Reply to: Interactive comment on “A case study of dust aerosol radiative properties over Lanzhou, China” by L. Zhang et al.

Anonymous Referee #3

Comment 1:

I am not a native English speaker, so I did not check the English of the manuscript.

Reply: The language has been polished in the revised version.

Comment 2:

Page 2890, line 18. You mean “cannot be obviously observed.”

Reply: The referee’s interpretation is quite right, we will modify it and try to improve the language of the manuscript.

Comment 3:

It would to nice if adding a photo to show the SACOL and corresponding instruments. I think there is one in the SACOL document. But I leave the decision to the authors. If the authors feel it is not necessary, please ignore this comment.

Reply: Pictures of SACOL and its instruments will be provided in the revised manuscript as shown in the following.

Comment 4:

Page 2892, Can a table or tables show basic properties of these instruments?

Reply: A table of basic descriptions of instruments used in the observation is added to the revised manuscript. .

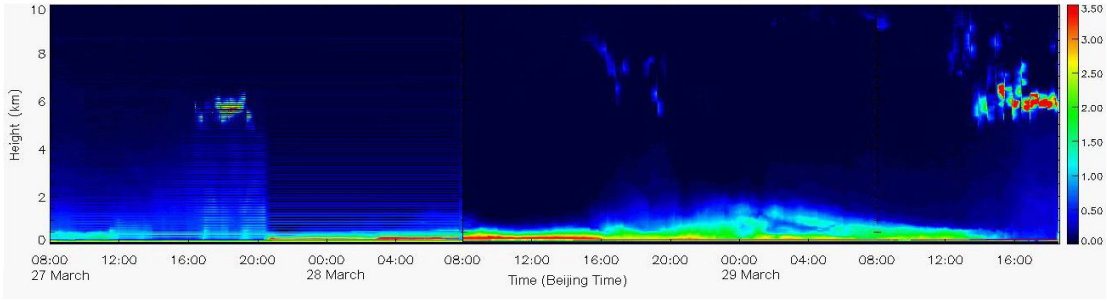
Table 1. Specification of instruments

Instrument	Specification	
CE370-2	Transmitter: Actively Q-switched frequency-doubled Nd: YAG laser	Wavelength: 532 nm
	Laser power: 50 mW	Output laser energy: 8–12μJ
	Pulse width: <15 ns	Pulse repetition frequency: 4.7 kHz
	Filter bandwidth: 0.2 nm	Total beam divergence: 55 μrad
	Telescope field-of-view: 110 μrad	Detector: Avalanche photodiode
	Detection mode: Photon counting	Acquisition time: >0.8 s
	Vertical resolution: 15 m	Maximum range: 30 km
TP/WVP-3000	Calibrated brightness temperature accuracy: 0.5 K	Long term stability: <1.0 K/yr
	Water vapour band: 22–30 GHz	Oxygen band: 51–59 GHz
	Brightness temperature algorithm for level 1 products: Dual gain, 4 point nonlinear model	Retrieval algorithms for level 2 products: Neural networks
CE-318	Wavelengths: 1020, 870p1, 670, 440, 870p2, 870, 936, and 870p3 nm	
	Field-of-view of collimator: 1.2°	Bandwidth: 10 nm
M9003	Principle:	Wavelengths:
	Integrating nephelometer	450, 520, and 700 nm
	Light scattering angle:	Time resolution: 5 min
	10° –170°	

Comment 5:

Fig. 3. Probably can use a new colorbar.

Reply: In the light of the referee's suggestion a new diagram has been made.



Comment 6:

Fig. 7. (b), it is extinction coefficient or scatter coefficient?

Reply: Fig. 7b shows the temporal evolution of aerosol scattering coefficient, not extinction coefficient.

Comment 7:

Page 2899, section 4.6. It would nice if adding some physical explanations on correlation between PM_{10} and dust extinction coefficient if possible.

Reply: As shown in Fig. 9b there is a good linear correlation between PM_{10} concentration and aerosol extinction coefficient, of which the correlation coefficient is 0.94. It indicates that the aerosol concentration, as a main part, determines the aerosol extinction coefficient. The aerosol extinction coefficient is more likely related with aerosol concentration, atmospheric condition, mixing layer height, aerosol type and size distribution (Schaap et al., 2009).

References

Schaap, M., Apituley, A., Timmermans, R. M. A., Koelemeijer, R. B. A., and de Leeuw, G.: Exploring the relation between aerosol optical depth and PM2.5 at Cabauw, the Netherlands, Atmos. Chem. Phys., 9, 909–925, 2009.