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Supplement of

Measurement report: Urban ammonia and amines in Houston, Texas

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Table S1. CIMS sensitivities and detection limits for ammonia and amine measurements during this study in Houston. The sensitivities (Hz $pptv^{-1}$) shown here are normalized for 1,000,000 Hz reagent ion signals. The detection limits are estimated as three times the standard deviation of the background signal over one minute of background measurements. In comparison, we also included those previously reported with the same instrument nearly 10 years earlier by [*You et al.*, 2014], estimated with the same time resolution.

Compound	**Sensitivity (Hz $pptv^{-1}$ MHz^{-1})**	**Detection limit (pptv)**	**Sensitivity[*You et al.*, 2014] (Hz $pptv^{-1}$ MHz^{-1})**	**Detection limit[*You et al.*, 2014] (pptv)**
Ammonia	13.1 ± 0.87	128.4	13	35
C1 amine	8.6 ± 0.06	0.4	12	0.1
C2 amine	2.6 ± 0.02	0.7	12	0.5
C3 amine	4.3 ± 0.03	1.2	8	0.8
C4 amine	2.3 ± 0.02	3.6	4	3.3
C5 amine	1.3 ± 0.01	2.7	2	1.9
C6 amine	1.3 ± 0.01	2.6	2	1.4

Table S2. Relationships of the measured concentrations of each amine ammonia derived from the combined observations in Houston reported by this study and Kent, Ohio reported by [*You et al.*, 2014].

Amine	**Relationship to ammonia in pptv**
C1	1.1×10^{-3} [NH_3]
C2	1.4×10^{-3} [NH_3]
C3	8.4×10^{-3} [NH_3]
C4	No correlation
C5	1.9×10^{-2} [NH_3]
C6	3.5×10^{-3} [NH_3]

Figure S1. (a) Measurement site in the greater Houston urban area. The site was SE of the city center and located NW of Tranquility Bay. (b) Satellite view of the nearby vicinity of the measurement site. The University of Houston campus is seen in the lower left. The highways, a train yard, and industrial areas are seen in the lower right. The upper right shows the nearby residential zone.

