INTRODUCTION

Significant aerosol has been known to play an important role in climate by altering the radiation budget and altering the Earth’s energy balance. However, the exact nature of aerosol impact on the climate remains uncertain due to the complexity of aerosol processes and the variability of atmospheric conditions. The composition of aerosol is critical in determining its radiative and other physical properties. Various techniques are available to study aerosol composition, but none can simultaneously provide a complete picture of aerosol composition. This report focuses on the development of a new technique for measuring aerosol composition in the atmosphere.

RESULTS I - Photochemical SOA

Figure 1: Schematic of the AOS-PTR-ITMS instrument

Figure 2: Time series of the signal (arbitrary units) observed at a number of mass-to-charge ratios (m/z) during sample collection.

Figure 3: Observed correlation between different mass signals.

Figure 4: Time series of m/z 80 and m/z 79 signals with local wind direction.

RESULTS II - Pyridine

Figure 5: Observed correlation between different mass signals.

Figure 6: Time series of m/z 80 and m/z 79 signals with local wind direction.

Summary

- New aerosol organic PTR-ITMS instrument was fielded in a complex environment.
- Detection limit for test aerosol organic: 10-20 ng m⁻³.
- Definite signals observed at a number of mass peaks.
- Different masses exhibited temporal/spatial variations.
- Individual mass signals not always correlated with proxy for AMS total organic mass.
- Compound identification complicated based on mass alone: glyoxal, methyl glyoxal, glyoxylic acid.
- Detection of aerosol phase pyridine and gas-particle partitioning.
- Working with other data for further comparison and analysis: AMS H/O vs. DOA, W-TOP AMS data, others.