The manuscript by Yu et al. reports one-year concurrent measurement of airborne PAHs at 12 sites across China. Size-segregated PAHs together with typical organic markers are measured to evaluate health risks of PAHs in different size particles and attribute emission sources of PAHs over different regions in China. The finding that toxic PAHs are concentrated in ultrafine particles is particularly interesting. The authors also find that PAH pollution is high in the northern China and nation-widely increases in wintertime, due to the unfavorable meteorological conditions and enhanced emissions of coal combustion and biomass burning. I think this is an important work nowadays in China as well in the global air pollution community. Overall this manuscript is well-organized and well-written and should be accepted after the authors address the minor issues below.

Major comments:

1. The PM samples were collected in 6 regions of China, including urban, sub-urban and remote sites. The authors are suggested to add more comparison of PAH concentrations and compositions among different types of sampling sites.

2. As I know, the national standard is not for BaP_{eq} but BaP. The authors should directly compare measured BaP levels with the national standard.

Specific comments:

1. Line 52. Replace “associated” to “was associated”.

2. Line 57. Replace “enriches” to “enrich”.
3. Line 58. Replace “and” to “which”.
4. Line 91. Delete “in”.
5. Line 133. Replace “8h” to “8 h”.
6. Line 146. Replace “3.3μm” to “3.3 μm”.
7. Line 190. Replace “site” to “sites”.
8. Line 214.The unit is misspelling. It should be “ng m^{-3}”.
9. Line 259. Replace “high” to “higher”.
10. Line 264. The abbreviation of boundary layer height is “BLH”. Please replace “BHL” to “BLH” throughout the manuscript.
11. Line 281. Replace “within each northern region” to “within each region in the northern China”.
12. Line 299. Replace “high” to “higher”.
13. Line 306-308. The sentence “This is also confirmed by the significant correlations of $\sum_{24}$ PAHs with the biomass burning tracer, levoglucosan, the coal combustion tracer, picene, and the vehicle exhaust tracer, hopanes at most sites.” should be re-phrased to “This is also confirmed by the significant correlations of $\sum_{24}$ PAHs with the typical tracers of biomass burning (levoglucosan), coal combustion (picene) and vehicle exhaust (hopanes)”.
14. Line 314. Replace “biomass tracer” to “biomass burning tracer”.
15. Line 338-340. Provide the full words for the abbreviation “SCE”.

16. Figure 8. Please illustrate in the figure caption that the black dot-line represents the ILCR.
17. Table S4. Please add a line in the table to distinguish the sites in the northern China and the southern China.
18. Figure S11. Please add legend in the figure.