Simultaneous measurements of atmospheric ammonia and particle number concentrations in Houston, TX

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Introduction

An abundance of natural and anthropogenic ammonia (NH₃) sources form the basis for the creation of ammonium salts (e.g., (NH₃)₂SO₄). These salts largely contribute to the formation of particulate matter (PM). Increased rates of respiratory and cardiovascular illness as well as increased morbidity and mortality rates can arise from exposure to PM [1]. NH₃ is currently not regulated under the National Ambient Air Quality Standards by the United States Environmental Protection Agency and little is known about atmospheric NH₃ levels in urban areas.

NH₃ is also often not considered when modeling aerosol nucleation and growth. Monitoring particle number concentrations alongside NH₃ allows the effect of NH₃ on new particle formation to be investigated.

Results

Comparison between NH₃ and particle number concentration time series 7/19/12–7/31/12

Left: Dependence of NH₃ on wind direction

Right: Diurnal profile of atmospheric NH₃ levels

Conclusions

The NH₃ sensor was successfully deployed atop the North Moody Tower at the University of Houston and the continuous data collection is currently underway.

In the future an extended NH₃ dataset, meteorological parameters, and other air pollutants measured by a TCEQ CAMS will be incorporated into data analysis in order to further examine the effect of NH₃ on local and regional air quality with respect to PM formation.

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