**SUPPORTING INFORMATION**

# Quantifying Ambient Concentration and Emission Profile of D5-siloxane of a Residential Neighborhood in the Greater Houston Area

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**Table S1.** Calibration factor at each calibration point for D5-siloxane during the entire campaign.

| Time of Calibration | Calibration Factor (cps/ppb) |
|---|---|
| 01/26 12:01 | 1850 ± 34 |
| 01/26 18:29 | 1495 ± 31 |
| 01/26 21:28 | 4433 ± 53 |
| 01/27 12:26 | 2906 ± 43 |
| 01/27 16:49 | 2000 ± 36 |
| 01/27 17:53 | 2357 ± 39 |
| 01/27 23:12 | 2521 ± 40 |
| 01/28 10:03 | 2445 ± 39 |
| 01/28 16:09 | 2518 ± 40 |
| 01/28 22:11 | 2423 ± 39 |

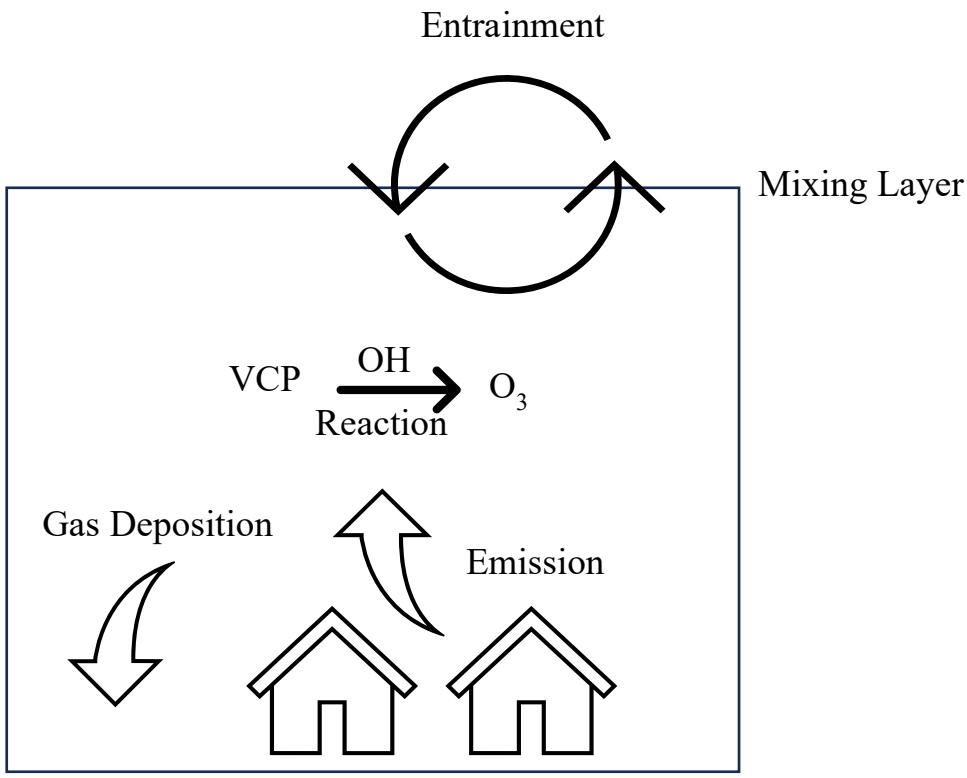


**Figure S1.** Schematic of the 0-D box model showing the emission estimation and all parameters involved.

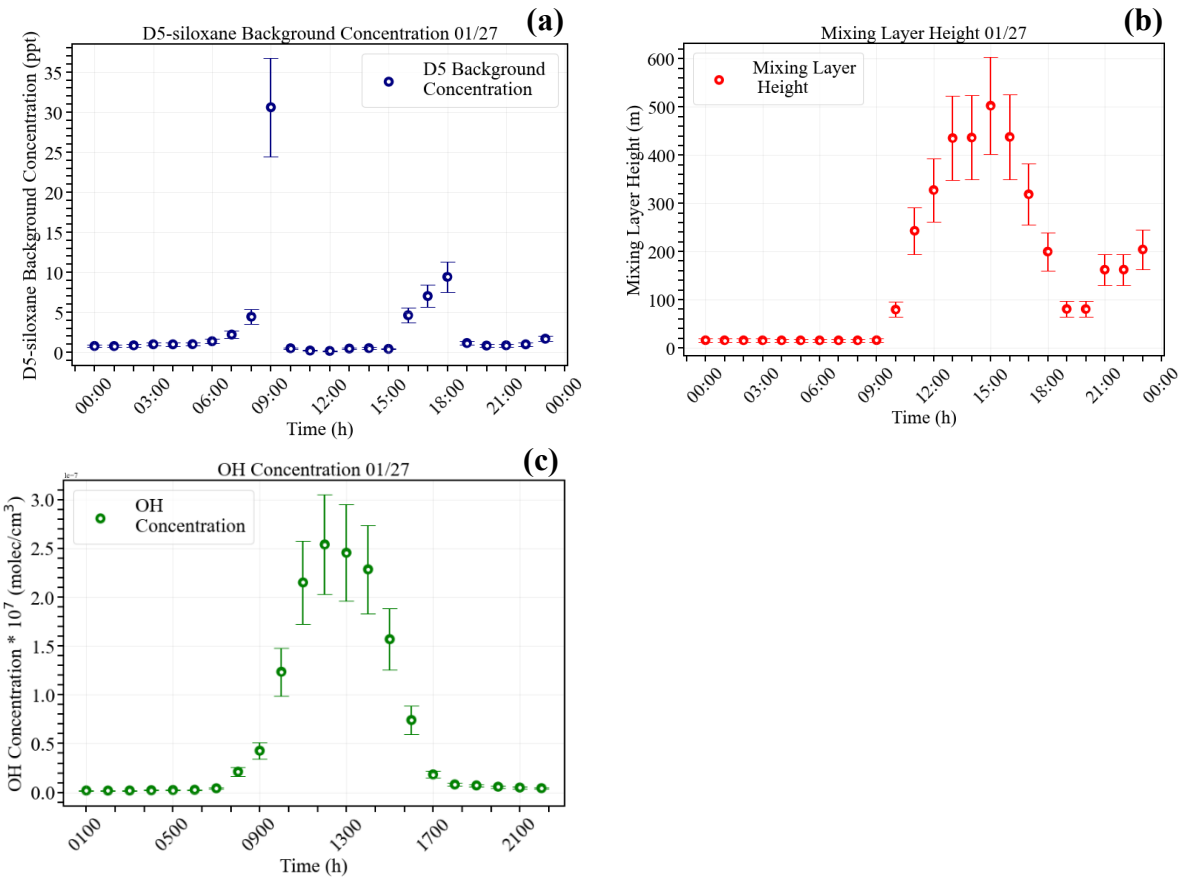


