The paper entitled "MAX-DOAS retrieval of aerosol extinction properties in Madrid, Spain" by Wang et al. present a half-year aerosol extinction properties retrieval based on MAX-DOAS measurement of O4 absorption in Madrid, Spain. The O4 DSCDs in the UV band was used to retrieve the aerosol extinction profile via the HEIPRO inversion algorithm. Not only the retrieved aerosol optical depth show an overall good agreement with the correlative AERONET product, but also the surface aerosol extinction coefficients derived from MAX-DOAS measurement are comparable to in situ PM2.5 concentrations. The time series of AOD shows higher levels in summer season due to more frequent dust intrusions. Moreover, a case of severe dust intrusion was discussed for the performance of the MAX-DOAS retrieval to capture the dust event with an elevated particle layer. The potential causes of the systematical underestimation of MAX-DOAS retrieved AOD were discussed, especially during high aerosol loading condition according to the case study. I have no major concerns that need to be addressed. The manuscript is generally well written, clearly presented and is recommended for publication in AMT after some minor corrections.

Minor comments:

P1, L9: UV-> UV spectral region

R: It has been corrected in the revised manuscript.

P2, L27: Since no long-term aerosol extinction profile results were presented in the manuscript, it's better to describe with aerosol extinction properties, i.e. AOD, surface AEC.

R: 'aerosol extinction profiles' -> 'aerosol extinction properties'.

P3, L17&L22: The MAX-DOAS measurements are working in both UV and visible band, however, why did the authors only use the O4 absorptions in UV to retrieve the aerosol extinction profiles? Is it possible to show some inter-comparison of aerosol retrieval results between different wavelength bands?

R: It's better to show the retrievals from different wavelength and related inter-comparison. However, we had a problem to record the spectra in the visible range. Unfortunately, no retrievals can be obtained in the visible band during this campaign.

P6, L26: Why the sensitivity study of the a priori profile was tested with these four specific shapes? Is it restricted with the algorithm itself or any other reasons? Obviously, it is not realistic that Gaussian distribution as shown in Fig. 3(b).

R: These four shapes of a priori are the default types of parameterization of a priori in the inversion algorithm. In principle, Gaussian distribution is completely differ from the others. Even though it is not realistic in a normal case, Gaussian distribution is more suitable to capture the elevated plume layer, e.g. desert dust plume. Please also refer to the response to Referee #2.

P7, L31: The comparison of AODs from MAX-DOAS and AERONET is not so well under high aerosol loading situation. If the correlation between them was improved if the dust days was excluded from the statistics?

R: Please refer to the revised Figure 4, in which we have supplemented a scatter plot of AODs from MAX-DOAS and AERONET.

P8, L10: Please add one more sentence or proper reference for the estimation of light path based on O4 SCD at horizontal direction.

R: More details about the approximation method can be found in Sinreich et al., 2013 and Wang et al., 2014. We have referred these two papers in the revised manuscript.

P9, L32: Figs. ->Figure

R: It has been corrected in the revised manuscript.

Figure 3: delete 'vertical'

R: We have corrected it.

Figure 6: correlation plots -> linear regression plots

R: 'correlation plots' have been replaced with 'linear regression plots'

Sinreich, R., Merten, A., Molina, L., and Volkamer, R.: Parameterizing radiative transfer to convert MAX-DOAS dSCDs into near-surface box-averaged mixing ratios, Atmos. Meas. Tech., 6, 1521-1532, doi: 10.5194/amt-6-1521-2013, 2013.

Wang, Y., Li, A., Xie, P. H., Wagner, T., Chen, H., Liu, W. Q., and Liu, J. G.: A rapid method to derive horizontal distributions of trace gases and aerosols near the surface using multi-axis differential optical absorption spectroscopy, Atmos. Meas. Tech., 7, 1663-1680, doi:10.5194/amt-7-1663-2014, 2014.