

# Summary of Recent Tests to Reduce Mass Spec. Background and Signal-to-Noise During Aircraft Operation

Ann Middlebrook - NOAA  
Boulder AMS Users Mini Meeting  
University of Colorado  
March 9-10, 2003

## Background Testing Summary

- Continuous Pumping
  - Best for reducing background, even with heater and filament off
- Inlet closed when system off (system under vacuum)
  - Marginally helpful
- Time since system off (source region cooling)
  - Background is lower when the source region remains warm
- Initial Pumping with Inlet Closed
  - Reduces background some
- Heat Cycle: >850 C for 1.5-2 hrs, then back to normal temperature
  - Increases  $m/z > 50$  background and reduces others
- Donut separating MS and ion source regions
  - Definitely needed
- Sorption pump in two locations (MS region w/o donut and between pumps #4 and 5)
  - Didn't seem to help

## Background Summary

- Background appears to have two sources
  - Outgassing of system (pump #5?) when not continuously pumped
  - Ionization source region while warming up when heater and filament are on
- Recommend procedure without hardware modifications – common sense prevails!
  - Close inlet when system off
  - Keep inlet closed during initial pumping
  - Do not cycle temperature

## Other Things to Try

- Flush ionization source region with nitrogen when system off
  - Small tubing in from MS region and thru donut to directly next to ionization source
  - Out thru pump #5 (new outlet valve between pumps #4 and 5) and aerosol inlet valve
- Gate valve between pump #5 and ionization source region
  - Need collar to mount valve, increasing ionization source region volume and surface area
  - Mounting collar could make background worse
- Make the donut on MS region fit more tightly around heater power and thermocouple feedthrus
  - John has tested this and it helps with the background in general
- Electrically cooled sleeve in ionization source region
  - John is working on this