**Figure S2.** Hourly data for box model parameters for Day 1, January 27, 2023. Plot (a) is OH radical concentration provided by the CMAQ model. Plot (b) is the mixing layer height provided by the WRF model, adjusted based on temperature profiles. Plot (c) is the background concentration of D5-siloxane above the mixing layer, provided by the CMAQ model.

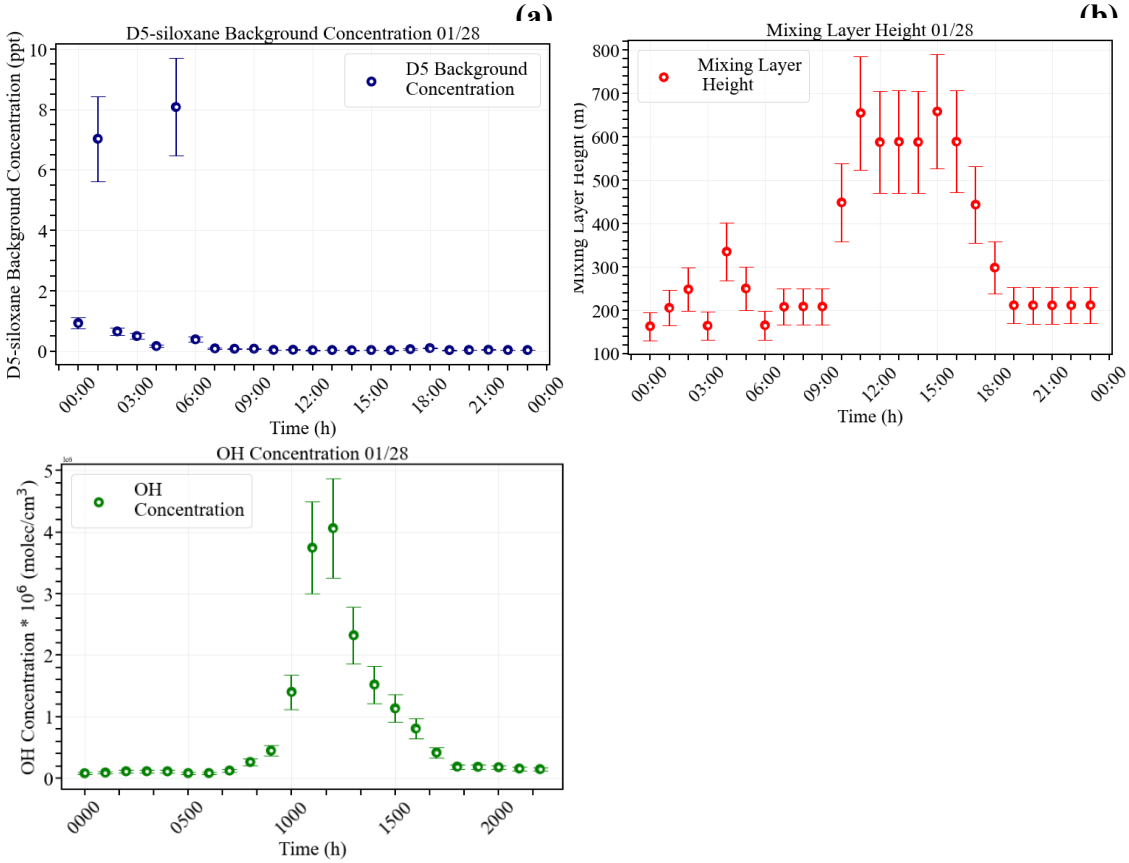


**Figure S3.** Hourly data for box model parameters for Day 2, January 28, 2025. Plot (a) is OH radical concentration provided by the CMAQ model. Plot (b) is the mixing layer height provided by the WRF model, adjusted based on temperature profiles. Plot (c) is the background concentration of D5-siloxane above the mixing layer, provided by the CMAQ model.

