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*Supplement of*

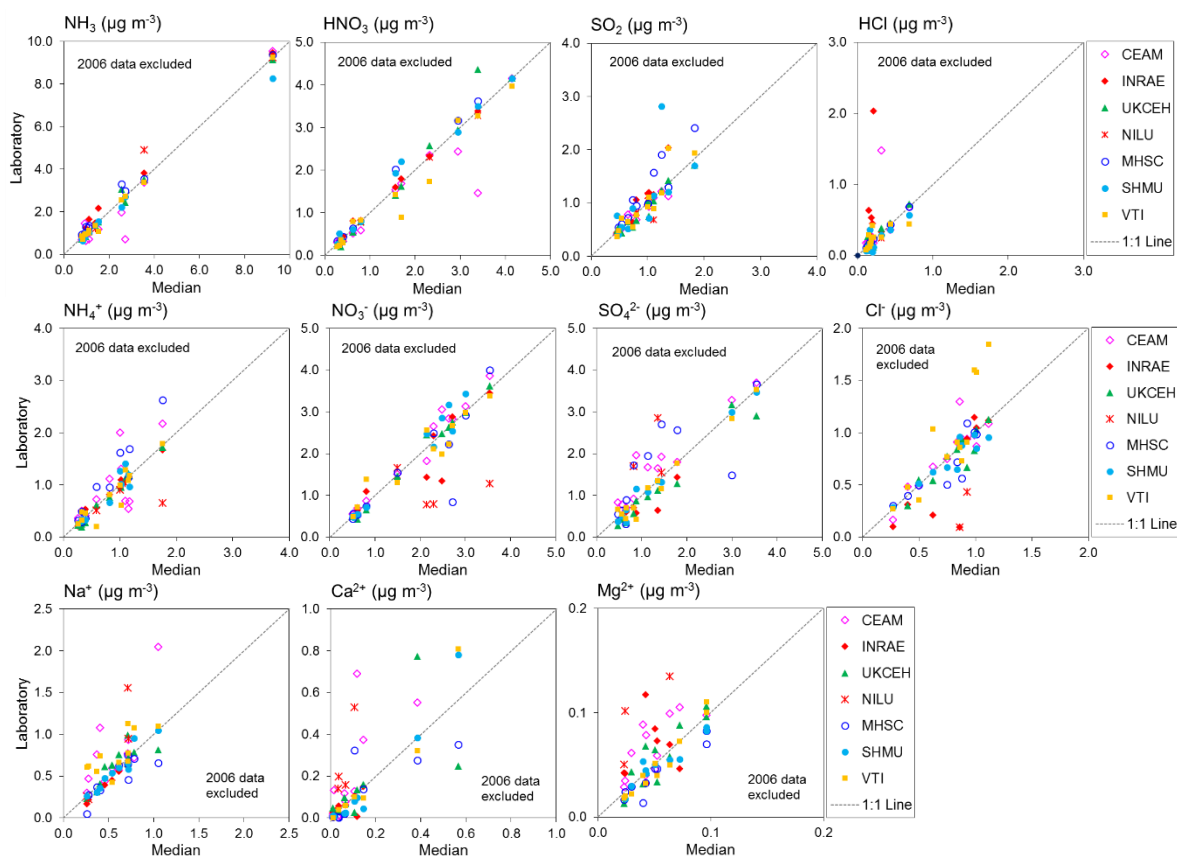
## **Pan-European rural monitoring network shows dominance of NH<sub>3</sub> gas and NH<sub>4</sub>NO<sub>3</sub> aerosol in inorganic atmospheric pollution load**

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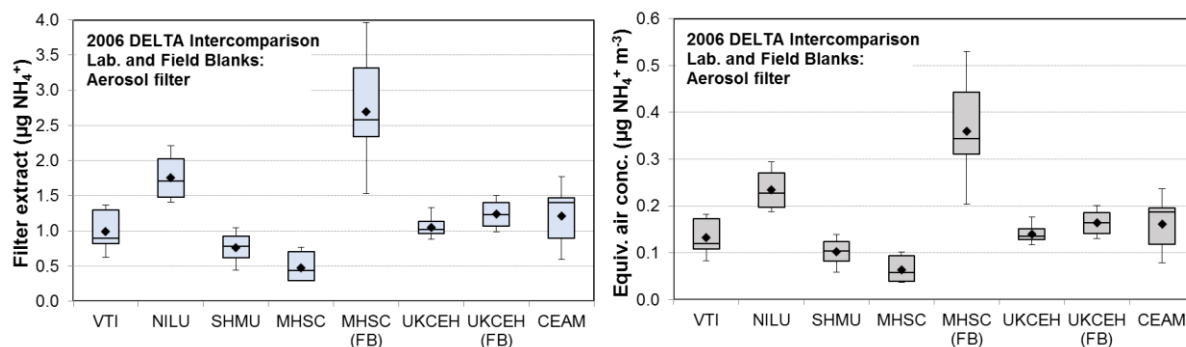
# Supplementary material



Lab	Gas: NH <sub>3</sub>			Gas: HNO <sub>3</sub>			Gas: SO <sub>2</sub>			Gas: HCl		
	R <sup>2</sup>	slope	n	R <sup>2</sup>	slope	n	R <sup>2</sup>	slope	n	R <sup>2</sup>	slope	n
CEAM	0.94	1.02	12	0.83	0.81	12	0.90	0.85	11	0.88	0.92	11
INRAE	0.99	1.00	8	0.99	0.99	8	0.88	1.25	7	0.02	1.73	8
UKCEH	1.00	0.99	12	0.97	1.12	12	0.94	0.97	12	0.88	1.03	12
NILU	0.97	1.00	4	1.00	0.96	4	0.00	0.02	4	0.08	0.79	3
MHSC	0.99	0.99	10	0.99	1.16	9	0.86	1.33	10	0.99	1.02	10
SHMU	1.00	0.89	10	0.98	0.99	10	0.80	1.10	10	0.74	0.84	10
VTI	1.00	1.00	12	0.95	0.96	12	0.84	1.19	12	0.54	0.58	12
Lab	Particle: NH <sub>4</sub> <sup>+</sup>			Particle: NO <sub>3</sub> <sup>-</sup>			Particle: SO <sub>4</sub> <sup>2-</sup>			Particle: Cl <sup>-</sup>		
	R <sup>2</sup>	slope	n	R <sup>2</sup>	slope	n	R <sup>2</sup>	slope	n	R <sup>2</sup>	slope	n
CEAM	0.51	0.97	12	0.97	1.08	12	0.91	0.96	12	0.78	1.03	12
INRAE	0.98	0.93	8	0.77	0.86	8	0.75	0.75	8	0.64	1.24	8
UKCEH	0.99	1.06	12	0.99	1.05	11	0.95	0.93	11	0.83	0.98	10
NILU	0.01*	0.06*	4	0.03	-0.08	4	0.90	1.63	3	-	-	2
MHSC	0.93	1.48	10	0.97	1.05	9	0.54	0.75	10	0.74	0.92	9
SHMU	0.88	1.08	10	0.96	1.14	10	0.98	1.00	10	0.86	0.83	10
VTI	0.86	0.99	12	0.91	0.86	11	0.97	0.99	12	0.73	1.62	12
Lab	Particle: Na <sup>+</sup>			Particle: Ca <sup>2+</sup>			Particle: Mg <sup>2+</sup>					
	R <sup>2</sup>	slope	n	R <sup>2</sup>	slope	n	R <sup>2</sup>	slope	n			
CEAM	0.20	0.54	11	0.52	1.60	11	0.55	0.94	11			
INRAE	0.99	0.99	8	0.39	0.57	8	0.04	0.33	8			
UKCEH	0.67	0.84	11	0.47	0.85	11	0.82	1.09	12			
NILU	0.84	2.24	4	0.78	4.85	4	0.47	2.49	4			
MHSC	0.74	0.78	9	0.67	0.64	10	0.88	0.79	9			
SHMU	0.91	1.05	10	0.95	1.33	10	0.90	0.78	10			
VTI	0.51	0.70	11	0.93	1.31	8	0.96	1.18	11			

\*regression line excluding one outlier;  $Y = 0.98x - 0.06$ ,  $R^2 = 1.00$

Figure S1: Scatter plots comparing atmospheric gas (NH<sub>3</sub>, HNO<sub>3</sub>, SO<sub>2</sub> and HCl) and aerosol (NH<sub>4</sub><sup>+</sup>, NO<sub>3</sub><sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, Cl<sup>-</sup>, Na<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>) concentrations measured by each of the NEU laboratories with the median estimate of all laboratories for field inter-comparisons conducted between 2007 – 2009 only. Data from the 2006 inter-comparisons are excluded in this analysis, to compare with Figure 6 in main text which included all periods. A summary of the regression results is shown in the table below the graphs. Note (i) There are fewer data points for INRAE because they joined the NEU network later in 2007 and participated in the 2008 and 2009 inter-comparisons only. (ii) Low number of observations in some cases were due to some laboratories not reporting all parameters. NILU: HCl, Cl<sup>-</sup>, Na<sup>+</sup>, Ca<sup>2+</sup> and Mg<sup>2+</sup> reported for 2008 inter-comparisons only.



	Acid coated aerosol filter: Laboratory Blanks		Acid coated aerosol filter: Field Blanks (FB)	
	µg NH <sub>4</sub> <sup>+</sup> in extract	'Equivalent air concentration for 2 week exposure (µg NH <sub>4</sub> <sup>+</sup> m <sup>-3</sup> )	µg NH <sub>4</sub> <sup>+</sup> in extract	'Equivalent aerosol concentration for 2 week exposure (µg NH <sub>4</sub> <sup>+</sup> m <sup>-3</sup> )
VTI	mean = 0.99 (n = 8) range = 0.62 – 1.37	mean = 0.13 (n = 8) range = 0.08 – 0.18		
NILU	mean = 0.99 (n = 8) range = 0.62 – 1.37	mean = 0.23 (n = 8) range = 0.19 – 0.29		
SHMU	mean = 0.64 (n = 4) range = 0.44 – 1.05	mean = 0.10 (n = 4) range = 0.06 – 0.14		
MHSC	mean = 0.48 (n = 9) range = 0.28 – 0.76	mean = 0.06 (n = 9) range = 0.04 – 0.10	mean = 2.70 (n = 9) range = 1.53 – 3.97	mean = 0.36 (n = 9) range = 0.20 – 0.53
UKCEH	mean = 1.05 (n = 10) range = 0.88 – 1.33	mean = 0.14 (n = 10) range = 0.12 – 0.18	mean = 1.24 (n = 6) range = 0.98 – 1.50	mean = 0.16 (n = 6) range = 0.13 – 0.20
CEAM	mean = 1.21 (n = 7) range = 0.59 – 1.78	mean = 0.16 (n = 8) range = 0.08 – 0.24		

'Equivalent aerosol concentrations, based on air volume of 7.5 m<sup>3</sup> sampled by DELTA® system over a 2-week exposure period in the 2006 DELTA intercomparison.

Figure S2: Comparison of laboratory and field blanks (where reported) for ammonium aerosol filters from the 2006 DELTA® intercomparison exercise between six participating laboratories.

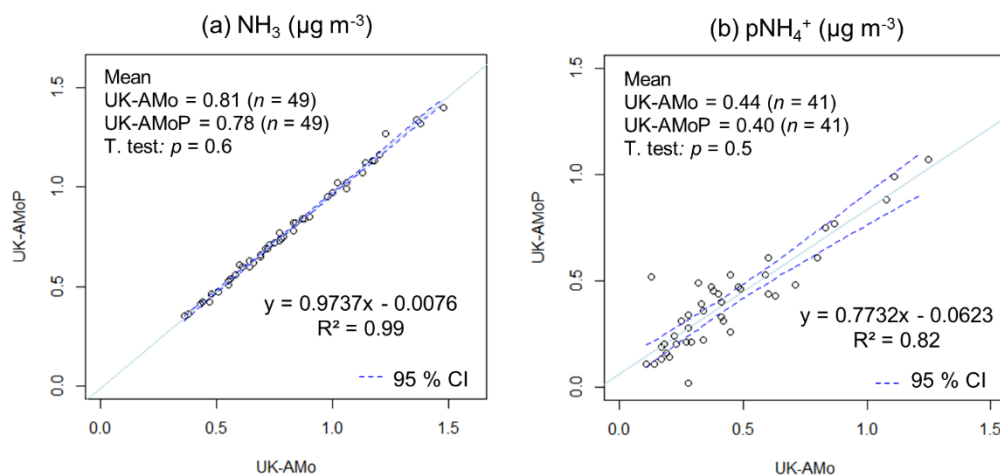


Figure S3: Comparison of replicated DELTA monthly measurement of (a) NH<sub>3</sub> and (b) particulate NH<sub>4</sub><sup>+</sup> concentrations at the UK Auchencorth (UK-AMo) and its' parallel site (UK-AMoP). Months where paired data are not available were excluded from analysis. Independent samples t test was carried out using R.  $p < 0.05$  = statistically significant difference in mean concentration between replicated measurements.  $p > 0.05$  = not a statistically significant difference.

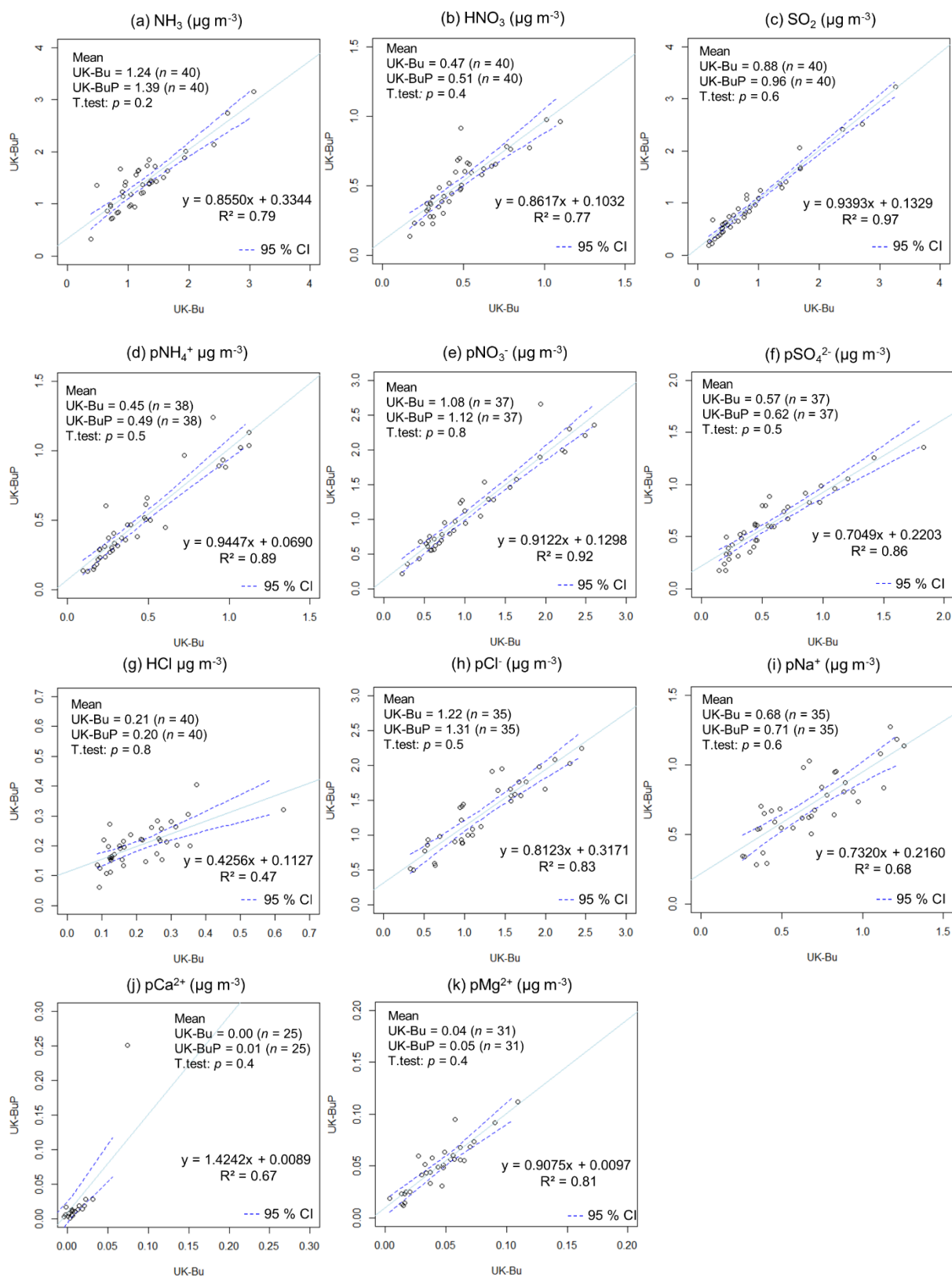


Figure S4: Comparison of replicated DELTA monthly measurement of gases (a: NH<sub>3</sub>, b: HNO<sub>3</sub>, c: SO<sub>2</sub>, g: HCl) and particulates (d: NH<sub>4</sub><sup>+</sup>, e: NO<sub>3</sub><sup>-</sup>, f: SO<sub>4</sub><sup>2-</sup>, h: Cl<sup>-</sup>, i: Na<sup>+</sup>, j: Ca<sup>2+</sup>, k: Mg<sup>2+</sup>) at the UK Bush site (UK-Bu) and its parallel site (UK-BuP). Independent samples t test was carried out on R ( $p < 0.05$  = statistically significant difference in mean concentration between the replicates;  $p > 0.05$  = not a statistically significant difference).

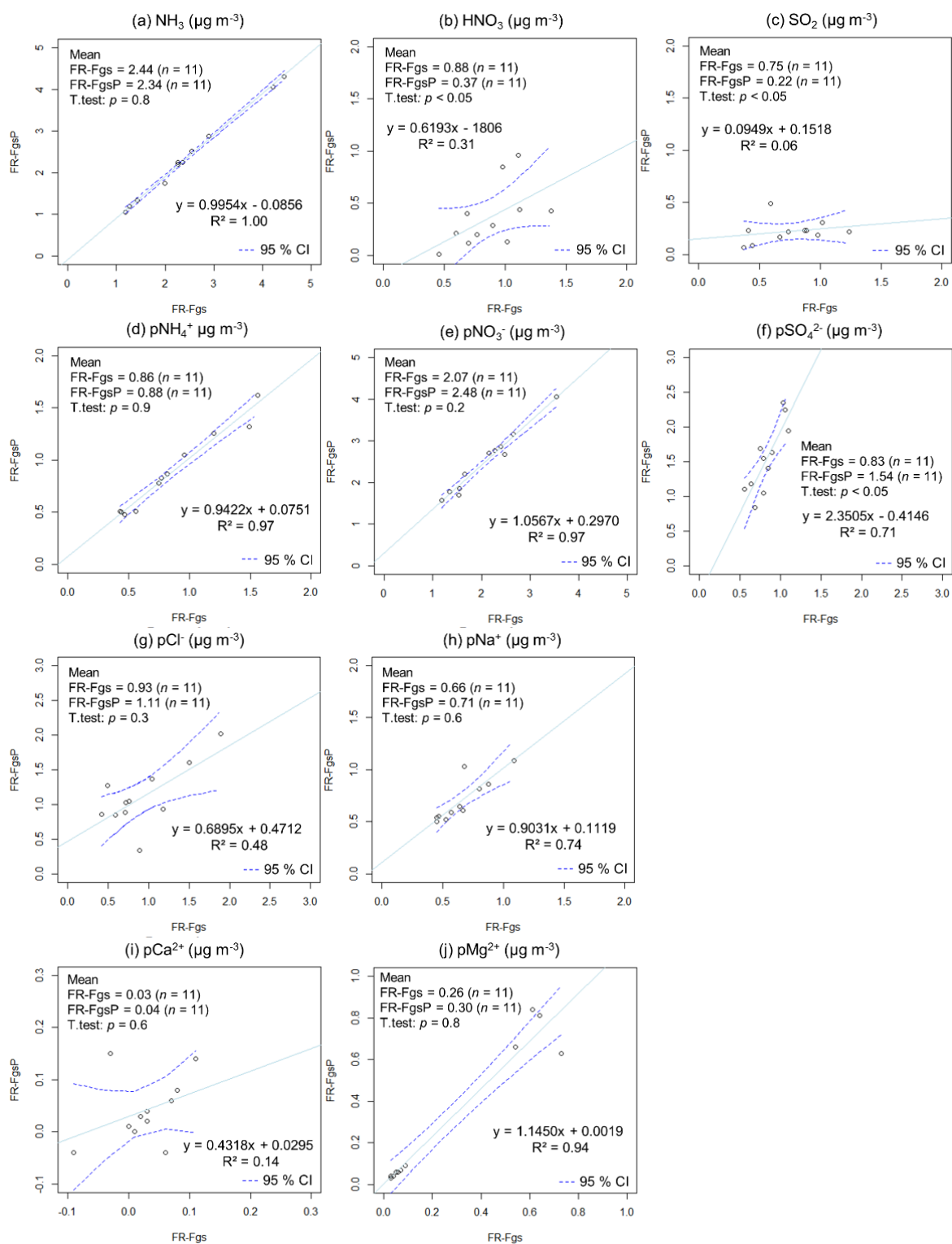


Figure S5: Comparison of replicated DELTA monthly measurement of gases (a: NH<sub>3</sub>, \*b: HNO<sub>3</sub>, \*\*c: SO<sub>2</sub>) and particulates (d: NH<sub>4</sub><sup>+</sup>, e: NO<sub>3</sub><sup>-</sup>, \*\*f: SO<sub>4</sub><sup>2-</sup>, g: Cl<sup>-</sup>, h: Na<sup>+</sup>, i: Ca<sup>2+</sup>, j: Mg<sup>2+</sup>) at the French Fougères site (FR-Fgs) and its' parallel site (FR-FgsP). Independent samples t-test was carried on R ( $p < 0.05$  = statistically significant difference in mean concentration between the replicates;  $p > 0.05$  = not a statistically significant difference). \*K<sub>2</sub>CO<sub>3</sub>/glycerol coated denuder used at FR-Fgs (HNO<sub>3</sub> determination includes potential interference from co-collected oxidised N species) vs NaCl coated denuder at FR-FgsP. (selective for HNO<sub>3</sub>). \*\* SO<sub>2</sub> is partially captured on NaCl coated denuders only, with break-through of SO<sub>2</sub> onto the aerosol filters resulting in larger particulate SO<sub>4</sub><sup>2-</sup> concentrations than the Fr-Fgs site.

