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Discussions

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Interactive comment on "3D evolution of Saharan dust transport towards Europe based on a 9-year EARLINET-optimized CALIPSO dataset" *by* Eleni Marinou et al.

Anonymous Referee #2

Received and published: 11 January 2017

The paper entitled "3D evolution of Saharan dust transport towards Europe based on a 9-year EARLINET-optimized CALIPSO dataset" is an interesting analysis of mineral dust properties above North Africa, the Mediterranean and Europe that contains valuable information in 3 dimensions using CALIPSO products improved with EARLINET techniques and data.

However, the manuscript needs to undergo some improvements before being published in ACP. First, I suggest to improve the English and writing throughout the manuscript. Additionally, results presented here are valuable and interesting but in general discussion need to be extended and completed at some points in Section 3. I suggest that the authors include more statistics such as the mean, standard deviation, extreme val-

ues, etc for some of the properties presented here and for the different regions. Some sentences comparing the results obtained in Section 3 with results obtained in previous studies would also be useful. They should also consider the use of tables to summarize main results, making easier for the reader to focus on the main findings of the study. Consider also the minor comments following next:

I suggest to replace the word utilize by use

Page 2, line 26: Replace "means of identifying" by "mean of identifying"

Page 2, line 29: Remove "a" before pure dust extinction

Page 2, line 31: Replace later by latter

Page 3, line 17-18: Is the climatology by Winker et al, 2013 on dust properties? If not, remove it from the paragraph

Page 4, line 24: Replace CALISPO by CALIPSO

Page 4, line 27: Explain the acronym LIVAS

Page 5, line 5: Did you quantify this error? Could you provide an estimated value here?

Page 5, line 6: I suggest replacing "Based on this this technique" by "On using this technique"

Page 5, line 31: I suggest starting a new paragraph from "The conditional dust product..."

Page 6, line 9: What do you mean they should be used with caution? Because of the definition provided here, it is expected that Con-DE is larger than total extinction for some cases, but it is still correct

Page 6, lines 11-16: It will be useful to include in this paragraph the information about the region studied and the period covered

Page 6, line 28: Remove "of the" before "mean DOD values"

Page 6, line 30: Please add a short sentence here explaining why dust transport is suppressed

Page 7, line 17: Provide the precise value of the mean DOD and its standard deviation instead of ranges or rephrase the sentence

Page 8, line 4: Does α represent the total aerosol extinction or the dust aerosol extinction?

Page 8, line 22: Replace "situation" by "horizontal pattern" or "horizontal distribution"

Page 8, line 24: I suggest renaming section 3.3. as "Climatological dust cross sections" to be coherent with the title in section 3.4.

Page 9, line 3: what do you mean by mobilization of the sources here? Please, elaborate more this sentence

Figure 3 (4, and 5): Please, increase the size of the axis labels text for the Domain figures

Page 9, line 12-13: Elaborate this sentence

Page 9, line 15: Similar Clim-DE values are observed between 50-60 deg N for other longitudinal zones, why do you point it out for this specific zone? Also, what is the uncertainty for the Clim-DE product? Values of 5 Mm-1 are very low and could fall within the uncertainty. Add discussion regarding the uncertainty throughout the manuscript where needed

Page 9, line 16: What are the criteria to consider a value of 10 Mm-1 "significantly" high?

Page 9, line 29-33: You should consider adding here more discussion and some statistical parameters (e.g. mean, standard deviation, maxima, minima, etc) to enrich this summary. Also, some sentences about the dust vertical distribution in the summary are missing.

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Page 10, line 1: How is the impact on cloud formation estimated?

Page 10, line 2: Please, include additional information and discussion on this part related to the dust mass concentration calculation. What is the point of calculating it here?

Page 10, lines 12-14: The information included here should be provided earlier in the section, before discussing the results.

Page 10, line 23: Replace "populations of dust" by "dust features"

Page 10, line 25: Indicate the other seasons and regions where the two distinct layers are observed

Page 11, lines 3-12: This paragraph should be moved to later on in the manuscript, in order to keep all the discussion related to figure 4 together. Additionally, more discussion on depolarization should be provided here.

Page 11, line 16: Replace "in the same range with" by "in the same range as"

Page 11, line 32: At the end of section 3.3 you mentioned that Con-De will be used to discuss if the decreasing intensity with height and latitude is representative, but this is not discussed in section 3.4. Please, include some sentences. Additionally, some more discussion comparing the results from sections 3.4 and 3.3 will be interesting.

Page 12, line 18: Replace "statistical significant" by "statistically significant"