Summary of Status on AMS Mass Concentration Quantification and Plans for Future Experiments

Part 1: Summary of Quantification Status

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Summary & Future Work

• Agree on terminology and notation, be consistent
  – The names of the transmission terms
  – DeCarlo et al. (2004) notation on sizes & shape factors

• Work on quantifying and improving:
  – Everything else
    • \(m/z\) dependence, \(RIE_{\text{species}}, \chi_r, \chi_v\), mass of nitrate calibration particles
  – Transmission & Collection
    • \(TE_L\)
      – \(TE_{L,\text{high}}\) and \(TE_{L,\text{low}}\)
    • \(CE_b\)
    • \(CE_s\)
  – For various systems and as a function of many variables
So what we are currently doing is:

- James’ program assumes:
  - Constant CE for each species
  - No size-dependence

- So we are measuring:
  - what’s marked “AMS Measurement” in prev. slide

- Then we are multiplying x 2:
  - Really dividing by CE of 0.5

- The next slide shows the result of doing this for the Pittsburgh data

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AMS vs. SMPS in Pittsburgh

[Graphs showing comparison between AMS and SMPS measurements in Pittsburgh.]

Reproducibility: ToF vs Q AMS

ToF-AMS vs Q-AMS SULFATE Comparison
Queens, NYC, Jan. 2004
ToF-AMS vs Q-AMS SULFATE Comparison
Queens, NYC, Jan. 2004

ToF-AMS vs Q-AMS NITRATE Comparison
Queens, NYC, Jan. 2004

AMS Particle Transmission & Collection Summary

Should be Included in an appropriate paper -> feedback now!
Summary of AMS Transmission & Collection

My proposal on terminology:

AMS \( (d_{va}) \) = Real \( (d_{va}) \) * TEL \( (d_{va}) \) * CEs \( (d_{va}) \) * CEb \( (d_{va}) \)

Very important to come up with common terminology!

Comments on this proposal?

Terminology & Notation: Let’s Decide!

AMS \( (d_{va}) \) = Real \( (d_{va}) \) * TEL \( (d_{va}) \) * CEs \( (d_{va}) \) * CEb \( (d_{va}) \)

- Proposal on “Transmission Eff.” (TEL)
  - Particles that exit the lens and hit the vaporizer

- Proposals:
  - “Transmission and Collection Efficiency” (TCE)
    
    \[ CTE(d_{va}) = TEL(d_{va}) \times CEs(d_{va}) \times CEb(d_{va}) \]

  - “Overall Collection Efficiency”
    
    \[ CE(d_{va}) = CEs(d_{va}) \times CEb(d_{va}) \]
Terminology & Notation: *Let’s Decide!*

- Proposals on the table:
  - Call it “Overall Collection Efficiency”
  - Options on the detailed notation:
    
    \[ CE(d_{va}) = TEL(d_{va}) \times CES(d_{va}) \times CEB(d_{va}) \]
    
    \[ CE(d_{va}) = TEL(d_{va}) \times TE_s(d_{va}) \times CEB(d_{va}) \]
    
    \[ CE(d_{va}) = E_L(d_{va}) \times E_s(d_{va}) \times E_b(d_{va}, ...) \]

  - We finally agreed on:
    
    \[ CE_{AMS} = E_L \times E_s \times E_b \]

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Final Consensus on Terminology & Notation

\[ CE_{AMS} = E_L \times E_s \times E_b \]

This should be included in a paper in the near future

Please use these definitions in your papers & prez in future!
http://cires.colorado.edu/jimenez/ams.html

- Repository of information & links *(send me updates!)*
- *Let me know about new papers ASAP!*
  - Post full paper, OR abstract, OR at least citation