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Enrichment of organic nitrogen in fog residuals observed in the Italian Po Valley

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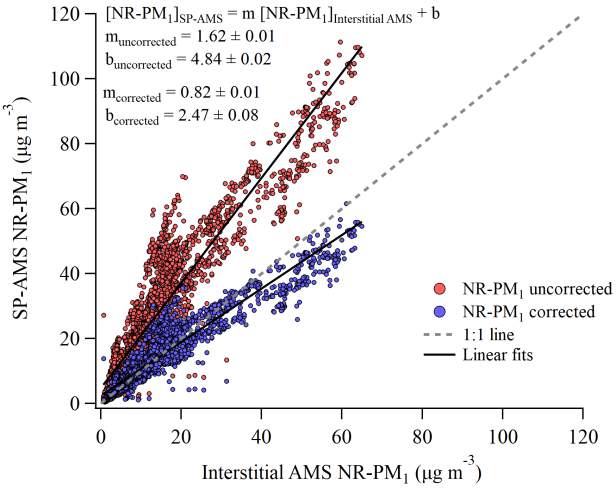

Figure S1. Comparison of the NR-PM_1 mass concentration between the SP-AMS and the interstitial AMS, before correction (red) was applied and after applying the correction (blue). The discrepancy between the two instruments was due to an underestimated ionization efficiency for the SP-AMS, resulting in an overestimated mass concentration, likely due to a bad calibration setup. Therefore, a correction factor of 0.51 was derived by comparison with the interstitial AMS, which was validated by ion-chromatography on parallel PM_1 filter samples.

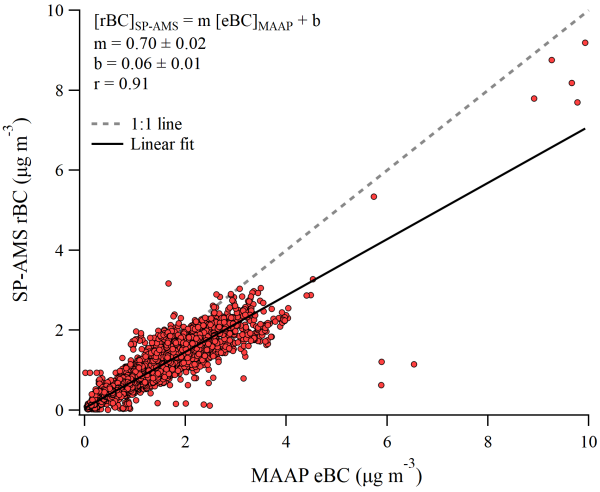

Figure S2. Comparison of the rBC mass concentration vs. eBC mass concentration measured with the SP-AMS and the MAAP, respectively. Data include only non-fog periods when both instruments sampled behind the WAI. The BC comparison shows a strong linear correlation (Pearson correlation coefficient, r=0.91).

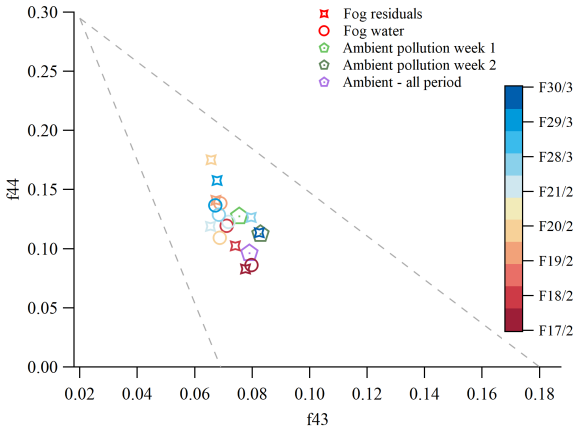

Figure S3. Fraction of m/z 44 to total OA (f44) vs. fraction of m/z 43 to total OA (f43) scatter plot averaged for each fog event (color scale). Fog residuals (diamonds), fog water (circles), and ambient aerosol (pentagons). The two dotted lines indicate the space for typical oxygenated OA.