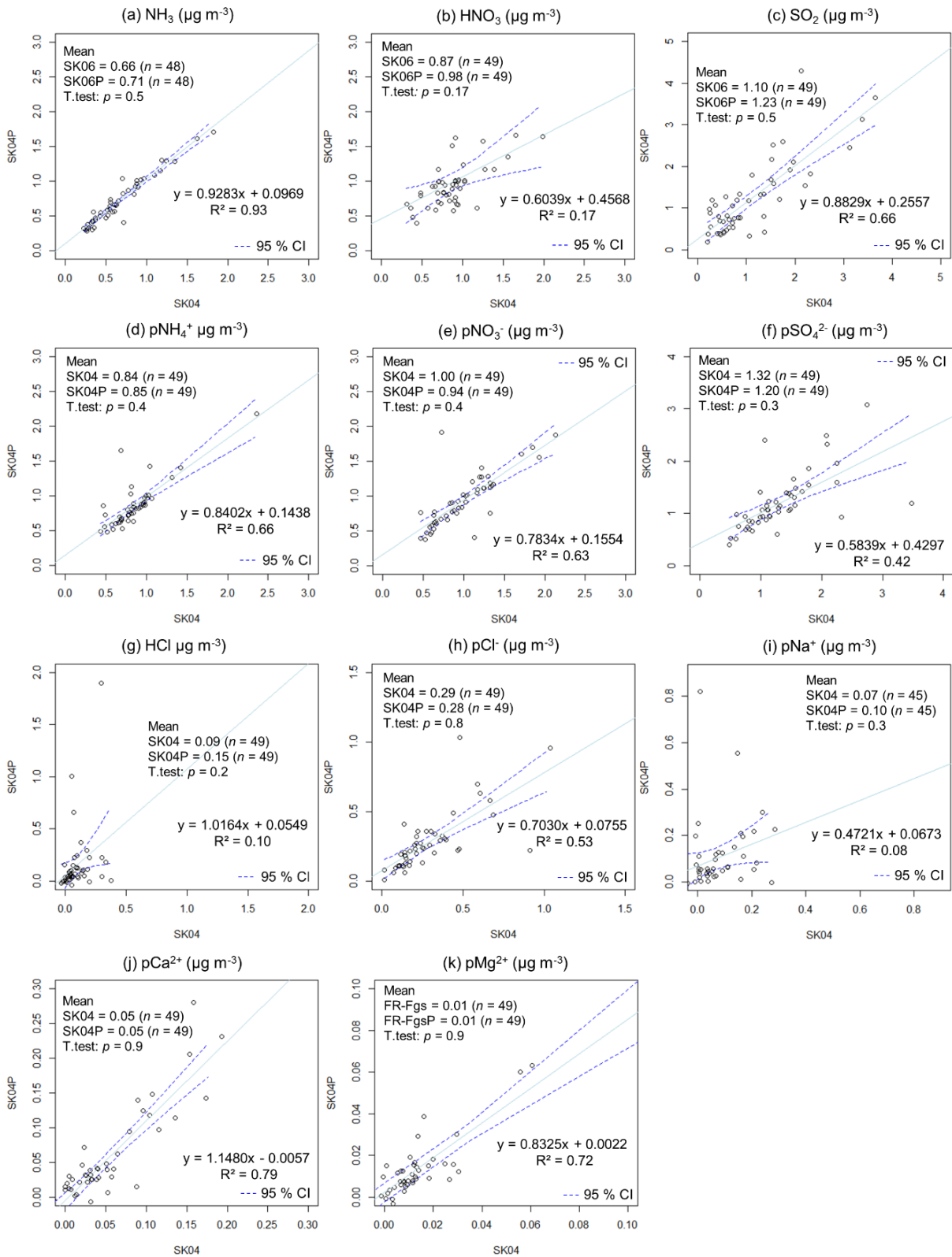
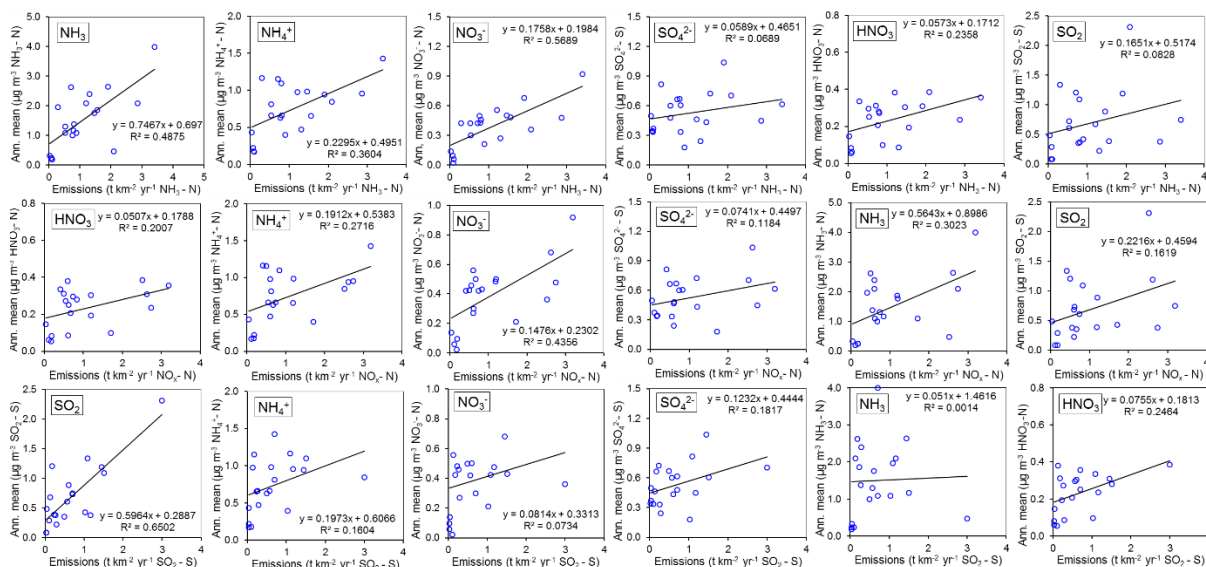


Figure S6: Comparison of replicated DELTA monthly measurement of gases (a:  $\text{NH}_3$ , b:  $\text{HNO}_3$ , c:  $\text{SO}_2$ , g:  $\text{HCl}$ ) and particulates (d:  $\text{NH}_4^+$ , e:  $\text{NO}_3^-$ , f:  $\text{SO}_4^{2-}$ , h:  $\text{Cl}^-$ , i:  $\text{Na}^+$ , j:  $\text{Ca}^{2+}$ , k:  $\text{Mg}^{2+}$ ) at the Slovakian site (SK06) and its' parallel site (SK06P). Independent samples t test was carried out on R ( $p < 0.05$  = statistically significant difference in mean concentration between the replicates;  $p > 0.05$  = not a statistically significant difference).



National annual average ( $n = 20$ ) ( $\mu\text{g m}^{-3}$ )	4-year averaged national emission densities (2007 – 2010, 20 countries)								
	$\text{NH}_3$ (tonnes N $\text{km}^{-2} \text{yr}^{-1}$ )			$\text{NO}_x$ (tonnes N $\text{km}^{-2} \text{yr}^{-1}$ )			$\text{SO}_2$ (tonnes S $\text{km}^{-2} \text{yr}^{-1}$ )		
	slope	intercept	$R^2$	slope	intercept	$R^2$	slope	intercept	$R^2$
Gas $\text{NH}_3$ - N	0.75	0.70	0.49***	0.57	0.90	0.30*	0.05	1.46	0.00 <sup>NS</sup>
Gas $\text{HNO}_3$ - N	0.06	0.17	0.24*	0.05	0.18	0.20*	0.08	0.18	0.25*
Gas $\text{SO}_2$ - S	0.17	0.52	0.24 <sup>NS</sup>	0.22	0.46	0.16 <sup>NS</sup>	0.60	0.29	0.65***
Aerosol $\text{NH}_4$ - N	0.23	0.50	0.36**	0.19	0.54	0.27*	0.20	0.61	0.16 <sup>NS</sup>
Aerosol $\text{NO}_3^-$ - N	0.18	0.20	0.57***	0.15	0.23	0.44**	0.08	0.33	0.07 <sup>NS</sup>
Aerosol $\text{SO}_4^{2-}$ - S	0.06	0.47	0.07 <sup>NS</sup>	0.07	0.45	0.12 <sup>NS</sup>	0.12	0.44	0.18 <sup>NS</sup>

Figure S7: (TOP) Scatter plots and (BOTTOM) summary statistics of regression analyses between national annual averaged gas ( $\text{NH}_3$ ,  $\text{HNO}_3$ ,  $\text{SO}_2$ ) and aerosol ( $\text{NH}_4^+$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ) concentrations, and the national emission densities of  $\text{NH}_3$ -N (upper plots),  $\text{NO}_x$ -N (middle plots) and  $\text{SO}_2$ -S (lower plots) (expressed as emissions per unit area of the country per year, averaged over the 4-year period 2007 to 2010) for each of the 20 countries in the NEU DELTA® network.



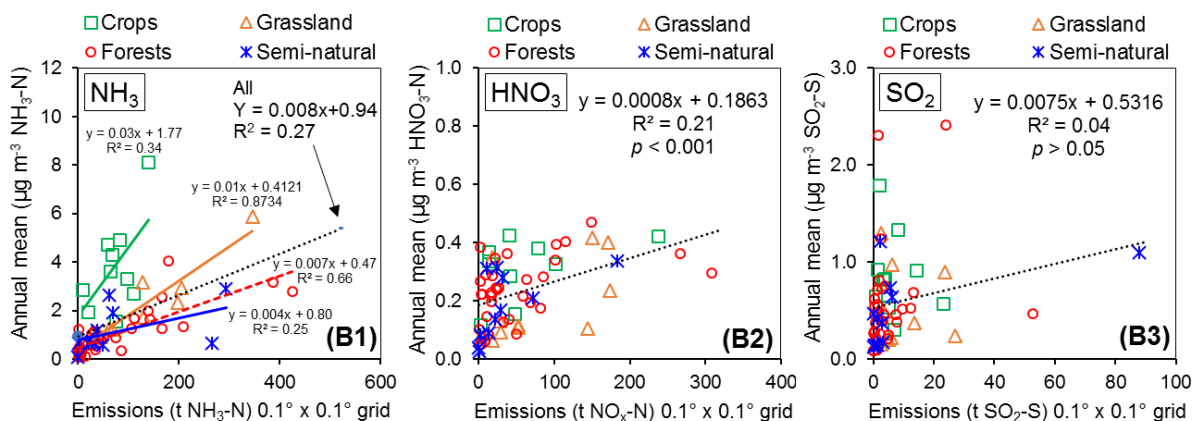


Figure S8: Regression plots of annual averaged gas ( $\text{NH}_3$ ,  $\text{HNO}_3$ ,  $\text{SO}_2$ ) concentrations (2007 – 2010) at each site in the NEU DELTA<sup>®</sup> network vs 4-year averaged total emissions of gases ( $\text{NH}_3$ ,  $\text{NO}_x$  and  $\text{SO}_2$ : tonnes  $\text{yr}^{-1}$ ) from single EMEP grids ( $0.1^\circ \times 0.1^\circ$ ) in which each site is located ( $n = 66$ ). Coloured symbols indicate the ecosystem classification of each site (Crops,  $n = 10$ ; Grassland,  $n = 10$ ; Forests,  $n = 35$  and Semi-natural,  $n = 11$ ).

### Comparisons with gridded emissions

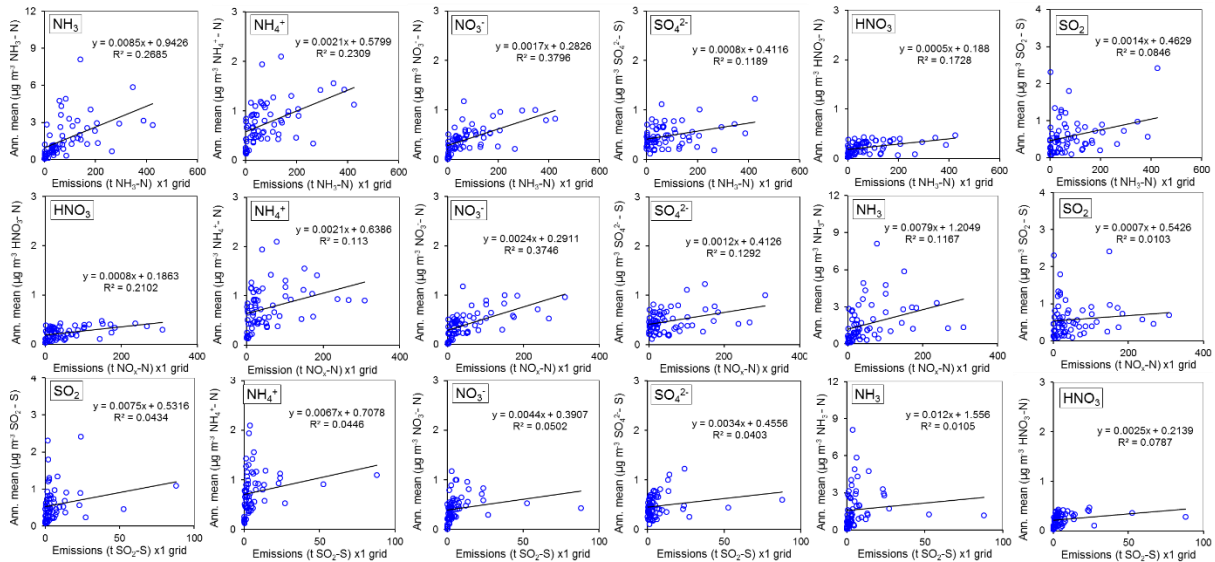
The comparisons in the manuscript used national emission totals, where emissions have been summed and averaged across very large and heterogeneous areas in each country. Another approach is to compare the individual site mean data with gridded emissions from individual  $0.1^\circ \times 0.1^\circ$  EMEP grids in which the NEU sites are located. This also provided significant correlations for  $\text{NH}_3$  ( $p < 0.001$ ,  $n = 66$ , Figure S8B1) and  $\text{HNO}_3$  vs  $\text{NO}_x$  ( $p < 0.05$ , Figure S8B2), but not for  $\text{SO}_2$  (Figure S8B3, Figure SS9). Some interesting features also emerged in the  $\text{NH}_3$  comparisons, with clustering of data according to ecosystem types (Figure 10B1). The cropland sites have highest  $\text{NH}_3$  concentrations compared with gridded emissions (slope = 0.03,  $R^2 = 0.34$ ,  $p = 0.08$ ,  $n = 10$ ), followed by grassland sites (slope = 0.01,  $R^2 = 0.87$ ,  $p < 0.001$ ,  $n = 10$ ) (Fig. S8B1, Figure S9). Forest (slope = 0.007,  $R^2 = 0.66$ ,  $p < 0.001$ ,  $n = 35$ ) and semi-natural sites (slope = 0.004,  $R^2 = 0.25$ ,  $p = 0.11$ ,  $n = 11$ ) are similar, with smaller  $\text{NH}_3$  concentrations compared with their gridded emissions. Since  $\text{NH}_3$  is spatially heterogeneous even at a local sub-grid scale (e.g. Dragosits et al., 2002), the smaller concentrations at semi-natural and forest sites in grids with large emissions indicates these sites may be located further away from sources in the grid (Tang et al., 2018; van Zanten et al., 2017). Dry deposition of  $\text{NH}_3$  is also largest to forests and semi-natural areas (larger  $V_d$  than to crops/grass ecosystem types, e.g. Smith et al., 2000; Flechard et al., 2011), which could also contribute to the smaller concentrations at higher emissions. Relationship between emissions and concentrations in the atmosphere is however complex, influenced by other factors such as chemical interactions, variations in meteorological conditions and long-range transboundary import.

The lack of correlation between  $\text{SO}_2$  concentrations and gridded emissions (Figure S8B3) suggests that a  $0.1^\circ \times 0.1^\circ$  grid may be too local a spatial scale for an emission-concentration comparison for  $\text{SO}_2$ , as  $\text{SO}_2$  is likely to be highly localised with emissions occurring from a smaller number of large point sources at an elevated height. Indeed, emissions in neighbouring grids surrounding each site are highly variable. For example, the 4-year averaged  $\text{SO}_2$  emissions in the 4 EMEP grids around the Italian San Rossore site (IT-SRo) varied between 0.47 to 610 kt  $\text{SO}_2 \text{ yr}^{-1}$ . Further analysis was also carried out comparing site mean concentrations against the averaged emissions of an extended number of EMEP grids (4 x grids) (Supp. Figure S4). Since the analysis provided similar results to the comparisons with individual gridded emissions, they are not included for further discussions in this main paper, but are provided here for information.