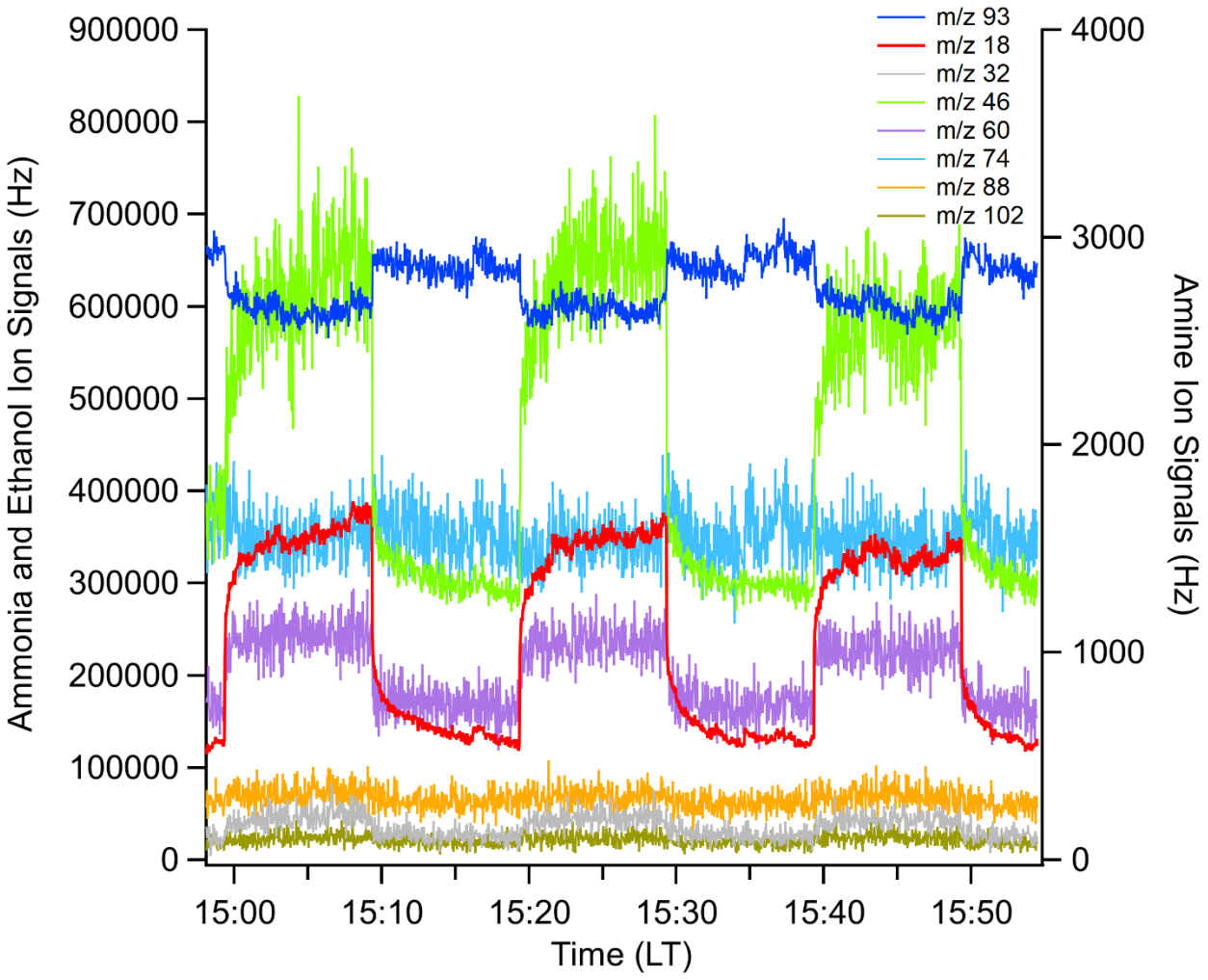

Figure S2. A time series of the measurement/background cycle of the CIMS. This shows three switches of the inlet flow between ambient measurement and the phosphate scrubber. At 15:49, the flow was switched to background mode and the response of the NH_4^+ signal (m/z 18) immediately droped. The NH_4^+ signal continues to decrease after the drop, and the signal reaches an e-folded concentration within 28 seconds.

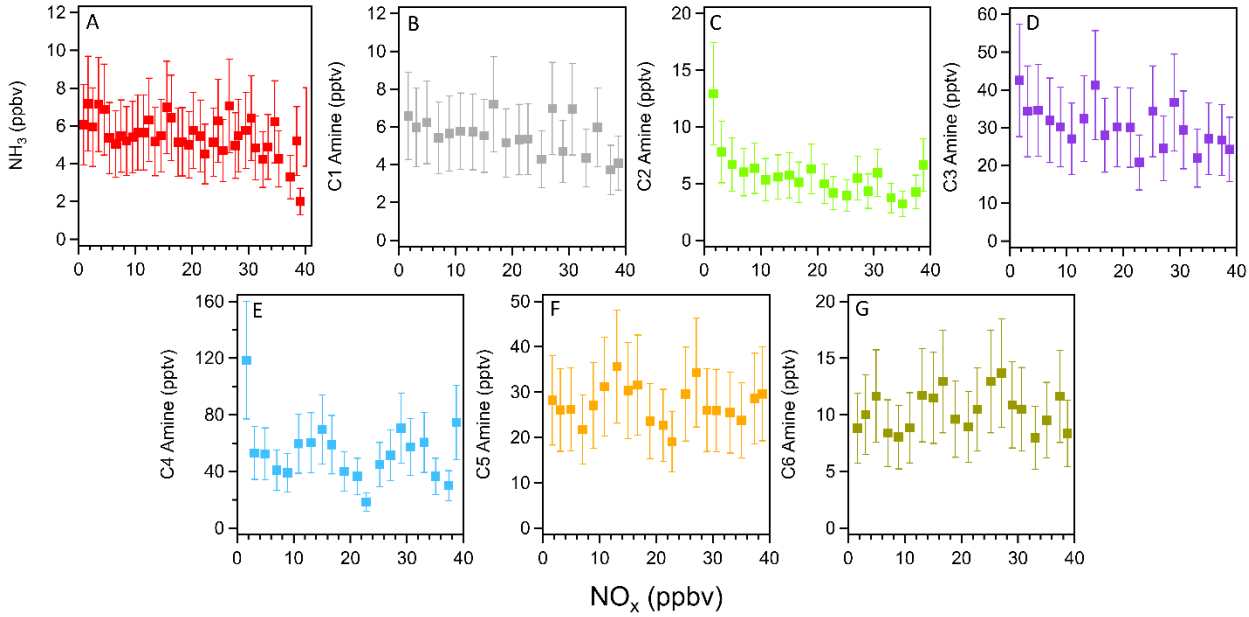

Figure S3. Correlation between (a) ammonia and (b-g) C1-C6 amines with the collocated NO_x concentrations during the measurement campaign. Vertical bars indicate one standard deviation from the mean values of observation data.