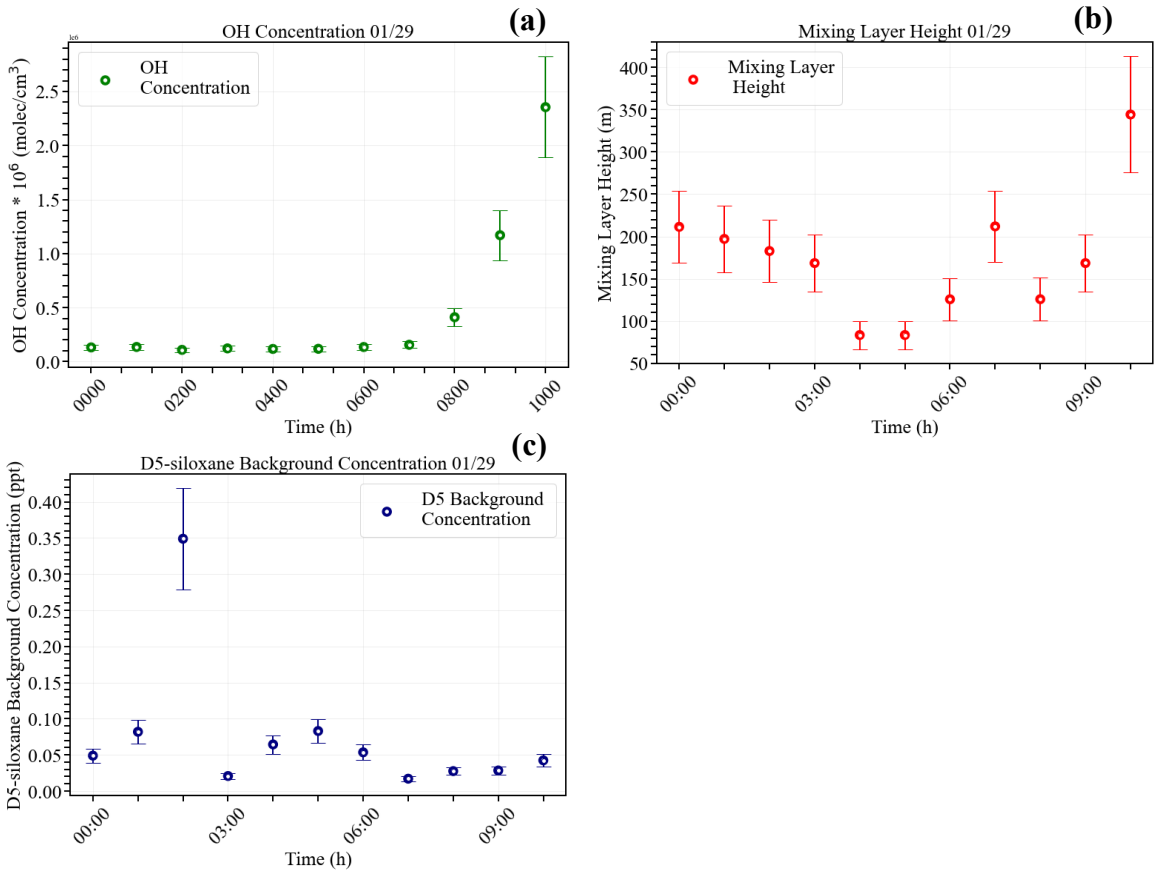


**Figure S4.** Hourly data for box model parameters for Day 3, January 29, 2025. Plot (a) is OH radical concentration provided by the CMAQ model. Plot (b) is the PBL height provided by the WRF model, adjusted based on temperature profiles. Plot (c) is the background concentration of D5-siloxane, provided by the CMAQ model.

