We would like to first express our thanks to the reviewer for her constructive comments. The responses to these are below after the reviewer points that are in italics.

The paper is devoted to the assessment of the influence of aerosol diurnal cycle on the total 24-hour radiative effect at the TOA. On the base on AERONET data as the input parameters the authors estimated the radiative effect of diurnal aerosol variability and compared it with that estimated with average aerosol values as well as with the single value taken at the MODIS overpass time. Text has a good structure and is well documented. However, the reviewer has some remarks.

Major remarks:

1. In Section 2.2 more information on the calculation RT scheme should be given. It would be useful to present the accuracy of RT calculations in the libRadtran package. What spectral interval is considered?

More details are given in the revised version both regarding the RT scheme and the input data that were used (e.g. spectral interval was the Kato correlated-k bands from 240.1185 nm to 3991.003 nm).

If the unusual conditions are observed for a particular site (for example, extremely high AOTs in fire smoke conditions, which can strongly affect the typical diurnal cycle) what the technique was used for removing the possible biases in diurnal cycle? This can be added to the section 2.1.

As written in the text ("all individual observations … were taken"), no attempt was made to remove the extreme cases. We considered it essential to use as large amount of data as possible, but also including all the cases to capture the true possible diurnal AOD variability in each site.

2. Since it was mentioned that the MODIS surface albedo had been applied, could you clarify what the assumption - black-sky and white-sky albedo - was used? This might be important in winter conditions when the aerosol effect over bright surface can be positive. It would be very interesting to see the effects of diurnal cycle of aerosol with taking into account for surface albedo effects (at least, to distinct the cases with bright snow and sand surfaces and grass).

AERONET uses MODIS black-sky albedo, so it was therefore also our albedo product. This is now clarified in the revised text. As emphasized in the text, our specific focus was on the effect induced by AOD diurnal variability, so on purpose in our modeling approach the impact of most other input parameters is averaged out, to large extent. Nevertheless, we wanted to form as representative input data as possible, also for albedo and very good alternative was available from AERONET data files.

3. The paper is devoted to the analysis of radiative effects from all AERONET sites. However, the most part of the paper is devoted to the description of only the 4 or 8 sites. And there is only one Figure which concerns the effects obtained over all sites. I would recommend to add the Table with the statistics for all the data.

Overall statistics are now included in the Table 1 of the revised version.

4. It would be also useful to add the analysis of possible physical causes of the diurnal aerosol cycle where it is possible, at least.

Some possible reasons for diurnal AOD cycles are now discussed in the revised version.

5. At the same time formally at different wavelengths the diurnal cycle can be not the same (the changes in coarse mode can influence more in near infrared region). This, of course, would not play great role but can be described in the text.

We agree. However, we wanted to estimate the relevance of AOD diurnal cycle in shortwave ADRE, if this diurnal cycle is neglected. For this purpose, we selected the diurnal pattern at visible wavelength for our simulations, as the most appropriate.

Minor remarks:

page 10328 line 6: "at the top" instead of "on the top" missing preposition before ADRE?

Corrected.

line 19: seems wrong preposition: "in individual: : :"

Unfortunately, I did not understand what was the problem here?

page 10329 line 7 remove or change somehow "also"

The meaning of this sentence was that while the indirect forcing has larger uncertainties currently, there are still uncertainties also in the direct forcing.

line 16 Please, clarify why the accuracy is increasing at higher air mass. The possible effect of coarse mode scattering within the angle of view of the instrument may work in opposite direction?

Reference was given for this discussion. The uncertainty due to the calibration is proportional to 1/m. Of course, the forward scattered diffuse light can enter the instrument FOV and can work in opposite direction. However, this effect starts being significant only at relatively large SZA and thus the limit of airmass of 5 is applied, as also mentioned in the text.

page 10330 Please, explain, why do you use the Angstrom Exponent over the 380-500 nm range, which differs from widely used 440-870nm range.

There was no particular reason for this specific choice. However, as emphasized in the text, our focus was on dADRE not on ADRE. So while our Angstrom Exponent choice might affect ADRE to some extent, the impact is arguably low in dADRE, in aerosol direct radiative effect due to the AOD diurnal cycle only.

page 10331 line 8 Please, move the sentence "We required: : :" to the subsection 2.1

This is done in the revised version.

line 12-15: You used a,b,c separation which was not used in the text. It should be used or removed.

We use numbers now instead, to list the different cases of simulations that were carried out.

page 10333 line 28 "profound" is not good to use here (may be "significant"?)

Word profound was changed to significant.

page 10334 line 11 (not shown) - why not shown? Not clear.

That statement refers to ADRE, while in the figure we showed only dADRE. In the revised version we included also time evolution ADRE (and therefore "not shown" was removed from the revised version).