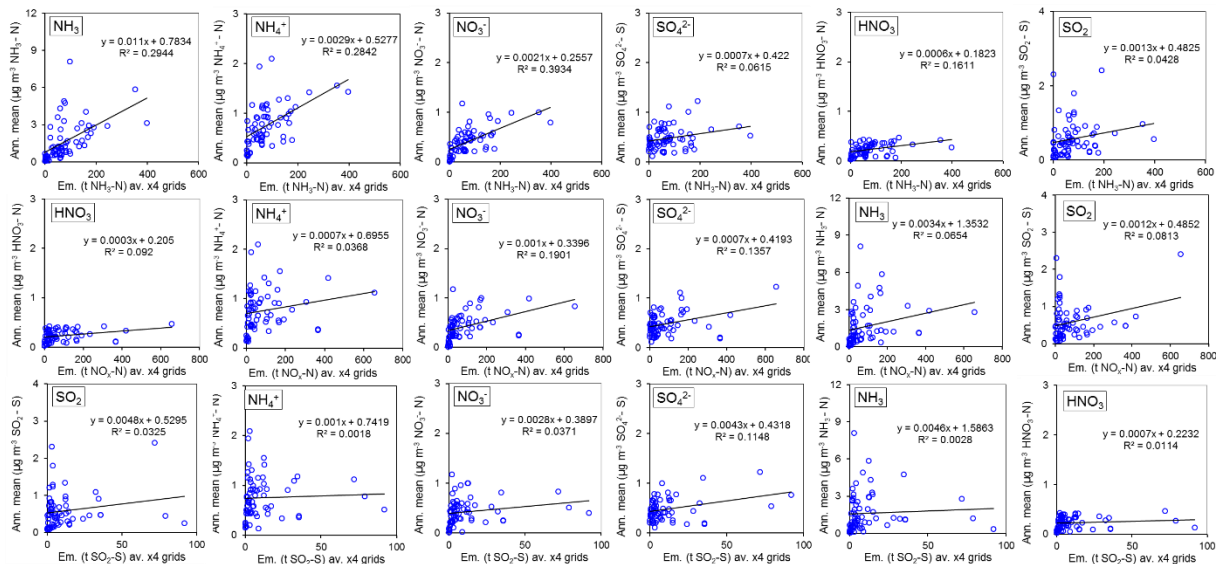
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Site annual average ( $n = 66$ ) ( $\mu\text{g m}^{-3}$ )	4-year averaged emissions (2007 – 2010) from single EMEP grid ( $0.1^\circ \times 0.1^\circ$ ) containing monitoring site								
	$\text{NH}_3$ (tonnes $\text{N yr}^{-1}$ )			$\text{NO}_x$ (tonnes $\text{N yr}^{-1}$ )			$\text{SO}_2$ (tonnes $\text{yr}^{-1}$ )		
	slope	intercept	$R^2$	slope	intercept	$R^2$	slope	intercept	$R^2$
Gas $\text{NH}_3$ - N	0.0085	0.94	0.27***	0.0079	1.2	0.12**	0.0120	1.56	0.01 <sup>NS</sup>
Gas $\text{HNO}_3$ - N	0.0005	0.19	0.17***	0.0008	0.19	0.21***	0.0025	0.21	0.08*
Gas $\text{SO}_2$ - S	0.0014	0.46	0.08*	0.0007	0.54	0.01 <sup>NS</sup>	0.0075	0.53	0.04 <sup>NS</sup>
Aerosol $\text{NH}_4$ - $\text{N}^+$	0.0021	0.58	0.23***	0.0021	0.64	0.11**	0.0067	0.71	0.04 <sup>NS</sup>
Aerosol $\text{NO}_3^-$ - N	0.0017	0.28	0.38***	0.0024	0.29	0.37***	0.0044	0.39	0.05 <sup>NS</sup>
Aerosol $\text{SO}_4^{2-}$ - S	0.0008	0.41	0.12**	0.0012	0.41	0.13**	0.0034	0.46	0.04 <sup>NS</sup>

Figure S9: (TOP) Scatter plots and (BOTTOM) summary statistics of regression analyses between annual averaged gas ( $\text{NH}_3$ ,  $\text{HNO}_3$ ,  $\text{SO}_2$ ) and aerosol ( $\text{NH}_4^+$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ) concentrations at each NEU DELTA<sup>®</sup> site, and the emissions of  $\text{NH}_3$ -N (upper plots),  $\text{NO}_x$ -N (middle plots) and  $\text{SO}_2$ -S (lower plots) from individual EMEP grids ( $0.1^\circ \times 0.1^\circ$ ) containing the site (emissions expressed per EMEP grid, averaged over the 4-year period 2007 to 2010).



Site annual average ( $n = 66$ ) ( $\mu\text{g m}^{-3}$ )	4-year averaged emissions (2007 – 2010) from 4 x EMEP grids (each = $0.1^\circ \times 0.1^\circ$ ) surrounding each site								
	$\text{NH}_3$ (tonnes N $\text{km}^{-2} \text{yr}^{-1}$ )			$\text{NO}_x$ (tonnes N $\text{km}^{-2} \text{yr}^{-1}$ )			$\text{SO}_2$ (tonnes S $\text{km}^{-2} \text{yr}^{-1}$ )		
	slope	intercept	$R^2$	slope	intercept	$R^2$	slope	intercept	$R^2$
Gas $\text{NH}_3$ - N	0.0110	0.78	0.29***	0.0034	1.35	0.07*	0.0046	1.59	0.00 <sup>NS</sup>
Gas $\text{HNO}_3$ - N	0.0006	0.18	0.16***	0.0003	0.21	0.09*	0.0007	0.22	0.01 <sup>NS</sup>
Gas $\text{SO}_2$ - S	0.0013	0.48	0.04 <sup>NS</sup>	0.0012	0.49	0.08*	0.0048	0.53	0.03 <sup>NS</sup>
Aerosol $\text{NH}_4^+$ - N <sup>+</sup>	0.0029	0.53	0.28***	0.0007	0.70	0.04 <sup>NS</sup>	0.0010	0.74	0.00 <sup>NS</sup>
Aerosol $\text{NO}_3^-$ - N	0.0021	0.26	0.39***	0.0010	0.34	0.19***	0.0028	0.39	0.04 <sup>NS</sup>
Aerosol $\text{SO}_4^{2-}$ - S	0.0007	0.42	0.06*	0.0007	0.42	0.14**	0.0043	0.43	0.11**

Figure S10: (TOP) Scatter plots and (BOTTOM) summary statistics of regression analyses between annual averaged gas ( $\text{NH}_3$ ,  $\text{HNO}_3$ ,  $\text{SO}_2$ ) and aerosol ( $\text{NH}_4^+$ ,  $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ) concentrations at each NEU DELTA<sup>®</sup> site, and the averaged emissions of 4 EMEP grids (each grid =  $0.1^\circ \times 0.1^\circ$ , emissions expressed per EMEP grid, averaged over the 4-year period 2007 to 2010) surrounding each site, of  $\text{NH}_3$ -N (upper plots),  $\text{NO}_x$ -N (middle plots) and  $\text{SO}_2$ -S (lower plots)

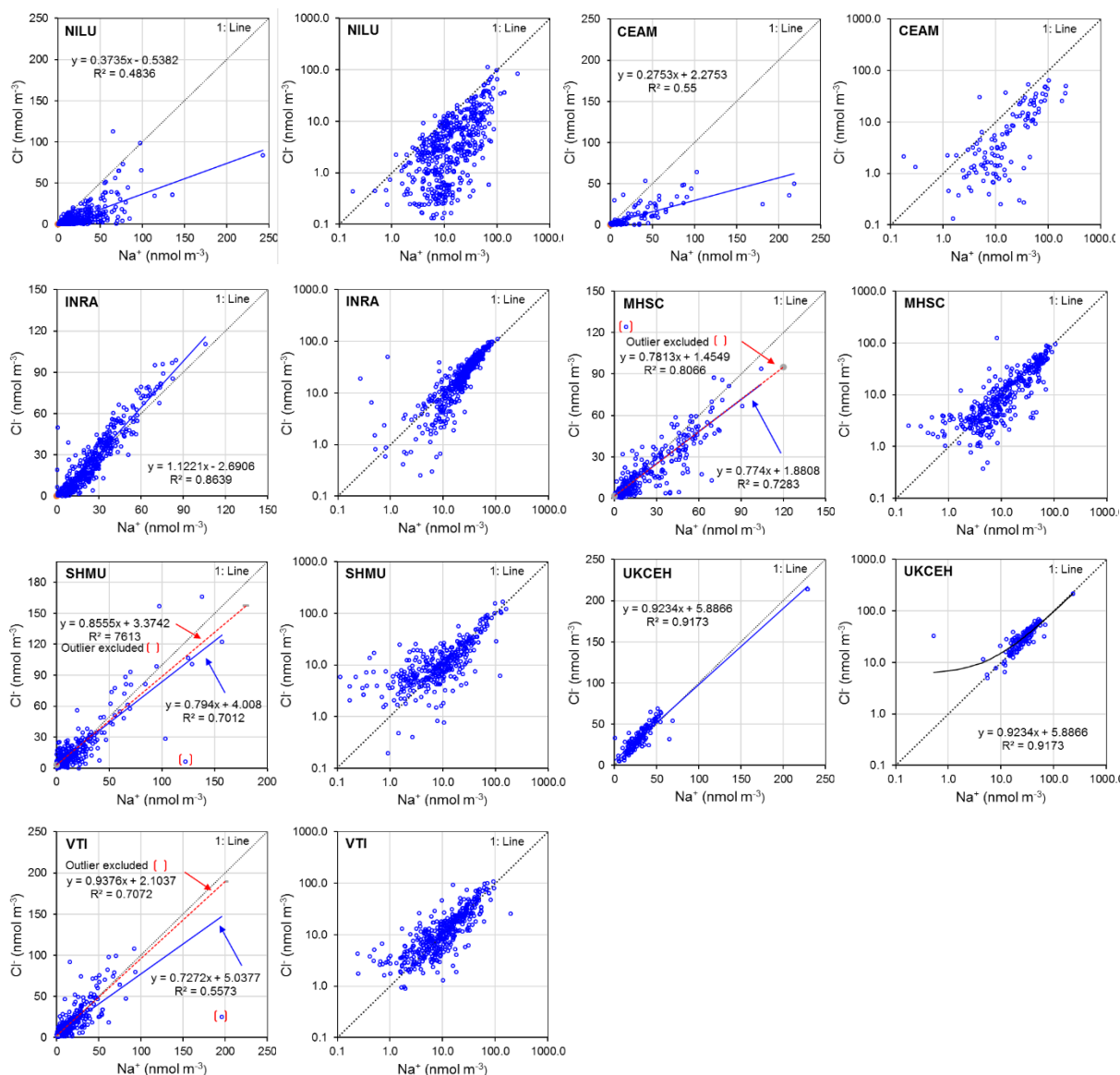


Figure S11: Regression plots between molar concentrations of Na<sup>+</sup> and Cl<sup>-</sup>, with analysis grouped by sites with measurements made by each of the seven laboratories, NILU ( $n = 16$ ), CEAM ( $n = 3$ ), INRAE ( $n = 10$ ), MHSC ( $n = 9$ ), SHMU ( $n = 9$ ), UKCEH ( $n = 5$ ) and VTI ( $n = 12$ ). In each case, the same plots are also shown on a log scale, to improve visualisation of data points at the lower concentrations. Each data point is the monthly measured concentration at individual sites.

Table S1: Details of all sites in the NEU DELTA® network.

Site no.	Site name	Site Code	Lat. (°N)	Long. (°E)	Ecosystem Type	Host organisation	START	END
1	Hainich	DE-Hai	51.0792	10.4519	Forests	Max-Planck-Institut für Biogeochemie	21/02/07	04/01/11
2	Weizstein	DE-Wet	50.4533	11.4575	Forests		22/02/07	05/01/11
3	Gebesee	DE-Geb	51.1000	10.9142	Crops		21/02/07	05/01/11
4	Itharandt	DE-Ith	50.9636	13.5669	Forests	Technical University Dresden	07/02/07	28/12/10
5	Grillenburg	DE-Gri	50.9494	13.5125	Grassland		07/02/07	28/12/10
6	Klingenberg	DE-Kli	50.8931	13.5222	Crops		07/02/07	28/12/10
7	Hogwald	DE-Hog	48.3000	11.1000	Forests	FZK/IMK-IFU (Ins. Meteorology & Climate Research Atmos. Env. Research)	28/02/07	10/01/11
8	Mitra II	PT-Mi1	38.5406	-8.0000	Forests	Lisbon University	01/12/06	24/01/11
9	Petrodolinskoye	UA-Pet	46.5000	30.3000	Crops	Odessa National University	01/12/06	28/12/10
10	Renon	IT-Ren	46.5878	11.4347	Forests	Autonome Provinz Bozen	03/01/07	03/01/11
11	Fyodorovskoe bog	RU-Fyo	56.4617	32.9239	Forests	Russian Academy of Sciences	01/12/06	01/01/11
12	Espirra	PT-Esp	38.6392	-8.6017	Forests	Instituto Superior Technico Lisboa	09/01/07	04/01/11
13	BKFOREs	CZ-BK1	49.5025	18.5383	Forests	Inst. Systems Biology & Ecology	08/11/06	04/01/11
14	Bugac	HU-Bug	46.6917	19.6017	Semi-natura	Hungarian Met. Service	13/11/06	05/01/11
15	POLWE I	PL-Pol	52.7622	16.3094	Semi-natura	University of Poznan	10/11/06	03/01/11
16	Oensingen	CH-Oe1	47.2856	7.7319	Grassland	VTI (von Thunen Institut)	03/11/06	03/01/11
17	Laegern	CH-Lae	47.4778	8.3653	Forests	EIH	07/11/06	03/01/11
18	Monte Bondone	IT-MBo	46.0294	11.0828	Semi-natura	Centro di Ecologia Alpina	01/12/06	21/01/11
19	Piana del Sele (Borgo Cioffi)	IT-BC1	40.5236	14.9572	Crops	CNR ISA-Fom	05/12/06	03/01/11
20	Hesse	FR-Hes	48.6742	7.0656	Forests	INRAE (French National Research Institute for Agriculture, Food & Environment) /UHP	19/02/07	10/01/11
21	Dripsey	IE-Dri	51.9867	-8.7517	Grassland	University College Cork	01/12/06	03/06/10
22	Grignon	FR-Gri	48.8439	1.9522	Crops	INRAE / INAPG (Institut National Agronomique Paris-Grignon, France)	29/11/06	20/01/11
23	Fontainebleau	FR-Fon	48.4761	2.7800	Forests	Université Paris-Sud	29/11/06	07/01/11
24	Le Bray	FR-LBr	44.7172	-0.7689	Forests	INRAE Bordeaux	14/12/06	24/01/09
25	Laqueuille	FR-Lq2	45.6392	2.7369	Grassland	INRAE	09/11/06	07/01/11
26	Puechabon	FR-Pue	43.7414	3.5958	Forests	Dream CEFÉ-CNR (French res. center in Ecology & Evol. Ecology)	27/10/06	28/12/10
27	Griffin	UK-Gri	56.6167	-3.8000	Forests	University of Edinburgh	06/12/06	19/11/08
28	East Saltoun	UK-ESa	55.9000	-2.8380	Crops		07/11/06	21/10/08
29	Carlow	IE-Ca2	52.8500	-6.9000	Grassland	Trinity College Dublin	01/11/06	05/01/11
30	Soroe	DK-Sor	55.4869	11.6458	Forests	RISOE (National Laboratory for Sustainable Energy, Denmark)	31/10/06	15/12/10
31	Sodankylä	FI-Sod	67.3617	26.6378	Forests	Finnish Meteorological Institute	27/11/06	17/01/11
32	Kaamanen	FI-Kaa	69.1407	27.2833	Semi-natura		02/01/09	02/10/09
33	Lompolajankka	FI-Lom	68.2144	24.3531	Semi-natura		04/11/06	29/11/06
34	Rimi	DK-Lva	55.6953	12.1178	Grassland	RISOE	30/10/06	11/03/09
35	Risbyholm	DK-Ris	55.5303	12.0972	Crops	Geografisk Institut	30/11/06	04/08/08
36	Norunda	SE-Nor	60.0833	17.4667	Forests	Dept Physical Geography & Ecosystems Analysis	14/11/06	10/12/10
37	Skyttorp	SE-Sk2	60.1294	17.8400	Forests		11/01/07	02/12/08
38	Braschaat	BE-Bra	51.3092	4.5206	Forests	University of Antwerpen	31/10/06	04/01/11
39	Vielsalm	BE-Vie	50.3053	5.9967	Forests	Faculté universitaire des Sciences agronomiques de Gembloux	09/11/06	03/02/11
40	Lonzee	BE-Lon	50.5519	4.7447	Crops		10/11/06	27/01/11
41	Hyytiälä	FI-Hyy	61.8475	24.2950	Forests	University of Helsinki	01/12/06	09/12/10
42	Roccarespampani	IT-Ro2	42.3900	11.9208	Forests	University of Tuscia	01/12/06	05/01/11
43	Cabauw	NL-Ca1	51.9708	4.9269	Grassland	ECN (Energy Research, Netherlands)	31/01/07	29/12/10
44	Horstermeer	NL-Hor	52.0289	5.0675	Semi-natura	Universiteit Amsterdam	13/03/07	04/01/11
45	Speulder	NL-Spe	52.2523	5.6905	Forests	ECN	09/11/06	29/11/10
46	Amplero	IT-Amp	41.9039	13.6050	Semi-natura	University of Tuscia	01/12/06	24/09/08
47	Collelongo	IT-Col	41.8494	13.5881	Forests		14/12/06	20/01/11
48	San Rossore	IT-SRo	43.7278	10.2844	Forests	DC-DG JRC (Joint Research Centre, Italy)	01/02/07	12/01/11
49	Po Valley Pavia	IT-PoV	45.0628	8.6683	Crops		12/12/06	12/01/11
50	Loobos	NL-Loo	52.1678	5.7439	Forests	Alterra	14/12/06	14/01/11
51	SK04 Stara Lesna	SK04	49.1500	20.2833	Grassland	SHMU (Slovak Hydrometeorological Institute)	08/11/06	04/01/11
51P	SK04 Stara Lesna P	SK04P	49.1500	20.2833	Grassland		08/11/06	04/01/11
52	SK06 Starina	SK06	49.0500	22.2667	Grassland		08/11/06	04/01/11
53	SK07 Topolinky	SK07	47.9667	17.8667	Grassland		31/10/06	03/01/11
54	El Saler	ES-ES1	39.3458	-0.3186	Forests	CEAMF undacion Centro de Estudios Ambientales del Mediterraneo	14/03/07	12/01/11
55	Vall de Aliñá	ES-VDA	42.1519	1.4483	Semi-natura		01/03/07	15/01/11
56	Las Majadas del Tietar (Caceres)	ES-LMa	39.9414	-5.7733	Forests		13/03/07	20/01/11
57	Auchencorth	UK-AMo	55.7917	-3.2389	Semi-natura	UKCEH (UK Centre for Ecology & Hydrology)	01/11/06	05/01/11
57B	Auchencorth	UK-AMoP	55.7917	-3.2389	Semi-natura		01/11/06	05/01/11
58	Easter Bush	UK-EBu	55.8658	-3.2056	Grassland		01/11/06	05/01/11
58P	Easter Bush Parallel	UK-EBu	55.8658	-3.2056	Grassland		01/11/06	01/03/10
59	Mehrstedt	DE-Meh	51.2761	10.6572	Forests	Max-Planck-Institut für Biogeochemie	13/08/07	05/01/11
60	Fougeres	FR-Fgs	48.3830	-1.1847	Forests	INRAE	05/08/08	05/01/11
60P	Fougeres Parallel	FR-FgsP	48.3830	-1.1847	Forests		10/02/10	05/01/11
61	Solohead	UK-Sol	52.5100	-8.2100	Forests		26/11/08	05/01/11
62	Birkenes	NO-Bir	58.3833	8.2500	Forests	Dept Physical Geography & Ecosystems Analysis	01/01/09	01/01/10
63	Brandbjerg	DK-Bra	55.8833	11.9667	Semi-natura	RISOE	08/04/09	13/12/10
64	Bilos	FR-Bil	44.5217	-0.8960	Forests	INRAE Bordeaux	01/10/09	12/01/11

Table S2: Details of sites in the NEU Wet Deposition Network.