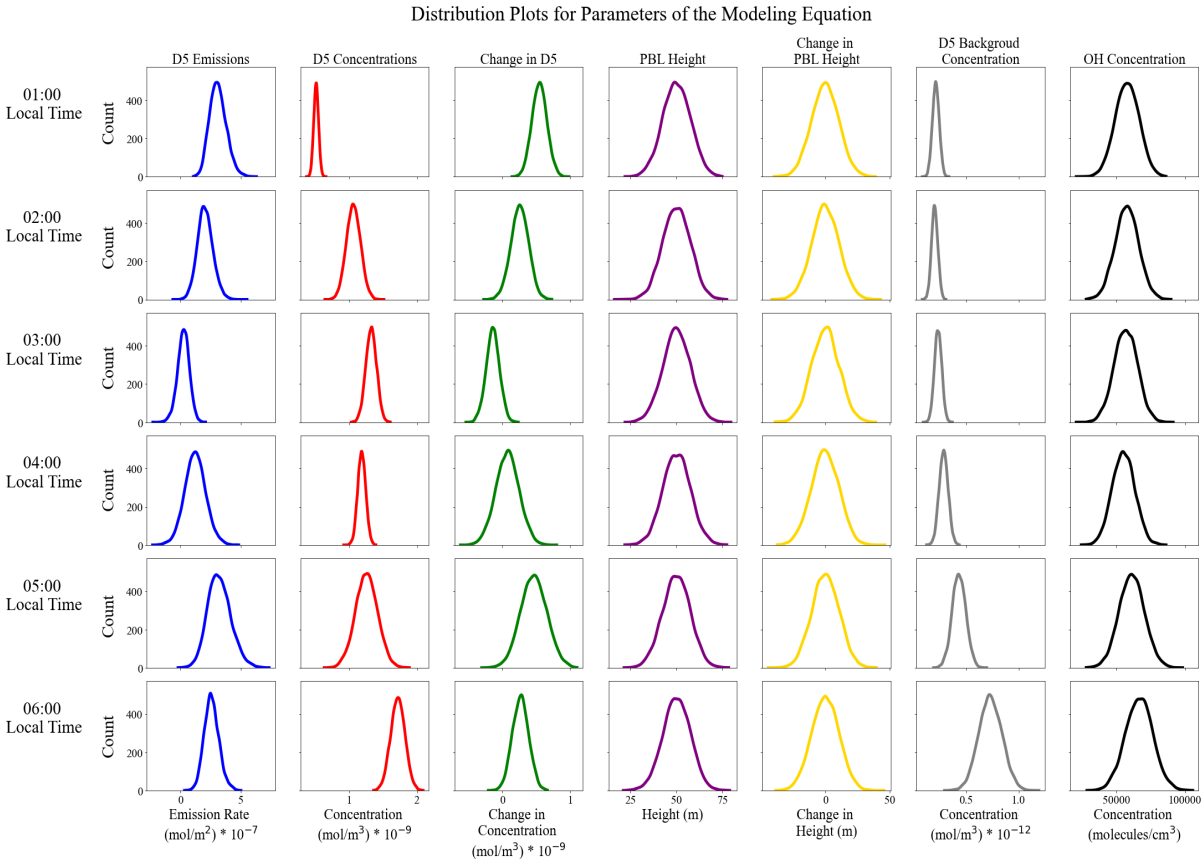


**Figure S5.** An example of the emission calculation method as described in Section 2.3.2, shown as the first 6 hours on Day 1. The y-axis is the number of points within a bin, and along the x-axis is the range of values for each parameter. Each model parameter is defined in the subtitle of the column.

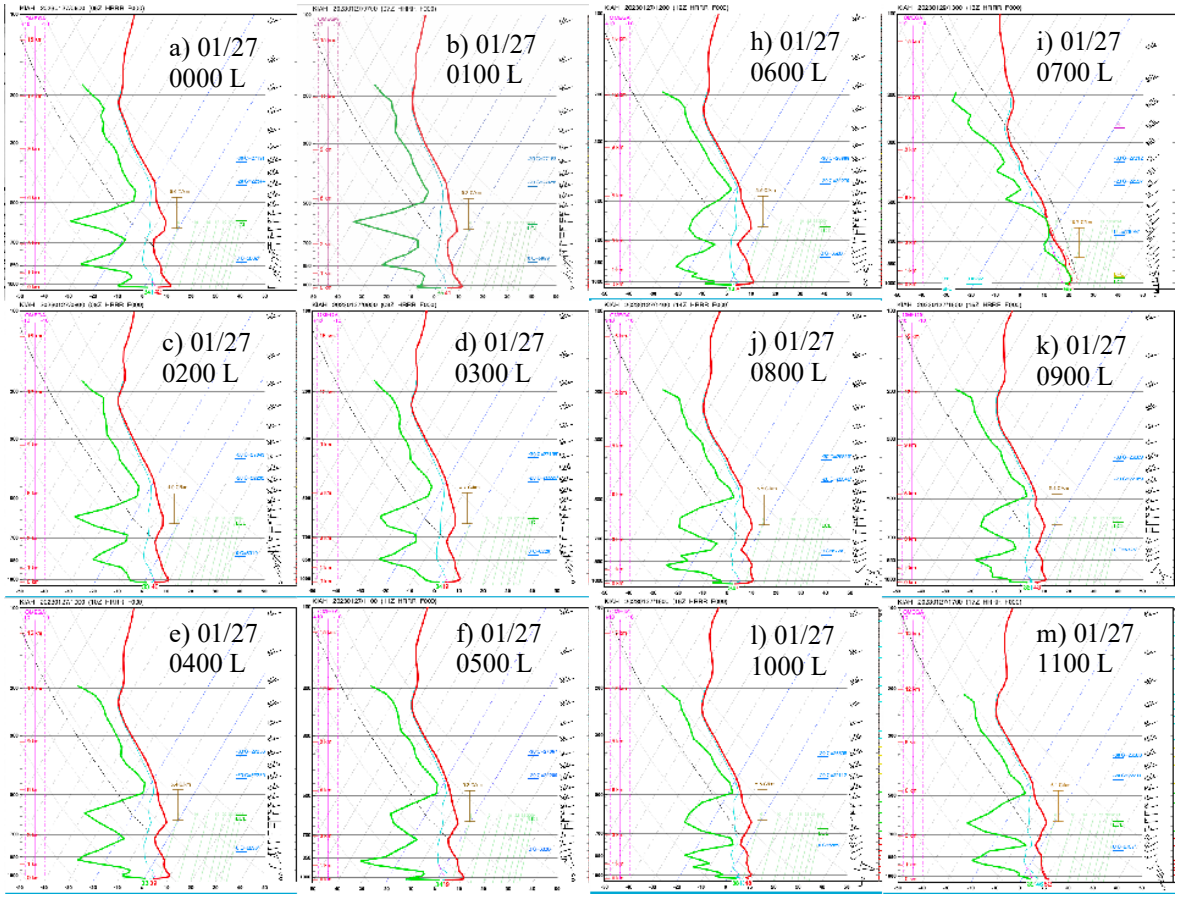


**Figure S6.** Skew-T Log-P soundings from the HRRR model 0-hour runs for Day 1, 0 am local time to 11 am local time,[1] provided through SHARPy.[2] in red is the temperature, and shown in green is the dewpoint. Temperatures run along the x-axis but are skewed to the right, and pressures run along the left y-axis logarithmically, where the name Skew-T Log-P originates from. The original times are in UTC, and local time is denoted as L.