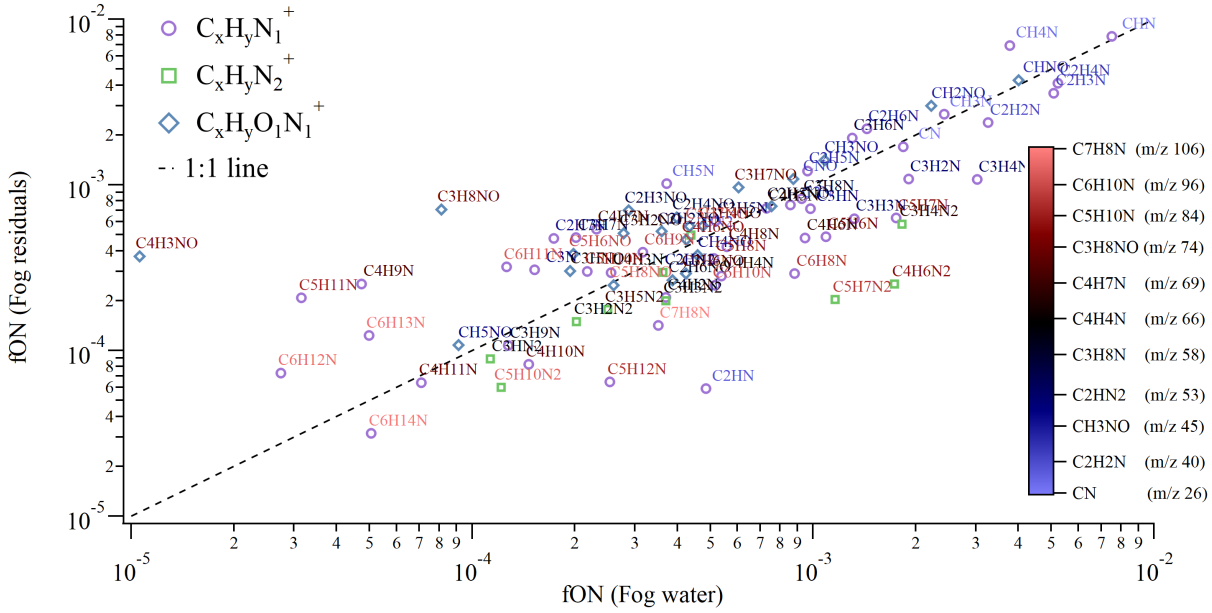

Figure S4. Scatter plot showing the organic fraction of each individual ON ion measured with the SP-AMS in the fog residuals vs. fog water, with a strong correlation (r=0.89). The color bar shows smaller (blue) to larger (red) ions.

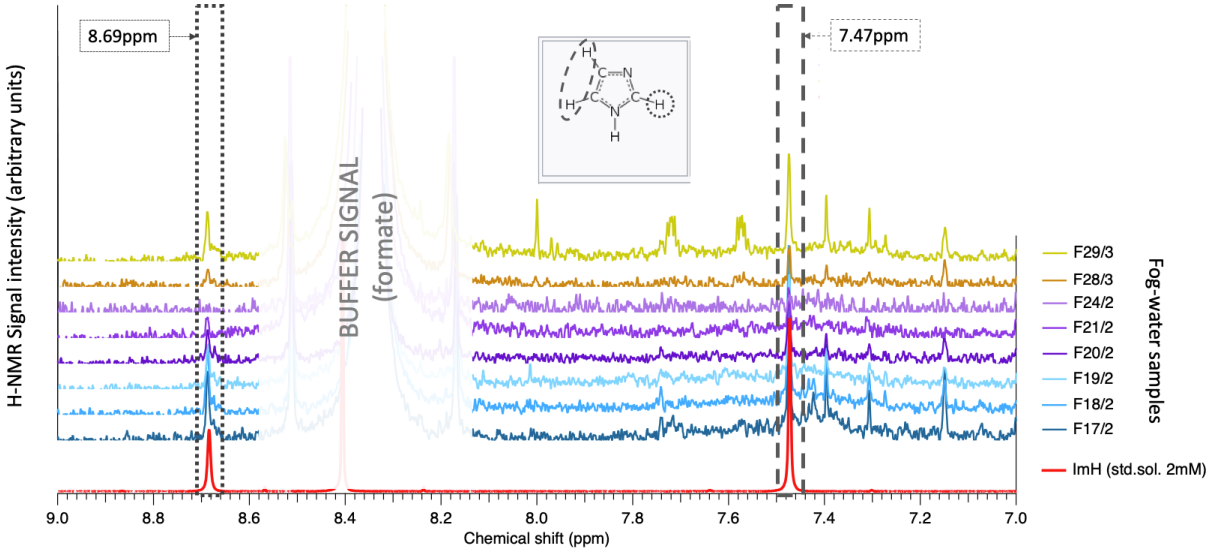

Figure S5. Aromatic region of the 1H-NMR spectra of a standard solution of 1H-Imidazole (ImH, 2mM solution, 2mL evaporated and re-dissolved in D_2O) and of the fog water samples analyzed.

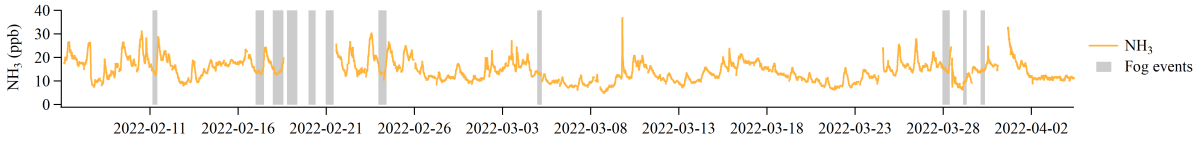

Figure S6. 5 minute averaged concentration of gas-phase ammonia (NH_3). Fog events are indicated by the gray areas.

Table S1. The start and end times included for each fog event in this study, during February and March 2022. Start and end times are in local time (LT), and given in hour:minute day:month.

Fog event	Start time (LT)	End time (LT)
F11/02	03:44 11 Feb	04:20 11 Feb
	04:56 11 Feb	08:56 11 Feb
F17/02	00:00 17 Feb	01:48 17 Feb
	04:00 17 Feb	10:12 17 Feb
F18/02	23:25 17 Feb	12:37 18 Feb
F19/02	18:49 18 Feb	00:14 19 Feb
	01:14 19 Feb	04:02 19 Feb
	04:14 19 Feb	07:38 19 Feb
F20/02	00:10 20 Feb	02:10 20 Feb
	02:34 20 Feb	08:35 20 Feb
F21/02	23:35 20 Feb	05:59 21 Feb
	07:23 21 Feb	08:59 21 Feb
F24/02	23:18 23 Feb	06:18 24 Feb
	07:43 24 Feb	09:07 24 Feb
F05/03	01:26 05 Mar	03:14 05 Mar
F28/03	23:09 27 Mar	07:57 28 Mar
F29/03	03:22 29 Mar	06:58 29 Mar
F30/03	03:23 30 Mar	04:59 30 Mar
	06:35 30 Mar	07:47 30 Mar