

Interactive comment on “Nation wide increase of polycyclic aromatic hydrocarbons in ultrafine particles during winter over China” by Qingqing Yu et al.

Huili Lei

huili_lei512@126.com

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Overall, this manuscript is short on bright spots and largely repeats known conclusions. The current level does not meet the publication standards of Atmospheric Chemistry and Physics.

I am not sure that using the same sampling and analysis methods to carry out TSP size-grading sampling in northern and southern China can be an advantage of this study. Because the results presented by the authors are comparable to those of other studies, this equivalence, to some extent, may indicate that the measurements are comparable despite the differences in sampling and analysis methods.

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The correlation analysis between PAH concentration and meteorological parameters in this manuscript might be reconsidered. The meteorological parameters, T, SR, and BHL, were low in winter and high in summer, while the concentration of PAHs changed in the opposite way. This difference constitutes an inverse correlation between these meteorological parameters and the concentration of PAHs. Therefore, the authors' emphasis on the worsened PAH pollution in winter caused by adverse meteorological conditions is lack of argument. It is suggested to analyze the correlation between PAH concentration and meteorological parameters in northern and southern China in each season, and it is better to normalize the concentration at different sites. On the other hand, it is well known that the effect of meteorological conditions on pollutants is nonlinear. If feasible, it is desirable to use a nonlinear model to evaluate and even quantify the effect of meteorological conditions on the concentration of PAHs.

In addition, the source analysis of PAHs does not seem to be in-depth. It is expected to link the source contribution to the health risks of a specific PAH. This relation will improve the understanding of the impact of changes in emission sources on the composition and health risks of PAHs, which will be more conducive to the development of effective local control measures.

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