

Atmos. Chem. Phys. Discuss., referee comment RC2
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Comment on acp-2021-661

Claudia Grossi (Referee)

Referee comment on "Limitations of the radon tracer method (RTM) to estimate regional greenhouse gas (GHG) emissions – a case study for methane in Heidelberg" by Ingeborg Levin et al., Atmos. Chem. Phys. Discuss., <https://doi.org/10.5194/acp-2021-661-RC2>, 2021

In this study the authors apply the Radon Tracer Method (RTM) using a 24-year dataset of atmospheric methane (CH_4) and radon (^{222}Rn) concentrations, measured at the Heidelberg city, to estimate the trend of methane emissions over the city surrounding area. Then they compare the RTM based CH_4 emissions with results obtained using the EDGARv6.0 bottom-up inventory. Authors, who were the first to introduce the RTM in Levin et al., 1999, also analyze the strength and weakness of the RTM application mainly in regards to the radon flux value used in it and the representability of the catchment area of the atmospheric station depending on the heterogeneity of the GHGs sources.

The aim of this paper follows completely within the scope of this journal. The study is well designed and the English of the manuscript has been already reviewed by the other reviewer, who is a native speaker. The work behind the achievement of the 24-year dataset is impressive and it gives a really robust statistics to the results obtained in this study.

On the other hand, some aspects of the manuscript could be improved for the fluency of the reading and to clearly identify what has been done so far in the field of the RTM application. The state of the art and the discussion of the results of this study are not updated and they did not consider past outcomes from others researchers.

The paper deserves to be published in the ACP journal after that some changes will be made as explained in details in the following sections presented in the attached document

Please also note the supplement to this comment:

<https://acp.copernicus.org/preprints/acp-2021-661/acp-2021-661-RC2-supplement.pdf>