Site no.	Site name	Site Code	Lat. (°N)	Long. (°E)	Ecosystem Type	Host organisation	START	END
1	Hainich	DE-Hai	51.0792	10.4519	Forests	Max-Planck-Institut für Biogeochemie	04/12/08	11/01/11
2	Wetzstein	DE-Wet	50.4533	11.4575	Forests		19/02/08	12/01/11
5	Grillenburg	DE-Gri	50.9494	13.5125	Grassland		02/12/08	28/12/10
8	Mitra II	PT-Mi1	38.5406	-8.0000	Forests	Lisbon University	08/02/08	09/03/10
15	POLWET	PL-wet	52.7622	16.3094	Semi-natural	University of Poznan	30/01/08	16/02/11
17	Laegern	CH-Lae	47.4778	8.3653	Forests	EIH	29/01/08	03/01/11
19	Piana del Sele (Borgo Cioffi)	IT-BCi	40.5236	14.9572	Crops	CNR ISAFom	28/10/08	23/04/10
23	Fontainebleau	FR-Fon	48.4761	2.7800	Forests	Université Paris-Sud	30/01/08	03/11/10
24	Le Bray	FR-LBr	44.7172	-0.7689	Forests	INRAE Bordeaux	01/02/08	05/01/09
26	Puechabon	FR-Pue	43.7414	3.5958	Forests	Dream CEFE-CNR	01/02/08	28/12/10
39	Vielsalm	BE-Vie	50.3053	5.9967	Forests	Faculté universitaire des Sciences agronomiques de Gembloux	30/01/08	03/02/11
42	Roccarespampani	IT-Ro2	42.3900	11.9208	Forests	University of Tuscia	03/09/08	05/01/11
48	San Rossore	IT-SR	43.7278	10.2844	Forests	DC-DG JRC	19/12/07	12/01/11
54	El Saler	ES-ES1	39.3458	-0.3186	Forests	CEAM	18/12/07	01/12/09
55	Vall de Alina	ES-VDA	42.1519	1.4483	Semi-natural		28/02/08	15/01/11
56	Las Majadas del Tietar (Caceres)	ES-LMa	39.9414	-5.7733	Forests		20/02/07	20/01/11
60	Fougeres	FR-Fgs	48.3830	-1.1847	Forests	INRAE	23/06/09	31/08/10
64	Bilos	FR-Bil	44.5217	-0.8960	Forests	INRAE Bordeaux	01/10/09	12/01/11

Table S3: Details on analytical methods used in the analysis of anions ( $\text{NO}_3^-$ ,  $\text{SO}_4^{2-}$ ,  $\text{Cl}^-$ ) and cations ( $\text{NH}_4^+$ ,  $\text{Na}^+$ ,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ ) in aqueous denuder and filter extracts in the NEU DELTA<sup>®</sup> network (all labs) and in precipitation samples from the NEU wet deposition network (INRA and SHMU).

Laboratory		$\text{NH}_4^+\text{-N}$	$\text{NO}_3^-\text{-N}$	$\text{SO}_4^{2-}\text{-S}$	$\text{Cl}^-$	$\text{Na}^+$	$\text{Ca}^{2+}$	$\text{Mg}^{2+}$
CEAM	Method	Spectrophotometry Indophenol blue (636 nm)	IC	IC	ICP-OES	ICP-OES	ICP-OES	ICP-OES
	LOD ppm	0.003	0.01	0.008	0.005	0.005	0.005	0.001
INRAE	Method	Spectrophotometry Salicylic acid	IC	IC	IC	IC	IC	IC
	LOD ppm	0.01	0.05	0.05	0.05	0.05	0.05	0.05
UKCEH	Method	AMFIA	IC	IC	IC	ICP-OES	ICP-OES	ICP-OES
	L LOD ppm	0.03	0.06	0.1	0.1	0.01	0.063	0.001
MHSC	Method	IC	IC	IC	IC	IC	IC	IC
	LOD ppm	0.03	0.03	0.03	0.05	0.05	0.1	0.1
NILU	Method	Spectrophotometry Indophenol blue	IC	IC	IC	IC	IC	IC
	LOD ppm	0.03	0.04	0.05	0.05	0.1	0.01	0.01
SHMU	Method	IC	IC	IC	IC	IC	IC	IC
	LOD ppm	0.09	0.01	0.03	0.05	0.05	0.07	0.03
VTI	Method	IC	IC	IC	IC	IC	IC	IC
	LOD ppm	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
DELTA LOD ( $\mu\text{g m}^{-3}$ )		$\text{NH}_3 = 0.02$ $\text{pNH}_4^+ = 0.03$	$\text{HNO}_3 = 0.05$ $\text{pNO}_3^- = 0.06$	$\text{SO}_2 = 0.05$ $\text{pSO}_4^{2-} = 0.06$	$\text{HCl} = 0.05$ $\text{pCl}^- = 0.16$	$\text{pNa}^+ = 0.16$	$\text{pCa}^{2+} = 0.09$	$\text{pMg}^{2+} = 0.05$

Table S4: Summary statistics on denuder capture efficiencies for atmospheric NH<sub>3</sub> gas by the 7 laboratories from DELTA inter-comparisons conducted at 4 different field test sites for all years (2006 – 2010).

	Denuder capture Efficiency (%) NH <sub>3</sub>				Denuder capture Efficiency (%) NH <sub>3</sub>			
	4 years (2006 - 2009)				3 years (2007 - 2009)			
	mean	min	max	N	mean	min	max	N
VTI	95	65	99	10	95	65	99	10
MHSC	88	67	100	41	91	77	99	12
UKCEH	90	58	99	42	91	58	99	13
CEAM	82	49	100	41	78	49	100	13
NILU	92	81	105	30	89	84	98	5
SHMU	93	47	100	38	87	47	96	11
INRAE	97	94	99	8	97	94	99	8
Mean all	91				90			

VTI: denuder capture efficiencies reported for 2008 and 2009 periods only. INRAE: 2009 period only.

Table S5: Summary statistics for replicated measurements of gaseous NH<sub>3</sub> and particulate NH<sub>4</sub><sup>+</sup> concentrations at the UK Auchencorth (UK-AMo) and parallel site (UK-AMoP) in the NEU DELTA<sup>®</sup> network.

Year	Gas: NH <sub>3</sub>					Particle: NH <sub>4</sub> <sup>+</sup>				
	UK-AMo		UK-AMoP		Difference	UK-AMo		UK-AMoP		Difference
	Mean	n	Mean	n		Mean	n	Mean	n	
2006	0.58	2	0.54	2	6.9%	0.35	2	0.35	2	0.0%
2007	0.78	12	0.74	12	5.1%	0.54	12	0.48	12	11%
2008	0.77	11	0.74	11	3.9%	0.45	11	0.37	11	18%
2009	0.87	12	0.84	12	3.4%	0.39	6	0.31	6	20%
2010	0.84	12	0.83	12	1.2%	0.36	10	0.42	10	-17%
All	0.81	49	0.78	49	3.7%	0.44	41	0.40	41	9.1%



Table S6: Summary statistics for replicated measurements of reactive gases (NH<sub>3</sub>, HNO<sub>3</sub>, SO<sub>2</sub>, HCl) and aerosols (NH<sub>4</sub><sup>+</sup>, NO<sub>3</sub><sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, Cl<sup>-</sup>, Na<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>) concentrations at the UK Easter Bush (UK-EBu) and parallel site (UK-EBuP) in the NEU DELTA<sup>®</sup> network.

Year	Gas: NH <sub>3</sub>					Particle: NH <sub>4</sub> <sup>+</sup>				
	UK-EBu		UK-EBuP		Difference	UK-EBu		UK-EBuP		Difference
	Mean	n	Mean	n		Mean	n	Mean	n	
2006	0.92	2	0.89	2	3.3%	0.35	2	0.38	2	-8.6%
2007	1.62	12	1.65	12	-1.9%	0.57	12	0.58	12	-1.8%
2008	0.93	12	1.18	12	-27%	0.42	12	0.48	12	-14%
2009	1.11	12	1.35	12	-22%	0.34	10	0.41	10	-21%
2010	1.90	2	1.93	2	-1.6%	0.50	2	0.50	2	0.0%
All	1.24	40	1.39	40	-12%	0.45	38	0.49	38	-8.9%
	Gas: HNO <sub>3</sub>					Particle: NO <sub>3</sub> <sup>-</sup>				
2006	0.33	2	0.31	2	6.1%	0.75	2	0.77	2	-2.7%
2007	0.56	12	0.54	12	3.6%	1.26	12	1.19	12	5.6%
2008	0.50	12	0.54	12	-8.0%	1.01	12	1.09	12	-7.9%
2009	0.39	12	0.47	12	-20%	0.97	9	1.12	9	-15%
2010	0.50	2	0.68	2	-36%	1.25	2	1.17	2	6.4%
All	0.47	40	0.51	40	-8.5%	1.08	37	1.12	37	-3.7%
	Gas: SO <sub>2</sub>					Particle: SO <sub>4</sub> <sup>2-</sup>				
2006	0.35	2	0.38	2	-8.6%	0.58	2	0.62	2	-6.9%
2007	1.30	12	1.29	12	0.8%	0.77	12	0.76	12	1.3%
2008	0.84	12	0.94	12	-12%	0.50	12	0.59	12	-18%
2009	0.57	12	0.67	12	-17%	0.38	9	0.50	9	-32%
2010	0.96	2	1.37	2	-43%	0.50	2	0.47	2	6.0%
All	0.88	40	0.96	40	-9.1%	0.57	37	0.62	37	-8.8%
	Gas: HCl					Particle: Cl <sup>-</sup>				
2006	0.33	2	0.24	2	27%	1.94	2	1.76	2	9.3%
2007	0.28	12	0.21	12	25%	1.38	12	1.33	12	3.6%
2008	0.20	12	0.20	12	0.0%	1.03	10	1.23	10	-19%
2009	0.15	12	0.19	12	-27%	1.04	9	1.27	9	-22%
2010	0.10	2	0.14	2	-40%	1.33	2	1.32	2	0.8%
All	0.21	40	0.20	40	4.8%	1.22	35	1.31	35	-7.4%
	Particle: Na <sup>+</sup>					Particle: Ca <sup>2+</sup>				
2006	1.00	2	0.99	2	1.0%	0.01	2	0.02	2	-100%
2007	0.75	11	0.68	11	9.3%	0.01	10	0.01	10	0.0%
2008	0.56	11	0.66	11	-18%	0.02	5	0.06	5	-200%
2009	0.67	9	0.76	9	-13%	-0.02	6	-0.02	6	0.0%
2010	0.70	2	0.71	2	-1.4%	-0.02	2	-0.03	2	-50%
All	0.68	35	0.71	35	-4.4%	0.00	25	0.01	25	100%
	Particle: Mg <sup>2+</sup>									
2006	0.05	2	0.06	2	-20%					
2007	0.04	11	0.04	11	0.0%					
2008	0.03	7	0.05	7	-67%					
2009	0.05	9	0.06	9	-20%					
2010	0.07	2	0.07	2	0.0%					
All	0.04	31	0.05	31	-25%					

Table S7: Summary statistics for replicated measurements of reactive gases(NH<sub>3</sub>, HNO<sub>3</sub>, SO<sub>2</sub>, HCl) and aerosols (NH<sub>4</sub><sup>+</sup>, NO<sub>3</sub><sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, Cl<sup>-</sup>, Na<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>) concentrations at the French Fougères (FR-Fgs) and parallel site (FR-FgsP) in the NEU DELTA<sup>®</sup> network.

Year	Gas: NH <sub>3</sub>					Particle: NH <sub>4</sub> <sup>+</sup>				
	FR-Fgs		FR-FgsP		Difference	FR-Fgs		FR-FgsP		Difference
	Mean	n	Mean	n		Mean	n	Mean	n	
2010	2.44	11	2.34	11	4.1%	0.86	11	0.88	11	-2.3%
	Gas: HNO <sub>3</sub>					Particle: NO <sub>3</sub> <sup>-</sup>				
2010	0.88	11	0.37		58%	2.07	11	2.48	11	-19.8%
	Gas: SO <sub>2</sub>					Particle: SO <sub>4</sub> <sup>2-</sup>				
2010	0.75	11	0.22	11	71%	0.83	11	1.54	11	-86%
	Gas: HCl					Particle: Cl <sup>-</sup>				
2010	0.93	11	-	-	-	0.93	11	1.11	11	-19%
	Particle: Na <sup>+</sup>					Particle: Ca <sup>2+</sup>				
2010	0.66	11	0.71	11	-7.6%	0.03	11	0.04	11	-33%
	Particle: Mg <sup>2+</sup>									
2010	0.26	11	0.30	11	-15%					

Note: NaCl coated denuders were used instead of K<sub>2</sub>CO<sub>3</sub>/glycerol coated denuders at the FR-FgsP parallel site. Results for the acid gases (HNO<sub>3</sub>, SO<sub>2</sub>) and particulates (NO<sub>3</sub><sup>-</sup>, SO<sub>4</sub><sup>2-</sup>) are therefore not directly comparable, while NaCl cannot be determined on NaCl coated denuders.

Table S8: Summary statistics for replicated measurements of reactive gases(NH<sub>3</sub>, HNO<sub>3</sub>, SO<sub>2</sub>, HCl) and aerosols (NH<sub>4</sub><sup>+</sup>, NO<sub>3</sub><sup>-</sup>, SO<sub>4</sub><sup>2-</sup>, Cl<sup>-</sup>, Na<sup>+</sup>, Ca<sup>2+</sup>, Mg<sup>2+</sup>) concentrations at the Slovakian EMEP (SK04) and parallel site (SK04P) in the NEU DELTA<sup>®</sup> network.

Year	Gas: NH <sub>3</sub>					Particle: NH <sub>4</sub> <sup>+</sup>				
	SK04		SK04P		Difference	SK04		SK04P		Difference
	Mean	n	Mean	n		Mean	n	Mean	n	
2006	0.40	2	0.45	2	-12%	0.91	2	1.07	2	-18%
2007	0.68	11	0.73	11	-7.4%	0.94	11	0.95	11	-1.1%
2008	0.69	11	0.75	11	-8.7%	0.94	12	1.01	12	-7.4%
2009	0.68	12	0.76	12	-12%	0.78	12	0.74	12	5.1%
2010	0.65	12	0.66	12	-1.5%	0.71	12	0.68	12	4.2%
All	0.66	48	0.71	48	-7.6%	0.84	49	0.85	49	-1.2%
	Gas: HNO <sub>3</sub>					Particle: NO <sub>3</sub> <sup>-</sup>				
2006	0.73	2	0.82	2	-12%	1.16	2	1.31	2	-13%
2007	0.98	11	0.99	11	-1.0%	1.25	11	1.16	11	7.2%
2008	0.78	12	0.93	12	-19%	0.99	12	1.01	12	-2.0%
2009	0.81	12	1.10	12	-36%	0.89	12	0.75	12	16%
2010	0.94	12	0.94	12	0.0%	0.85	12	0.78	12	8.2%
All	0.87	49	0.98	49	-13%	1.00	49	0.94	49	6.0%
	Gas: SO <sub>2</sub>					Particle: SO <sub>4</sub> <sup>2-</sup>				
2006	1.21	2	0.84	2	31%	0.92	2	0.97	2	-5.4%
2007	1.29	11	1.46	11	-13%	1.96	11	1.70	11	13%
2008	0.95	12	1.21	12	-27%	1.25	12	1.30	12	-4.0%
2009	0.94	12	1.15	12	-22%	1.12	12	1.02	12	8.9%
2010	1.20	12	1.17	12	2.5%	1.08	12	0.87	12	19%
All	1.10	49	1.23	49	-12%	1.32	49	1.20	49	9.1%
	Gas: HCl					Particle: Cl <sup>-</sup>				
2006	0.25	2	*1.06	2	-324%	0.63	2	0.64	2	-1.6%
2007	0.13	11	0.09	11	31%	0.44	11	0.39	11	11%
2008	0.08	12	0.14	12	-75%	0.26	12	0.28	12	-7.7%
2009	0.09	12	*0.19	12	-111%	0.17	12	0.17	12	0.0%
2010	0.05	12	0.03	12	40%	0.24	12	0.22	12	8.3%
All	0.09	49	0.15	49	-67%	0.29	49	0.28	49	3.4%
	Particle: Na <sup>+</sup>					Particle: Ca <sup>2+</sup>				
2006	-0.04	2	0.03	2	175%	0.02	2	0.03	2	-50%
2007	0.15	7	0.22	7	-47%	0.03	11	0.02	11	33%
2008	0.10	12	0.10	12	0.0%	0.02	12	0.01	12	50%
2009	0.06	12	0.09	12	-50%	0.03	12	0.03	12	0.0%
2010	0.03	12	0.05	12	-67%	0.11	12	0.13	12	-18%
All	0.07	45	0.10	45	-43%	0.05	49	0.05	49	0.0%
	Particle: Mg <sup>2+</sup>									
2006	0.02	1	0.02	1	0.0%					
2007	0.01	11	0.01	11	0.0%					
2008	0.01	12	0.01	12	0.0%					
2009	0.01	12	0.01	12	0.0%					
2010	0.01	12	0.01	12	0.0%					
All	0.01	48	0.01	48	0.0%					

\* Larger mean values due to high outlier Cl<sup>-</sup> values in 2006 (Nov-06 = 1.90 µg Cl<sup>-</sup> m<sup>-3</sup>) and in 2009 (Jan-09 = 1.01 µg Cl<sup>-</sup> m<sup>-3</sup>).

Table S9: Annual mean NH<sub>3</sub> gas concentrations measured in the NEU DELTA<sup>®</sup> network and summary statistics.

Site	Ecosystem type	NH <sub>3</sub> -N (µg m <sup>-3</sup> )				Summary statistics					Group Mean
		2007	2008	2009	2010	mean	min	max	sd	N	
UK-ESa	Crops	4.30	1.40	-	-	2.85	1.40	4.30	2.05	2	
DE-Geb	Crops	8.78	2.87	3.22	4.79	4.92	2.87	8.78	2.71	4	
FR-Gri	Crops	3.00	3.33	4.19	2.72	3.31	2.72	4.19	0.64	4	
DE-Kli	Crops	1.81	1.48	1.60	1.31	1.55	1.31	1.81	0.21	4	
BE-Lon	Crops	4.33	3.44	7.34	3.88	4.75	3.44	7.34	1.77	4	
UA-Pet	Crops	2.07	2.93	1.61	1.24	1.96	1.24	2.93	0.73	4	
IT-BCi	Crops	6.82	7.53	10.89	7.20	8.11	6.82	10.89	1.88	4	
IT-PoV	Crops	3.49	3.35	4.16	3.54	3.64	3.35	4.16	0.36	4	
DK-Ris	Crops	3.59	5.07	-	-	4.33	3.59	5.07	1.05	2	
SK07	Crops	2.73	3.98	1.99	2.16	2.72	1.99	3.98	0.90	4	3.81
FR-Bil	Forest	-	-	-	0.43	0.43	0.43	0.43	-	1	
NO-Bir	Forest	-	-	0.25	0.23	0.24	0.23	0.25	0.01	2	
CZ-BK1	Forest	0.46	0.55	-	0.41	0.47	0.41	0.55	0.07	3	
BE-Bra	Forest	2.75	2.68	3.20	2.57	2.80	2.57	3.20	0.28	4	
IT-Col	Forest	-	0.45	0.74	0.51	0.57	0.45	0.74	0.15	3	
ES-ES1	Forest	1.56	1.56	1.34	0.92	1.35	0.92	1.56	0.30	4	
PT-Esp	Forest	2.12	1.61	1.61	1.42	1.69	1.42	2.12	0.30	4	
FR-Fon	Forest	1.01	0.80	1.17	1.14	1.03	0.80	1.17	0.17	4	
FR-Fgs	Forest	-	-	2.00	2.01	2.01	2.00	2.01	0.01	2	
FR-FgsP	Forest	-	-	-	1.93	1.93	1.93	1.93	-	1	
RU-Fyo	Forest	0.26	0.29	0.42	0.32	0.32	0.26	0.42	0.07	4	
UK-Gri	Forest	0.13	-	-	-	0.13	0.13	0.13	-	1	
DE-Hai	Forest	0.74	0.67	1.07	1.07	0.89	0.67	1.07	0.21	4	
FR-Hes	Forest	1.02	0.77	0.91	0.81	0.88	0.77	1.02	0.11	4	
DE-Hog	Forest	2.31	2.28	3.18	2.47	2.56	2.28	3.18	0.42	4	
FI-Hyy	Forest	0.07	0.07	0.10	0.11	0.09	0.07	0.11	0.02	4	
CH-Lae	Forest	1.15	1.12	1.48	1.27	1.26	1.12	1.48	0.16	4	
ES-LMa	Forest	1.29	0.82	1.06	0.71	0.97	0.71	1.29	0.26	4	
FR-LBr	Forest	0.97	1.31	-	-	1.14	0.97	1.31	0.24	2	
NL-Loo	Forest	4.04	2.89	3.19	2.50	3.16	2.50	4.04	0.65	4	
PT-Mi1	Forest	0.94	0.94	0.86	-	0.91	0.86	0.94	0.05	3	
SE-Nor	Forest	0.09	0.25	0.44	0.27	0.26	0.09	0.44	0.14	4	
FR-Pue	Forest	0.48	0.38	0.47	0.43	0.44	0.38	0.48	0.05	4	
FR-Ren	Forest	0.28	0.25	0.51	0.28	0.33	0.25	0.51	0.12	4	
IT-Ro2	Forest	1.55	2.13	1.53	1.29	1.63	1.29	2.13	0.36	4	
IT-SRo	Forest	1.04	0.65	2.54	0.58	1.20	0.58	2.54	0.91	4	
SK04	Forest	0.61	0.52	0.56	0.54	0.56	0.52	0.61	0.04	4	
SK04P	Forest	0.60	0.62	0.62	0.54	0.60	0.54	0.62	0.04	4	
SK06	Forest	0.45	0.51	0.50	0.55	0.50	0.45	0.55	0.04	4	
SE-SK2	Forest	0.15	0.08	-	-	0.12	0.08	0.15	0.05	2	
FI-Sod	Forest	0.19	0.05	0.13	0.17	0.14	0.05	0.19	0.06	4	
DK-Sor	Forest	1.26	1.28	1.28	1.27	1.27	1.26	1.28	0.01	4	
NL-Spe	Forest	3.72	4.08	4.46	3.96	4.06	3.72	4.46	0.31	4	
DE-Tha	Forest	0.53	0.70	0.96	0.96	0.79	0.53	0.96	0.21	4	
BE-Vie	Forest	0.29	0.37	0.35	0.46	0.37	0.29	0.46	0.07	4	
DE-Wet	Forest	0.31	0.50	0.60	0.76	0.54	0.31	0.76	0.19	4	1.04
UK-EBu	Grass	1.34	0.76	0.91	1.39	1.10	0.76	1.39	0.31	4	
UK-EBuP	Grass	1.35	0.98	1.11	-	1.15	0.98	1.35	0.19	3	
NL-Ca1	Grass	6.29	5.60	5.85	5.75	5.87	5.60	6.29	0.30	4	
IE-Car	Grass	1.69	1.44	1.52	2.22	1.72	1.44	2.22	0.35	4	
IE-Dri	Grass	2.28	1.78	2.88	-	2.31	1.78	2.88	0.55	3	
DE-Gri	Grass	0.93	0.79	0.89	1.00	0.90	0.79	1.00	0.09	4	
FR-Lq2	Grass	1.14	1.09	1.45	1.36	1.26	1.09	1.45	0.17	4	
CH-Oe1	Grass	3.20	2.17	3.62	2.76	2.94	2.17	3.62	0.62	4	
DK-Rim	Grass	1.22	1.21	-	-	1.22	1.21	1.22	0.01	2	
UK-Sol	Grass	-	-	2.37	3.94	3.16	2.37	3.94	1.11	2	2.16
IT-Amp	Semi-Natura	0.52	0.61	-	-	0.57	0.52	0.61	0.06	2	
UK-AMo	Semi-Natura	0.64	0.61	0.72	0.69	0.67	0.61	0.72	0.05	4	
UK-AMoP	Semi-Natura	0.61	0.61	0.69	0.69	0.65	0.61	0.69	0.05	4	
DK-Bri	Semi-Natura	-	-	-	0.64	0.64	0.64	0.64	-	1	
HU-Bug	Semi-Natura	2.36	2.18	3.07	2.88	2.62	2.18	3.07	0.42	4	
NL-Hor	Semi-Natura	2.52	2.47	2.85	3.77	2.90	2.47	3.77	0.60	4	
FI-Kaa	Semi-Natura	-	-	1.01	0.29	0.65	0.29	1.01	0.51	2	
FI-Lom	Semi-Natura	0.06	0.06	0.09	0.08	0.07	0.06	0.09	0.02	4	
DE-Meh	Semi-Natura	-	1.80	1.73	2.25	1.93	1.73	2.25	0.28	3	
IT-MBo	Semi-Natura	0.76	0.71	0.82	0.66	0.74	0.66	0.82	0.07	4	
PL-Pol	Semi-Natura	1.12	0.78	1.82	0.95	1.17	0.78	1.82	0.46	4	
ES-VDA	Semi-Natura	-	0.61	0.83	0.63	0.69	0.61	0.83	0.12	3	1.11
	mean	1.75	1.55	1.87	1.58	1.63					
	min	0.06	0.05	0.09	0.08	0.07					
	max	8.78	7.53	10.89	7.20	8.11					
	n	58	60	57	58	68					

