Air ion ratios – Fun with Linear response

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2009 AMS Users meeting
Basic Principles

• If threshold too high...linearity is lost (C, V)
• Multiple Ion events less biased than single ion events
  – 40 is proxy for SI - 28 is multiple ions
• Organics more affected than inorganics
  – Inorganics have fewer m/z where ions go so more events are multiple ion events
    • NO3 = 30+46, SO4 = 48, 64, 80...etc
  – Organics signal spread out over many more m/z
    • Org = All-air-SO4-NO3-NH4... lots more m/z
1-May: V m/z ratios
1-May: V m/z ratios

0.022
1-May: V m/z ratios

Sqrl: 0.018 (m/z duty cycle)
Normalize ratio to 0.018

(m/z 40 / m/z 28) / 0.018

Organic (µg m⁻³)
Example Cases - MCP or Threshold change

Scaled m/z 40 to m/z 28 (divided by 0.018)

m/z 40 to m/z 28 normalized to 0.018

Sunday, November 1, 2009
Example Case 2

Here a correction should probably be applied...

![Graph showing data points with a note about a correction.](image-url)
First Order Correction

• Use the normalized 40/28 ratio to correct the data.

• Corrected Data = Data / normalized ratio(time)

• Caveats: for inorganics this may not be appropriate
• NOT recommended for general use, only for pathological data sets.
• IF you use this correction in published data, it needs to be explicitly stated.
Recommendations

- SI calibration – Lab/Field
- Check Filters – Lab/Field
- Regressions - Field
- Keep a record – Example Spreadsheet

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<th>DateTimeW</th>
<th>MCP Voltage</th>
<th>SI (m/z 40)</th>
<th>Acq Thresh</th>
<th>SI Thresh</th>
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