

General Comments:

This manuscript elucidates the seasonal variations, the formation mechanism, and the sources of PM_{2.5} in two megacities in Sichuan Basin. The concentrations of major chemical components of PM_{2.5} in different seasons are investigated. The chemical characteristics of clean days and polluted days are presented to study the formation of key chemical species as well as transportation pathway of secondary aerosols. In general, the research results provide meaningful information on both formation mechanism and environmental control strategies of PM_{2.5}. However, there are still some key issues which need to be addressed before possible publication.

1. The factors contributing to the different temporal patterns of sulfate and nitrate should be further discussed. Specific heterogeneous reaction which may play important roles in polluted days and its major contributing components can be clearly pointed out.
2. The discussion on PM_{2.5} formation process can be combined with the analysis on the variation of gaseous precursors, including SO₂ and NO₂.
3. More discussion on geographical sources of different chemical components of PM_{2.5} is recommended. I also suggest the analysis on the different topography of these two megacities, which will help to better explain the impact of local emission and regional transportation.

Besides, I have some specific comments on the manuscript as follows:

1. Section 2.5: I'd like to recommend adding detailed equations of PSCF analysis for better understanding.
2. Line 170-171: Citation format error: "Tao et al. (2013, 2014)" should be corrected into "(Tao et al., 2013, 2014)".
3. Line 244: The authors claimed the concentration of NO₃⁻ decreased on the polluted days in the warm season of CQ. But in Figure 6(d), the concentration of NO₃⁻ is higher in the polluted days. There seems to be contradictory.

4. Section 3.4.2: The authors applied CO-scaled $PM_{2.5}$ and major components to isolate the impact of meteorological conditions. Specific scaling approach or related references should be provided.

5. Section 3.4.3: I'd like to recommend adding a graph containing RH levels and NO_3^- concentration between the two sites. Also, a correlation between $[NO_3^-]/[SO_4^{2-}]$ and $[NH_4^+]/[SO_4^{2-}]$ is suggested to investigate the difference of NO_3^- formation between CQ and CD.

6. Figure 3: The black dots which indicate the average values should be stated in the figure caption.