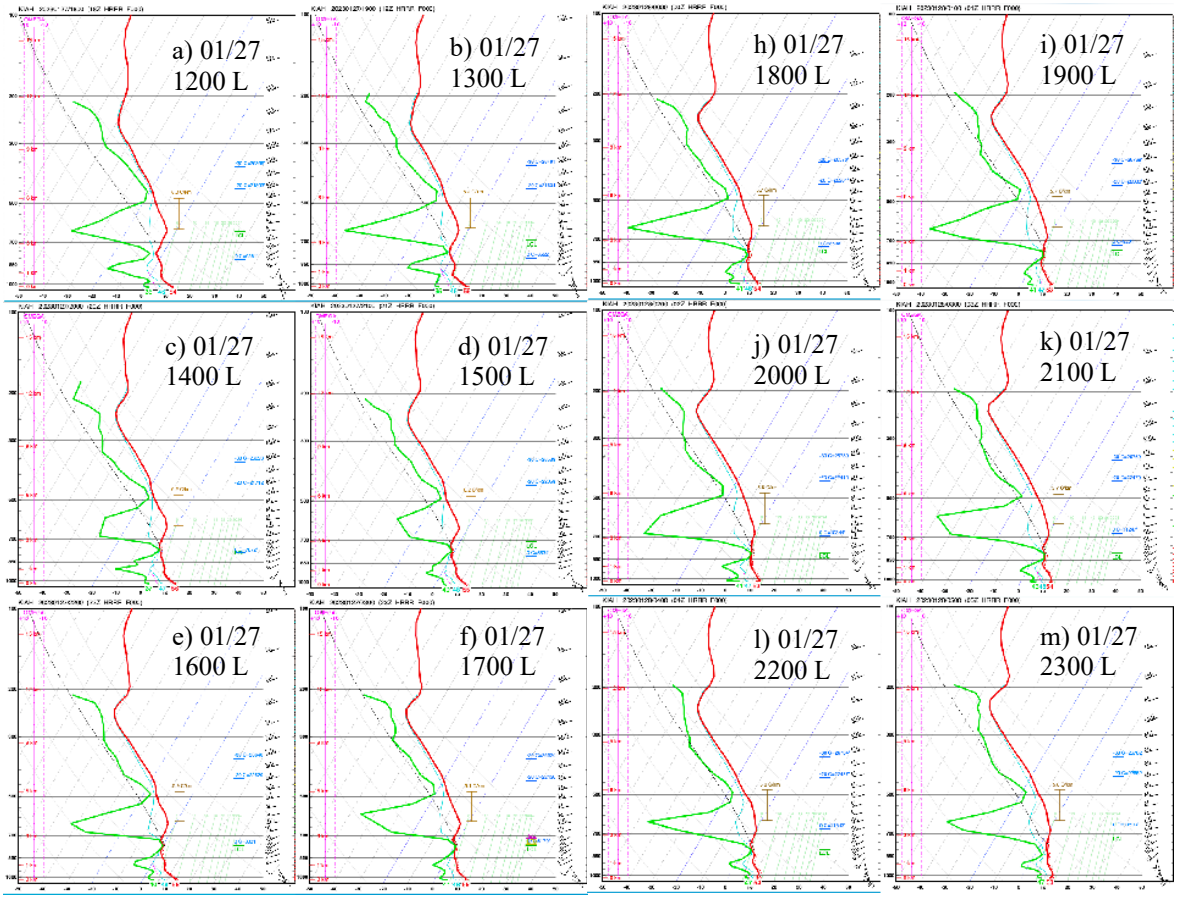


**Figure S7.** Skew-T Log-P soundings from the HRRR model 0-hour runs for Day 2, 12 pm local time to 23 pm local time,[1] provided through SHARPy.[2] Shown in red is the temperature, and shown in green is the dewpoint. Temperatures run along the x-axis but are skewed to the right, and pressures run along the left y-axis logarithmically. The original times are in UTC, and local time is denoted as L.

