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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.

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We thank the Reviewer 2 for the positive comments. We have considered these comments in regards of our revised manuscript.

In the general remark, Reviewer 2, firstly, thanks for a coherent, readable manuscript on a topic of considerable interest to the operational forecasting community. Reviewer 2 furthermore states that, the skill of model analyses of aerosol particle concentrations is an important measure of progress toward desired goals in air quality, climate, and atmospheric chemistry research, and, moreover, points that this is a worthwhile paper.

Comment 1: There are a few passages of results I found confusing that probably need to be rewritten, especially the discussion of fine and coarse mode AOD on page 19871.

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In your revisions, you should consider whether your results permit conclusions to be drawn about your model behavior. If biases are different in the UV compared with the mid-visible, the two most likely causes are 1) balance of the aerosol species in your model simulation; 2) assumed optical properties of one of more of the aerosol species. To some extent, you can separate #1 and #2 by considering the behavior of the model results for only those locations where AERONET indicates that the fine mode fraction is very high, or very low (Note: be wary of AERONET retrievals with very low fine mode fraction, as that can be indicative of cirrus cloud contamination: (Chew et al. *AtmEnv* 2011: <http://www.sciencedirect.com/science/article/pii/S1352231011008375>)

Reply: The discussion part has been now improved to better present the results. We now divided the discussion part into two subsections, presenting fine-coarse mode results (subsection 3.4) and more general remarks (subsection 3.5) separately. In our opinion, subsection 3.4 now provides a significant analysis showing the model performance in regards of coarse and fine mode aerosols. Considering the Reviewer 2 comment, we did try to look more in details to coarse and fine mode fraction and the corresponding model performance. However, with the given data we have, this is our best attempt to assess the performance of the ECMWF model in terms of fine and coarse mode aerosols (as presented in subsection 3.4) .

Comment 2: Your paper has a lot of numerical results presented, which are of interest for model development, but you should work to identify general trends representing model tendencies not tied to specific regions. One way you can do this is by testing whether the optical properties of MACC coarse-mode aerosols are consistent with what is observed by AERONET. The prognosis for both model developers and model data users is very different if the aerosol species are unbalanced, vs. if the aerosol particle optical properties are biased.

Reply: See our reply to Comment 1 above: we have now improved the manuscript.

Comment 3: 19861-29: “of the year”

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Reply: Corrected.

Comment 4: 19862-25: “November”

Reply: Corrected.

Comment 5: 19862-18: “When we removed: : :before removing AOD340,500).” Unclear. I think this might be easier to comprehend if it were two, or even 3, separate sentences.

Reply: Changed as suggested.

Comment 6: 19863-11: “calculated using these two wavelengths” I assume this is 340 and 550; you should just say that.

Reply: Changed to the actual wavelengths as suggested (Ångström exponent was calculated using 340 and 500 nm in the manuscript).

Comment 7: 19866-21: “(where the origin of rain dust is)” I’m not sure exactly what you meant by this.

Reply: Rain dust or ‘red rain’ represents brown-colored rain that is caused by red dust (or just dust) suspended in the falling water. The dust is carried from Sahara to Europe. More detailed explanation can be found in e.g. Avila et al. (1997).

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 19853, 2013.

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