How do recent high resolution datasets compare?

Recent available datasets

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Available years</th>
<th>Spatial resolution</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>CMAQ fusion</td>
<td>2002 - 2019</td>
<td>12 km</td>
<td>Bayesian downscaler to fuse ground monitors &amp; model</td>
</tr>
<tr>
<td>Van Donkelaar et al. 2021 (VD)</td>
<td>1998 - 2020</td>
<td>0.01 and 0.1 degrees</td>
<td>Satellite + ground obs &amp; model</td>
</tr>
<tr>
<td>Amini et al. in review</td>
<td>2000 - 2019</td>
<td>Urban at 50 m &amp; non-urban at 1km</td>
<td>Obs (ground, satellite, + reanalysis) &amp; machine learning</td>
</tr>
</tbody>
</table>

Annual mean 2019 PM$_{2.5}$ concentrations at census tracts

PM$_{2.5}$ disparities

Disparities are calculated as the ratio of population-weighted PM$_{2.5}$ for each population subgroup to the population-weighted overall average for different aggregations (i.e., all, urban, or rural tracts) and regions.

Conclusions & next steps

- Datasets generally agree on relative PM$_{2.5}$ exposure differences by group with some variation (e.g., Amini shows larger disparities than VD in many regions across variables).
- Absolute magnitude exposure differs across datasets with Amini and CMAQ often larger.
- Urban and rural differences provide insights on other EJ variables.
- Amini and VD resolve intraurban differences particularly in the west, unlike CMAQ.
- Investigate relative versus absolute EJ exposure differences.
- Differences among datasets may be due to source differences, such as differences in underlying smoke emissions; more work needed to confirm.
- Consider comparing PM composition, sources, and regional datasets if possible.

References

1. Amini, H. et al. Hyperlocal super-learned PM$_{2.5}$ components across the contiguous US. https://www.researchgate.net/publication/346431151 (2022) doi: 10.21203/rs.3.rs.21472079.v1

Tess.carter@gwu.edu