

Interactive comment on “Interrelations between surface, boundary layer, and columnar aerosol properties over a continental urban site” by Dongxiang Wang et al.

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Herewith we would like to thank the reviewers for all of their valuable expert comments on the initially submitted version of this manuscript. All of them were addressed in the individual answers to both Reviewers and/or included in the revised version of the manuscript.

Most important comment, raised by both Reviewers, was related to the fact that in some sections of the manuscript we did not clearly enough stated that the obtained correlations were weak or none. One of Reviewers had an impression that we are making generalizations on possible relations, even if there aren't any. This was not at

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all our intention and it is now clearly stated in the revised manuscript. In fact, it is right opposite - with our work we show that the relations found in already published research, obtained on the basis of case-study approach, do not necessarily apply nor are seen in the long-term study. Therefore, special care should be taken when interpreting and comparing the different results.

In the revised version of the manuscript more care was dedicated to defining the selection of data taken for analyses, including more detailed reasoning for our choice. However, we insist on keeping all scatter plots (even if only in an appendix) to transparently document this study, which was actually focused on searching for relations and lack of them for some sets of parameters should be treated as a valid result. However, following the request of reviewers, an effort was put at explaining the obtained results.

As suggested, we also extended our analyses with additional 44 sets of profiles. Now we analyze over 250 full sets of comprehensive optical properties profiles. Please note that each single set contains: 3 backscattering profiles, 2 extinction profiles, 2 depolarization profiles and water vapor profiles - this is a unique data set, never reported in any other study in literature.

The fact that we perform quasi-continuous 24/7 observations does not mean that for all of this data one can obtain such comprehensive sets of properties, due to various limitation: low and mid-level clouds, fog/smog, precipitation, laser failures, signal-to-noise-requirements, et cetera. This means that it is not possible to directly translate the qualitative information visible in 24/7 lidar signals to the quantitative sets of optical properties profiles, the latter being assured by comprising with the tough QC requirements of the EARLINET-ACTRIS Data Base. Note that as much as 97% of total number of our profiles stored in this data base fulfills those requirements, accordingly to the latest Quality Control tests performed this year.

We reckon that it is relevant to keep the proposed separation of the temporal periods. Even though the mean values obtained for those periods do not show much difference

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in the given range of the standard deviations, several scatter plots show differences that we want to present, as indication that relations reported in literature for particular case studies related to special meteorological and air-quality conditions are not necessarily valid when larger sample of data is taken into account.

Finally, as for plots showing the physical quantities derived from the lidar, radiometer and photometer data, as suggested we scaled all of them to the lidar wavelengths (355 and 532), which indeed showed that the values derived within boundary layer and columnar ones are consistent. Although, we would like to stress that this daytime comparisons are shown mainly to indicate that aerosol load in free troposphere over Warsaw (and in vicinity of the city) can contribute strongly to the columnar aerosol optical depth, and be significantly higher than the aerosol load within boundary layer.

We believe that we managed to substantially improve this manuscript by exerting the suggested by both Reviewers changes. We are very thankful for the precious time of Reviewers that they kindly dedicated into completing their reviews.

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