

Interactive comment on “Source-sector contributions to European ozone and fine PM in 2010 using AQMEII modeling data” by Prakash Karamchandani et al.

Anonymous Referee #3

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Review to the paper

Source-sector contributions to European ozone and fine PM in 2010 using AQMEII modeling data

by P. Karamchandani, Y. Long, G. Pirovano, A. Balzarini, and G. Yarwood

In this work, the authors make use of calculations performed for year 2010 with CAMx model within the AQMEII project to make a source apportionment of ozone and PM pollution in European cities. Namely, the relative contributions from 10 SNAP source categories, and also from SOA, natural PM sources and boundary conditions to calculated concentrations of O₃ and PM_{2.5} in February and August 2010 are estimated

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for 16 cities. So-called, tagged species methods for ozone and PM (OSAT/PSAT) were used to make the source allocations and the main calculation results are presented in the paper.

The work presented in the paper is very relevant in order to identify the main sources of health damaging pollution in different urban locations, which could contribute to design more optimal emission reduction strategies. The paper is well written, with the material being presented clearly and neatly.

The results definitely carry interesting information, but unfortunately the authors limit most of the paper to describing what a reader him/herself can easily see in the allocation tables. It'd be interesting to learn how the main presented results differ from other source allocations exercises, what added information is obtained in this work, and also a short discussion on the implication of the results could be recommended. Furthermore, some discussion regarding uncertainties in the apportionment results due to (spatially variable) inaccuracies in model calculations could be relevant here.

Specific comments:

1. Model setup. As the boundary conditions (BCs) appear a major source, could the authors specify what species were included in the BCs and provide a short discussion on their accuracy. How the cities were defined in model results: by one model grid cell, or depending on the city size?

2. Model evaluation. I think it'd be more relevant to show the model performance for the selected months, February and August (especially since the authors indicate some model problems with modelled temporal evolution). I'd recommend to move annual mean evaluation to Supplement, and rather include the evaluation of model performance for those two months in the main part.

It'd also be relevant to include information regarding the model accuracy with respect to PM components (in particular SOA and mineral dust) that has effect the accuracy of

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source apportionment.

3. Results and Discussion. To my opinion, Sections 3 and 4 give a too detailed narrative about the results in Tables 3-5. Basically those sections are describing the same numbers, just from two different angles. As mentioned above, I'd suggest more discussion on the credibility and uncertainty of the results due to modelling inaccuracies (for instance, regarding BCs and SOA, which are often calculated to be major sources). The result that BCs are the one main source of summertime PM_{2.5} in Minsk and Kiev is surprising to me. Could the author specify which PM components from beyond Europe that contribute so much to PM pollution in those cities.

It'd also be very interesting to see comparison of the obtained results with other studies, including those which applied a "zero-out" approach (Google search shows at least one such Chapter 5 in http://emep.int/publ/reports/2009/status_report_1_2009.pdf).

Another relevant issue for discussion is how representative the presented source apportionment result are given quite significant effects of meteorology, especially for relatively short periods (could the weather conditions characterized as "typical" in February and August 2010)?

Further I wonder how well the PSAT method cope with the situations when PM pollution is due to more than one SNAP source? For instance PM episodes were registered last years in France (Paris), Germany, the UK etc. caused by ammonia emissions from agriculture and urban traffic emissions. Tables 4 and 5 identify several cities where SNAP7 and SNAP10 are among the major contributors.

Minor comments:

p.2 line 9: typo in (Colette et al., 2014), also this reference is missing.

Table 2. Specify what correlation is shown

Figure 1. I'm not sure it's so important to include it. Or I'd suggest to show the cities considered on the map and the grid cells they are covered with. Figures 3-5: the colour

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scales chosen make it impossible to spot the regions with exceedances of the critical levels; unless they are changes I cannot see much sense in showing those maps.

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