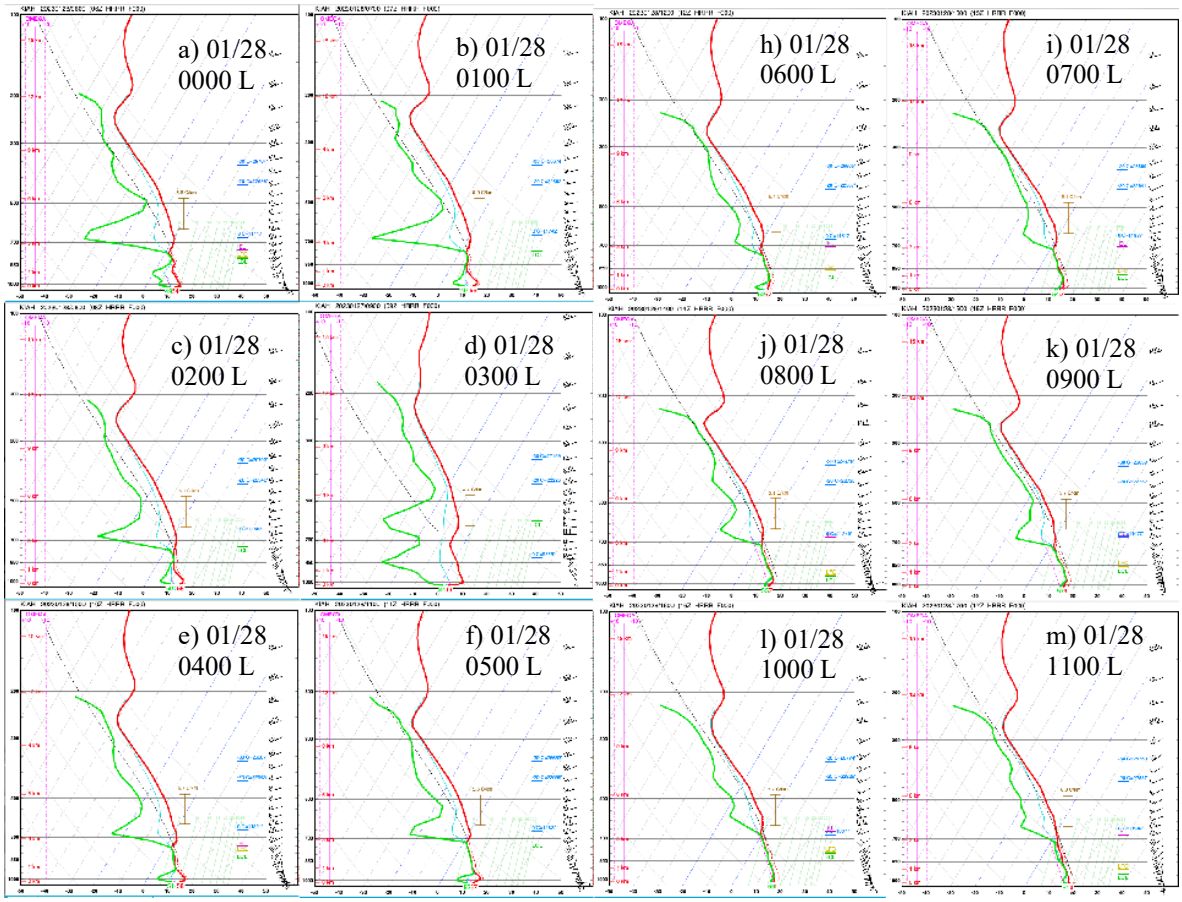


**Figure S8.** Skew-T Log-P soundings from the HRRR model 0-hour runs for Day 3, 0 am local time to 11 am local time,[1] provided through SHARPy.[2] Shown in red is the temperature, and shown in green is the dewpoint. Temperatures run along the x-axis but are skewed to the right, and pressures run along the left y-axis logarithmically. The original times are in UTC, and local time is denoted as L.

