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Interactive comment on “Illustrating the benefit of using hourly monitoring data on secondary inorganic aerosol and its precursors for model evaluation” by M. Schaap et al.

Anonymous Referee #1

Received and published: 14 June 2010

I find the paper well written and it shows the value of a comprehensive dataset in combination with model to evaluate atmospheric processes. A full year of hourly measurements with the MARGA instruments is rather unique, and the dataset will also be of importance for groups also outside the Netherlands.

I have some questions/comments to the manuscript:

Introduction:

Here you only describe the nitrogen SIA species as important, however sulphate is in many cases (episodes) the dominant SIA and it should be mentioned as well. When referring to the EMEP programme it is better to use a more official reference

C3958

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than an unpublished paper (Aas et al 2010), e.g. the EMEP monitoring strategy (ECE/EB.AIR/GE.1/2009/15) may be more appropriate.

Experimental:

Why is only nitrogen and sulphur species mentioned? The MARGA/GRAEGOR system also allow measurements of HCl, sea salts and base cations. I assume it is because the model does not include all these species? Nevertheless if more complete measurements has been undertaken it is important to mention. It could also be valuable to give an average concentration of all the species (in table 1) to illustrate the relative importance of i.e sea salt and base cations. This information is important when you want to discuss the importance of course nitrate (and sulphate).

Further the inlet system of the MARGA/GRAEGOR allows separating between PM10 and PM2.5. Why has the PM10 been used when the model only (?) includes fine particles? Is it because there is not a full year of PM2.5 measurements? But if there are periods with both PM10 and PM2.5 it would be nice to include some discussion of the difference to illustrate the difference between fine and coarse SIA.

Model simulation:

It is only mentioned that coarse nitrate is not included. What about coarse sulphate?

For the ammonia emissions, is it included any diurnal variations, or how is this (if it is) addressed in the model?

Results:

Even though SO₂ and NO₂ is not mentioned, I assume these are measured at Cabauw as well. How well is these primary species addressed in the model?

The peak concentrations of sulphate in spring and winter are these sea salt related? The data has not been corrected for sea salt sulphur. Or can it be other coarse sulphate not included in the model? An ion balance test of these episodes may give some

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indications on this.

Discussion:

You state that the regular Dutch measurements underestimate the SIA. First of all that is a bit strange statement/observation for sulphate since these measurements shouldn't be biased, though for NH_4NO_3 it is relevant. However this is in contradiction to the results seen in figure 1 where the regular measurements are in good agreement with the MARGA/GRAEGOR system,

In the strategy discussion it would be nice to include how your recommendations relate to other monitoring obligations/strategies in Europe, i.e. in UNE CE and EU.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 12341, 2010.

ACPD

10, C3958–C3960, 2010

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