

Interactive comment on “Long-term profiling of aerosol light-extinction, particle mass, cloud condensation nuclei, and ice-nucleating particle concentration over Dushanbe, Tajikistan, in Central Asia” by Julian Hofer et al.

Anonymous Referee #2

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Paper analyzes the results of 18 months lidar observations over Dushanbe and provide statistics for seasonal variation of aerosol parameters. Authors apply previously developed POLIPHON approach to derive profiles of CCN and INP. Manuscript is well and clearly written and can be published in ACP. I have just some technical comments.

Abstract, Ln. 1.” ...were conducted with a state-of-the-art multiwavelength lidar” Should be explained, which parameters make it “state-of-art”

p.4 Ln.11. “.of (30–40 sr) and for Central Asian aerosol pollution (30–50 sr)”. Refer-

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ences should be given. For dust, 30 sr is too low.

p.4 Ln.8 “. . .on typical particle linear depolarization ratio values (Müller et al., 2007; Tesche et al., 2009) for dust (0.31) and non-dust (0.05)”. These are values for African dust. Are data for Asian dust available? What are values from CADEX measurements?

Are results for seasonal variations of lidar ratio, depolarization, Angstrom available?

P.8. Ln9 “Our findings are in reasonable agreement with the MODIS observations of the Ångström exponent” How reliable is Angstrom from MODIS over the bright surface? Definitely AERONET should be the primary instrument for comparison.

Fig.2. Does plot “d” shows particle depolarization? It’s strange that it is close to zero at 5 km, where backscattering is also close to zero. How could authors get particle depolarization at such low backscattering?

Fig.6 needs some discussions. Lidar ratio (LR) at 532 is below 40 sr, which is low. Previously published values of lidar ratios should be reviewed. On this figure LR355>LR532, while during SAMUM the lidar ratios coincided. It should be discussed. Recall, that during SHADOW campaign in Africa, LR355 exceeded LR532, which was related to the spectral dependence of the dust imaginary part (Veselovskii, I., Goloub, P., Podvin, T., Bovchaliuk, V., Derimian, Y., Augustin, P., Fourmentin, M., Tanre, D., Korenskiy, M., Whiteman, D., Diallo, A., Ndiaye, T., Kolgotin, A., Dubovik, O.: Study of African dust with multi-wavelength Raman lidar during the “SHADOW” campaign in Senegal, *Atm. Chem. Phys.* 16, 7013–7028, 2016.) What is difference between African and Asian dust?

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