


University
of Colorado
Boulder

Some thoughts on Aerosol Standards for Chemical Composition

Prof. Jose L. Jimenez
University of Colorado-Boulder

**DOE ASR/ARM PI Meeting
Tysons, VA 21-March-2018**

12



University
of Colorado
Boulder

Two Types of Needs

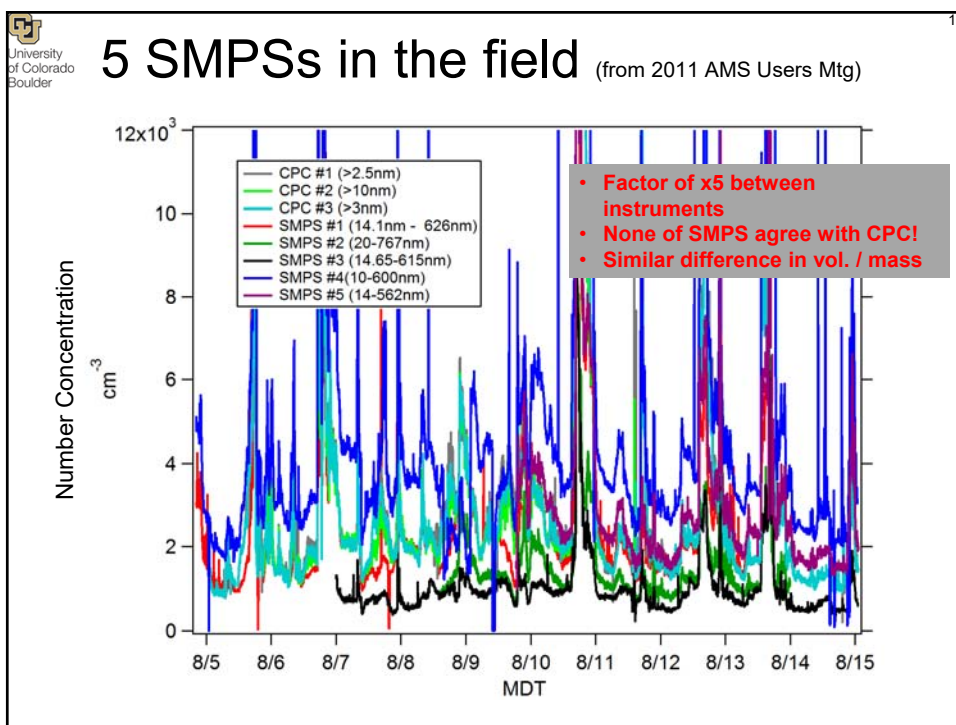
- “Operational needs”
 - Calibrations have been done many times in the literature
 - But problems in day-to-day calibrations & quantification of research (& “research monitoring”) instruments
- “Researchy needs”
 - Nobody has done it well, or very few cases, difficult procedures

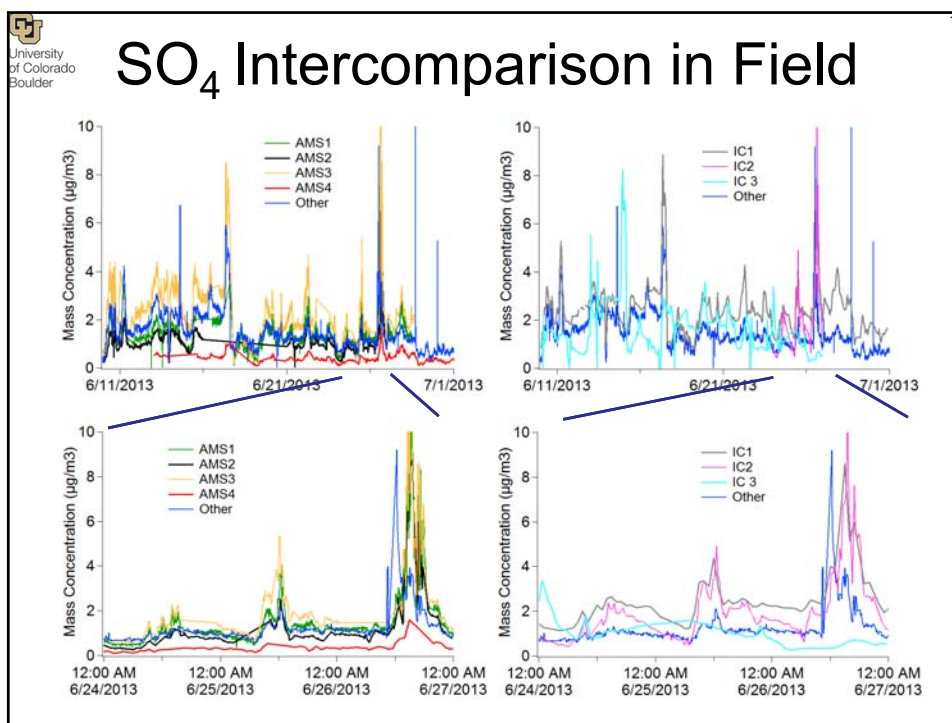
13

University of Colorado Boulder

Simple calibration source

- Calibration of chemical composition monitors (ACSM, \$150k; MARGA \$100k...)
 - Requires an expensive DMA-CPC system (\$75k) and time-consuming + complex operation
- A simpler push-button system to generate particles of known mass and composition seems like the greatest need to me
- Croteau et al., poster #211:





University of Colorado Boulder

Lessons from Field Intercomp.

- Yours truly has spent 2+ years in the field
- Instruments in prev. 2 slides were all operated by well-known groups, would be trusted by default
 - In reality, little attention to quantification until shown results of intercomparisons (esp. for SMPS)
 - Issues were mostly identified after considerable effort (~15 p-days)
- But most campaigns don't do intercomparisons, or there is only 1 instrument to compare to!
 - Rule of thumb: unless it has an knowledgeable operator dedicating it sufficient time, and even then there are lots of surprises
- Campaigns with multiple high-quality instruments, that allow multiple ways of checking, offer the best opportunities to learn



“Researchy” needs

- Generating particles of known chemical morphology (X coated by Y) reproducibly
 - Done by individual groups as research project
- Generating particles of known shape factor reproducibly
- “Calibration campaigns”
 - Coordinated effort for generating particles of known properties, sample by many instruments at the same time
 - “ACTRIS” project in Europe (e.g. Crehn et al. ACP 2015; Frohlich et al. ACP 2015)
 - Sync with larger lab or field campaigns, hard to get people’s attention otherwise