Reviewer #1

The manuscript describes and analyses a strong episode of dust on the eastern Mediterranean region, by using satellite, surface and models for estimating the impact of dust on surface radiation. The analysis is sound and merits publication in this journal. It is also of interest for applications such as solar energy forecast. In any case, only minor comments are asked to be taken into account.

- However it would be interesting to add real measurements of solar energy plants to the estimations here described, if available.

Author's reply: The solar energy plants receive the input energy which is the local energy yield and produce the energy output which is only a percentage of the inputs because of the total system and material losses. The climatological, topographical and geographical conditions are affecting the performance as well. As a result, adding real measurements of solar energy plants is a complex issue while the comparison of RTM simulations against real plants measurements, needs a completely separate and energy-losses-based analysis. We agree with the reviewer that this would be interesting and we hope to have the opportunity to study real solar plant measurements in a following study.

- Page 2, lines 24-25: please state the reason to choose LibRadTran model among the different models available (if any specific reason). It would be useful to state briefly the advantages. Cite accordingly.

Author's reply: We thank the reviewer for this comment. In the revised paper we included a brief description of the advantages using libRadtran.

- Page 4, line 15: "the temporal resolution of AERONET measurements is very high (_1 per 10 minutes)". This statement is relative. AERONET performs direct AOD measurements broadly every 15 minutes. Other instruments measure the AOD every 1 minute or less. So I do not consider the temporal resolution to be very high in relation to other instruments available.

Author's reply: The sentence has been restated.

- Page 7, line 18: what is the comparison of CALIPSO and MODIS in terms of AOD for the specific episode?

Author's reply: The maximum AOD observed with CALIOP is about 3 in the center of the plume, while the corresponding AOD from MODIS is almost 3.5 over the Greek region and about 3 over the plume part that CALIPSO overpasses. We added the proposed direct comparison of these two sensors in the revised version.

- Page 8, lines 14-27: only level 2 retrievals should be used for climate data records, although level 1.5 are still useful for analysing specific cases. The authors decided to use only level 1.5 data. Do the authors consider that level 2 data criteria were too strict for this particular case, based on their experience or other simultaneous measurements? Could the authors state which AERONET criteria were decisive for not attaining level 2?

Author's reply: In this particular Dust Case, level 1.5 and level 2.0 AOD products had exactly the same data points. Figure 5 upper plot demonstrated both level 1.0 and level 2.0 (identical to level 1.5). The automatic filtering algorithm (described at Smirnov et al.,2000) filters out a lot of AOD values due to very rapid change of aerosol load. For AOD study we have used level 1.0 data because this high values were considered as "clouds" when in reality there were irregular high dust concentration. There is no way to have this estimation using only CIMEL measurements, so it cannot be applied in AERONET algorithms or generalize this method. But the general picture of the atmospheric conditions on that particular day, described in detail in the present study, drives us to this approach. For inversions retrievals we have used level 1.5 products, although most measurements have already been filtered out by the cloud screening procedure, we just wanted to skip the sza>50º criterion used for level 2.0. We keep in mind that retrievals at sza<50º have higher uncertainties, but considering our scientific interest on that episode and the importance of having some ground based estimation of the nature of aerosols we chose to proceed with level 1.5. Inversion products haven't been used in model calculations, so these higher uncertainties are not spread in our results. The paragraph has been restated to clarify the difference between AOD level 1.0 and inversions level 1.5 products.

- Page 8, line 31-32: for the 8 year climatology, level 1.5 or level 2 was used?

Author's reply: The climatology was based on Level 1.5 data. This information was added in the revised version.

- Page 7, line 8: "extends" or "is extended"

Author's reply: Corrected.

- Page 7, line 18: CALIPSO - Page 8, line 30: "by comparing"?

Author's reply: We corrected these two grammatical failures. Thank you for noticing them.

- Page 10, line 3: please revise

Author's reply: We revised the sentence, thank you for mentioning this.

- Page 10, line 6: describe figure 9 before passing on figure 10

Author's reply: You are right. We corrected that.

- Page 10, line 11: perhaps I missed something, but I would say you refer to AOD instead of radiative forcing.

Author's reply: We want to thank the reviewer for the carefully reading and this conceptual correction. The reference was for the AOD indeed, so we made the appropriate revision.

- Figure 5: add axis units

Author's reply: The axis units were added in the revised paper.

- Figure 6: avoid using smoothed lines between points, as in the other figures

Author's reply: In the revised paper we used straight lines between points in Figure 6 and anywhere else it was applicable (e.g. not in mean spectrally polynomial fitting case).

- Figure 8: plot c, state UV index or units. Same for caption.

Author's reply: We thank the reviewer for this definition omission. We now fixed this issue for both plot and caption.