**Atmospheric
Chemistry
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Discussions

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Interactive comment on "Comparing ECMWF AOD with AERONET observations at visible and UV wavelengths" *by* V. Cesnulyte et al.

V. Cesnulyte et al.

vaida.cesnulyte@fmi.fi

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We have received the comments on our manuscript by two reviewers. We thank the Reviewer 1 for a positive and constructive comments. We have considered these comments in regards of our revised manuscript. Below, we detail the comments together with our response to them.

Reviewer 1 indicates in a general remark that our manuscript is well written and with no obvious errors, however he/she would believe the analysis could have gone further. According to Reviewer 1, just simply comparing your model to AERONET – especially <only> 12 AERONET stations – is not particularly interesting. The question arose why not consider other data - e.g. surface concentrations – or, many more AERONET

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sites? Reviewer 1, however, understands that it is necessary to document model performance, and also does appreciate the author's attempt to summarize model performance in terms of broad categories (biomass burning sites, urban sites).

Reply: The main aim of our paper was to focus on optical properties of aerosols, therefore the analysis of e.g. surface concentrations is beyond our scope of this study. We agree that, it would be interesting to see more by including additional sites however, in our case, the main criteria in selecting AERONET sites was the availability of data for both 340 nm and 500 nm and the period considered in the study (2003-2006). This resulted to decreased number of sites available, especially considering that our analysis took into account different aerosol environments (dust, biomass burning, urban). The sites, e.g. Banizoumbou, Beijing, Churchill, Rome, which were of an interest, could not be included due to above mentioned reasons. An explanation on a selection of stations is added also in the manuscript.

Comment 1: In general, I fell that more description of the reanalysis process should be given in this paper. I do not feel that referring to previous works is enough; at least a brief presentation is warranted here. Do you do any corrections to the Level 2, collection 5 data set that you assimilate? For example, Zhang and Reid have shown that it is necessary to make corrections to the MODIS dataset before assimilation.

Reply: We have now changed the MACC aerosol re-analysis (subsection 2.1) to better describe the re-analysis process in MACC system.

Comment 2: Finally, why do you evaluate UV AOD when your OC is non-absorbing? The strongest UV absorption is generally by OC (e.g. Kirchstetter et al.).

Reply: We agree that in some areas, e.g. biomass burning, there could be absorbing organics at UV. This fact might lead to underestimation that is also seen in the ECMWF model. However, in most of current global models, as well as the ECMWF model, absorbing part of OC has not been included. Our study mainly aimed on an evaluation of ECMWF model by looking at the optical properties of aerosols (AOD) from the model

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and comparing it with the measurements from AERONET. In our manuscript, we analyzed total AOD (including scattering and absorption) without specifying at any single aerosol type in particular, therefore, the OC absorption specifically was beyond our scope of model validation.