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.

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.
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.

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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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).

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