

Interactive comment on “Latitudinal gradient and interannual variation of PM₁₀ concentration over eighty-six Chinese cities” by W. J. Qu et al.

Anonymous Referee #2

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General comments: This paper describes spatial and temporal variations of aerosol mass concentration in China from viewpoints of aerosols' impact on climate change and human health. Aerosol is one of the most important factors in climate system as pointed out in the introduction of this paper. A study on the spatial and temporal variations of aerosol properties contributes to climate change studies. However, I wonder about suitability of PM10 data at environmental monitoring sites for climate change studies from the following reasons.

1. Most of monitoring sites are located in a heavy air pollution area such as industrial area or central area of large city, so that the obtained data just reflect air pollution in a small area. It is just a point data on a surface as described in page 23155 (lines 2-9). Moreover, vertical distribution, at least aerosol optical thickness, of aerosols must

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be considered for climate change studies. I recommend a comparison of PM10 data with satellite aerosol data such as MODIS or with ground based observation such as AERONET. Although some discussions with TOMS aerosol index data are found, it is not sufficient because TOMS aerosol index is dependent on optical properties and vertical profile of aerosols. The discussion on the aerosol optical thickness is also just referring to other papers.

2. Chemical components of aerosols may be different among the locations. Aerosols in the coast area where aerosols mainly consist of anthropogenic particles such as sulfate and black carbon are different from aerosols in inland area of western China where dust particles may be dominant even though the both observation sites are located along the same latitude. Chemical components of aerosols as well as size distribution are closely related to aerosol optical properties. Therefore PM10 mass concentration is insufficient for the study of aerosol impact on climate change.

Finally, it should be pointed out that this paper just shows spatial distribution of PM10 mass concentration and speculations for the distribution. For the latitudinal gradient of PM10, three reasons are discussed in page 23156 (lines 20-29). However, discussions are insufficient, and the more detailed analyses are required for the publication of this paper in ACP, for example, comparison with emission inventory data, and spatial and temporal analysis of precipitation, etc. Otherwise this paper only shows geographical map of air-polluted city.

Specific comments: Page 23146, lines 10~11, 26: Referring to Zhang et al. (2003) and Chu et al. (2008), it is difficult to find detailed descriptions about API. The descriptions in these papers are almost similar to the present paper. More detailed descriptions are required.

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