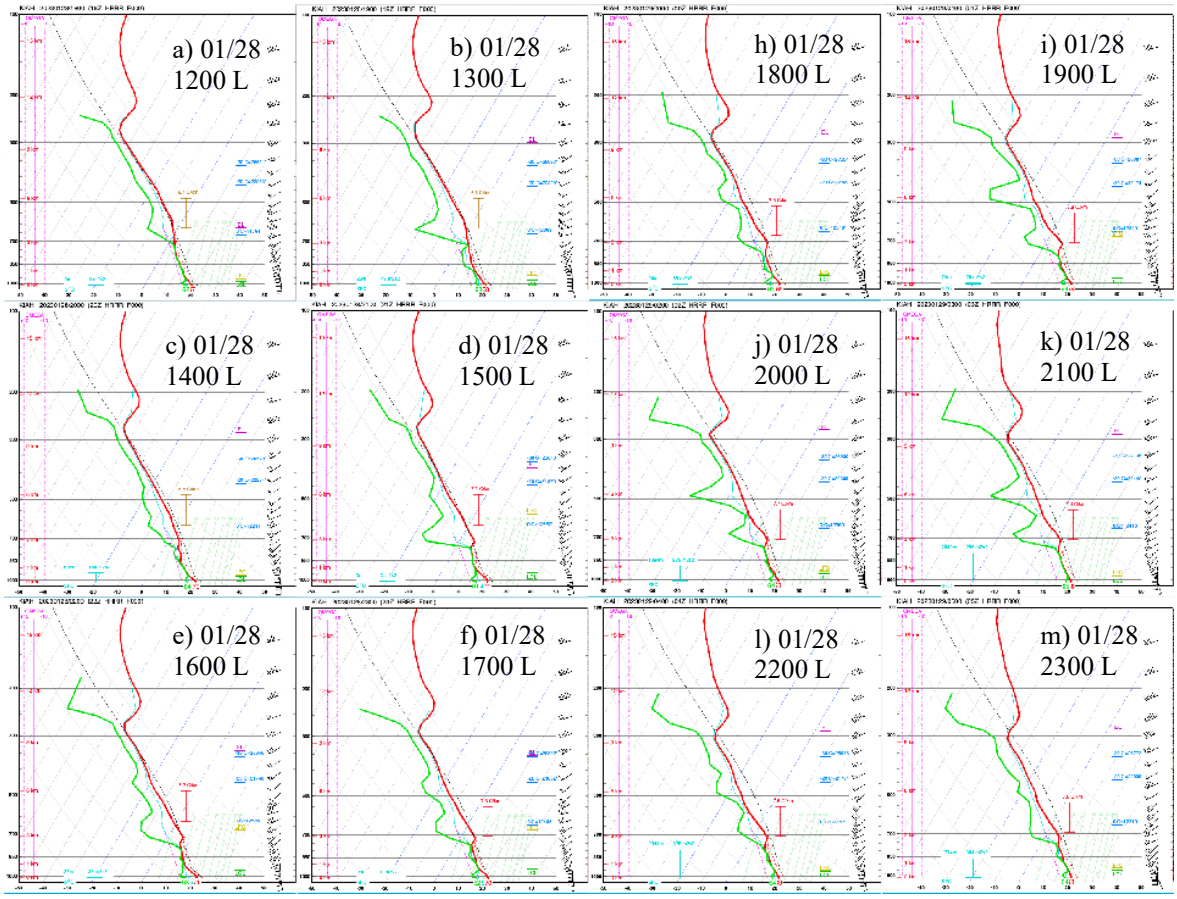


**Figure S9.** Skew-T Log-P soundings from the HRRR model 0-hour runs for Day 2, 12 pm local time to 23 pm local time,[1] provided through SHARPy.[2] Shown in red is the temperature, and shown in green is the dewpoint. Temperatures run along the x-axis but are skewed to the right, and pressures run along the left y-axis logarithmically. The original times are in UTC, and local time is denoted as L.

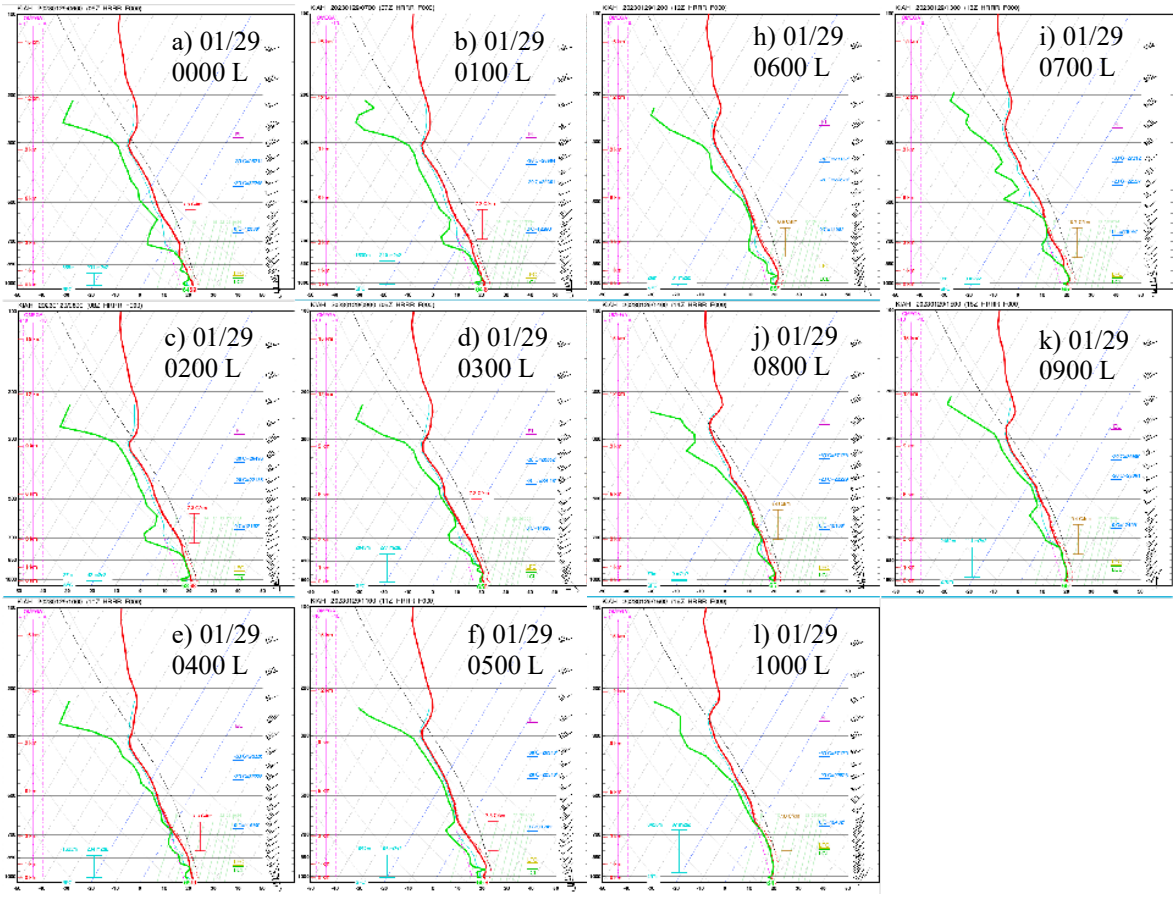


**Figure S10.** Skew-T Log-P soundings from the HRRR model 0-hour runs for Day 4, 0 am local time to 10 am local time,[1] provided through SHARPy.[2] Shown in red is the temperature, and shown in green is the dewpoint. Temperatures run along the x-axis but are skewed to the right, and pressures run along the left y-axis logarithmically. The original times are in UTC, and local time is denoted as L.

