

Interactive  
Comment

***Interactive comment on “ACTRIS ACSM  
intercomparison – Part I: Reproducibility of  
concentration and fragment results from 13  
individual Quadrupole Aerosol Chemical  
Speciation Monitors (Q-ACSM) and consistency  
with Time-of-Flight ACSM (ToF-ACSM), High  
Resolution ToF Aerosol Mass Spectrometer  
(HR-ToF-AMS) and other co-located instruments”  
by V. Crenn et al.***

**Anonymous Referee #2**

Received and published: 18 September 2015

Overall Comment and Recommendation:

C3013

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This is an excellent intercomparison study of 13 Q-ACSMs co-located at a site near Paris, France. The findings of this paper are consistent with Budisulistiorini et al. (2014, AMT) and provide further insights into reproducibility of data collected from this instrument and how its data compares to existing air monitoring data. This well-written paper will be of high interest to the growing community of ACSM users throughout the world. I only have a few specific comments below that I kindly ask the authors to seriously consider before publication in AMT.

#### Specific Comments:

1.) Page 7270, Lines 20-24: The authors should realize that ACSM users in other parts of the world may not have more than 1 SMPS system in their labs as these are not cheap instruments. I would argue that this conclusion of validating the size of ammonium nitrate or ammonium sulfate particles downstream of a DMA (part of 1 SMPS system) used to generate the calibrant aerosol with another SMPS system shouldn't be taken as required by all future users who may not have access to two of these expensive systems. I think the authors should say that if possible this type of check should be done.

2.) Related to # 1 above, it remains unclear to me why the authors of this paper didn't use RIE sulfate values specific to each ACSM. Why is this? Is this due to the study being done before the Budisulistiorini et al. (2014, AMT) paper was published that indicated the need for RIE sulfate calibrations? This is understandable if this is the case, but it was unclear.

3.) In an ideal world, the authors would have captured other seasons to see how the 13 ACSMs intercompared. Budisulistiorini et al. (2014, AMT) found that different seasons yielded different results between ACSM and collocated datasets. Of particular concern in this prior study was that the OM-to-OC ratios became VERY VERY high during more photochemically active seasons, such as summer. OM-to-OC values approached 4 in warmer months, where as in winter the OM-to-OC ratios were similar to

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what was observed here in the present study! This suggested that RIE for organics may not be the same as the AMS instruments and should also be calibrated like ammonium, nitrate, and sulfate. At minimum, the authors should acknowledge the need to do such intercomparison studies in the future that cover other seasons (especially more photochemically active seasons). The OM-to-OC ratios observed in the warmer seasons is a bit concerning and does suggest the need for laboratory studies to more thoroughly examine what the RIE is for organics depending upon how oxidized the organic material is within the aerosol sampled by the ACSM. Wouldn't you all agree this is a concerning issue that remains for the ACSM?

Minor Comments:

1.) Page 7244, Line 19-25:

The authors probably should cite Budisulistiorini et al. (2015, ACPD), as they have published 12 months of data from both Atlanta, GA and from Look Rock, TN in the US. Citation information can be found here: <http://www.atmos-chem-phys-discuss.net/15/22379/2015/acpd-15-22379-2015.html>

2.) Page 7247, Line 18:

Shouldn't "Chapel Hill, UK" be "Chapel Hill, NC = North Carolina, USA" ? I'm pretty sure that is where URG is located.

3.) Page 7248, Line 20:

Change "Organic" to "organic"

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Interactive comment on Atmos. Meas. Tech. Discuss., 8, 7239, 2015.

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