The second ACTRIS inter-comparison (2016) for Aerosol Chemical Speciation Monitors (ACSM): Calibration protocols and instrument performance evaluations.

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**Supplementary material**

**Table S1: Calibration factors for each instrument in both Jump Scan (JS) and Full Scan (FS) mode. The RF NO3 is calculated using the FS calibration mode.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Int. No | RF NO3 (10-11)  amps/μg m-3 | RIE SO4 JS | RIE SO4 FS | RIENH4 JS | RIE NH4 FS |
| 1 | 5.49 | 0.47 | 0.86 | 5.68 | 4.9 |
| 2 | 3.39 | 0.93 | 1.4 | 4.55 | 4.2 |
| 3 | 7.38 | 0.32 | 0.47 | 5.4 | 3 |
| 4 | 6.97 | 0.97 | 1 | 4.52 | 3.7 |
| 5 | 3.76 | 0.59 | 1.09 | 5.1 | 2.9 |
| 6 | 2.83 | 0.57 | 0.84 | 4.81 | 4.9 |
| 7 | 3.07 | 0.81 | 1.2 | 8.26 | 7.5 |
| 8 | 4.59 | 0.44 | 0.48 | 8.26 | 7.2 |
| 9 | 3.01 | 0.49 | 0.68 | 5.19 | 5 |
| 10 | 6.97 | 0.74 | 1.05 | 5.61 | 5.6 |
| 11 | 3.34 | 0.44 | 0.62 | 7.42 | 7.6 |
| 12 | 4.65 | 0.58 | 1.04 | 6.13 | 5.7 |
| 13 | 4.03 | 0.41 | 0.71 | 5.52 | 4.6 |
| 14 | 3.15 | 0.58 | 0.85 | 4.7 | 4.6 |
| 15 | 2.93 | 0.4 | 0.56 | 5.98 | 4.9 |

# Supplementary figures:



**Figure S1: PM1 concentrations compared between a) PILS + OM (Sunset) against TEOM PM1 mass concentrations and b) fractional aerosol composition determined from the PILS + OCEC instrument.**



**Figure S2. a) 72-hour air mass back trajectories calculated using HYSPLIT and displayed using the ZeFir toolkit; color scale represents the trajectory density (with higher values meaning a higher occurrence), b) temperature and relative humidity, and c) wind speed and direction during the post intercomparison period.**



**Figure S3: Temporal coverage of the 15 instruments that participated in the post calibration intercomparison period.**

  
**Figure S4: Composition dependent collection efficiency (CDCE) calculated for each instrument (using RIE values from the FS mode) participating in the intercomparison campaign using the parameterization in Middlebrook et al. (2012).**



**Figure S5. Comparison of NO3 concentrations measured by each instrument with median NO3 concentration calculated from the combined 15 instruments. Slopes values vary ±0.15. The center dotted line represents a 1:1 relationship. The two outer dotted lines represent +/- 30%. Fits are orthogonal fits and are not forced through 0.**



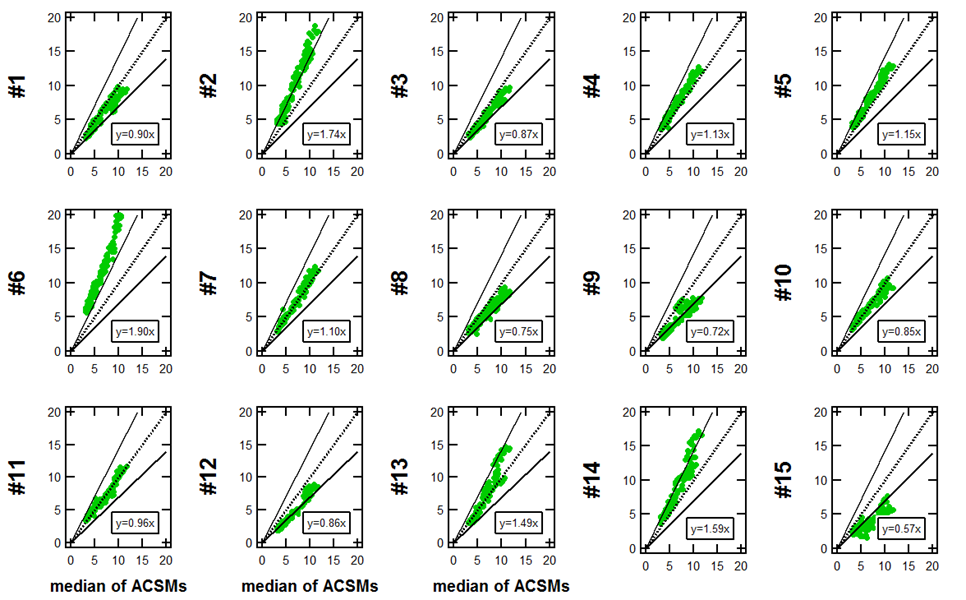
**Figure S6. Comparison of SO4 concentrations measured by each instrument with median SO4 concentration calculated from the combined 15 instruments. Slopes values vary ± 0.40. The center dotted line represents a 1:1 relationship. The two outer dotted lines represent +/- 30%. Fits are orthogonal fits and are not forced through 0.**



**Figure S7. Comparison of NH4 concentrations measured by each instrument with median NH4 concentration calculated from the combined 15 instruments. Slopes values vary ± 0.40. The center dotted line represents a 1:1 relationship. The two outer dotted lines represent +/- 30%.** **Fits are orthogonal fits and are not forced through 0.**



**Figure S8. Comparison of Org concentrations measured by each instrument with median Org concentration calculated from the combined 15 instruments, analyzed using the standard fragmentation table. Slopes values vary ± 0.30. The center dotted line represents a 1:1 relationship. The two outer dotted lines represent +/- 30%. Fits are orthogonal fits and are not forced through 0.**

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**Figure S9. Comparison of Org concentrations measured by each instrument with median Org concentration calculated from the combined 15 instruments after fragmentation table correction following Pieber et al. (2016). Slopes values vary ± 0.50. The center dotted line represents a 1:1 relationship. The two outer dotted lines represent +/- 30%. Fits are orthogonal fits and are not forced through 0.**



**Figure S10. Z-scores of the prominent fragments and b) Average *f44* vs *f43* concentrations for all participating instruments with the default fragmentation table with the Pieber correction applied.**



**Figure S11. Comparison of Org concentrations measured by each instrument with median Org concentration calculated from the combined 15 instruments after using a time varying correction based on NO3\_MF in Eq. 2. Slopes values vary ± 0.3.**