NMVOC WG: Comparing measurements and emission inventory data for NMVOCs in urban areas

- A comparison of VOCi/acetylene ratios between observations and emission inventory (EDGAR) show
  - generally, more variability in the EI ratios than in the obs ratios
  - little to no correlation overall, which also holds true across different cities/regions (LA, NY, London)
- Ambient ratios trend to be lower than those accounting for photochemical age (LA, NY), but overall this difference is relatively minor

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Aim
• Build on existing work comparing local/national EI and obs using emission ratios in urban areas -> at a global level to facilitate regional comparisons to inform our understanding of NMVOC speciation in inventories

Methods
• Initial scoping using obs from previous studies
• Compare to global EI: EDGARv4.3.2 / (CEDS)
Initial conditions

<table>
<thead>
<tr>
<th>EI Compound (Group)</th>
<th>Obs Compound(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethane</td>
<td>ethane</td>
</tr>
<tr>
<td>Propane</td>
<td>propane</td>
</tr>
<tr>
<td>Butanes</td>
<td>nbutane + ibutane</td>
</tr>
<tr>
<td>Pentanes</td>
<td>ipentane + npentane</td>
</tr>
<tr>
<td>Hexanes and higher</td>
<td>nhexane + nheptane + noctane</td>
</tr>
<tr>
<td>Ethene</td>
<td>Ethene</td>
</tr>
<tr>
<td>Propene</td>
<td>Propene</td>
</tr>
<tr>
<td>Ethyne</td>
<td>ethyne</td>
</tr>
<tr>
<td>Other alk(adi)enes/alkynes</td>
<td>1butene</td>
</tr>
<tr>
<td>Benzene</td>
<td>benzene</td>
</tr>
<tr>
<td>Methylbenzene</td>
<td>toluene</td>
</tr>
<tr>
<td>Dimethylbenzenes</td>
<td>oxylene + mpxylene</td>
</tr>
<tr>
<td>Other aromatics</td>
<td>ethylbenzene</td>
</tr>
</tbody>
</table>

- All ratios VOC/ acetylene
- Match year & month between obs & EI
- Total emissions, no sector breakdown
- Limited accounting for photochemical age / assume relatively fresh emissions for urban obs
- Extract grid cells (1, 9, 25 cells) from the urban areas where we have obs data
All Obs vs EI (EDGARv4.3.2, 9cells)
Ambient ratios vs ratios accounting for photochemical age

Los Angeles (2010)

- Ethane
- Propane
- Butanes
- Pentanes
- Hexane
- Ethene
- Propene
- Other Alkenes
- Benzene
- Toluene
- Xylenes
- TMB

VOC / Ethyne (g / g)

- Photochemical Age Method
- Ambient Ratio
Obs vs EI ratios: LA, NY
Summary

• A comparison of VOCi/acetylene ratios between observations and emission inventory (EDGAR) shows
  • generally, more variability in the EI ratios than in the obs ratios
  • little to no correlation overall, which also holds true across different cities/regions
• Ambient ratios trend to be lower than those accounting for photochemical age (LA, NY)

Next steps

• Continue analysis, including analysis for the remaining focus cities (NY, LA, London, Paris, Beijing, Tokyo, Mexico City, Beirut/Mecca (?), 2 cities in Taiwan (?))
• Use ratios that account for photochemical age
• Consider VOC:CO ratios (integrate more CEDS data)
• Comparison to traffic sector ratios (currently ratios without any sectoral breakdown)
• Write a paper!

Thank you for your attention! Thoughts? Questions? Ideas?

->the WG is open to everyone