Table S10: Annual average NH<sub>3</sub> concentration measured in the NEU 1 DELTA<sup>®</sup> network and comparison with UNECE critical levels of NH<sub>3</sub> concentrations (annual mean), showing percentage exceedances for all sites and according to sites grouped by ecosystem type.

Country	ID	Ecosystem type	Annual averaged NH <sub>3</sub> (µg m <sup>-3</sup> )					% of sites in exceedance of UNECE Critical Levels of NH <sub>3</sub> concentrations (annual mean)	
			mean	min	max	sd	N		
Germany	DE-Kli	C	1.88	1.59	2.20	0.26	4	<b>ALL sites (n = 64)</b> mean = 1.98 µg NH <sub>3</sub> m <sup>-3</sup> > 1 µg NH <sub>3</sub> m <sup>-3</sup> = 63 % > 3 µg NH <sub>3</sub> m <sup>-3</sup> = 27 %	
Ukraine	UA-Pet	C	2.38	1.50	3.55	0.88	4		
Slovakia	SK07	C	3.30	2.42	4.84	1.09	4		
UK	UK-ESa	C	3.46	1.70	5.22	2.48	2		
France	FR-Gri	C	4.02	3.30	5.09	0.78	4		
Italy	IT-PoV	C	4.41	4.07	5.05	0.44	4		
Denmark	DK-Ris	C	5.26	4.36	6.15	1.27	2		
Belgium	BE-Lon	C	5.77	4.18	8.92	2.15	4		
Germany	DE-Geb	C	5.97	3.49	10.66	3.29	4		
Italy	IT-BCi	C	9.85	8.28	13.22	2.28	4		
Finland	FI-Hyy	F	0.11	0.09	0.13	0.02	4	<b>Crops (n = 10)</b> mean = 4.63 µg NH <sub>3</sub> m <sup>-3</sup> > 1 µg NH <sub>3</sub> m <sup>-3</sup> = 100 % > 3 µg NH <sub>3</sub> m <sup>-3</sup> = 80 %	
Sweden	SE-SK2	F	0.14	0.09	0.18	0.06	2		
UK	UK-Gri	F	0.16	0.16	0.16	-	1		<b>Forests (n = 34)</b> mean = 1.27 µg NH <sub>3</sub> m <sup>-3</sup> > 1 µg NH <sub>3</sub> m <sup>-3</sup> = 50 % > 3 µg NH <sub>3</sub> m <sup>-3</sup> = 12 %
Finland	FI-Sod	F	0.17	0.06	0.24	0.08	4		
Norway	NO-Bir	F	0.29	0.28	0.30	0.02	2		
Sweden	SE-Nor	F	0.32	0.11	0.54	0.17	4		
Russia	RU-Fyo	F	0.39	0.32	0.51	0.08	4		
France	FR-Ren	F	0.40	0.30	0.62	0.15	4		
Belgium	BE-Vie	F	0.45	0.35	0.56	0.09	4		
France	FR-Bil	F	0.52	0.52	0.52	-	1		
France	FR-Pue	F	0.54	0.47	0.58	0.05	4		
Czech Rep.	CZ-BK1	F	0.58	0.50	0.67	0.09	3		
Slovakia	SK06	F	0.61	0.55	0.67	0.05	4		
Germany	DE-Wet	F	0.66	0.37	0.92	0.23	4		
Italy	IT-Col	F	0.68	0.63	0.74	0.05	4		
Slovakia	SK04	F	0.72	0.66	0.76	0.05	4		
Slovakia	SK04P	F	0.68	0.54	0.89	0.19	3		
Germany	DE-Iha	F	0.95	0.64	1.17	0.26	4		
France	FR-Hes	F	1.06	0.93	1.24	0.14	4		
Germany	DE-Hai	F	1.08	0.82	1.30	0.26	4		
Portugal	PT-Mi1	F	1.11	1.04	1.14	0.06	3		
Spain	ES-LMa	F	1.18	0.87	1.56	0.31	4		
France	FR-Fon	F	1.25	0.97	1.43	0.21	4		
France	FR-LBr	F	1.39	1.18	1.60	0.30	2		
Italy	IT-SR	F	1.47	0.71	3.09	1.11	4		
Switzerland	CH-Lae	F	1.52	1.36	1.79	0.20	4		
Denmark	DK-Sor	F	1.54	1.53	1.55	0.01	4		
Spain	ES-ES1	F	1.63	1.12	1.89	0.36	4		
Italy	IT-Ro2	F	1.97	1.57	2.59	0.43	4		
Portugal	PT-Esp	F	2.05	1.73	2.57	0.36	4		
France	FR-Fgs	F	2.43	2.43	2.44	0.01	2		
France	FR-FgsP	F	2.34	2.34	2.34	-	1		
Germany	DE-Hog	F	3.11	2.77	3.87	0.51	4		
Belgium	BE-Bra	F	3.40	3.12	3.89	0.34	4		
Netherlands	NL-Loo	F	3.83	3.04	4.91	0.80	4		
Netherlands	NL-Spe	F	4.92	4.52	5.42	0.38	4		
Germany	DE-Gri	G	1.10	0.96	1.21	0.10	4	<b>Grassland (n = 9)</b> mean = 2.62 µg NH <sub>3</sub> m <sup>-3</sup> > 1 µg NH <sub>3</sub> m <sup>-3</sup> = 100 % > 3 µg NH <sub>3</sub> m <sup>-3</sup> = 33 %	
UK	UK-EBu	G	1.34	0.93	1.68	0.37	4		
UK	UK-EBuP	G	1.39	1.18	1.65	0.23	3		
Denmark	DK-Rim	G	1.47	1.46	1.48	0.01	2		
France	FR-Lq2	G	1.53	1.32	1.76	0.21	4		
Ireland	IE-Car	G	2.08	1.74	2.69	0.43	4		
Ireland	IE-Dri	G	2.81	2.16	3.50	0.67	3		
Switzerland	CH-Oe1	G	3.57	2.63	4.40	0.75	4		
UK	UK-Sol	G	3.83	2.88	4.79	1.35	2		
Netherlands	NL-Ca1	G	7.13	6.80	7.64	0.36	4		
Finland	FI-Lom	SN	0.09	0.07	0.11	0.02	4	<b>Semi-natural (SN) (n = 11)</b> mean = 1.34 µg NH <sub>3</sub> m <sup>-3</sup> > 1 µg NH <sub>3</sub> m <sup>-3</sup> = 36 % > 3 µg NH <sub>3</sub> m <sup>-3</sup> = 18 %	
Italy	IT-Amp	SN	0.69	0.63	0.74	0.08	2		
Denmark	DK-Brj	SN	0.77	0.77	0.77	-	1		
Finland	FI-Kaa	SN	0.79	0.35	1.22	0.62	2		
UK	UK-AMo	SN	0.81	0.75	0.87	0.06	4		
UK	UK-AMoP	SN	0.79	0.74	0.84	0.05	4		
Spain	ES-VDA	SN	0.84	0.74	1.01	0.15	3		
Italy	IT-MBo	SN	0.90	0.80	0.99	0.08	4		
Poland	PL-Pol	SN	1.42	0.95	2.21	0.56	4		
Germany	DE-Meh	SN	2.34	2.10	2.73	0.34	3		
Hungary	HU-Bug	SN	3.18	2.64	3.73	0.51	4		
Netherlands	NL-Hor	SN	3.52	3.00	4.58	0.74	4		

(SK04/SK04P and FR-Fgs/FR-FgsP = parallel measurements)

(UK-EBu/UK-EBuP = parallel measurement)

(UK-AMo/UK-AMoP = parallel measurement)

Table S11: Annual mean particulate NH<sub>4</sub><sup>+</sup> concentrations measured in the NEU DELTA<sup>®</sup> network and summary statistics.

Site	Ecosystem type	NH <sub>4</sub> <sup>+</sup> -N (µg m <sup>-3</sup> )				Summary statistics					Group Mean
		2007	2008	2009	2010	mean	min	max	sd	N	
UK-ESa	Crops	0.99	0.41	-	-	0.70	0.41	0.99	0.41	2	
DE-Geb	Crops	1.13	1.05	1.25	1.17	1.15	1.05	1.25	0.08	4	
FR-Gri	Crops	1.15	0.73	0.97	0.86	0.93	0.73	1.15	0.18	4	
DE-Kli	Crops	1.06	1.05	1.06	1.11	1.07	1.05	1.11	0.03	4	
BE-Lon	Crops	1.01	0.82	1.32	1.58	1.18	0.82	1.58	0.34	4	
UA-Pet	Crops	1.16	1.70	0.91	0.89	1.17	0.89	1.70	0.38	4	
IT-BCI	Crops	1.38	1.33	0.83	0.98	1.13	0.83	1.38	0.27	4	
IT-PoV	Crops	2.53	2.22	1.58	1.44	1.94	1.44	2.53	0.52	4	
DK-Ris	Crops	0.49	0.62	-	-	0.56	0.49	0.62	0.09	2	
SK07	Crops	1.44	1.59	1.05	1.01	1.27	1.01	1.59	0.29	4	1.11
FR-Bil	Forest	-	-	-	0.38	0.38	0.38	0.38	-	1	
NO-Bir	Forest	-	-	0.21	0.23	0.22	0.21	0.23	0.01	2	
CZ-BK1	Forest	0.94	0.85	-	0.74	0.84	0.74	0.94	0.10	3	
BE-Bra	Forest	0.87	0.98	1.20	1.45	1.13	0.87	1.45	0.26	4	
IT-Col	Forest	-	0.48	0.52	0.39	0.46	0.39	0.52	0.07	3	
ES-ES1	Forest	0.77	1.03	1.02	0.77	0.90	0.77	1.03	0.15	4	
PT-Esp	Forest	1.03	0.67	0.51	0.70	0.73	0.51	1.03	0.22	4	
FR-Fon	Forest	1.14	0.79	0.94	0.82	0.92	0.79	1.14	0.16	4	
FR-Fgs	Forest	-	-	0.89	0.71	0.80	0.71	0.89	0.13	2	
FR-FgsP	Forest	-	-	-	0.69	0.69	0.69	0.69	-	1	
RU-Fyo	Forest	0.49	0.42	0.33	0.49	0.43	0.33	0.49	0.08	4	
UK-Gri	Forest	0.20	-	-	-	0.20	0.20	0.20	-	1	
DE-Hai	Forest	1.03	0.86	0.96	0.84	0.92	0.84	1.03	0.09	4	
FR-Hes	Forest	0.86	0.75	0.80	0.79	0.80	0.75	0.86	0.05	4	
DE-Hog	Forest	0.98	1.07	1.02	0.90	0.99	0.90	1.07	0.07	4	
FI-Hyy	Forest	0.17	0.09	0.19	0.25	0.18	0.09	0.25	0.07	4	
CH-Lae	Forest	1.12	0.77	0.85	0.90	0.91	0.77	1.12	0.15	4	
ES-LMa	Forest	0.37	0.54	0.47	0.50	0.47	0.37	0.54	0.07	4	
FR-LBr	Forest	0.69	0.48	-	-	0.59	0.48	0.69	0.15	2	
NL-Loo	Forest	1.60	1.60	1.34	1.18	1.43	1.18	1.60	0.21	4	
PT-Mi1	Forest	0.92	0.48	0.38	-	0.59	0.38	0.92	0.29	3	
SE-Nor	Forest	0.70	0.72	0.26	0.28	0.19	0.10	0.28	0.09	4	
FR-Pue	Forest	0.54	0.38	0.43	0.38	0.43	0.38	0.54	0.08	4	
FR-Ren	Forest	0.59	0.46	0.41	0.29	0.44	0.29	0.59	0.12	4	
IT-Ro2	Forest	0.83	0.81	0.70	0.70	0.76	0.70	0.83	0.07	4	
IT-SRo	Forest	0.85	0.94	0.65	0.68	0.78	0.65	0.94	0.14	4	
SK04	Forest	0.74	0.73	0.60	0.55	0.66	0.55	0.74	0.09	4	
SK04P	Forest	0.74	0.79	0.58	0.53	0.66	0.53	0.79	0.12	4	
SK06	Forest	0.75	0.69	0.60	0.60	0.66	0.60	0.75	0.07	4	
SE-SK2	Forest	0.18	0.12	-	-	0.15	0.12	0.18	0.04	2	
FI-Sod	Forest	0.02	0.10	0.13	0.27	0.13	0.02	0.27	0.10	4	
DK-Sor	Forest	0.60	0.49	0.64	0.56	0.57	0.49	0.64	0.06	4	
NL-Spe	Forest	1.30	1.34	1.35	1.23	1.31	1.23	1.35	0.05	4	
DE-Iha	Forest	0.89	0.85	1.02	0.92	0.92	0.85	1.02	0.07	4	
BE-Vie	Forest	0.52	0.35	0.42	0.79	0.52	0.35	0.79	0.19	4	
DE-Wet	Forest	0.89	0.71	0.81	0.73	0.79	0.71	0.89	0.08	4	0.65
UK-EBu	Grass	0.44	0.33	0.38	0.30	0.36	0.30	0.44	0.06	4	
UK-EBuP	Grass	0.45	0.37	0.33	-	0.38	0.33	0.45	0.06	3	
NL-Ca1	Grass	1.92	1.47	1.40	1.44	1.56	1.40	1.92	0.24	4	
IE-Car	Grass	0.58	0.60	0.44	0.48	0.53	0.44	0.60	0.08	4	
IE-Dri	Grass	0.50	0.57	0.31	-	0.46	0.31	0.57	0.13	3	
DE-Gri	Grass	0.96	0.83	0.89	0.95	0.91	0.83	0.96	0.06	4	
FR-Lq2	Grass	0.54	0.36	0.45	0.39	0.44	0.36	0.54	0.08	4	
CH-Oe1	Grass	1.32	0.99	0.87	0.97	1.04	0.87	1.32	0.20	4	
DK-Rim	Grass	0.66	0.50	-	-	0.58	0.50	0.66	0.11	2	
UK-Sol	Grass	-	-	0.40	0.45	0.43	0.40	0.45	0.04	2	0.67
IT-Amp	Semi-Natura	0.50	0.46	-	-	0.48	0.46	0.50	0.03	2	
UK-AMo	Semi-Natura	0.42	0.33	0.32	0.28	0.34	0.28	0.42	0.06	4	
UK-AMoP	Semi-Natura	0.37	0.29	0.24	0.35	0.31	0.24	0.37	0.06	4	
DK-Brj	Semi-Natura	-	-	-	0.90	0.90	0.90	0.90	-	1	
HU-Bug	Semi-Natura	1.39	1.12	0.89	1.22	1.16	0.89	1.39	0.21	4	
NL-Hor	Semi-Natura	1.47	1.28	1.47	1.45	1.42	1.28	1.47	0.09	4	
FI-Kaa	Semi-Natura	-	-	0.34	0.16	0.25	0.16	0.34	0.13	2	
FI-Lom	Semi-Natura	0.24	0.08	0.05	0.22	0.15	0.05	0.24	0.10	4	
DE-Meh	Semi-Natura	-	1.15	1.13	1.09	1.12	1.09	1.15	0.03	3	
IT-MBo	Semi-Natura	0.82	0.66	0.55	0.64	0.67	0.55	0.82	0.11	4	
PL-Pol	Semi-Natura	1.30	0.90	0.96	1.22	1.10	0.90	1.30	0.19	4	
ES-VDA	Semi-Natura	-	0.52	0.40	0.62	0.51	0.40	0.62	0.11	3	0.70
mean		0.84	0.75	0.72	0.75	0.73					
min		0.02	0.08	0.05	0.16	0.13					
max		2.53	2.22	1.58	1.58	1.94					
n		58	60	57	58	68					

Table S12: Annual mean HNO<sub>3</sub> gas concentrations measured in the NEU DELTA<sup>®</sup> network and summary statistics.

