

Comment on soil-2021-6

Yong Zhang (Referee)

Referee comment on "Spatial variations, origins, and risk assessments of polycyclic aromatic hydrocarbons in French soils" by Claire Froger et al., SOIL Discuss., <https://doi.org/10.5194/soil-2021-6-RC2>, 2021

In the manuscript, concentrations of $\Sigma 15\text{PAHs}$ from about 2154 soil sampling sites all over France were quantified, and the map of $\Sigma 15\text{PAHs}$ concentrations revealed strong spatial variations of PAHs contamination in soil throughout France. Based on PAHs molecular diagnostic ratios, historical origin of PAHs in the northern part of France were identified, and it would be linked to significant emissions of PAHs in Europe during the industrial period of 1850–1950 with in particular contribution of coal/biomass combustion and iron-steel production. A health risk assessment was conducted for the residential population and resulted in a median value of 1.07×10^{-8} in total lifetime cancer risk. The topic of this manuscript falls within the scope of the Journal. Some of general and specific questions still need to be resolved or improved. So, I think this manuscript can be accepted and published in the Journal after a minor revision.

General Comments:

- In the introduction, it would be better for the authors to considered the occurrence of PAHs in other environmental media, such as atmosphere and rivers, so as to explain whether soil is the "source" or "sink" of PAHs.
- In the Materials and Methods section, QA/QC procedures should be performed.
- The specific source period of PAHs in soil needs to be demonstrated scientifically, such as specific period of PAHs generation could be determined by C isotope method.
- Format of the text should be modified and all Figures should be marked with longitude and latitude.
- It would be better for the authors to consider and quantify alkyl-PAHs from all of their samples. May be it would be more comprehensive for this work.

Specific comments:

- Reasons why "The results of the uncertainty calculations reported in the supplementary material (Table S1) highlighted the fact that the acenaphtylene uncertainty was higher than its associated concentrations; therefore, acenaphtylene was not considered in this study." should be explained in details.
- In section 3.3, it was mentioned that the concentration and ratio of PAHs indicated that pollutants were caused by distant atmospheric deposition. Relevant literature cited should be given.
- Figure 2, the ratio points involved in the figure are mainly concentrated in the north, which contains a large number of missing values and reduces the representativeness of the sampling points.
- Figure 4, the "R" in the figure should be changed to " R^2 ", and " $p < 2.2e-16$ " means " $p < 0.05$ "?

What means for "Erreur! Source du renvoi introuvable!" in line 440 and line449.