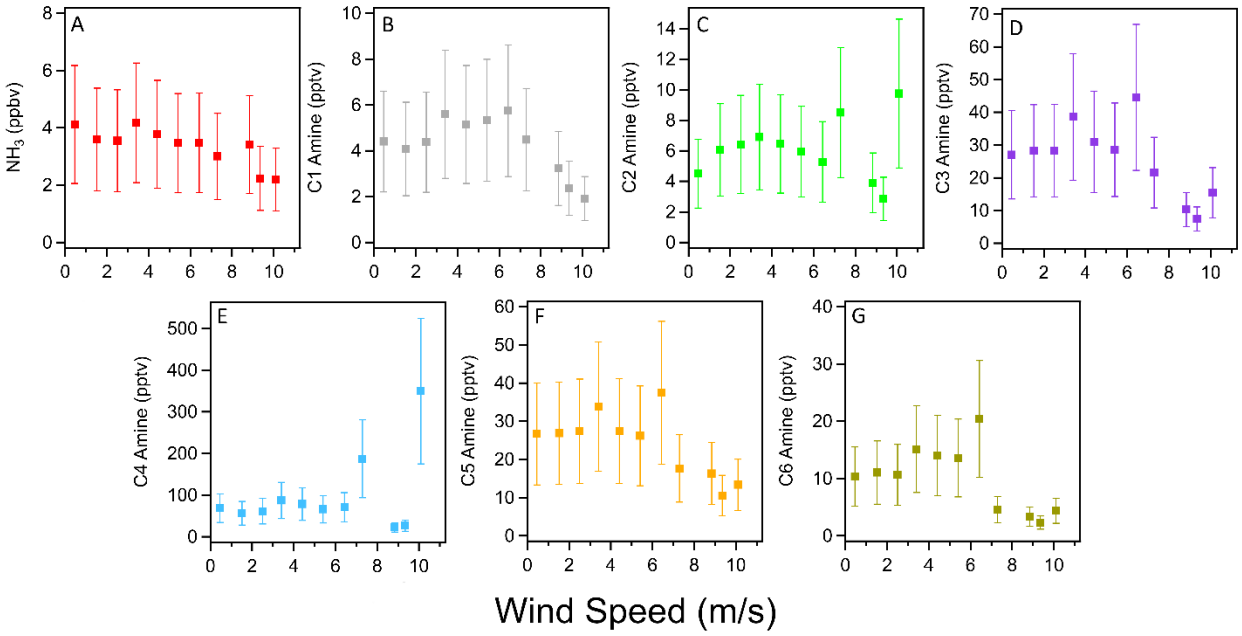

Figure S4. Correlation of (a) ammonia and (b) C1-C6 amines with wind speed throughout the observation period.

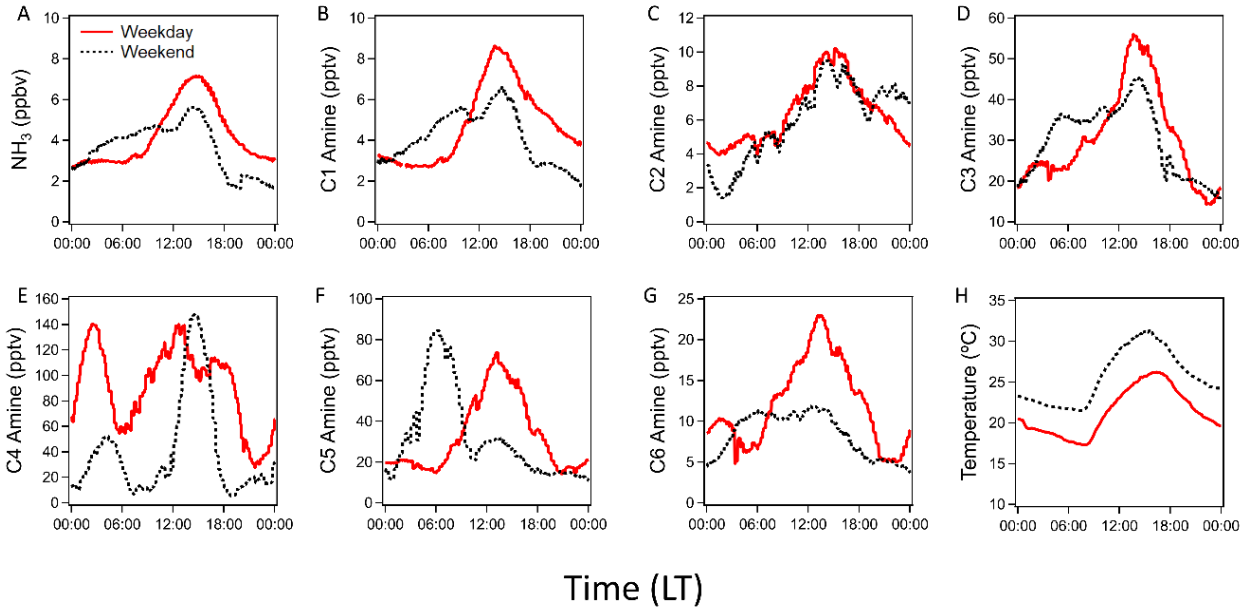

Figure S5. Diurnal cycles of (a) ammonia, (b-g) amines, and (h) temperature on weekdays (solid red) vs weekdays (dashed black).

48
49 **References**
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53