Atmospheric Measurement Techniques Discussions

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Comment on amt-2022-134

Anonymous Referee #2

Referee comment on "Intercomparison of detection and quantification methods for methane emissions from the natural gas distribution network in Hamburg, Germany" by Hossein Maazallahi et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2022-134-RC2, 2022

The quantification of CH4 emissions from gas leaks is highly important and an interesting dataset has been obtained using different methods. While parts of the manuscript are well written and also interesting conclusions have been drawn, other parts need major improvements. In my opinion, this paper can only be published after these improvements have been made and a reviewer (ideally from the inventory community) has seen the revised paper. The suggested improvements are mainly concerning the suction method and its implications on the inventories.

1) Line 135-136: "The reported uncertainty range of this method is ± 10% based on 23 measurements in the 1990s (E.ON, personal communication, 2020)."

This is only an appropriate reference if there is no published data about the uncertainty of the suction method. In this case, it should be stated that to your knowledge there are no publications about the uncertainty of the suction method. Otherwise, an appropriate reference should be used.

2) Line 518-524: "At several of the locations where the mobile method had indicated high emission rates subsurface accumulation was widespread, and the suction method was either not deployed or the measurements were incomplete because of either safety reasons or because the suction team estimated that they would be unable to complete the measurements within a day."

I do not understand the requirement to complete the measurements within a day. If the aim of the study is to compare methods, the measurements should be completed even if it takes longer than a day. This constraint resulted in only one data point (fully completed measurement) for the suction method. In line 1002-1003 it is stated "While the mobile

and tracer methods have been evaluated previously, this is the first peer-reviewed study that includes the suction method." I doubt that one can state this given just one completed measurement. It could be justified if the partially completed sampling and its comparison to the other methods is discussed in more detail

3) Line 960-997 "4.4 Possible suction method sampling bias with implications for emission inventories"

After reading it the first time I became interested in the topic and started reading the referenced reports. After doing this, my conclusion is that 4.4. needs major revision.

You write in line 961-962 "The national inventory for CH4 leakage from the gas distribution network in Germany is based on measurements with the suction technique (Umweltbundesamt, 2021)." I wanted to find out to which degree the inventory is based on the suction method and had a look at the referenced report. What I found is a reference to Gottwald et al., 2012 and Müller-Syring & Schutz, 2014. I had only a look at the latter reference and this only discusses theoretical emission estimates. It could be my fault that I missed the appropriate section in this extended report. However, it would be good to clarify what is meant with "based on" and it would be good to state where in this very extended report this can be found. (similar to what you do in line 966)

The next reference I was looking at was "MEEM 2022" (line 963). According to the reference section this is "MEEM, Analysing the Methods for Determination of Methane Emissions of the Gas Distribution Grid (2022). [online] Available from https://www.dbi-gut.de/emissions.html. (Last Accessed: 25 January 2022)" The link refers to a webpage of a project and the "MEEM Project - Phase I" has the title as given in the stated reference. I only found a "Management Summary GERG Project Phase I with the title Analysing the Methods for Determination of MethaneEmissions of the Gas Distribution Grid" published in May 2016. The second phase under a different name has been completed in 2018. Therefore the reference to the "ongoing project", which is "underway to refine these emission estimates" needs to be updated.

Line 965-966: "This implies that this method is not applied at locations of the A1 category, which demand immediate repair (P. 27 in GERG, 2018)." Though the statement is correct in Annex 5 of the given reference it is stated "Three measurement principles are considered for direct measurements on underground pipelines: Tracer Method, Suction Method, High Flow Sampler". Though I see that the suction method could "have a location sampling bias towards leaks in the B and C category", I am not convinced that it is not accounted for this bias in the inventories by using other methods for the A1 and A2 categories.

In summary: I think this section is interesting but needs to be re-written. The references of the reports should be revised (correct year, link,...), Also, the reference GERG, 2018 and GERG 2020 are the same. In addition, it needs to be clearer what the suction method

is used for and if this has really implications for the emission inventories or not.