

Dear Editor,

We provide below our responses to the reviewers' comments. Our replies and the corresponding changes made to the manuscript are presented in bold. Text from the original manuscript is shown in black, while newly added text is indicated in brown. We believe that these revisions have improved the manuscript.

Melina Macouin, on behalf of all co-authors

Response to reviewer 2 – RC2

We thank the reviewer 2 for the positive comments and very helpful and adequate suggestions. Our responses to their comments, as well as the changes made to the manuscript, are in bold below and text from manuscript in black and brown (new text).

This article discusses the implementation of a hands-on science workshop developed to engage students, teachers, citizens, and academics in citizen science projects. The authors conducted and participated in an impressive number of outreach events in France (and one in Senegal), where the workshop was held with hundreds of individuals, including children in elementary schools. Through demonstration and experimentation, the workshops sought to make visible: (1) magnetic forces and phenomena, (2) magnetic particles in air and soil, and (3) magnetic particles on tree bark, including its spatial variation within the city. The authors discuss the mutual benefits of the workshop for both the organizers and the participants, including enhanced dialogue, knowledge co-production, and shared experimentation.

This is an inspiring project that demonstrates the power of effective geoscience communication and engagement. I was particularly excited about the type, nature, and diversity of experiments and the insights on two-way dialogue and learning. Below, I provide a few major comments that I hope will be helpful to the authors as they refine the manuscript.

Additional context on the participatory air pollution project and on the workshop itself would strengthen the paper. As a reader with little familiarity of either the project or the workshop, there were several instances when I had a hard time following the text because I didn't have enough background information. Currently, there are only a few sentences in section 2.1 on the larger project and one sentence at the end of section 2.1 that connects the two (i.e., the project and the workshop). From this text, I gathered that the workshop is an outreach component of the larger research project. Later in the text, it seems the workshop also serves as a citizen recruiting event. It would be helpful to clearly state the overarching goal of the

workshop. Is the goal to promote participation in the larger community-based air quality project? To promote participation in science more broadly? To improve geoscience/science communication? From my reading, the aim is to promote participation in science broadly through improved geoscience communication (hence the emphasis on citizen science and the contrasting, unsuccessful approach of distributing leaflets).

We acknowledge that the approach (here, biomonitoring using tree bark and environmental magnetism) required additional explanation. We provided clarifications on these two topics in the methods, in Section 2.1 to better explain our approach, which we aimed to convey during the workshop. We reworked the beginning of the section to clarify the link between the participatory air pollution project and on the workshop itself and explaining other contexts of implementation, we added sentences: L. 63: “We initially designed and proposed this workshop for the launch of the NanoEnvi participatory program in April 2018 in Toulouse (France). The workshop has also been implemented beyond the participatory project to share our approach and demonstrate the use of tree bark as a biomonitor for PM. “

Line 67, we precised: “by deploying passive biosensors.”

Generally, between lines 63 and 74, we have expanded the description of the magnetic methods and incorporated over 10 additional references.

Notably, we added Line 71 : Tree bark is an efficient natural collector of airborne particles (Gu et al., 2025), capturing them on its surface through physical interception (Brignole et al., 2018; Li et al., 2025). It has therefore been used as a biomonitoring medium for atmospheric PM pollution, including potential toxic elements on pine bark (Kousehlar and Widom, 2019; Odabasi et al., 2016; Sut-Lohmann et al., 2020) and in other tree bark (Conkova and Kubiznakova, 2008; Li et al., 2025; Xu et al., 2018).

We removed the sentence: Line 80 « Participants or classroom received and installed biosensors as part of this larger study. »

The reviewer is right that it is better to clarify the goal as to promote participation in science broadly. To clarify the purpose of the workshop, we precised its purpose by adding:

in the abstract: Line 21: ‘Here, we present a hands-on science outreach workshop designed to promote participation in science and foster dialogue between citizen and researchers. The workshop demonstrates the use of tree bark as a biomonitor of urban air quality through magnetic methods.