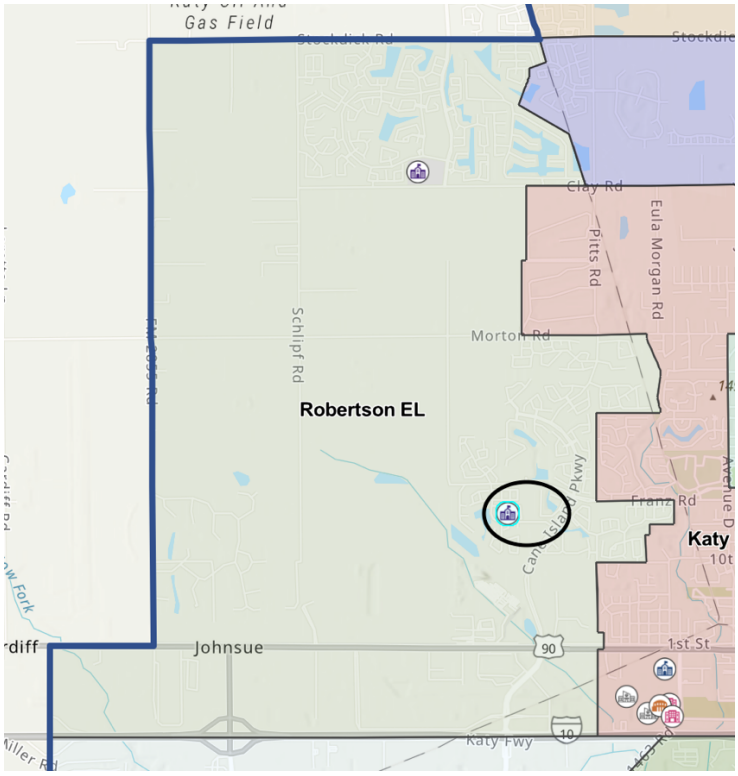


**Figure S11.** Circled is the location of the sampling site and the elementary school, and shown in green is the entire zoned area.[3]

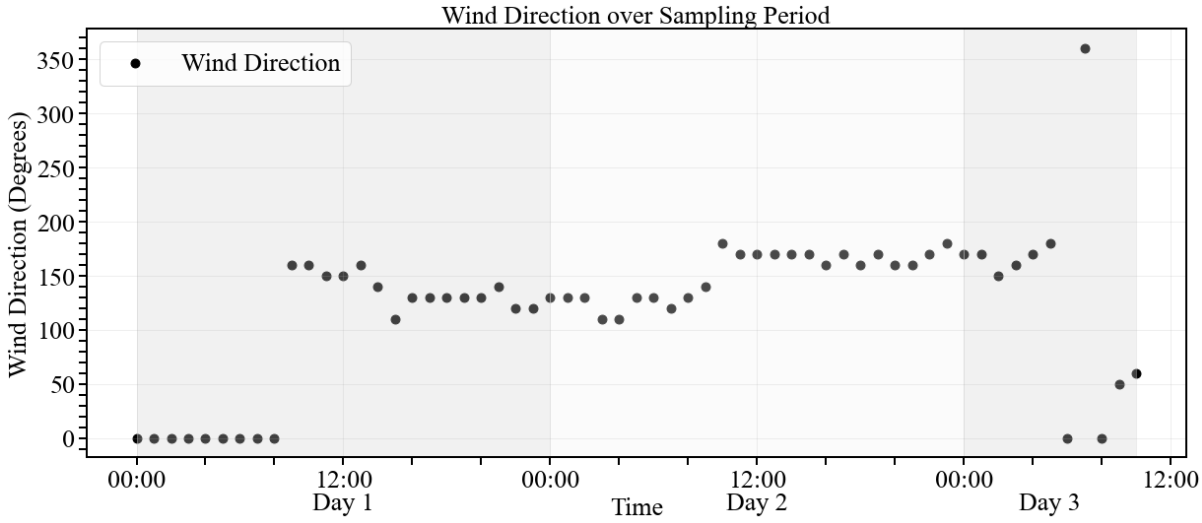


**Figure S12.** Plot showing the wind direction from the nearest METAR to the sampling site, with 0/360 degrees representing a northerly wind.

## References


1. D. C. Dowell, C. R. Alexander, E. P. James, S. S. Weygandt, S. G. Benjamin, G. S. Manikin, B. T. Blake, J. M. Brown, J. B. Olson, M. Hu, T. G. Smirnova, T. Ladwig, J. S. Kenyon, R. Ahmadov, D. D. Turner, J. D. Duda and T. I. Alcott, The High-Resolution Rapid Refresh (HRRR): An Hourly Updating Convection-Allowing Forecast Model. Part I: Motivation and System Description, *Weather and Forecasting*, 2022, **37**, 1371-1395.
2. W. G. Blumberg, K. T. Halbert, T. A. Supinie, P. T. Marsh, R. L. Thompson and J. A. Hart, SHARPpy: An Open-Source Sounding Analysis Toolkit for the Atmospheric Sciences, *Bulletin of the American Meteorological Society*, 2017, **98**, 1625-1636.
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