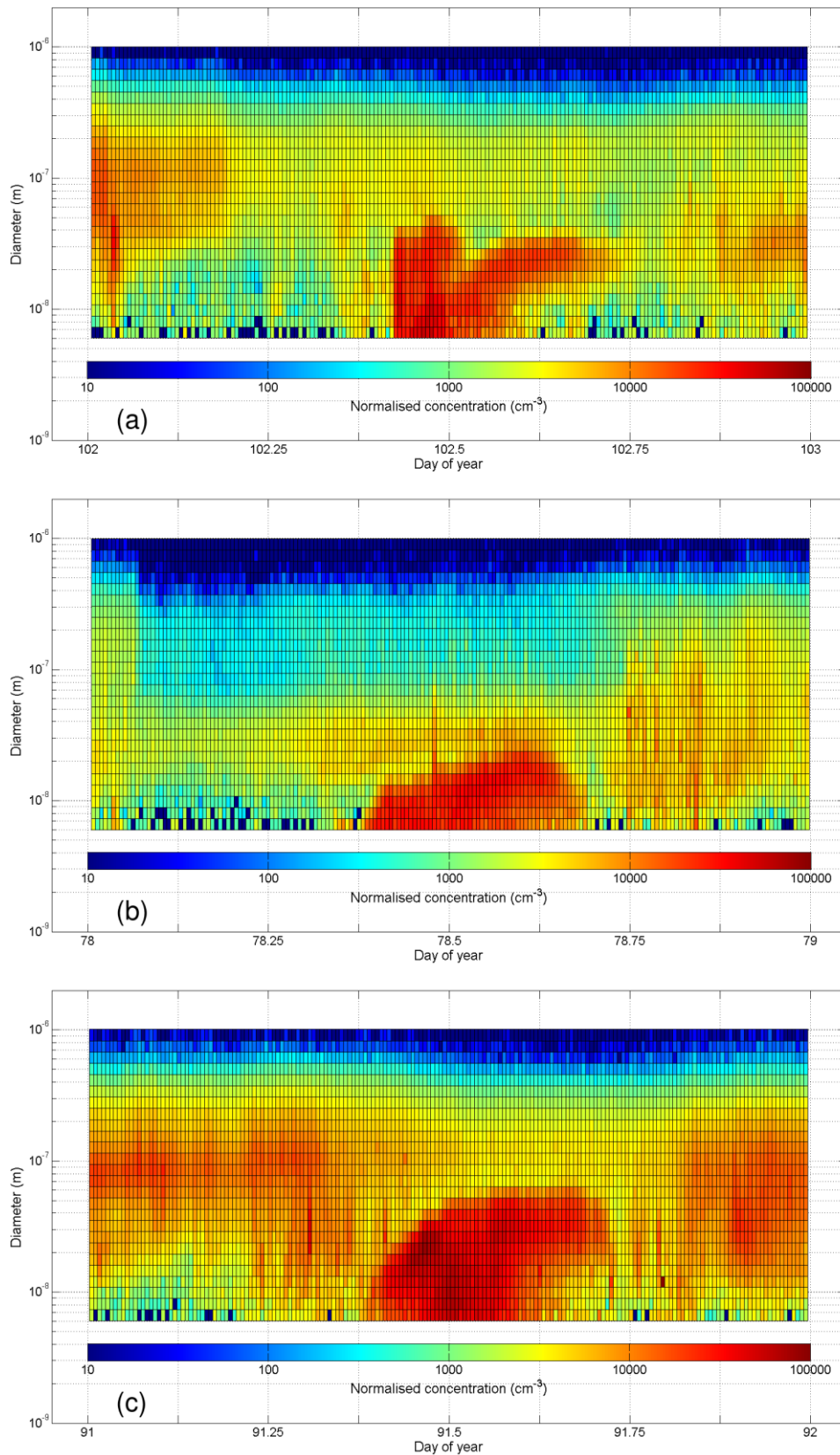


Figure S1. Size distribution surface plots for NPF and consecutive particle diameter growth process as banana-shape plots with an emission interference on 12-04-2015 (a), with limited growth of particles on 19-03-2017 (b) and with a broad unresolvable onset on 01-04-2017 (c) in the city centre.

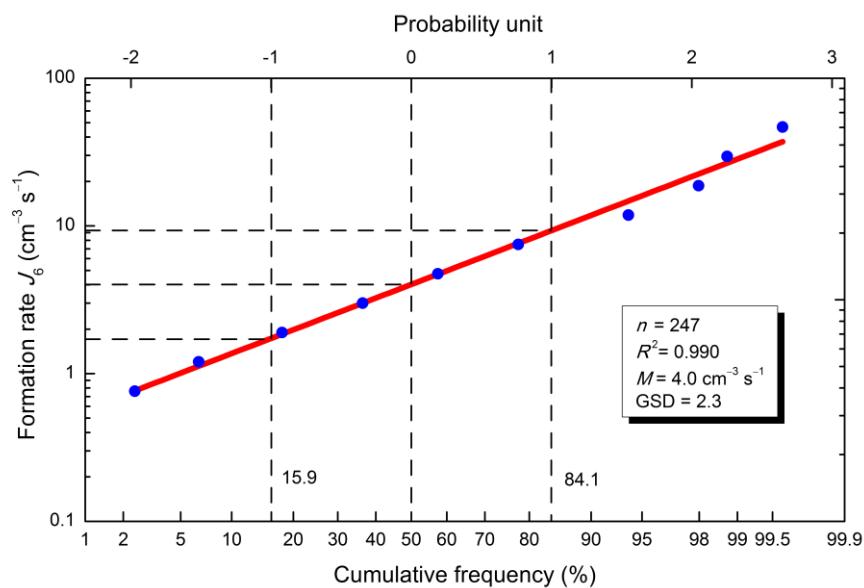


Figure S2. Log-probability graph of the formation rate J_6 and its cumulative frequency distribution for n individual data in the joint overall data set. The linear line in red represents the apparent fit to the data. Coefficient of determination (R^2), median J_6 value (M) and its geometric standard deviation (GSD) obtained from the fitted line are also shown.