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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Organic aerosol concentration and composition over Europe: insights from comparison of regional model predictions with aerosol mass spectrometer factor analysis" *by* C. Fountoukis et al.

Anonymous Referee #1

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The paper by Fountoukis et al. presents advances and insights of regional model performance over the European domain using the most advanced AMS measurements for validating their model. The paper is well written and easy to follow. Significant attention is given to sensitivity analysis with multiple aspects addressed and problems highlighted. I recommend publication of the manuscript in Atmospheric Chemistry and Physics after the following comments have been addressed.

The major comment relates to giving adequate attention to cases of major disagree-

ment between the model and the measurements. It is not to say which one is right, especially when it comes to fragmented organic matter, but rather that we learn from mistakes more than we do from success. The encouraging result of two thirds of data agreeing within a factor of two which is within 100% is good, but what about the remaining one third of data where disagreement is really large? What are those sites, what are the periods, what are the synoptic situations, etc.? There is simply no discussion of those data at all.

The use of state-of-the-art AMS measurement data is commendable, but why model validation is limited to daily resolution? Comparison at hourly resolution may be poorer, but again we learn from mistakes more. In relation to hourly data I have to note that the predicted diurnal patterns are pretty flat, partly due to unnecessarily extended Y scale. If diurnal profiles are flat at most of the sites I would not be surprised about models low sensitivity to the most investigated parameters (except biomass burning emissions) and possibly one third of data disagreeing more than 100% due to model not being able to capture dynamic changes. I have to admit that asking for model validation at hourly resolution may be too much, but then the authors should omit diurnal profiles.

The conclusion that biomass burning emissions inventory underestimates those emissions is sound and should be highlighted as all other sensitivity tests showed little impact. As it stands, the most significant finding is buried among other minor findings.

Minor comments:

Use preposition "at" when referring to sites "at Cabauw, at Mace Head", not "in".

Fig.5 omit semicolon after PM1 or change to "Comparison of predicted vs. observed PM1 OA components:..."

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 7597, 2014.