

Summary of 1st Aerodyne AMS User's Meeting
Portland, Oregon, Oct. 17, 2001 (during AAAR Annual Meeting)

Summarized by Roya Bahreini, Caltech

The following is a list of items that were brought up and discussed during the meeting.

Jose L. Jimenez

1. Use of NH_4NO_3 as the species for calibration. There are problems associated with it:
 - a. It may evaporate in lines coming to the AMS.
 - b. We can't get it dry completely.Thus, we might want to try other species for calibration, but the species selected should be such that we have 100% collection and evaporation efficiency of those particles. Also there should not be major background for the species we are calibrating with.
2. Possible use of mixed solutions for calibrating for other species.
3. Concern of drop in transmission efficiency for particles with $D_a > 1$ micron. (These particles are lost upon impact with the pin-hole before the lenses).

Doug Worsnop:

1. Everyone needs to do NH_4NO_3 calibration. First, you need to make sure the DMA is well calibrated (use PSLs, make note of the RH of the sheath flow in the DMA). Then size select NH_4NO_3 at different sizes and observe of the shape factor 0.8 comes up in all cases.
2. With a larger quadrupole, we get less water background. Thus, we can calibrate for both ammonium and nitrate.

John Jayne:

1. Modifications to the AMS
 - a. Large quadrupole
 - i. Higher ion throughput
 - ii. More sensitivity
 - b. Extra pump on ionizer/quadrupole region
 - i. More sensitivity
 - ii. Lower water background
 - c. Use of conversion dinode
 - i. Eliminates ion-mass bias on e-multiplier gain
 - d. Aerodynamic lenses
 - i. Better transmission of small particles
 - ii. Adjustable inlet beam
 - e. Oven
 - i. Conical shape of the heater
 - ii. Heater coupled with thermocouple for temperature monitoring
 - f. Hybrid pump

- i. Use combination of drag/turbo pump to reduce inlet pressure on 1st pump
 - ii. Reduce pressure on the backing pump
2. Future Modifications
 - a. Implement a light scattering probe to check transmission of the larger particles
 - b. Implement a beam width probe to check focusing of particles with different shapes
 - c. Use of high temperature heater for detecting less volatile species
 - d. Designing a new ionizer with overlapping of the e-beam with the particle beam for more sensitivity

Manjula Canagaratna:

1. Necessary to do mass and resolution calibration of the quadrupole at low, mid, and high m/z
 - a. In the new version of the software, you have to option of selecting different m/z to do mass calibration of the quadrupole by changing the slope and offset of the MS calibration and resolution.
 - b. Suggested m/z for calibration: $m/z=28$, 55, and 149 amu. If the resolution is not set properly, MS signal at $m/z=149$ amu spreads out.
2. Different procedure for species mass calibration has been coded for in the new version of the software
3. Once species mass calibration is complete, obtain collection/transmission efficiency, but don't use them. Report values and "nitrate equivalent loading". We need to scale these values up after comparing with PILS.

Frank Drewnick:

1. Test with different nitrate species (KNO_3 and NaNO_3)
 - a. Both have little signal at $m/z=46$ amu
 - b. KNO_3 has a broader signal at $m/z=30$ amu
 - c. With different solution concentration, fragmentation of nitrate changes
 - d. Need 2.2-2.7 V to get instantaneous evaporation, but at higher temperature, signal at $m/z=46$ amu decreases (i.e. NO_2^+ fragments more)
2. Tests with different sulfate species ($(\text{NH}_4)_2\text{SO}_4$ and CuSO_4)
 - a. Fragmentation of sulfate from $(\text{NH}_4)_2\text{SO}_4$ changes with solution concentration and heater power, but fragmentation of CuSO_4 does not change
3. Results of field campaign in NY City (Summer 2001)

Jonathan Allen:

1. Use of .hdf files rather than .itx files
 - a. Possibility of random access to different data rather than the need to load all the files in igor
 - b. Less disk space requirement (by a factor of 20)
 - c. hdf files are readable in matlab and igor