

Interactive comment on “Systematic comparison of dust BSC-DREAM8b modeled profiles with Potenza EARLINET lidar database” by L. Mona et al.

Anonymous Referee #2

Received and published: 28 January 2014

The authors provide an evaluation of modeled properties of mineral dust layers over Potenza with coincident lidar measurements. The manuscript is of interest to the scientific community. However, major revisions are required before publication. Despite being written in a lengthy and repetitive style, the manuscript fails to provide all the information I would like to find as a reader. Furthermore, most of the figures seem redundant since their content can be explained in single sentences. I therefore suggest that the authors revise their manuscripts carefully by keeping in mind the points given below.

Major points

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The text needs careful revision and re-organization. Please remove repetitive and redundant parts and get straight to the point of what you want to tell the readers.

The introduction should be shortened according to what is really necessary for this study. Lidar-specific parts should be moved to Section 2.1.

Most of the information provided in Section 2 is already available elsewhere. I don't see why it is necessary to spend so much text on it.

The authors should provide a better presentation of how lidar measurements are identified as dust cases. It seems like the description of this crucial procedure is somewhat lost in the text of Section 2.1. I suggest to revise the description of dust-case identification and to move it to the methodology section, maybe even as an individual subsection.

What happens if geometric properties of the dust layers are obtained from lidar measurements at several wavelengths (page 31377, line 7-13)? Which wavelength is used in the end? Do you average the findings of the different channels? Are such cases used for internal quality assurance. Please elaborate.

Regarding the comparison of optical properties: There are so many possible reasons for deviations in the optical properties besides the misrepresentation of aging in the model. What about the effects of sources and transport? Don't forget that the model could be wrong at any step from the source to your measurement comparison. I think these points deserve more attention in the discussion of the findings.

The manuscript could gain more scientific depth if the authors would use the results of their investigation to study the representativeness of the lidar observations of mineral dust at Potenza. It would be interesting to gain some information on the rate of missed dust cases due to unfavourable weather conditions, system downtime, or other disturbing factors. Such an investigation could be restricted to DREAM forecasts of dust events with an AOT of larger than 0.1, i.e., model cases that should be observable

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with the lidar.

Minor points

change null to zero

Please stick to quantitative statements and refrain from subjective formulations like "almost perfect agreement", "good agreement", "satisfying agreement", etc.

page 31364, line 26: All particles are 100 μm large at the source? I don't think so. Also if you talk about particle size, please state if you refer to radius or diameter.

page 31369, line 29: I guess it is the signal-to-noise ratio of the Raman channel that you refer to

page 31371, line 10: Agreement of what?

page 31371, line 14-18: What about a table to present this information? It could also include the availability of extinction coefficients for comparison. What is the number of independent measurement cases?

page 31371, line 21: Are you talking about 310 separated dust events or 310 individual measurements during dust events? If the latter, what is the number of individual dust events observed at Potenza station?

page 31376, line 22-26: Either something is wrong with this definition or I have no idea what you are talking about.

page 31377, line 24: When you know the base and top height of a layer, you have information on the layer's extend but not on its shape.

page 31378, line 12-18: The effect of the PBL on dust-layer identification should be addressed in the methodology section.

page 31379, line 10: Could the rather coarse vertical resolution of the model have an effect?

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page 31379, line 29: This seems a little speculative? How likely are isolated extreme points in aerosol layers from long-range transport?

page 31382, line 10: What is the occurrence rate of mixed layers over Potenza? Please try to quantify your speculations.

Tables

I would add the information provided in Table 1 to Figure 2 and omit the table.

Figures

Figure 1 is not required to support what is discussed in the text and should be omitted from the paper.

Figure 2: Add the information from Table 1. Please give an observation frequency rather than counts.

Figure 3 is not necessary.

Figures 4 and 5: I suggest to keep only one of these figures. The findings of the omitted figure can then be referred to in the discussion of the figure that is kept.

Figure 6: What about showing profiles for different AOT intervals? Please always plot the mean values with their respective standard deviation as error bars. I suggest to use a scale of the extinction coefficient that is familiar to people that work with lidar (i.e., inverse km or Mm).

Figure 7 might be more helpful (also for your discussion) if you could provide histograms for different height intervals.

Figure 8 is not necessary.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 31363, 2013.

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