

Interactive comment on “PMCAMx-2015 evaluation over Europe against AERONET and MODIS aerosol optical depth measurements” by Antigoni Panagiotopoulou et al.

Anonymous Referee #2

Received and published: 27 February 2016

Review on manuscript

PMCAMx-2015 evaluation over Europe against AERONET and MODIS aerosol optical depth measurements by A. Panagiotopoulou, P. Charalambidis, C. Fountoukis, C. Pilinis, and S. N. Pandis

Remote sensing measurements of aerosols represent a valuable complementary to surface in-situ data for CTM evaluation. Indeed, satellite observations provide finely resolved in space AOD data with global coverage, though being of somewhat varying quality due to assumptions involved in the retrieval algorithms. AERONET sun-photometers provide directly measured AOD at high time-resolution. Therefore last decades those data have been increasingly widely used for model evaluations.

C1

In this work, the authors make use of MODIS and AERONET measured AOD to compare with results from PMCAMx-2015 model in order to get better insight in the model performance with respect to aerosol loads. Thus, the paper addresses relevant to the scope of GMD issues.

The article is very neatly and clearly written, and the methods applied are valid, but it does not offer any substantial novelty regarding ideas, data or methodology.

Some of the conclusions appear not to be satisfactorily well founded (i.e. regarding model performance with respect to the individual aerosol types based on AOD evaluation).

The title contain a proper reference to the model used, but does not indicate the short-term (one month) and thus limited model evaluation. Besides, only levels of monthly mean AOD have been compared, rather than a complete evaluation. Therefore, I'd suggest to use “comparison” instead of “evaluation”. Also, I'd not advise to include rather hypothetical explanations (lines 22-25), but rather say that the probable reasons of disagreements are discussed in the paper.

In general, the paper is written in good language, the formulations are clear and the supplemented references are relevant and ample.

Other comments:

1. The considered period (May 2008) should be indicated in the Abstract and in Sections 2, 3.
2. I recommend to include a bit more complete summary of earlier evaluation of all aerosol components
3. Explain more clearly whether the model calculates size-resolved chemical composition, or only size resolved number density
4. For comprehensive and robust model evaluation and better understanding model

C2

result more in-depth analysis should be performed, including spatial and temporal correlations, RMSE, STD etc etc.

4. I find the explanations of model vs observations AOD discrepancies by over/underestimation of a particular aerosol components a bit speculative. I would strongly recommend to also include (at least) aerosol evaluation with monitoring surface data in different regions (and airborne measurements if possible) to support the conclusions.

P. 2 lines 13-14: What is the temporal resolution of AERONET data?

P. 4 lines 13-16: provide biases for all aerosol species and even better for the regions included in your AOD discussion; only 4 sites with data for sulphates???

P. 7 line 3: How is Mie theory applied for aerosol mass? line 10: Have you made tests on accounting for "brown carbon", i.e. absorbing OC (which is believed to make notable contribution)? Lines 19... Study period? time resolution of AERONET data? AOD at which wave length was used?

P. 8 line 7: location instead of part

P. 9 lines 4-6: I do not understand. Suggest the explain better, or just refer to the sources. Lines 22-23: times coinciding with the satellites' overpasses?

P. 10 line 16: compared with

pp. 11 lines 10-18: Given rather poor quality of emission data for those regions, I feel rather skeptic and "alarmed" about good agreement between model and measurements

p. 13 line 4: Rather sloppy formulation

P. 15 line 16-18: This is rather unfair statement. MODIS data is particularly valuable due to its spatial coverage (besides the AOD errors are relatively small) line 16: correct "complement" line 21-22: Please, elaborate, otherwise leave out. It's not needed

C3

unless model comparison with MODEI and AEROCOM lead to different conclusions.

P 16 line 7: again "excellent" model performance using poor emission input is typically indicative of some kind of compensating errors. Lines 15-17: too speculative conclusion about model's excelling in calculating all of aerosol types

Interactive comment on Geosci. Model Dev. Discuss., doi:10.5194/gmd-2015-225, 2016.

C4