De Leeuw et al. reported a new 3-D climatology of AOD over mainland China based on the combination of MODIS, ATSR and AERONET. Compared with MODIS, the radiometer of ATSR extends the AOD time series albeit the large offset between these two products. This topic is not new, but the methods used are robust and analysis is sound. For instance, ground- based AERONET AODs have been used to validate the space-borne AOD, in addition to the intercomparisons between MODIS AOD and ATSR AOD. Overall, the paper is well written, and deserves publications in ACP if the following concerns being successfully addressed.

We thank the anonymous reviewer for the careful consideration of the MS and the positive recommendation

General comments:

1. **Table 1: It is well known that the time period when AERONET stations operated in the past varies a lot by regions. The time period for each site in Table is suggested to be added so that the readers can be better informed. Likewise, the various time periods or AREONET sites can be interpreted by differentiating the scatters in Figs. 7 and 8 in various shapes. This will help give more information with regard to the validation results.**

   We have added the time periods of operation in Table, where we discriminated between periods when disruptions were 3 months or longer. However, in Figs 7 and 8 we have not differentiated between different stations since we do not used that kind of analysis. The study of the reasons for the differences between ATSR and MODIS is out of scope for the current paper and would make it too long. However, this would be interesting for a separate study warranting another paper (see also response to Rev#1 t).
2. **Why only CALIOP AOD over north parts of mainland China is shown in Fig. 5? The topic is the AOD climatology over China, and it will be useful to show CALIOP AOD throughout the study area. Meanwhile, you can highlight in Fig. 5 the region of interest (35-45 N; 70-150E) for the cross-section map in Fig.6.**

   In Sect. 3 we present an overview of data available. Here we show only part of the data because those for all China have been presented and analyzed in Proestakis et al. under review in ACPD (https://doi.org/10.5194/acp-2017-797). Here we show this slice as an example of the complementary information from CALIOP. This slice was chosen because it encompasses the Taklimakan desert as well as the BTH area,

i.e. the desert with high dust emission and the BTH region which is strongly influenced by both dust and anthropogenic aerosol. The area shown in Fig. 5 and Fig. 6 is the same.

Minor comments:

1. **Page 2, line 22-23: The following references could be considered to be added to inform the readers of the background of aerosol effect. "Aerosol particles are important because of their effects on weather and climate (e.g., Rosenfeld et al., 2008; Koren et al., 2014; Guo et al., 2016), health (Pope et al., 2009; Anenberg et al., 2010), atmospheric chemistry, visibility(Sisler and Malm, 1994), cultural heritage, etc."**

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Koren, I., G. Dagan, and O. Altaratz, 2014. From aerosol-limited to invigoration of warm convective clouds, Science, 344(6188), 1143–1146, doi:10.1126/science.1252595.

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Rosenfeld, D., U. Lohmann, G. B. Raga, C. D. O'Dowd, M. Kulmala, S. Fuzzi, A. Reissell, and M. O. Andreae (2008), Flood or drought: How do aerosols affect precipitation?, Science, 321(5894), 1309–1313.

Sisler, J. F., and Malm, W. C. (1994). The relative importance of soluble aerosols to spatial and seasonal trends of impaired visibility in the United States. Atmospheric environment, 28(5), 851-862.

These references have been added

2. **Page 17, line 14: "Varying between -20 and 80 minutes"? Also, the discussion as regards the overestimation of MODIS AOD relative to ATSR AOD could be problematic. In the morning, the boundary layer height (BLH) generally increases as a result of increasing turbulence caused by increasing incoming solar radiation (Guo et al., 2016; Stull et al., 1988; Petäjä et al., 2016). The later overpass time of MODIS/Terra will have higher BLHs, resulting in lower aerosol concentrations and smaller AOD. This is opposite to the results shown in Fig.10. Therefore, more insightful discussion is much needed here (Li et al., 2017).**

The difference in overpass time, with possible higher BL due to increasing turbulence mixing, was exactly the reason for showing Fig. 10, as discussed in the paragraph above the Fig. However, we do not see a systematic difference related to difference in overpass time indicated with the colours. The colour scale extends to -20 to avoid excluding data points where the difference is small or even negative. As shown in the Fig. there are some data points with a difference in overpass time of 0-20 minutes. Note that the equator passing times differ by 30 min, but the actually overpass time, which can be evaluated from the data files, may be different from 30 min due to swath width.

References:

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