

## ***Interactive comment on “Analysis of the vertical structure and size distribution of dust aerosols over the semi-arid region of the Loess Plateau in China” by B. Zhou et al.***

### **Anonymous Referee #1**

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Comments to Zhou et al., ACPD, Loess Plateau lidar observations

General

The paper presents observations (in situ, photometer, lidar) of desert dust in north-western China. There are not so many papers on this topic. Some revisions are required.

Details

Abstract:

Page 6114, line 11: add diameter to 0.7  $\mu\text{m}$  to 5.0  $\mu\text{m}$ .

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Page 6114, line 22: moderate mode? You mean accumulation mode?

Introduction:

Page 6115: During the last 5-8 years there were many observational activities dealing with desert dust (UAE2, AMMA, DABEX, DODO, SAMUM, NAMMA), but no one is mentioned in the introduction. A brief overview of these dust observations should be given.

Methodology section can be kept very short, however, please provide more information regarding the rather low lidar ratio  $S_2$  of 20 sr (where did you find such low values over the continent, what type of aerosol causes these low values??).

Results:

In Figure 5 you present the time series of AOT. How did you overcome the problem with the incomplete overlap between laser beam and receiver field of view? What did you assume for the extinction coefficient in the lowermost 500 m of the atmosphere, where do not have trustworthy extinction values? Figure 6 indicates that even up to 1000m trustworthy extinction values are not available.

Page 6121, line 15: How trustworthy are the depolarization ratio values? The depolarization observation is of essential importance in lidar dust observations. But a critical discussion on uncertainties in the depol observations is missing. Please provide more information on the calibration of the parallel and cross polarized channels, and also on the retrieval itself. Did you use Rayleigh calibration in the aerosol free troposphere? What about particle depolarization values. These can better be compared to all other dust depolarization values around the world.

Section 3.2 to 3.4

I am not an expert for in situ aerosol observations and scattering modelling. But the following paragraphs do not provide any new informations, to my opinion, and should be kept rather short. Definitions are questionable to me. The fine mode contains

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particles with effective diameters up to 2.5 microns. The diameter of 2.5 seem to be arbitrarily chosen, and what means 'effective' here. Coarse mode particles are particles with diameters greater than 10 microns, and not, as I was thinking, greater than 1 micron. There are clear definitions for fine mode, accumulation mode, coarse mode, giant particles, and sand particles. These definitions should be applied.

Figure 6: Figure 6 clearly shows the overlap effect for heights below 1000 m. This must be mentioned. And please show the particle depolarization ratio instead of the volume depolarization ratio.

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Interactive comment on Atmos. Chem. Phys. Discuss., 12, 6113, 2012.