

Interactive comment on “Study of the effect of different type of aerosols on UV-B radiation from measurements during EARLINET” by D. S. Balis et al.

D. S. Balis et al.

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Reply to referee 1 comments

First of all we would like to thank the anonymous referee for his comments that helped to clarify many issues in the paper. His/her suggestions have been considered in the revised version of the paper, as follows:

1. The input data for the RT model simulations have been described in more detail in the methodology section according to the reviewers's suggestion.
2. In figure 2a the AOD at 323 nm used for the RT calculations has been inserted as estimated from the AOD at 399nm and the Angstrom exponent based on the sun-photometer measurements. This has been clarified in the appropriate section in the

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text.

3. A description of the MFR sunphotometer has been added. These measurements together with the Brewer measurements provided AOD for Thessaloniki. Both instruments (as described now in the text) provide AOD and Angstrom exponent in specific wavelengths regions and both have been used in order to increase the number of cases that could be examined.

4. Concerning figure 2 we added a new figure 2c where we present the wind measurements for the 10th of August. The wind direction indeed changed in the afternoon hours from north to east, indicating the arrival of air masses originating from nearby cities. It is true that this fact was not obvious from the LACE overview paper, however we combine in the revised version this reference with the new figure in order to explain the change in SSA.

5. A more detailed paragraph for the uncertainty of the method for estimating SSA has been inserted. It is true that due to the low AOD values the method is highly uncertain for that special case, however the meteorological data support the change in SSA that we have estimated for this day.

6. The reviewer is right. We removed the argument that Bundke et al, paper supports the morning-evening change in SSA and we just mention what other estimates of SSA were available during LACE98 for that day.

7. All spectral measurements used in the study, both at Lindenberg and Thessaloniki have been cosine corrected. This has been clarified in the text.

8. The reason for not showing LR values below 1km is because of the high overlap of our system. We apply an overlap correction to the extinction profiles only down to 800m, as suggested by Wandinger and Ansmann.

9. In the description of case 2 the main point that we want to stress is that we have a case with same AOD, same total ozone and different UV-B and we attribute this differ-

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ence to different aerosol characteristics. The referee is right that the inconsistency of the SSA for the first day remains and this is a measured evidence that the uncertainties involved in the estimation of SSA can lead to questionable conclusions.

10. In fact we wanted to stress that the 13-Sep might have a larger maritime component than the 29-Oct, and not to claim that on the 13-Sep we had maritime aerosols. The text has been corrected accordingly

11. The reviewer is right that the description of case three was not clearly written. Our interpretation is that both cases are influenced from polluted regions (Balkans, Italy) and indeed there might be a possibility for the presence of Sahara dust, which however is not supported by the trajectories. The reason for showing this case is that we have different ozone, similar type of aerosols and big difference in AOD and thus we can have a measured estimate of the effect of AOD only on the UV-B. The text has been changed accordingly

12. We agree with the reviewer's comment on Figure 7. It was too strong to say that we verified our findings with the trajectories. Instead we say that for the maritime and continental cases, where theoretically one expects similar SSA values, the corresponding trajectories are indeed distinguishable, which is not the case for circled cases. We want to say that there are strong indications that from combined observations of the LR and SSA one can improve the characterization of the aerosols.

13. We removed the 2 upper levels (300hPa and 200hPa) from the trajectories of 25-Sep for consistency with the others

14. The time difference between Brewer and lidar measurements are of the order of an hour. Actually we used the last UV-spectrum of each day considered, while the lidar measurements were performed at sunset. We assumed that the aerosol conditions remained rather stable during a period of two hours in the late afternoon. However it is true that rapid changes can affect the comparisons. An appropriate comment has been added.

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15. The reason for showing only 18 cases is that only for these ones we could satisfy the conditions described above (14)

16. A more detailed description of Fig8 has been inserted.

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