

Interactive comment on “Pesticides in the atmosphere: a comparison of gas-particle partitioning and particle size distribution of legacy and current-use pesticides” by C. Degrendele et al.

Anonymous Referee #4

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This manuscript reported measurements for selected OCP and CUPs in air at two atmospheric monitoring stations in Czech Republic. The novelty of this work is several current used pesticides have been detected in certain atmospheric samples. As for the part of gas-particle partitioning of OCPs and CUPs, I am doubt if the air sampling method used in this work is applicable to fulfill this proposal. As it is described in the manuscript, a high-volume air sampler was used to collect weekly air sample, with an average of 4310 m³. It is well known that there are several weaknesses to use high-volume air sampler for the determination of gas/particle partitioning for semi-volatile

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organic compounds. First, fine particles less than the pore size of the QFF may penetrate the filter and part of them can be caught by the PUF. Second, with 7 days sampling time, particle-bound OCPs or CUPs may happen with desorption and enter into gaseous phase. These aspects may lead overestimated gaseous concentrations for both OCPs and CUPs. Especially for the polar CUPs, their occurrence in the gaseous phase might be just caused by the fine particles caught by PUF slice. Therefore, such samples can only provide a sum concentration of OCPs and CUPs in the atmosphere, and are not efficient for evaluation of gas/particle partitioning process at all.

Moreover, as the authors intended to compare the gas-particle partitioning of and size distributions of both OCPs and CUPs, the factors, e.g. the fraction of total organic carbon in the particles and humidity of air which could affect the partitioning process of OCPs and CUPs should be included in the study as well. However, there are no such data available to support the data analysis.

Furthermore, there are many studies have been published for OCPs in rural atmosphere, and some CUPs have been included as well. As the CUPs have relatively high polarity, their gas/particle partitioning behaviors may differ to the legacy OCPs, and should be highlighted in the discussion of the manuscript. However, this issue is not presented in the manuscript.

Overall, it seems that the entire work such as sampling method and sample analysis have not been systematical organized that the measurements of this work could not support a reliable evaluation for seasonal gas/particle partitioning and size distribution of CUPs. I guess this manuscript is hard to be accepted for publication in ACP.

Specific comments

Title “Pesticides in the atmosphere: a comparison of gas-particle partitioning and particle size distribution of legacy and current-use pesticides”

There are only limited OCPs and CUPs studied in this work, it is not appropriate to use

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such title.

Abstract: It is hard to understand the important findings of this work when I read the abstract. For example “In general, gas-particle partitioning of pesticides was governed by physicochemical properties, with higher vapor pressure leading to higher gas phase fractions, and associated seasonality in gas-particle partitioning was observed in nine pesticides”, this statement is suitable for most organic chemicals including organic pesticides, should be not a major finding of this study.

P23653, L5, “and the relative lack of information regarding their toxic effects” Are you sure there are lack information for toxic effects of CUPs? Which CUP do you mean?

P23654, L5, “with a focus on the gas-particle partitioning and the particle size distribution. For many of these CUPs, this is the first time that their seasonal gas-particle partitioning and size distributions have been examined”

if gas-particle partitioning and particle size distribution are the major objectives of this study, the characters of the particle itself should be examined as well, e.g. TOC and organic matter fraction on PM10 and grain size of particles, and origin of the particles.

Air sampling

P23655, L3, what is the pore size of QM-A?

I am wondering, if it is necessary to collect 7-days, 4310 m³ for each air sample. I do not think it is so hard to determine the OCPs and CUPs selected in this study with 500 or 1000 m³ air. When the authors intend to estimate gas/particle partitioning, you do need consider about breakthrough of both particle-bound and gases chemicals, and degradation as well.

P23657, In the section “results and discussion”, it is not necessary to emphases “Detection frequency at the background site”.

P23660, L8-13, there are many other studies for CUPs in rural air, you may compare

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with literature data if you like.

P23660, “Seasonal variations at the background site”, you may use air mass back trajectories to figure out possible origin for high concentrations of OCPs and CUPs determined in this work. At least, the authors should not always simply address the high concentrations to certain application of pesticides around the sampling site. A statistics analysis may be helpful as well.

P23663, L17-26, this paragraph should be move to introduction.

For the section “Gas-particle partitioning at the background site”, there are many studies for Gas-particle partitioning of OCPs, which can be refered and compared with this work.

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