Site	Ecosystem type	HNO <sub>3</sub> -N (µg m <sup>-3</sup> )				Summary statistics					Group Mean
		2007	2008	2009	2010	mean	min	max	sd	N	
UK-ESa	Crops	0.12	0.12	-	-	0.12	0.12	0.12	0.00	2	
DE-Geb	Crops	0.26	0.25	0.29	0.34	0.29	0.25	0.34	0.04	4	
FR-Gri	Crops	0.54	0.37	0.40	0.39	0.43	0.37	0.54	0.08	4	
DE-Kli	Crops	0.32	0.30	0.31	0.37	0.33	0.30	0.37	0.03	4	
BE-Lon	Crops	0.26	0.32	0.37	0.37	0.33	0.26	0.37	0.05	4	
UA-Pet	Crops	0.38	0.33	0.31	0.32	0.34	0.31	0.38	0.03	4	
IT-BCI	Crops	0.38	0.38	0.43	0.32	0.38	0.32	0.43	0.05	4	
IT-PoV	Crops	0.44	0.44	0.40	0.43	0.43	0.40	0.44	0.02	4	
DK-Ris	Crops	0.14	0.17	-	-	0.16	0.14	0.17	0.02	2	
SK07	Crops	0.37	0.32	0.38	0.41	0.37	0.32	0.41	0.04	4	0.32
FR-Bil	Forest	-	-	-	0.17	0.17	0.17	0.17	-	1	
NO-Bir	Forest	-	-	0.09	0.08	0.09	0.08	0.09	0.01	2	
CZ-BK1	Forest	0.39	0.42	-	0.34	0.38	0.34	0.42	0.04	3	
BE-Bra	Forest	0.52	0.45	0.49	0.43	0.47	0.43	0.52	0.04	4	
IT-Col	Forest	-	0.12	0.16	0.12	0.13	0.12	0.16	0.02	3	
ES-ES1	Forest	0.33	0.32	0.27	0.27	0.30	0.27	0.33	0.03	4	
PT-Esp	Forest	0.47	0.32	0.32	0.33	0.36	0.32	0.47	0.07	4	
FR-Fon	Forest	0.46	0.35	0.39	0.41	0.40	0.35	0.46	0.05	4	
FR-Fgs	Forest	-	-	0.19	0.19	0.19	0.19	0.19	0.00	2	
FR-FgsP	Forest	-	-	-	*(0.08)	-	-	-	-	-	
RU-Fyo	Forest	0.15	0.13	0.13	0.17	0.15	0.13	0.17	0.02	4	
UK-Gri	Forest	0.06	-	-	-	0.06	0.06	0.06	-	1	
DE-Hai	Forest	0.23	0.21	0.20	0.31	0.24	0.20	0.31	0.05	4	
FR-Hes	Forest	0.40	0.31	0.32	0.37	0.35	0.31	0.40	0.04	4	
DE-Hog	Forest	0.34	0.35	0.32	0.36	0.34	0.32	0.36	0.02	4	
FI-Hyy	Forest	0.12	0.09	0.10	0.10	0.10	0.09	0.12	0.01	4	
CH-Lae	Forest	0.37	0.34	0.36	0.38	0.36	0.34	0.38	0.02	4	
ES-LMa	Forest	0.24	0.22	0.26	0.25	0.24	0.22	0.26	0.02	4	
FR-LBr	Forest	0.32	0.25	-	-	0.29	0.25	0.32	0.05	2	
NL-Loo	Forest	0.32	0.23	0.28	0.26	0.27	0.23	0.32	0.04	4	
PT-M1	Forest	0.32	0.18	0.19	-	0.23	0.18	0.32	0.08	3	
SE-Nor	Forest	0.06	0.04	0.05	0.05	0.05	0.04	0.06	0.01	4	
FR-Pue	Forest	0.26	0.19	0.22	0.22	0.22	0.19	0.26	0.03	4	
FR-Ren	Forest	0.09	0.09	0.09	0.08	0.09	0.08	0.09	0.01	4	
IT-Ro2	Forest	0.21	0.26	0.27	0.23	0.24	0.21	0.27	0.03	4	
IT-SR	Forest	0.36	0.26	0.25	0.21	0.27	0.21	0.36	0.06	4	
SK04	Forest	0.22	0.17	0.18	0.21	0.20	0.17	0.22	0.02	4	
SK04P	Forest	0.22	0.21	0.25	0.21	0.22	0.21	0.25	0.02	4	
SK06	Forest	0.24	0.20	0.22	0.23	0.22	0.20	0.24	0.02	4	
SE-SK2	Forest	0.08	0.06	-	-	0.07	0.06	0.08	0.01	2	
FI-Sod	Forest	0.06	0.04	0.04	0.06	0.05	0.04	0.06	0.01	4	
DK-Sor	Forest	0.25	0.23	0.20	0.19	0.22	0.19	0.25	0.03	4	
NL-Spe	Forest	0.36	0.36	0.42	0.43	0.39	0.36	0.43	0.04	4	
DE-Iha	Forest	0.32	0.25	0.26	0.32	0.29	0.25	0.32	0.04	4	
BE-Vie	Forest	0.18	0.12	0.09	0.13	0.13	0.09	0.18	0.04	4	
DE-Wet	Forest	0.26	0.26	0.28	0.35	0.29	0.26	0.35	0.04	4	0.23
UK-EBu	Grass	0.12	0.11	0.09	0.11	0.11	0.09	0.12	0.01	4	
UK-EBuP	Grass	0.12	0.12	0.10	-	0.11	0.10	0.12	0.01	3	
NL-Ca1	Grass	0.36	0.45	0.43	0.43	0.42	0.36	0.45	0.04	4	
IE-Car	Grass	0.11	0.10	0.09	0.12	0.11	0.09	0.12	0.01	4	
IE-Dri	Grass	0.07	0.07	0.05	-	0.06	0.05	0.07	0.01	3	
DE-Gri	Grass	0.33	0.38	0.28	0.41	0.35	0.28	0.41	0.06	4	
FR-Lq2	Grass	0.15	0.10	0.13	0.14	0.13	0.10	0.15	0.02	4	
CH-Oe1	Grass	0.43	0.39	0.39	0.38	0.40	0.38	0.43	0.02	4	
DK-Rim	Grass	0.24	0.23	-	-	0.24	0.23	0.24	0.01	2	
UK-Sol	Grass	-	-	0.07	0.11	0.09	0.07	0.11	0.03	2	0.20
IT-Amp	Semi-Natura	0.15	0.13	-	-	0.14	0.13	0.15	0.01	2	
UK-AMo	Semi-Natura	0.09	0.09	0.08	0.10	0.09	0.08	0.10	0.01	4	
UK-AMoP	Semi-Natura	-	-	-	-	-	-	-	-	-	
DK-Brj	Semi-Natura	-	-	-	0.17	0.17	0.17	0.17	-	1	
HU-Bug	Semi-Natura	0.29	0.30	0.35	0.30	0.31	0.29	0.35	0.03	4	
NL-Hor	Semi-Natura	0.35	0.31	0.33	0.36	0.34	0.31	0.36	0.02	4	
FI-Kaa	Semi-Natura	-	-	0.02	0.03	0.03	0.02	0.03	0.01	2	
FI-Lom	Semi-Natura	0.04	0.04	0.02	0.05	0.04	0.02	0.05	0.01	4	
DE-Meh	Semi-Natura	-	0.32	0.30	0.33	0.32	0.30	0.33	0.02	3	
IT-MBo	Semi-Natura	0.23	0.21	0.19	0.21	0.21	0.19	0.23	0.02	4	
PL-Pol	Semi-Natura	0.26	0.26	0.25	0.36	0.28	0.25	0.36	0.05	4	
ES-VDA	Semi-Natura	-	0.08	0.09	0.07	0.08	0.07	0.09	0.01	3	0.18
mean		0.26	0.23	0.23	0.25	0.23					
min		0.04	0.04	0.02	0.03	0.03					
max		0.54	0.45	0.49	0.43	0.47					
n		57	59	56	56	66					

\*Different DELTA<sup>®</sup> denuder sample train using NaCl coated denuders to collect HNO<sub>3</sub>

Table S13: Annual mean particulate NO<sub>3</sub><sup>-</sup> concentrations measured in the NEU DELTA<sup>®</sup> network and summary statistics.

Site	Ecosystem type	pNO <sub>3</sub> <sup>-</sup> -N (µg m <sup>-3</sup> )				Summary statistics					Group Mean
		2007	2008	2009	2010	mean	min	max	sd	N	
UK-ESa	Crops	0.23	0.25	-	-	0.24	0.23	0.25	0.01	2	
DE-Geb	Crops	0.50	0.62	0.76	0.49	0.59	0.49	0.76	0.13	4	
FR-Gri	Crops	0.88	0.64	0.70	0.62	0.71	0.62	0.88	0.12	4	
DE-Kli	Crops	0.57	0.50	0.55	0.42	0.51	0.42	0.57	0.07	4	
BE-Lon	Crops	0.72	0.67	1.29	0.56	0.81	0.56	1.29	0.33	4	
UA-Pet	Crops	0.50	0.46	0.34	0.39	0.42	0.34	0.50	0.07	4	
IT-BCI	Crops	0.76	0.70	0.56	0.49	0.63	0.49	0.76	0.12	4	
IT-PoV	Crops	1.49	1.36	1.03	0.83	1.18	0.83	1.49	0.30	4	
DK-Ris	Crops	0.48	0.34	-	-	0.41	0.34	0.48	0.10	2	
SK07	Crops	0.67	0.60	0.51	0.43	0.55	0.43	0.67	0.10	4	0.61
FR-Bil	Forest	-	-	-	0.28	0.28	0.28	0.28	-	1	
NO-Bir	Forest	-	-	0.09	0.10	0.10	0.09	0.10	0.01	2	
CZ-BK1	Forest	0.37	0.42	-	0.29	0.36	0.29	0.42	0.07	3	
BE-Bra	Forest	0.90	0.79	0.91	0.71	0.83	0.71	0.91	0.10	4	
IT-Col	Forest	-	0.24	0.22	0.22	0.23	0.22	0.24	0.01	3	
ES-ES1	Forest	0.75	1.23	1.02	0.84	0.96	0.75	1.23	0.21	4	
PT-Esp	Forest	0.54	0.51	0.43	0.52	0.50	0.43	0.54	0.05	4	
FR-Fon	Forest	0.80	0.57	0.66	0.54	0.64	0.54	0.80	0.12	4	
FR-Fgs	Forest	-	-	0.60	0.48	0.54	0.48	0.60	0.08	2	
FR-FgsP	Forest	-	-	-	0.56	-	-	-	-	-	
RU-Fyo	Forest	0.14	0.15	0.10	0.16	0.14	0.10	0.16	0.03	4	
UK-Gri	Forest	0.11	-	-	-	0.11	0.11	0.11	-	1	
DE-Hai	Forest	0.48	0.40	0.64	0.41	0.48	0.40	0.64	0.11	4	
FR-Hes	Forest	0.53	0.44	0.47	0.47	0.48	0.44	0.53	0.04	4	
DE-Hog	Forest	0.45	0.54	0.67	0.48	0.54	0.45	0.67	0.10	4	
FI-Hyy	Forest	0.06	0.04	0.04	0.04	0.05	0.04	0.06	0.01	4	
CH-Lae	Forest	0.64	0.56	0.44	0.48	0.53	0.44	0.64	0.09	4	
ES-LMa	Forest	0.32	0.43	0.30	0.23	0.32	0.23	0.43	0.08	4	
FR-LBr	Forest	0.52	0.39	-	-	0.46	0.39	0.52	0.09	2	
NL-Loo	Forest	0.92	0.66	1.05	0.54	0.79	0.54	1.05	0.23	4	
PT-MI1	Forest	0.42	0.33	0.28	-	0.34	0.28	0.42	0.07	3	
SE-Nor	Forest	0.06	0.05	0.04	0.05	0.05	0.04	0.06	0.01	4	
FR-Pue	Forest	0.33	0.27	0.31	0.27	0.30	0.27	0.33	0.03	4	
FR-Ren	Forest	0.27	0.25	0.21	0.19	0.23	0.19	0.27	0.04	4	
IT-Ro2	Forest	0.54	0.48	0.41	0.33	0.44	0.33	0.54	0.09	4	
IT-SR	Forest	0.68	0.56	0.34	0.45	0.51	0.34	0.68	0.15	4	
SK04	Forest	0.28	0.22	0.20	0.19	0.22	0.19	0.28	0.04	4	
SK04P	Forest	0.26	0.23	0.17	0.18	0.21	0.17	0.26	0.04	4	
SK06	Forest	0.26	0.23	0.17	0.20	0.22	0.17	0.26	0.04	4	
SE-Sk2	Forest	0.07	0.07	-	-	0.07	0.07	0.07	0.00	2	
FI-Sod	Forest	0.03	0.02	0.02	0.01	0.02	0.01	0.03	0.01	4	
DK-Sor	Forest	0.63	0.55	0.63	0.50	0.58	0.50	0.63	0.06	4	
NL-Spe	Forest	0.98	0.85	0.94	0.77	0.89	0.77	0.98	0.09	4	
DE-Tha	Forest	0.37	0.42	0.55	0.38	0.43	0.37	0.55	0.08	4	
BE-Vie	Forest	0.40	0.33	0.59	0.31	0.41	0.31	0.59	0.13	4	
DE-Wet	Forest	0.47	0.38	0.38	0.40	0.41	0.38	0.47	0.04	4	0.39
UK-EBu	Grass	0.28	0.23	0.22	0.23	0.24	0.22	0.28	0.03	4	
UK-EBuP	Grass	0.27	0.25	0.25	-	0.26	0.25	0.27	0.01	3	
NL-Ca1	Grass	1.22	1.08	1.02	0.68	1.00	0.68	1.22	0.23	4	
IE-Car	Grass	0.30	0.36	0.26	0.28	0.30	0.26	0.36	0.04	4	
IE-Dri	Grass	0.28	0.30	0.22	-	0.27	0.22	0.30	0.04	3	
DE-Gri	Grass	0.47	0.46	0.46	0.42	0.45	0.42	0.47	0.02	4	
FR-Lq2	Grass	0.30	0.21	0.27	0.24	0.26	0.21	0.30	0.04	4	
CH-Oe1	Grass	0.73	0.59	0.48	0.56	0.59	0.48	0.73	0.10	4	
DK-Rim	Grass	0.64	0.47	-	-	0.56	0.47	0.64	0.12	2	
UK-Sol	Grass	-	-	0.24	0.26	0.25	0.24	0.26	0.01	2	0.42
IT-Amp	Semi-Natura	0.22	0.21	-	-	0.22	0.21	0.22	0.01	2	
UK-AMo	Semi-Natura	0.24	0.22	0.21	0.19	0.22	0.19	0.24	0.02	4	
UK-AMoP	Semi-Natura	-	-	-	-	-	-	-	-	-	
DK-Brj	Semi-Natura	-	-	-	0.39	0.39	0.39	0.39	-	1	
HU-Bug	Semi-Natura	0.48	0.44	0.37	0.40	0.42	0.37	0.48	0.05	4	
NL-Hor	Semi-Natura	1.13	0.79	1.13	0.93	1.00	0.79	1.13	0.17	4	
FI-Kaa	Semi-Natura	-	-	0.01	0.01	0.01	0.01	0.01	0.00	2	
FI-Lom	Semi-Natura	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	4	
DE-Meh	Semi-Natura	-	0.57	0.67	0.55	0.60	0.55	0.67	0.06	3	
IT-MBo	Semi-Natura	0.51	0.43	0.27	0.34	0.39	0.27	0.51	0.10	4	
PL-Pol	Semi-Natura	0.50	0.42	0.35	0.45	0.43	0.35	0.50	0.06	4	
ES-VDA	Semi-Natura	-	0.27	0.21	0.17	0.22	0.17	0.27	0.05	3	0.35
	mean	0.49	0.44	0.45	0.38	0.42					
	min	0.02	0.01	0.01	0.01	0.01					
	max	1.49	1.36	1.29	0.93	1.18					
	n	57	59	56	57	66					



Table S14: Annual mean SO<sub>2</sub> gas concentrations measured in the NEU DELTA<sup>®</sup> network and summary statistics.

Site	Ecosystem type	SO <sub>2</sub> -S (µg m <sup>-3</sup> )				Summary statistics					Group Mean
		2007	2008	2009	2010	mean	min	max	sd	N	
UK-ESa	Crops	0.70	0.59	-	-	0.65	0.59	0.70	0.08	2	
DE-Geb	Crops	0.58	0.45	0.42	0.68	0.53	0.42	0.68	0.12	4	
FR-Gri	Crops	0.78	0.53	0.47	0.50	0.57	0.47	0.78	0.14	4	
DE-Kli	Crops	1.80	1.46	1.60	2.32	1.80	1.46	2.32	0.38	4	
BE-Lon	Crops	1.17	0.94	0.78	0.75	0.91	0.75	1.17	0.19	4	
UA-Pet	Crops	1.26	1.30	1.35	1.44	1.34	1.26	1.44	0.08	4	
IT-BCi	Crops	0.75	0.78	1.18	0.60	0.83	0.60	1.18	0.25	4	
IT-PoV	Crops	0.98	0.85	0.69	0.77	0.82	0.69	0.98	0.12	4	
DK-Ris	Crops	0.34	0.28	-	-	0.31	0.28	0.34	0.04	2	
SK07	Crops	1.00	0.85	0.79	1.05	0.92	0.79	1.05	0.12	4	0.87
FR-Bil	Forest	-	-	-	0.21	0.21	0.21	0.21	-	1	
NO-Bir	Forest	-	-	0.07	0.10	0.09	0.07	0.10	0.02	2	
CZ-BK1	Forest	2.52	2.27	-	2.14	2.31	2.14	2.52	0.19	3	
BE-Bra	Forest	3.55	2.69	2.05	1.37	2.42	1.37	3.55	0.93	4	
IT-Col	Forest	-	0.13	0.15	0.12	0.13	0.12	0.15	0.02	3	
ES-ES1	Forest	0.89	0.76	0.59	0.52	0.69	0.52	0.89	0.17	4	
PT-Esp	Forest	0.97	0.74	0.66	0.63	0.75	0.63	0.97	0.15	4	
FR-Fon	Forest	0.72	0.48	0.44	0.43	0.52	0.43	0.72	0.14	4	
FR-Fgs	Forest	-	-	0.39	0.38	0.39	0.38	0.39	0.01	2	
FR-FgsP	Forest	-	-	-	-	-	-	-	-	-	
RU-Fyo	Forest	0.47	0.43	0.50	0.55	0.49	0.43	0.55	0.05	4	
UK-Gri	Forest	0.14	-	-	-	0.14	0.14	0.14	-	1	
DE-Hai	Forest	0.50	0.35	0.33	0.67	0.46	0.33	0.67	0.16	4	
FR-Hes	Forest	0.60	0.51	0.45	0.53	0.52	0.45	0.60	0.06	4	
DE-Hog	Forest	0.46	0.38	0.35	0.39	0.40	0.35	0.46	0.05	4	
FI-Hyy	Forest	0.31	0.20	0.31	0.27	0.27	0.20	0.31	0.05	4	
CH-Lae	Forest	0.56	0.49	0.41	0.39	0.46	0.39	0.56	0.08	4	
ES-LMa	Forest	0.26	0.27	0.16	0.21	0.23	0.16	0.27	0.05	4	
FR-LBr	Forest	0.48	0.31	-	-	0.40	0.31	0.48	0.12	2	
NL-Loo	Forest	0.74	0.52	0.53	0.48	0.57	0.48	0.74	0.12	4	
PT-Mi1	Forest	0.71	0.42	0.28	-	0.47	0.28	0.71	0.22	3	
SE-Nor	Forest	0.10	0.06	0.08	0.09	0.08	0.06	0.10	0.02	4	
FR-Pue	Forest	0.34	0.21	0.24	0.24	0.26	0.21	0.34	0.06	4	
FR-Ren	Forest	0.10	0.08	0.08	0.13	0.10	0.08	0.13	0.02	4	
IT-R02	Forest	0.40	0.36	0.36	0.34	0.37	0.34	0.40	0.03	4	
IT-SR	Forest	0.68	0.46	0.39	0.30	0.46	0.30	0.68	0.16	4	
SK04	Forest	0.63	0.48	0.47	0.60	0.55	0.47	0.63	0.08	4	
SK04P	Forest	0.73	0.61	0.58	0.58	0.63	0.58	0.73	0.07	4	
SK06	Forest	1.06	0.82	0.58	0.80	0.82	0.58	1.06	0.20	4	
SE-SK2	Forest	0.10	0.08	-	-	0.09	0.08	0.10	0.01	2	
FI-Sod	Forest	0.29	0.28	0.27	0.31	0.29	0.27	0.31	0.02	4	
DK-Sor	Forest	0.51	0.48	0.43	0.40	0.46	0.40	0.51	0.05	4	
NL-Spe	Forest	0.82	0.75	0.70	0.63	0.73	0.63	0.82	0.08	4	
DE-Tha	Forest	1.31	0.99	1.14	1.53	1.24	0.99	1.53	0.23	4	
BE-Vie	Forest	0.38	0.22	0.19	0.22	0.25	0.19	0.38	0.09	4	
DE-Wet	Forest	0.76	0.56	0.66	0.90	0.72	0.56	0.90	0.15	4	0.54
UK-EBu	Grass	0.65	0.42	0.28	0.58	0.48	0.28	0.65	0.17	4	
UK-EBuP	Grass	0.64	0.47	0.34	-	0.48	0.34	0.64	0.15	3	
NL-Ca1	Grass	1.12	1.17	0.81	0.79	0.97	0.79	1.17	0.20	4	
IE-Car	Grass	0.29	0.24	0.20	0.24	0.24	0.20	0.29	0.04	4	
IE-Dri	Grass	0.25	0.19	0.17	-	0.20	0.17	0.25	0.04	3	
DE-Gri	Grass	1.31	1.15	1.06	1.66	1.30	1.06	1.66	0.26	4	
FR-Lq2	Grass	0.19	0.14	0.13	0.14	0.15	0.13	0.19	0.03	4	
CH-Oe1	Grass	1.48	1.28	0.43	0.37	0.89	0.37	1.48	0.57	4	
DK-Rim	Grass	0.39	0.35	-	-	0.37	0.35	0.39	0.03	2	
UK-Sol	Grass	-	-	0.19	0.25	0.22	0.19	0.25	0.04	2	0.53
IT-Amp	Semi-Natura	0.15	0.13	-	-	0.14	0.13	0.15	0.01	2	
UK-AMo	Semi-Natura	0.45	0.29	0.26	0.47	0.37	0.26	0.47	0.11	4	
UK-AMoP	Semi-Natura	-	-	-	-	-	-	-	-	-	
DK-Bri	Semi-Natura	-	-	-	0.42	0.42	0.42	0.42	-	1	
HU-Bug	Semi-Natura	0.96	1.27	1.28	1.31	1.21	0.96	1.31	0.16	4	
NL-Hor	Semi-Natura	0.78	0.71	0.81	0.63	0.73	0.63	0.81	0.08	4	
FI-Kaa	Semi-Natura	-	-	0.36	0.57	0.47	0.36	0.57	0.15	2	
FI-Lom	Semi-Natura	0.14	0.16	0.14	0.07	0.13	0.07	0.16	0.04	4	
DE-Meh	Semi-Natura	-	0.56	0.48	0.89	0.64	0.48	0.89	0.22	3	
IT-MBo	Semi-Natura	0.20	0.16	0.16	0.16	0.17	0.16	0.20	0.02	4	
PL-Pol	Semi-Natura	1.13	0.95	0.84	1.46	1.10	0.84	1.46	0.27	4	
ES-VDA	Semi-Natura	-	0.17	0.13	0.12	0.14	0.12	0.17	0.03	3	0.50
mean		0.73	0.60	0.52	0.62	0.58					
min		0.10	0.06	0.07	0.07	0.08					
max		3.55	2.69	2.05	2.32	2.42					
n		57	59	56	56	66					

