Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Fine particulate matter (PM$_{2.5}$) trends in China, 2013–2018: contributions from meteorology" *by* Shixian Zhai et al.

Anonymous Referee #1

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General comments

This manuscript attempts to distinguish contributions from meteorology and emissions reduction to PM2.5 trends from 2013 to 2018 in five target regions in China. A multiple linear regression model (MLR) is developed using de-seasonalized (by taking 10-day average of hourly data) and detrended (by subtracting 50-day moving average of 10-day average from 10-day average) PM2.5 observations and corresponding five meteorological variables. The coefficients and intercepts obtained for each season and grid are applied to de-seasonalized but not detrended anomalies of meteorological variables (i.e., 50-day moving average minus 6-year average) to calculate PM2.5 anomalies attributable to meteorology. Consequently, residual anomalies are attributed to other factors, mainly changes in emissions. The attempt is valuable as the research

question, contribution from meteorology to the PM2.5 trend, is crucial to East Asian countries. Overall, the results with the MLR is acceptable. I would support publication of this manuscript with minor revision mostly asking clarification.

Specific comments

1) L25 'minor but significant': ambiguous expression. Can you add more explanation?

2) L26 'residual anthropogenic trends': anthropogenic emissions?

3) Section 2.3:

You may consider adding another variable for grid. For now, i represents both season and grid which made me difficult to follow at first.

Explicit description of Ya,i(t) is needed. It is not clear to me whether the anomaly is Ya,i(t) = 50-day moving average – 6-year average at the grid or Ya,i(t) = 10-day averge – (50-day moving average – 6-year average) at the grid.

4) Figure S2: How come PM2.5 anomalies are greater than de-seasonalized and detrended PM2.5? It makes sense if Ya,i(t) is as the second definition as I mentioned above.

Technical corrections

L131 K. Li et al. (2019): Couldn't find this reference. Did you mean Yi et al. (2019)?