Project H25-2003.

Measurements of Nitrogen Reservoir Species Using Ion Drift-Chemical Ionization Mass spectrometry (ID-CIMS) to Elucidate Nighttime Chemistry

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Summary

We have developed ion drift-chemical ionization mass spectrometry (ID-CIMS) instrumentation for in situ monitoring of organic and inorganic compounds in the atmosphere. Extensive evaluations and calibrations have been performed in the laboratory to prove the method and demonstrate its feasibility for atmospheric monitoring. Preliminary measurements of nitrogen containing compounds such as N2O5 and HNO3 were conducted during a three-week period in the summer of 2004 at an Aldine site north of Houston.

This funded project demonstrates the great potential of the newly developed instrumentation for measuring nitrogen-containing compounds and lays the foundation for future field studies. These measurements provide critical insight into poorly understood nighttime chemistry, and will lead to a better understanding of modeling overnight and long range transport. The chemistry of nighttime nitrogen containing compounds and computer modeling are important SIP considerations in Houston/Galveston/Brazoria and other areas.

Future studies using ID-CIMS to measure nitrogen-containing compounds are planned for the TexAQS II 2005-2006 intensive, possibly at the Williams Tower and other locations.

One paper related to this project entitled “development of ion drift-chemical ionization mass spectrometry” has been published in Analytical Chemistry.[1]

[1] Fortner, E. C.; Zhao, J.; Zhang, R. Anal. Chem. 2004, 76, 5436-5440.