Table S15: Annual mean particulate SO<sub>4</sub><sup>2-</sup> concentrations measured in the NEU DELTA<sup>®</sup> network and summary statistics.

Site	Ecosystem type	pSO <sub>4</sub> <sup>2-</sup> -N (µg m <sup>-3</sup> )				Summary statistics					Group Mean
		2007	2008	2009	2010	mean	min	max	sd	N	
UK-ESa	Crops	0.21	0.22	-	-	0.22	0.21	0.22	0.01	2	
DE-Geb	Crops	0.57	0.51	0.56	0.32	0.49	0.32	0.57	0.12	4	
FR-Gri	Crops	0.53	0.41	0.39	0.34	0.42	0.34	0.53	0.08	4	
DE-Kli	Crops	0.60	0.46	0.51	0.41	0.50	0.41	0.60	0.08	4	
BE-Lon	Crops	1.20	1.00	1.37	0.90	1.12	0.90	1.37	0.21	4	
UA-Pet	Crops	0.83	1.15	0.71	0.57	0.82	0.57	1.15	0.25	4	
IT-BCI	Crops	0.91	1.08	0.56	0.63	0.80	0.56	1.08	0.24	4	
IT-PoV	Crops	0.87	0.75	0.54	0.43	0.65	0.43	0.87	0.20	4	
DK-Ris	Crops	0.78	0.55	-	-	0.67	0.55	0.78	0.16	2	
SK07	Crops	0.81	0.63	0.55	0.44	0.61	0.44	0.81	0.16	4	0.63
FR-Bil	Forest	-	-	-	0.27	0.27	0.27	0.27	-	1	
NO-Bir	Forest	-	-	0.35	0.34	0.35	0.34	0.35	0.01	2	
CZ-BK1	Forest	0.68	0.96	-	0.48	0.71	0.48	0.96	0.24	3	
BE-Bra	Forest	1.56	1.32	1.16	0.88	1.23	0.88	1.56	0.29	4	
IT-Col	Forest	-	0.30	0.25	0.21	0.25	0.21	0.30	0.05	3	
ES-ES1	Forest	1.23	1.14	0.93	0.73	1.01	0.73	1.23	0.22	4	
PT-Esp	Forest	0.55	0.67	0.38	0.57	0.54	0.38	0.67	0.12	4	
FR-Fon	Forest	0.53	0.39	0.38	0.29	0.40	0.29	0.53	0.10	4	
FR-Fgs	Forest	-	-	0.36	0.29	0.33	0.29	0.36	0.05	2	
FR-FgsP	Forest	-	-	-	-	-	-	-	-	-	
RU-Fyo	Forest	0.47	0.66	0.29	0.57	0.50	0.29	0.66	0.16	4	
UK-Gri	Forest	0.11	-	-	-	0.11	0.11	0.11	-	1	
DE-Hai	Forest	0.52	0.32	0.53	0.29	0.42	0.29	0.53	0.13	4	
FR-Hes	Forest	0.40	0.35	0.36	0.31	0.36	0.31	0.40	0.04	4	
DE-Hog	Forest	0.41	0.47	0.42	0.23	0.38	0.23	0.47	0.11	4	
FI-Hyy	Forest	0.47	0.42	0.52	0.43	0.46	0.42	0.52	0.05	4	
CH-Lae	Forest	0.47	0.59	0.37	0.37	0.45	0.37	0.59	0.10	4	
ES-LMa	Forest	0.72	0.57	0.51	0.65	0.61	0.51	0.72	0.09	4	
FR-LBr	Forest	0.46	0.33	-	-	0.40	0.33	0.46	0.09	2	
NL-Loo	Forest	0.64	0.49	0.68	0.30	0.53	0.30	0.68	0.17	4	
PT-MI1	Forest	0.73	0.97	0.27	-	0.66	0.27	0.97	0.36	3	
SE-Nor	Forest	0.40	0.30	0.39	0.37	0.37	0.30	0.40	0.05	4	
FR-Pue	Forest	0.38	0.28	0.30	0.22	0.30	0.22	0.38	0.07	4	
FR-Ren	Forest	0.21	0.18	0.23	0.17	0.20	0.17	0.23	0.03	4	
IT-Ro2	Forest	0.51	0.54	0.43	0.38	0.47	0.38	0.54	0.07	4	
IT-SR	Forest	0.73	0.62	0.38	0.42	0.54	0.38	0.73	0.17	4	
SK04	Forest	0.67	0.42	0.37	0.36	0.46	0.36	0.67	0.15	4	
SK04P	Forest	0.57	0.43	0.34	0.29	0.41	0.29	0.57	0.12	4	
SK06	Forest	0.60	0.47	0.37	0.36	0.45	0.36	0.60	0.11	4	
SE-Sk2	Forest	0.42	0.35	-	-	0.39	0.35	0.42	0.05	2	
FI-Sod	Forest	0.36	0.35	0.53	0.41	0.41	0.35	0.53	0.08	4	
DK-Sor	Forest	0.88	0.68	0.77	0.76	0.77	0.68	0.88	0.08	4	
NL-Spe	Forest	0.58	0.64	0.58	0.42	0.56	0.42	0.64	0.09	4	
DE-Tha	Forest	0.49	0.45	0.55	0.33	0.46	0.33	0.55	0.09	4	
BE-Vie	Forest	0.86	0.70	0.62	0.88	0.77	0.62	0.88	0.13	4	
DE-Wet	Forest	0.46	0.32	0.34	0.28	0.35	0.28	0.46	0.08	4	0.48
UK-EBu	Grass	0.26	0.17	0.13	0.17	0.18	0.13	0.26	0.05	4	
UK-EBuP	Grass	0.25	0.20	0.17	-	0.21	0.17	0.25	0.04	3	
NL-Ca1	Grass	1.10	0.74	0.63	0.39	0.72	0.39	1.10	0.30	4	
IE-Car	Grass	0.26	0.31	0.25	0.23	0.26	0.23	0.31	0.03	4	
IE-Dri	Grass	0.25	0.28	0.22	-	0.25	0.22	0.28	0.03	3	
DE-Gri	Grass	0.49	0.51	0.48	0.35	0.46	0.35	0.51	0.07	4	
FR-Lq2	Grass	0.26	0.19	0.23	0.16	0.21	0.16	0.26	0.04	4	
CH-Oe1	Grass	0.58	0.63	0.32	0.40	0.48	0.32	0.63	0.15	4	
DK-Rim	Grass	0.82	0.74	-	-	0.78	0.74	0.82	0.06	2	
UK-Sol	Grass	-	-	0.24	0.18	0.21	0.18	0.24	0.04	2	0.38
IT-Amp	Semi-Natura	0.34	0.31	-	-	0.33	0.31	0.34	0.02	2	
UK-AMo	Semi-Natura	0.23	0.19	0.16	0.16	0.19	0.16	0.23	0.03	4	
UK-AMoP	Semi-Natura	-	-	-	-	-	-	-	-	-	
DK-Brj	Semi-Natura	-	-	-	0.67	0.67	0.67	0.67	-	1	
HU-Bug	Semi-Natura	0.72	0.82	0.62	0.49	0.66	0.49	0.82	0.14	4	
NL-Hor	Semi-Natura	0.77	0.53	0.78	0.55	0.66	0.53	0.78	0.14	4	
FI-Kaa	Semi-Natura	-	-	0.18	0.25	0.22	0.18	0.25	0.05	2	
FI-Lom	Semi-Natura	0.24	0.24	0.30	0.28	0.27	0.24	0.30	0.03	4	
DE-Meh	Semi-Natura	-	0.49	0.48	0.32	0.43	0.32	0.49	0.10	3	
IT-MBo	Semi-Natura	0.39	0.47	0.28	0.30	0.36	0.28	0.47	0.09	4	
PL-Pol	Semi-Natura	0.69	0.70	0.45	0.59	0.61	0.45	0.70	0.12	4	
ES-VDA	Semi-Natura	-	0.39	0.41	0.37	0.39	0.37	0.41	0.02	3	0.43
	mean	0.58	0.53	0.46	0.41	0.48					
	min	0.11	0.17	0.13	0.16	0.11					
	max	1.56	1.32	1.37	0.90	1.23					
	n	57	59	56	56	66					

Table S16: Annual mean HCl gas concentrations measured in the NEU DELTA<sup>®</sup> network and summary statistics.

Site	Ecosystem type	HCl-Cl <sup>-</sup> (µg m <sup>-3</sup> )				Summary statistics					Group Mean
		2007	2008	2009	2010	mean	min	max	sd	N	
UK-ESa	Crops	0.21	0.30	-	-	0.26	0.21	0.30	0.06	2	
DE-Geb	Crops	0.12	0.19	0.23	0.25	0.20	0.12	0.25	0.06	4	
FR-Gri	Crops	0.39	0.19	0.29	0.29	0.29	0.19	0.39	0.08	4	
DE-Kli	Crops	0.16	0.19	0.19	0.24	0.20	0.16	0.24	0.03	4	
BE-Lon	Crops	0.48	0.22	0.57	0.15	0.36	0.15	0.57	0.20	4	
UA-Pet	Crops	0.29	0.23	0.18	0.22	0.23	0.18	0.29	0.05	4	
IT-BCI	Crops	0.40	0.36	0.32	0.40	0.37	0.32	0.40	0.04	4	
IT-PoV	Crops	0.17	0.18	0.17	0.06	0.15	0.06	0.18	0.06	4	
DK-Ris	Crops	0.25	0.16	-	-	0.21	0.16	0.25	0.06	2	
SK07	Crops	0.23	0.09	0.19	0.05	0.14	0.05	0.23	0.08	4	0.24
FR-Bil	Forest	-	-	-	0.34	0.34	0.34	0.34	-	1	
NO-Bir	Forest	-	-	0.46	0.23	0.35	0.23	0.46	0.16	2	
CZ-BK1	Forest	0.27	0.26	-	0.20	0.24	0.20	0.27	0.04	3	
BE-Bra	Forest	0.54	0.26	0.45	0.19	0.36	0.19	0.54	0.16	4	
IT-Col	Forest	-	0.19	0.17	0.06	0.14	0.06	0.19	0.07	3	
ES-ES1	Forest	0.40	0.53	0.27	0.22	0.36	0.22	0.53	0.14	4	
PT-Esp	Forest	0.51	0.51	0.44	0.58	0.51	0.44	0.58	0.06	4	
FR-Fon	Forest	0.31	0.26	0.33	0.26	0.29	0.26	0.33	0.04	4	
FR-Fgs	Forest	-	-	0.24	0.27	0.26	0.24	0.27	0.02	2	
FR-FgsP	Forest	-	-	-	-	-	-	-	-	-	
RU-Fyo	Forest	0.06	0.06	0.06	0.10	0.07	0.06	0.10	0.02	4	
UK-Gri	Forest	0.16	-	-	-	0.16	0.16	0.16	-	1	
DE-Hai	Forest	0.09	0.12	0.11	0.32	0.16	0.09	0.32	0.11	4	
FR-Hes	Forest	0.19	0.15	0.17	0.19	0.18	0.15	0.19	0.02	4	
DE-Hog	Forest	0.08	0.09	0.10	0.16	0.11	0.08	0.16	0.04	4	
FI-Hyy	Forest	0.13	0.07	0.42	0.17	0.20	0.07	0.42	0.15	4	
CH-Lae	Forest	0.11	0.11	0.10	0.18	0.13	0.10	0.18	0.04	4	
ES-LMa	Forest	0.22	0.45	0.16	0.15	0.25	0.15	0.45	0.14	4	
FR-LBr	Forest	0.37	0.26	-	-	0.32	0.26	0.37	0.08	2	
NL-Loo	Forest	0.24	0.13	0.22	0.15	0.19	0.13	0.24	0.05	4	
PT-MI1	Forest	0.26	0.28	0.19	-	0.24	0.19	0.28	0.05	3	
SE-Nor	Forest	0.18	0.06	0.26	0.08	0.15	0.06	0.26	0.09	4	
FR-Pue	Forest	0.27	0.16	0.26	0.26	0.24	0.16	0.27	0.05	4	
FR-Ren	Forest	0.05	0.01	0.10	0.09	0.06	0.01	0.10	0.04	4	
IT-Ro2	Forest	0.36	0.39	0.25	0.14	0.29	0.14	0.39	0.11	4	
IT-SR	Forest	0.53	0.36	0.35	0.13	0.34	0.13	0.53	0.16	4	
SK04	Forest	0.13	0.08	0.10	0.05	0.09	0.05	0.13	0.03	4	
SK04P	Forest	0.09	0.14	0.20	0.03	0.12	0.03	0.20	0.07	4	
SK06	Forest	0.20	0.10	0.09	0.02	0.10	0.02	0.20	0.07	4	
SE-Sk2	Forest	0.16	0.18	-	-	0.17	0.16	0.18	0.01	2	
FI-Sod	Forest	0.16	0.18	0.25	0.10	0.17	0.10	0.25	0.06	4	
DK-Sor	Forest	0.39	0.36	0.40	0.21	0.34	0.21	0.40	0.09	4	
NL-Spe	Forest	0.40	0.41	0.50	0.49	0.45	0.40	0.50	0.05	4	
DE-Tha	Forest	0.17	0.13	0.14	0.22	0.17	0.13	0.22	0.04	4	
BE-Vie	Forest	0.13	0.08	0.26	0.09	0.14	0.08	0.26	0.08	4	
DE-Wet	Forest	0.12	0.16	0.16	0.28	0.18	0.12	0.28	0.07	4	0.22
UK-EBu	Grass	0.28	0.20	0.15	0.19	0.21	0.15	0.28	0.05	4	
UK-EBuP	Grass	0.22	0.21	0.20	-	0.21	0.20	0.22	0.01	3	
NL-Ca1	Grass	0.29	0.46	0.37	0.37	0.37	0.29	0.46	0.07	4	
IE-Car	Grass	0.24	0.15	0.19	0.24	0.21	0.15	0.24	0.04	4	
IE-Dri	Grass	0.21	0.14	0.26	-	0.20	0.14	0.26	0.06	3	
DE-Gri	Grass	0.16	0.30	0.20	0.31	0.24	0.16	0.31	0.07	4	
FR-Lq2	Grass	0.16	0.10	0.14	0.13	0.13	0.10	0.16	0.03	4	
CH-Oe1	Grass	0.09	0.09	0.08	0.16	0.11	0.08	0.16	0.04	4	
DK-Rim	Grass	0.34	0.19	-	-	0.27	0.19	0.34	0.11	2	
UK-Sol	Grass	-	-	0.11	0.17	0.14	0.11	0.17	0.04	2	0.21
IT-Amp	Semi-Natura	0.17	0.21	-	-	0.19	0.17	0.21	0.03	2	
UK-AMo	Semi-Natura	0.22	0.19	0.19	0.18	0.20	0.18	0.22	0.02	4	
UK-AMoP	Semi-Natura	-	-	-	-	-	-	-	-	-	
DK-Brj	Semi-Natura	-	-	-	0.26	0.26	0.26	0.26	-	1	
HU-Bug	Semi-Natura	0.12	0.10	0.07	0.10	0.10	0.07	0.12	0.02	4	
NL-Hor	Semi-Natura	0.20	0.32	0.35	0.97	0.46	0.20	0.97	0.35	4	
FI-Kaa	Semi-Natura	-	-	0.26	0.09	0.18	0.09	0.26	0.12	2	
FI-Lom	Semi-Natura	0.15	0.04	0.19	0.54	0.23	0.04	0.54	0.22	4	
DE-Meh	Semi-Natura	-	0.24	0.20	0.30	0.25	0.20	0.30	0.05	3	
IT-MBo	Semi-Natura	0.11	0.20	0.37	0.32	0.25	0.11	0.37	0.12	4	
PL-Pol	Semi-Natura	0.15	0.16	0.12	0.39	0.21	0.12	0.39	0.12	4	
ES-VDA	Semi-Natura	-	0.11	0.10	0.07	0.09	0.07	0.11	0.02	3	0.22
	mean	0.23	0.20	0.23	0.22	0.22					
	min	0.05	0.01	0.06	0.02	0.06					
	max	0.54	0.53	0.57	0.97	0.51					
	n	57	59	56	56	66					

Table S17: Annual mean particulate Cl<sup>-</sup> concentrations measured in the NEU DELTA<sup>®</sup> network and summary statistics.

