

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 PM_{2.5} 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) PM_{2.5} 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 PM_{2.5} anomalies attributable to meteorology. Consequently, residual anomalies are attributed to other factors, mainly changes in emissions. The attempt is valuable as the research

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question, contribution from meteorology to the PM_{2.5} 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 $Y_{a,i}(t)$ is needed. It is not clear to me whether the anomaly is $Y_{a,i}(t) = 50\text{-day moving average} - 6\text{-year average at the grid}$ or $Y_{a,i}(t) = 10\text{-day average} - (50\text{-day moving average} - 6\text{-year average})$ at the grid.

4) Figure S2: How come PM_{2.5} anomalies are greater than de-seasonalized and de-trended PM_{2.5}? It makes sense if $Y_{a,i}(t)$ 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)?

Interactive comment on Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2019-279>, 2019.

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