

Interactive comment on “Evaluation of a three-dimensional chemical transport model (PMCAMx) in the European domain during the EUCAARI May 2008 campaign” by C. Fountoukis et al.

H. Korhonen (Referee)

hannele.korhonen@alumni.helsinki.fi

Received and published: 20 May 2011

This manuscript presents a comparison of PMCAMx regional air quality model to EU-CAARI AMS measurements in May 2008. Overall, the model is capable of reproducing the relative contributions of sulphate, organics, nitrate and ammonium to submicron aerosol mass, and predicts their absolute concentrations with a reasonable accuracy. Organics (especially oxygenated species) are found to be the dominant component in Northern and Central Europe. PMCAMx is applied to a European domain for the first time.

C3665

The methodology used in this study is state-of-the-science, the results and assumptions are clearly presented and the manuscript is well-structured and mostly well-written. My main criticism is that the model is evaluated only against a very limited data set (one month and 4 ground stations + airborne measurements), which is hard to justify since much more extensive AMS data is available from the EUCAARI campaign. Since the model is compared only against May 2008 data, its performance in other seasons cannot be evaluated and AMS measurements from several other sites cannot be utilized.

I therefore recommend that the authors run the model at least for one full year, if not for both 2008 and 2009, and use all available AMS data from this period. This should not be computationally too demanding to do. Another option is to combine this manuscript with the forthcoming one presenting a comparison between modeled and PMF-analysed AMS organic aerosol components – I cannot help thinking that this latter option might have been the authors' initial intention since the current introduction would fit an OA component paper much better.

Specific comments:

- 1) If the authors decide to extend the current manuscript to cover a full year/two years, the introduction needs to be rewritten. Currently it focuses solely on organic aerosol (and to even specific OA components) while the focus of this manuscript is on general PM1 composition.
- 2) p. 14190, l. 15-16: Where are the boundary conditions obtained from?
- 3) p. 14195, l. 11-> : Provide an explanation why the aerosol composition in the Mediterranean area behaves differently from the rest of the Europe.
- 4) Table 3: Several of the statistical metrics are never mentioned in the text (apart from their formulae) and thus this table can be substantially condensed. Why some metrics values are not shown for nitrate in Finokalia?

C3666

5) If the authors decide to extend the current manuscript to cover a full year/two years rather than combine it with organic component paper, Figure 5 should be extended to all four sites. Filter measurements shown in Figure 5 should be discussed in the text or omitted from the figure.

6) p. 14198, l. 11: "sulfate lay within the error". What error?

7) p. 14198, l. 14->: While the OA description in PMCAMx is fairly sophisticated compared to many other models, it is still greatly simplified. Could this be a possible explanation to the bias?

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 14183, 2011.