Site	Ecosystem type	pCl <sup>-</sup> (µg m <sup>-3</sup> ) (µg m <sup>-3</sup> )				Summary statistics					Group Mean
		2007	2008	2009	2010	mean	min	max	sd	N	
UK-ESa	Crops	1.18	1.23	-	-	1.21	1.18	1.23	0.04	2	
DE-Geb	Crops	0.33	0.45	0.30	0.31	0.35	0.30	0.45	0.07	4	
FR-Gri	Crops	1.07	0.98	0.79	0.41	0.81	0.41	1.07	0.29	4	
DE-Kli	Crops	0.36	0.30	0.23	0.40	0.32	0.23	0.40	0.07	4	
BE-Lon	Crops	0.37	0.36	0.29	0.14	0.29	0.14	0.37	0.11	4	
UA-Pet	Crops	0.41	0.41	0.24	0.43	0.37	0.24	0.43	0.09	4	
IT-BCI	Crops	1.54	1.41	0.88	2.12	1.49	0.88	2.12	0.51	4	
IT-PoV	Crops	0.34	0.47	0.33	0.31	0.36	0.31	0.47	0.07	4	
DK-Ris	Crops	0.36	0.30	-	-	0.33	0.30	0.36	0.04	2	
SK07	Crops	0.53	0.28	0.20	0.23	0.31	0.20	0.53	0.15	4	0.58
FR-Bil	Forest	-	-	-	0.80	0.80	0.80	0.80	-	1	
NO-Bir	Forest	-	-	0.37	0.16	0.27	0.16	0.37	0.15	2	
CZ-BK1	Forest	0.29	0.29	-	0.17	0.25	0.17	0.29	0.07	3	
BE-Bra	Forest	0.67	0.60	0.41	0.29	0.49	0.29	0.67	0.17	4	
IT-Col	Forest	-	0.33	0.54	0.45	0.44	0.33	0.54	0.11	3	
ES-ES1	Forest	0.99	1.06	0.55	0.64	0.81	0.55	1.06	0.25	4	
PT-Esp	Forest	1.09	1.27	1.51	1.72	1.40	1.09	1.72	0.28	4	
FR-Fon	Forest	0.99	0.83	0.82	0.42	0.77	0.42	0.99	0.24	4	
FR-Fgs	Forest	-	-	1.47	0.96	1.22	0.96	1.47	0.36	2	
FR-FgsP	Forest	-	-	-	1.11	-	-	-	-	-	
RU-Fyo	Forest	0.14	0.12	0.07	0.22	0.14	0.07	0.22	0.06	4	
UK-Gri	Forest	0.85	-	-	-	0.85	0.85	0.85	-	1	
DE-Hai	Forest	0.36	0.32	0.22	0.23	0.28	0.22	0.36	0.07	4	
FR-Hes	Forest	0.45	0.35	0.25	0.03	0.27	0.03	0.45	0.18	4	
DE-Hog	Forest	0.12	0.15	0.17	0.12	0.14	0.12	0.17	0.02	4	
FI-Hyy	Forest	0.06	0.04	-	-	0.05	0.04	0.06	0.01	2	
CH-Lae	Forest	0.21	0.18	0.16	0.14	0.17	0.14	0.21	0.03	4	
ES-LMa	Forest	0.14	0.38	0.09	0.19	0.20	0.09	0.38	0.13	4	
FR-LBr	Forest	1.50	1.29	-	-	1.40	1.29	1.50	0.15	2	
NL-Loo	Forest	1.19	0.67	0.79	0.58	0.81	0.58	1.19	0.27	4	
PT-Mi1	Forest	1.04	0.96	0.90	-	0.97	0.90	1.04	0.07	3	
SE-Nor	Forest	0.08	0.08	0.04	0.02	0.06	0.02	0.08	0.03	4	
FR-Pue	Forest	0.52	0.50	0.54	0.18	0.44	0.18	0.54	0.17	4	
FR-Ren	Forest	0.12	0.17	0.15	-	0.15	0.12	0.17	0.03	3	
IT-Ro2	Forest	0.99	0.68	0.83	0.73	0.81	0.68	0.99	0.14	4	
IT-SR	Forest	2.60	1.92	1.16	1.68	1.84	1.16	2.60	0.60	4	
SK04	Forest	0.41	0.26	0.17	0.24	0.27	0.17	0.41	0.10	4	
SK04P	Forest	0.39	0.28	0.17	0.22	0.27	0.17	0.39	0.09	4	
SK06	Forest	0.35	0.25	0.17	0.30	0.27	0.17	0.35	0.08	4	
SE-Sk2	Forest	0.09	0.09	-	-	0.09	0.09	0.09	0.00	2	
FI-Sod	Forest	0.07	0.06	0.06	0.06	0.06	0.06	0.07	0.01	4	
DK-Sor	Forest	0.59	0.78	0.46	0.28	0.53	0.28	0.78	0.21	4	
NL-Spe	Forest	1.61	1.21	0.80	0.96	1.15	0.80	1.61	0.35	4	
DE-Tha	Forest	0.27	0.24	0.22	0.23	0.24	0.22	0.27	0.02	4	
BE-Vie	Forest	0.13	0.09	0.17	0.03	0.11	0.03	0.17	0.06	4	
DE-Wet	Forest	0.25	0.22	0.16	0.21	0.21	0.16	0.25	0.04	4	0.52
UK-EBu	Grass	1.38	0.86	1.04	1.11	1.10	0.86	1.38	0.22	4	
UK-EBuP	Grass	1.33	1.02	1.27	-	1.21	1.02	1.33	0.16	3	
NL-Ca1	Grass	1.02	1.20	0.93	0.88	1.01	0.88	1.20	0.14	4	
IE-Car	Grass	1.85	1.78	1.82	1.02	1.62	1.02	1.85	0.40	4	
IE-Dri	Grass	1.94	1.94	1.69	-	1.86	1.69	1.94	0.14	3	
DE-Gri	Grass	0.29	0.29	0.18	0.33	0.27	0.18	0.33	0.06	4	
FR-Lq2	Grass	0.35	0.28	0.23	0.01	0.22	0.01	0.35	0.15	4	
CH-Oe1	Grass	0.23	0.20	0.17	0.21	0.20	0.17	0.23	0.02	4	
DK-Rim	Grass	0.95	0.81	-	-	0.88	0.81	0.95	0.10	2	
UK-Sol	Grass	-	-	1.87	1.01	1.44	1.01	1.87	0.61	2	0.98
IT-Amp	Semi-Natura	0.29	0.25	-	-	0.27	0.25	0.29	0.03	2	
UK-AMo	Semi-Natura	1.27	1.16	1.00	1.02	1.11	1.00	1.27	0.13	4	
UK-AMoP	Semi-Natura	-	-	-	-	-	-	-	-	-	
DK-Brj	Semi-Natura	-	-	-	0.21	0.21	0.21	0.21	-	1	
HU-Bug	Semi-Natura	0.23	0.16	0.10	0.10	0.15	0.10	0.23	0.06	4	
NL-Hor	Semi-Natura	1.28	1.23	1.31	1.20	1.26	1.20	1.31	0.05	4	
FI-Kaa	Semi-Natura	-	-	0.11	0.19	0.15	0.11	0.19	0.06	2	
FI-Lom	Semi-Natura	0.13	0.06	0.06	0.02	0.07	0.02	0.13	0.05	4	
DE-Meh	Semi-Natura	-	0.44	0.31	0.31	0.35	0.31	0.44	0.08	3	
IT-MBo	Semi-Natura	0.12	0.12	0.08	0.09	0.10	0.08	0.12	0.02	4	
PL-Pol	Semi-Natura	0.59	0.44	0.28	0.30	0.40	0.28	0.59	0.14	4	
ES-VDA	Semi-Natura	-	0.04	0.04	0.05	0.04	0.04	0.05	0.01	3	0.37
	mean	0.67	0.58	0.53	0.47	0.57					
	min	0.06	0.04	0.04	0.01	0.04					
	max	2.60	1.94	1.87	2.12	1.86					
	n	57	59	55	55	66					

Table S18: Annual mean particulate Na<sup>+</sup> concentrations measured in the NEU DELTA<sup>®</sup> network and summary statistics.

Site	Ecosystem type	pNa <sup>+</sup> (µg m <sup>-3</sup> ) (µg m <sup>-3</sup> )				Summary statistics					Group Mean
		2007	2008	2009	2010	mean	min	max	sd	N	
UK-ESa	Crops	0.61	0.76	-	-	0.69	0.61	0.76	0.11	2	
DE-Geb	Crops	0.18	0.31	0.21	0.12	0.21	0.12	0.31	0.08	4	
FR-Gri	Crops	0.63	0.66	0.60	0.43	0.58	0.43	0.66	0.10	4	
DE-Kli	Crops	0.22	0.23	0.13	0.13	0.18	0.13	0.23	0.05	4	
BE-Lon	Crops	0.78	0.60	0.71	0.42	0.63	0.42	0.78	0.16	4	
UA-Pet	Crops	0.25	0.32	0.19	0.28	0.26	0.19	0.32	0.05	4	
IT-BCI	Crops	1.21	1.09	0.80	1.14	1.06	0.80	1.21	0.18	4	
IT-PoV	Crops	0.23	0.24	0.15	0.18	0.20	0.15	0.24	0.04	4	
DK-Ris	Crops	0.91	1.13	-	-	1.02	0.91	1.13	0.16	2	
SK07	Crops	0.13	0.13	0.09	0.08	0.11	0.08	0.13	0.03	4	0.49
FR-Bil	Forest	-	-	-	0.62	0.62	0.62	0.62	-	1	
NO-Bir	Forest	-	-	0.58	0.28	0.43	0.28	0.58	0.21	2	
CZ-BK1	Forest	0.20	0.27	-	0.09	0.19	0.09	0.27	0.09	3	
BE-Bra	Forest	1.09	1.15	1.03	0.69	0.99	0.69	1.15	0.21	4	
IT-Col	Forest	-	0.26	0.37	0.21	0.28	0.21	0.37	0.08	3	
ES-ES1	Forest	2.30	1.46	1.10	0.94	1.45	0.94	2.30	0.61	4	
PT-Esp	Forest	0.80	1.07	1.15	1.18	1.05	0.80	1.18	0.17	4	
FR-Fon	Forest	0.56	0.62	0.55	0.44	0.54	0.44	0.62	0.07	4	
FR-Fgs	Forest	-	-	0.82	0.67	0.75	0.67	0.82	0.11	2	
FR-FgsP	Forest	-	-	-	0.71	-	-	-	-	-	
RU-Fyo	Forest	0.08	0.09	0.04	0.10	0.08	0.04	0.10	0.03	4	
UK-Gri	Forest	0.38	-	-	-	0.38	0.38	0.38	-	1	
DE-Hai	Forest	0.18	0.22	0.14	0.10	0.16	0.10	0.22	0.05	4	
FR-Hes	Forest	0.20	0.23	0.24	0.18	0.21	0.18	0.24	0.03	4	
DE-Hog	Forest	0.05	0.12	0.09	0.07	0.08	0.05	0.12	0.03	4	
FI-Hyy	Forest	0.21	0.20	-	-	0.21	0.20	0.21	0.01	2	
CH-Lae	Forest	0.20	0.18	0.16	0.10	0.16	0.10	0.20	0.04	4	
ES-LMa	Forest	0.32	0.40	0.30	0.28	0.33	0.28	0.40	0.05	4	
FR-LBr	Forest	1.05	0.91	-	-	0.98	0.91	1.05	0.10	2	
NL-Loo	Forest	0.80	0.47	0.54	0.41	0.56	0.41	0.80	0.17	4	
PT-MI1	Forest	1.00	0.79	0.74	-	0.84	0.74	1.00	0.14	3	
SE-Nor	Forest	0.20	0.31	0.22	0.13	0.22	0.13	0.31	0.07	4	
FR-Pue	Forest	0.33	0.41	0.44	0.33	0.38	0.33	0.44	0.06	4	
FR-Ren	Forest	0.00	0.14	0.01	-	0.05	0.00	0.14	0.08	3	
IT-Ro2	Forest	0.56	0.59	0.53	0.63	0.58	0.53	0.63	0.04	4	
IT-SR	Forest	1.56	1.42	0.76	0.88	1.16	0.76	1.56	0.39	4	
SK04	Forest	0.38	0.10	0.06	0.03	0.14	0.03	0.38	0.16	4	
SK04P	Forest	0.17	0.10	0.09	0.05	0.10	0.05	0.17	0.05	4	
SK06	Forest	0.18	0.20	0.13	0.12	0.16	0.12	0.20	0.04	4	
SE-Sk2	Forest	0.23	0.17	-	-	0.20	0.17	0.23	0.04	2	
FI-Sod	Forest	0.18	0.15	0.16	0.15	0.16	0.15	0.18	0.01	4	
DK-Sor	Forest	1.03	1.04	0.98	0.62	0.92	0.62	1.04	0.20	4	
NL-Spe	Forest	1.33	0.78	0.46	0.35	0.73	0.35	1.33	0.44	4	
DE-Tha	Forest	0.17	0.27	0.15	0.09	0.17	0.09	0.27	0.07	4	
BE-Vie	Forest	0.37	0.35	0.35	0.20	0.32	0.20	0.37	0.08	4	
DE-Wet	Forest	0.11	0.17	0.10	0.10	0.12	0.10	0.17	0.03	4	0.45
UK-EBu	Grass	0.75	0.60	0.67	0.60	0.66	0.60	0.75	0.07	4	
UK-EBuP	Grass	0.68	0.66	0.61	-	0.65	0.61	0.68	0.04	3	
NL-Ca1	Grass	0.80	0.70	0.52	0.42	0.61	0.42	0.80	0.17	4	
IE-Car	Grass	0.97	0.99	0.93	0.65	0.89	0.65	0.99	0.16	4	
IE-Dri	Grass	1.02	1.12	0.89	-	1.01	0.89	1.12	0.12	3	
DE-Gri	Grass	0.15	0.21	0.09	0.07	0.13	0.07	0.21	0.06	4	
FR-Lq2	Grass	0.22	0.23	0.19	0.17	0.20	0.17	0.23	0.03	4	
CH-Oe1	Grass	0.23	0.16	0.15	0.17	0.18	0.15	0.23	0.04	4	
DK-Rim	Grass	1.05	1.52	-	-	1.29	1.05	1.52	0.33	2	
UK-Sol	Grass	-	-	1.00	0.67	0.84	0.67	1.00	0.23	2	0.64
IT-Amp	Semi-Natura	0.24	0.39	-	-	0.32	0.24	0.39	0.11	2	
UK-AMo	Semi-Natura	0.67	0.64	0.65	0.48	0.61	0.48	0.67	0.09	4	
UK-AMoP	Semi-Natura	-	-	-	-	-	-	-	-	-	
DK-Brj	Semi-Natura	-	-	-	0.63	0.63	0.63	0.63	-	1	
HU-Bug	Semi-Natura	0.13	0.12	0.08	0.07	0.10	0.07	0.13	0.03	4	
NL-Hor	Semi-Natura	0.98	0.77	0.51	0.74	0.75	0.51	0.98	0.19	4	
FI-Kaa	Semi-Natura	-	-	0.10	0.17	0.14	0.10	0.17	0.05	2	
FI-Lom	Semi-Natura	0.18	0.12	0.13	0.08	0.13	0.08	0.18	0.04	4	
DE-Meh	Semi-Natura	-	0.28	0.14	0.13	0.18	0.13	0.28	0.08	3	
IT-MBo	Semi-Natura	0.12	0.09	0.16	0.16	0.13	0.09	0.16	0.03	4	
PL-Pol	Semi-Natura	0.43	0.26	0.16	0.18	0.26	0.16	0.43	0.12	4	
ES-VDA	Semi-Natura	-	0.12	0.12	0.07	0.10	0.07	0.12	0.03	3	0.30
	mean	0.53	0.49	0.40	0.35	0.46					
	min	0.00	0.09	0.01	0.03	0.05					
	max	2.30	1.52	1.15	1.18	1.45					
	n	57	59	55	55	66					

Table S19: Annual wet deposition of inorganic components (kg ha<sup>-1</sup> yr<sup>-1</sup>) estimated from Rotenkamp bulk precipitation collectors in the NEU bulk wet deposition network and percentage composition by mass measured. The data shown are 2-year averaged deposition, made between 2008 and 2010, except at 5 sites with 1 year of measurement only (BE-Vie, FR-Fgs, FR-LBr, DE-Wet, IT-BCi).

Site ID / Ecosystem type	Annual Wet Deposition (kg ha <sup>-1</sup> yr <sup>-1</sup> )											% contribution to total (by mass)						
	NH <sub>4</sub> <sup>+</sup> -N	NO <sub>3</sub> <sup>-</sup> -N	SO <sub>4</sub> <sup>2-</sup> -S	SS-SO <sub>4</sub> <sup>2-</sup> -S	nss-SO <sub>4</sub> <sup>2-</sup> -S	Cl <sup>-</sup>	H <sup>+</sup>	Na <sup>+</sup>	Ca <sup>2+</sup>	K <sup>+</sup>	Mg <sup>2+</sup>	NH <sub>4</sub> <sup>+</sup> -N	NO <sub>3</sub> <sup>-</sup> -N	SO <sub>4</sub> <sup>2-</sup> -S	nss-SO <sub>4</sub> <sup>2-</sup> -S	Na <sup>+</sup> +Cl <sup>-</sup>	Ca <sup>2+</sup> +K <sup>+</sup> +Mg <sup>2+</sup>	
*BE-Vie	F	3.67	2.38	4.10	0.42	3.69	8.03	0.13	4.94	4.31	2.35	1.20	11.8%	7.6%	13.2%	11.9%	41.7%	25.3%
FR-Bil	F	1.25	0.65	2.70	1.73	0.96	36.8	0.09	20.6	2.34	1.50	2.18	1.8%	1.0%	4.0%	1.4%	84.3%	8.8%
FR-Pue	F	2.33	3.35	3.55	0.86	2.68	17.0	0.10	10.3	3.85	1.17	1.33	5.4%	7.8%	8.3%	6.3%	63.4%	14.8%
FR-Fon	F	0.72	0.61	1.52	0.23	1.29	4.37	0.12	2.78	2.30	0.94	0.46	5.2%	4.4%	11.0%	9.3%	51.7%	26.7%
*FR-Fgs	F	3.20	2.06	3.68	0.87	2.81	18.4	0.05	10.4	1.64	0.49	1.18	7.8%	5.0%	9.0%	6.9%	70.1%	8.1%
*FR-LBr	F	1.86	3.31	6.84	2.57	4.27	59.9	0.02	30.6	5.50	1.75	4.23	1.6%	2.9%	6.0%	3.7%	79.4%	10.1%
DE-Gri	G	3.80	4.00	4.26	0.17	4.09	3.51	0.20	2.06	2.38	1.07	0.44	17.5%	18.4%	19.6%	18.8%	25.6%	17.9%
*DE-Wet	F	5.00	5.33	4.60	0.27	4.33	4.91	0.31	3.21	1.94	0.73	0.59	18.8%	20.0%	17.3%	16.3%	30.5%	12.2%
DE-Hai	F	3.19	4.14	3.36	0.22	3.14	3.51	0.22	2.57	1.86	1.31	0.41	15.5%	20.1%	16.3%	15.3%	29.6%	17.4%
IT-SoR	F	2.20	3.22	6.84	3.23	3.61	70.1	0.18	38.5	8.16	2.65	4.62	1.6%	2.4%	5.0%	2.6%	79.6%	11.3%
IT-Ro2	F	3.36	1.57	4.07	1.07	3.00	22.7	0.08	12.8	8.47	1.97	2.07	5.9%	2.8%	7.1%	5.3%	62.1%	21.9%
*IT-BCi	C	5.09	2.54	5.51	2.09	3.41	47.3	0.00	24.9	13.0	5.27	3.61	4.7%	2.4%	5.1%	3.2%	67.3%	20.4%
PL-wet	SN	2.21	2.31	2.69	0.11	2.57	2.42	0.11	1.36	1.77	0.69	0.34	15.9%	16.6%	19.3%	18.5%	27.2%	20.1%
ES-Lma	F	12.4	4.38	3.93	0.53	3.39	13.0	0.00	6.35	14.7	4.52	2.22	20.2%	7.1%	6.4%	5.5%	31.5%	34.8%
ES-VDA	SN	14.6	6.03	7.74	0.38	7.36	9.38	0.01	4.55	25.0	2.99	1.72	20.3%	8.4%	10.7%	10.2%	19.3%	41.3%
ES-ES1	F	1.66	2.47	4.67	1.16	3.51	24.4	0.01	13.8	8.95	1.59	2.11	2.8%	4.1%	7.8%	5.9%	64.0%	21.2%
CH-Lae	F	2.82	2.56	2.64	0.11	2.53	2.24	0.13	1.28	2.93	2.05	0.39	16.6%	15.0%	15.5%	14.9%	20.7%	31.5%
mean		4.1	3.0	4.3	0.9	3.3	20.5	0.1	11.2	6.4	1.9	1.7	10.2%	8.6%	10.7%	9.2%	49.9%	20.2%
min		0.7	0.6	1.5	0.1	1.0	2.2	0.0	1.3	1.6	0.5	0.3	1.6%	1.0%	4.0%	1.4%	19.3%	8.1%
max		14.6	6.0	7.7	3.2	7.4	70.1	0.3	38.5	25.0	5.3	4.6	20.3%	20.1%	19.6%	18.8%	84.3%	41.3%
N		17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17

\*1 year of data only