VALIDATION AND SOURCE APPORTIONMENT ANALYSES OF CAMx MODEL OVER THE VENETO REGION AND VENICE LAGOON

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LIVING IN THE Po' VALLEY
MODEL SET-UP (1):

Photochemical model:
CAMx (version 4.0);

Meteorological input:
CALMET (version 5.5): temperature field, horizontal wind (u, v), vertical diffusivity;
pressure and water vapour concentration: interpolation of radio-soundings data;

Grid emissions:
TD approach at municipality level disaggregation. BU to be included.

MODEL SET-UP (2):

Boundary conditions: CHIMERE output of 0.5x0.5 degrees

- initial: 3D variable in space (x,y,z);
- boundary: function of (z, t) for the four borders;
- top: one constant value for each specie

Other input:
- landuse and albedo: CORINE LAND-COVER (0.5x0.5 Km²);
- photolysis rate;
- haze (CNR - Venice), ozone column (TOMS – NASA).
TESTING PERIOD:

- First run period: July 2004
- Testing period: 12-23 of July
MODEL RESULTS: VI-Bassano

MODEL RESULTS: VE-Bissuola
MODEL RESULTS: BL-City

MODEL RESULTS: 12-23 of July 2004

288 paired time step Ozone Model vs Measure

<table>
<thead>
<tr>
<th>Parameter</th>
<th>VR_CASIN</th>
<th>VI_BASSANO DEL GRAPPA</th>
<th>BL_CITTÀ</th>
<th>TV_CONOLIANO</th>
<th>VE_PARCO FUSOLFA</th>
<th>RO_MANDRIA</th>
<th>RO_BORSEA</th>
<th>VE_SACCA ISOLA</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation</td>
<td>0.85</td>
<td>0.79</td>
<td>0.75</td>
<td>0.64</td>
<td>0.23</td>
<td>0.33</td>
<td>0.80</td>
<td>0.81</td>
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<tr>
<td>Hourly maximum</td>
<td>212</td>
<td>248</td>
<td>192</td>
<td>228</td>
<td>184</td>
<td>240</td>
<td>231</td>
<td>167</td>
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<tr>
<td>Average</td>
<td>82</td>
<td>107</td>
<td>78</td>
<td>91</td>
<td>68</td>
<td>83</td>
<td>97</td>
<td>69</td>
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<tr>
<td>ASPPA</td>
<td>-18%</td>
<td>-20%</td>
<td>-9%</td>
<td>-16%</td>
<td>-9%</td>
<td>-25%</td>
<td>-15%</td>
<td>-16%</td>
<td></td>
</tr>
<tr>
<td>MeanBIASN</td>
<td>-15%</td>
<td>-3%</td>
<td>-40%</td>
<td>-19%</td>
<td>15%</td>
<td>0%</td>
<td>-14%</td>
<td>-22%</td>
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<tr>
<td>Gross-Error</td>
<td>13</td>
<td>3</td>
<td>31</td>
<td>17</td>
<td>10</td>
<td>0</td>
<td>14</td>
<td>13</td>
<td></td>
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<tr>
<td>Gross-ErrorN</td>
<td>15%</td>
<td>3%</td>
<td>40%</td>
<td>16%</td>
<td>16%</td>
<td>0%</td>
<td>14%</td>
<td>22%</td>
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<tr>
<td>NMSE</td>
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<td>0.08</td>
<td>0.26</td>
<td>0.14</td>
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<td>0.06</td>
<td>0.15</td>
<td>0.24</td>
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</tr>
</tbody>
</table>

- a good timing
- peak underestimation
- absolute error

HARMO-10 Crete 2005
SCENARIOS: local, regional and outer ozone formation contribution

<table>
<thead>
<tr>
<th>Scenarios</th>
<th>Description</th>
<th>NOx emission</th>
<th>VOC emission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1 (black line)</td>
<td>Base simulation</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Model 2 (azure line)</td>
<td>M2: LOCAL INDUSTRIAL</td>
<td>5.5%</td>
<td>7.2%</td>
</tr>
<tr>
<td>Model 3 (green line)</td>
<td>M3: REGION INDUSTRIAL</td>
<td>46.1%</td>
<td>48.7%</td>
</tr>
<tr>
<td>Model 4 (red line)</td>
<td>M4: REGION ALL HUMAN</td>
<td>100%</td>
<td>84.4%</td>
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<td>Model 5 (blue line)</td>
<td>M5: REGION TRANSPORT</td>
<td>52.6%</td>
<td>33.7%</td>
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<tr>
<td>Model 6 (yellow line)</td>
<td>M6: OUTER</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

SCENARIOS: domain daily max

Ozone domain average daily maximum

Ratio against Model 1 (base case)
12th to 17th average ozone

Percentage contribution of regional emissions

Osservatorio Regionale Aria
21 maggio 2003
Percentage contribution of each main sector

Porto Marghera cause attribution
Boundary Sensitivity

CHIMERE Boundary

Ozone Peak Surface D+2 Fcst Issued 20030505
CONCLUSIONS and ...

Traffic and production activities have a similar weight; also internal vs external ozone precursor contribution have similar weight.

The best policy for Veneto in terms of O3 reduction is limiting VOC from solvents used in the leather production district.

Most of the ozone concentration inside the domain comes from the boundary.

FURTHER STEPS

• Domain extension, cloud/rain input, elevated point sources;
• Simulation period extensions: 2004 summer;
• In-depth analysis of model sensitivity for abatement policies;
• Pollutant extension: particulate matter and wet pollutant deposition.

BIG PICTURE

• CAMx implementation effort
• Join forces with the neighbor Regional EPA

Acknowledgments

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