

Interactive comment on “Diurnal aerosol variations do affect daily averaged radiative forcing under heavy aerosol loading observed in Hefei, China” by Z. Wang et al.

Anonymous Referee #2

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The article submitted by Z. Wang et al. for its review is a short study about the effect of daily averaging the aerosol optical

properties before they are used in the estimation of the surface radiative forcing. Previous results show that daily averaging

the aerosol optical properties (the study focuses at the aerosol optical depth mainly) doesn't have a strong effect on the

surface radiative forcing, at least in some regions. The authors want to stress out that for regions with a high aerosol

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optical depth and important daily variations (such as Hefei in China), the daily averaging of the AOD has a strong effect on

the SFC, and therefore, instantaneous AOD measurements must be used.

General comments:

In my opinion, the study has a good presentation and has been clearly written (the English grammar is good enough although the

text would further benefit from another English review). Although the scientific objective is not exceptional, it is a fair

study of a particular issue that affects many other scientific works (such as the evaluation of the aerosol radiative forcing)

and therefore I consider it to be suitable for its publication on Atmospheric Measuring Techniques journal. However, the

authors still need to make clear some points and correct some errors.

Specific comments:

- Page 2125, line 22: "the SKYNET sky radiometer". This is a Prede POM radiometer, please indicate. Please also indicate the

model used in this study (POM01L, POM02...).

- Page 2126, line 28: I have the impression that the authors are using a different definition of the relative differences,

based on the magnitudes of these values, when plotted in subsequent sections. I think they are using $\text{abs}(F_{\text{ave}} - F_{\text{org}}) / F_{\text{org}} * 100$,

as they are expressed in % and moreover, no negative values appear in some plots.

- Page 2128, line 8: it is interesting to include AOD only in the study, but I think the

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authors should make an extra effort to

show that SSA and AS have a negligible effect. I think the paper would improve largely if they were able to apply a similar

procedure to show the effect of other parameters to the SFC.

- Page 2126: you use SBDART to estimate the surface radiative forcing. Please briefly comment about the uncertainties involved with this model to complete the discussion about the effect of the averages on the daily SRF estimation. You can base your estimation on previous cases such as Prasad, A.K., Singh, S., Chauhan, S.S., Srivastava, M.K., Singh, R.P., Singh, R., 2007. Aerosol radiative forcing over the Indo-Gangetic plains during major dust storms. Atmos. Environ. 41, 6289–6301. <http://dx.doi.org/10.1016/j.atmosenv.2007.03.060>, or A.R. Esteve, V.Estelles, M.P. Utrillas, J.A. Martinez-Lozano, Atmospheric Research 137 (2014) 195–204.

- The SKYNET measurement protocol consists of direct sun measurements every 1 minute and diffuse sky measurements every 10

minutes. In contrast, AERONET measures sun component every 15 minutes and diffuse sky every 30-60 minutes. Maybe the authors

could comment about the advantage of such a temporal resolution difference? What would be the effect of measuring every 15

minutes instead of 1-min, in terms of the SFC?

Technical corrections:

- Page 2124, lines 12-15: please rewrite this sentence (These errors increase with increasing daily aerosol optical depth (AOD)

MEANING THAT high temporal resolution...)

- Page 2127, line 22: "may not be negligible"

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- Page 2128, line 4: "as shown in Fig. 4. The daily averaged..."

- Page 2128, line 18-19: please write the correlation coefficient as 0.9945, as it is written in subsequent sections. Correct

also in the figures. Correct the sentence "which are also examined"

- Page 2128, line 26: "AOD at 500 nm and the corresponding"

- Page 2129, lines 5-7: please rewrite

- Page 2129, line 9: "Average Fave" is redundant.

- Page 2129, line 12: "responded to" could maybe written as "related to"

- Page 2129, lines 13-18: please rewrite, these items are not clearly understood.

- Page 2129, line 20: please remove "frequently" from here. Maybe "frequent heavy aerosol loadings"?

- Page 2129, line 22: remove "of them"

- Page 2129, line 24: over aiming?. High pollution regionS.

- Page 2120, line 8: up to. Line 10:"So we require paying". Line 15: "Care must be taken"

Figures and tables:

- Figure 1: The last point on the plotted series looks like increasing too fast. Probably it can be removed from the series.

- Figure 2: Please indicate the biases names in the in-plot bars. Please, check the colors of the lines and captions.

- Figure 3: Please include the 1:1 line and extend the linear fit to the plot limits. Same for figure 6.

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- Figure 7: Third histogram has wrong labels in the X axis. It must be the relative deltaF, instead of DRAF. It looks like

being a relative value to 100 ($dF/F*100$).

- Figure 8: please include the lines resulted from the fittings. Is AOD referred to 500nm?

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 2123, 2015.