

Interactive comment on “Linking climate and air quality over Europe: effects of meteorology on PM_{2.5} concentrations” by A. G. Megaritis et al.

Anonymous Referee #1

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This is a useful paper providing a detailed analysis of the effect of meteorological parameter changes, linked to climate change, on various processes affecting aerosol concentrations. While several studies have already been performed in this field, this paper specifically tempts as much as possible separating different effects. This allows making evident the many competing effects acting. In a concluding section, the impact of different parameter changes on PM_{2.5} levels are compared and relate to a climate change scenario. The paper should be published in ACP after having taken into account groups of remarks.

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Major comments:

Section 3, Base case simulations and model evaluation:

A discussion should be added on how well processes are represented in the model in order to be confident about the calculated sensitivities with respect to meteorological parameters.

The comparison with observations can only give part of the answer. A dynamical model evaluation (i.e. evaluating the model capacity to simulate sensitivities) is difficult and out of the scope of the study. Instead, the confidence in the simulated model sensitivities should be simulated based on our physical understanding. It would be helpful to add a table regrouping the various figures given in this section.

Section 10, Relative importance of meteorological parameters It is not clear to me, how figures 9 and 10 are constructed. It seems to me that figure 9 summarizes results with respect to the previously applied changes in parameters. Figure 10 apparently extrapolates these changes to future climate projections. But how is this done ?

I doubt a little bit that it is possible to conclude on a +-10% change in wind speed due to future climate scenario. It should be explained that these values are very crude choices.

Does the “error” bar in the figures 9 and 10 represent the spatial differences to a uniform parameter change or also include the response to variability of a parameter change itself ?

Is there a need of linear extrapolation, in order to extrapolate from a 10 % to a 40% change in precipitation intensity ? If so, the uncertainty in this procedure should be stated, for instance a saturation of wet deposition with respect to further increase in strong precipitation is expected. Temperature induced PM_{2.5} concentration changes are strongest with respect to those due to other parameters in figure 9, but weakest in figure 10. Is this simply due to the reference (i.e. relative vs. absolute changes) ?

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Technical correction : Page 10364 line 19: due mainly to changes "in" sulfate and sodium chloride

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 10345, 2014.

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