

## ***Interactive comment on “Long-term (2001–2012) fine particulate matter (PM<sub>2.5</sub>) and the impact on human health in Beijing, China” by S. Zheng et al.***

### **Anonymous Referee #3**

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In this paper Zheng et al. establish a relationship between ground-level PM<sub>2.5</sub> and AOD using one and an half years (from May 2011 to December 2012) of measurement data for PM<sub>2.5</sub> at the U.S. embassy site and AOD at the AERONET site in Beijing. Based on this relationship as well as AERONET AOD observations from 2001 to 2012, they derive daily PM<sub>2.5</sub> over a long-term period in Beijing and estimate the yearly premature mortality by different diseases attributable to PM<sub>2.5</sub>. This study is interesting as it shows a good example of using ground-based remote sensing method to monitor aerosol pollution and evaluate its impact on human health. The paper is well written and organized. I would recommend the paper to be published in ACP after some revisions as suggested below.

As described in the paper, the yearly premature mortality (Fig. 6) is calculated from  
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the yearly average of PM<sub>2.5</sub> and yearly registered population (the latter is presented in Fig.5). Although day-on-day PM<sub>2.5</sub> from 2001 to 2012 are shown in Fig.2, the trend of PM<sub>2.5</sub> cannot be seen clearly from the figure. I would suggest that the yearly averaged PM<sub>2.5</sub> from 2001 to 2012 be presented and its variation on the estimated trend of premature mortality discussed.

As shown in Fig. 1, there could be large biases in daily PM<sub>2.5</sub> estimated from AOD. How about the uncertainties in estimated yearly averaged PM<sub>2.5</sub>? It might not be so large as for the daily averaged values, but a quantitative estimate is needed. For example, the yearly averaged PM<sub>2.5</sub> estimated from AOD for the year 2012 can be compared with that calculated from the original PM<sub>2.5</sub> measured at the embassy site.

The authors state that ground-based PM<sub>2.5</sub> is not available for the period 2001–2012 in Beijing (P28660, Line 24–25). This might be true for long-term CONTINUOUS measurements of PM<sub>2.5</sub> over this period. In fact, there have been numerous measurements of PM<sub>2.5</sub> as well as its chemical components in Beijing since the early 2000s, as reported in both domestic and international publications including some review papers. The authors may consider the possibility of using these observational data to validate their estimated PM<sub>2.5</sub> for specific years or seasons.

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