EMEP/MSC-W activities
2016/2017
Hilde Fagerli ++

19.09.2017 3rd joint session to EMEP Steering Body and WGE
Content

• The new 0.1° emissions – evaluation using Airbase, EMEP etc
• Ship emissions
EMEP 0.1x0.1 emissions and model results – comparison to observations

- 22 countries reported sectoral gridded emissions in the new grid
- Remaining areas: gap filled and spatially distributed by CEIP
- Model runs using 0.1x0.1 AND 50kmx50km emissions for 2015 – compared to EMEP and Airbase measurements (excluding traffic stations)

- No SR/trend runs/Country Reports
Improved spatial correlation for NO$_2$
Some countries should be revisited (e.g. BG, PL, RO)
Improved spatial correlation for O3 – titration effect
Better reflect long-term exposure and deposition
Improved spatial correlation in the majority of countries
PM$_{2.5}$ – spatial correlation (mod-Airbase) within each country

Improved spatial correlation in the majority of countries, but more mixed results (and less measurements)
Improved wet deposition:

50kmx50km

0.1°x0.1°
O$_3$ – the daily maximum running 8 hour concentration

Spatial linear correlation coefficient based on EMEP + Airbase rural data

EMEP 0.1°x 0.1° with 20 levels performs best – look further into emission distribution and definitions

Norwegian Meteorological Institute
Summary

• In general: For NO$_2$ (and O$_3$) the results provide confidence in NO$_x$, for SO$_2$ the results are more mixed (as expected). Smaller improvements for PM
• Improved obs-mod correlation for wet deposition (especially SO$_x$ and NO$_x$)
• Some countries might benefit from revisiting their gridding
• To be done:
  - Comparison with model runs using TNO-MACC/CAMS emission data and other inventories
  - Look further into vertical resolution and boundary layer assumptions
What to do with international shipping emissions in the EMEP area?

- For trends, consistent shipping emissions are important
- This year: change from TNO-MACC to FMI shipping emissions
- Future: Rely on CAMS? (MET, FMI, TNO, CEIP partners)

<table>
<thead>
<tr>
<th></th>
<th>Sulphur</th>
<th>NOx</th>
<th>CO</th>
<th>PM$_{2.5}$</th>
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<tbody>
<tr>
<td></td>
<td>SO$_2$</td>
<td>SO$_4$</td>
<td>Gg NO$_2$</td>
<td>Gg CO</td>
</tr>
<tr>
<td>Baltic Sea</td>
<td>10.3</td>
<td>0.8</td>
<td>321</td>
<td>22</td>
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<tr>
<td>North Sea</td>
<td>23.8</td>
<td>1.5</td>
<td>695</td>
<td>51</td>
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<td>Mediterr. Sea</td>
<td>675</td>
<td>40</td>
<td>1353</td>
<td>94</td>
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<tr>
<td>Black Sea</td>
<td>68</td>
<td>3.9</td>
<td>172</td>
<td>13</td>
</tr>
</tbody>
</table>

1/1-2015 SECA for Baltic Sea and North Sea (1%-0.1% sulphur content)
International shipping and contribution to European ozone
### FULL Comparison HTAP 1 ensemble and HTAP 2 ensemble

Ozone Concentration Contribution in Europe due to a 20% reduction in anthropogenic emissions

<table>
<thead>
<tr>
<th></th>
<th>from Europe</th>
<th>from NorthAmerica</th>
<th>from East Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>HTAP 1 (box)</td>
<td>0.82</td>
<td>0.37</td>
<td>0.17</td>
</tr>
<tr>
<td>HTAP 2 (land only)</td>
<td>0.15</td>
<td>0.21</td>
<td>0.22</td>
</tr>
</tbody>
</table>

**Why?**
- Change in receptor region definitions
- Change in emissions (2001=>2010)
- Change in source regions
- Change in models contributing
What is the role of shipping emissions to European surface ozone concentrations?
Contribution to different European ozone metrics

The metrics matters
Next steps

• Co-operation within TFHTAP – encourage other modelling groups to add the ship emission model run
• The importance of the metric chosen (POD, …)
• Consistency with regional SR’s (relative importance of different areas within Europe as well as areas outside the EMEP domain)
• A number of different ship emission estimates – what does it imply (e.g. EDGAR vs. FMI)?
Other work

• Status run analysis in 0.1x0.1 degree
• Preparation for the joint EMEP and ACTRIS intensive measurement period
• Local Fraction (Thematic session)
• Use of ACSM data (high time resolution) for evaluation of diurnal profiles etc
• Diesel gate scandal
• TFHTAP: hosting web server & model calculation
• TFMM trend exercise
• Model updates; new landcover scheme/BVOC, updated chemical scheme, flexibility
Proposed workplan elements

1. Large-scale (IAM) ozone risk assessment in soil moisture limited areas
2. Impacts of uncertainties in SOA modelling for source-receptor matrices
3. Impacts of bi-directional exchange of NH3 on source-receptor relationships for nitrogen and PM2.5
4. Contribution of international ship traffic emissions to ozone in Europe – cooperation with TFHTAP