

This paper presents a literature survey on PM<sub>2.5</sub> chemical composition and aerosol optical properties conducted in China in the past nearly two decades. Geographical, inter-annual, and seasonal variations are discussed. Aerosol hygroscopic properties are investigated, source apportionments of haze formation are summarized, and historical emission policies are reviewed. A larger number of tables summarizing existing studies are also provided in the supplemental information document, providing a one-stop reference collection. The study provides the much needed knowledge that is useful for guiding future research needs and making emission control policies. The paper is well organized and well written. I have the following comments for the authors to consider in its final version.

1. An urgent task facing the Chinese government and the scientific community is to quantify the sources and formation mechanisms causing episodic events of high PM<sub>2.5</sub> mass concentrations and severe haze. This paper provides a summary of source apportionment studies on haze events, but not on PM<sub>2.5</sub> mass concentrations. It is recommended to also include a review of source factors identified for PM<sub>2.5</sub> in various regions of China.
2. For a few cities such as Beijing, Shanghai and Guangzhou, inter-annual variations are discussed based on field measurements conducted by different researchers (and likely using different instruments and/or QA/QC methods). How much confidence do you have on these inter-annual variations compared to measurement uncertainties?
3. A related question to question 2 above: is it possible to compare the trends identified in this study to other sources such as the online PM<sub>2.5</sub> data, the AOD trend analysis data, or available literature?
4. Please also add sub-section titles in the content lists.