Line 24: The workshop, originally developed to engage with residents and introduce our approach and underlying concepts prior to participation in the NanoEnvi participatory research project,

We also clarified in the introduction: Line 52: « ...introduces the use of tree bark as a biomonitor of urban air quality using environmental magnetism methods, with the aim of promoting participation in science and foster dialogue between citizen and researchers. The workshop was developed to promote citizen participation... »

My second major comment is the discussion. To bring these different threads together, could you frame your discussion as “four lessons learned” from the workshop? Could you also elaborate more in sections 5.2 and 5.3 on how the project fostered dialogue and facilitated interdisciplinary/inter-science communication? A few concrete examples with some supporting evidence from the literature?

We thank the reviewer for the suggestion of “four lessons” that we adopted.

See section title: line 308: 5 Four lessons learned

We added the following sentences with new discussions, examples and references in section 5.2

Line 333 “Engaging with participants has been identified as a key lesson for long-term citizen science projects (Lopez et al., 2024). The face-to-face encounters opened up opportunities for two-way dialogues, enabling the scientists to convey their motivations and ethics underlying the approach, while also addressing the need for researchers to clearly communicate (Riaux et al., 2023) and acknowledge (Dietz, 2013) their value system. In particular, exchanges surrounding the environmental impact of using of vegetal media instead of short-lived, low-cost sensors highlighted these underlying values and methodological choices, even prior the broader science-society dialogue enabled by citizen science (Wagenknecht et al., 2021).”

Line 325: “For example, participant feedback »

And for the section 5.3: Line 338: “This underscores the workshop’s capacity not only to disseminate knowledge but also to facilitate interdisciplinary innovation and the initiation of sustainability science projects. This aligns with Löhmus et al. (2025), who emphasize the importance of explicitly sharing disciplinary knowledge to foster interdisciplinary collaboration. In our case, this process is further reinforced by the presence of a non-academic audience, prompting a clearer articulation of disciplinary knowledge across fields. Such outcomes are rarely described in the literature, which more often reports the reverse dynamic (D’Este et al., 2023, Norström et al., 2020).”

- The tables and figures are fabulous. I really enjoyed their clarity and artistic quality. The legends are also clear and digestible.

We thank the reviewer for this encouraging comment.

Below, I provide major and minor comments by section.

1. Methods

- Each participant received two “paired indoor/outdoor” biosensors? Why? So that participants learn that air can be polluted in both environments? Perhaps this detail is not necessary for this paper. You could also simply say that participants received biosensors as part of the larger study.

Indeed, we simplified the details of the participatory project and instead focused on developing the approach: biomonitoring through tree bark and environmental magnetism methods, as mentioned earlier (see

We removed the sentence line 63: « Each participant or classroom received two biosensors to be placed indoors and outdoors (in the facade).”

You mention that bark was collected far from traffic. Why? Is the assumption that this bark has accumulated less pollution and serves as a baseline/reference? Because you revisit the concept of traffic as a source of air pollution in the hands-on mapping with color coded stickers, it would be good to clarify this.

We removed this detail and explicated more the principle of bark as biomonitor both in section 2.1 (see previous answers) and in the description of the fourth activity of the workshop in section 3.4. by adding sentences and new references in Line 197: Magnetic susceptibility was used to estimate the concentration of magnetic minerals, such as magnetite, deposited at the surface of tree bark. These magnetic minerals were used as proxies for anthropogenic pollution sources, particularly traffic-related emissions, including exhaust and non-exhaust particles (Delville et al., 2025). This approach has been applied in a limited number of participatory and environmental studies, including citizen-based projects in Toulouse (Leite et al., 2022) and Paris (Carvalho et al., 2024), as well as in broader environmental assessments (Chaparro et al., 2023). In this third component of the workshop, we invited participants

- Not all readers will be familiar with these methods. Consider mentioning that bark is a good bioindicator of pollution with levels typically higher near traffic sources (add a recent reference?).

This is now clearly explained (see previous answer) in section 2.1 with new references.

- Consider moving section 2.3 on Evaluation and Ethical Considerations to the end of Section 3. Make it section 3.6. Without knowing the details of the

workshop, it is hard to understand the evaluation section. It is also leads perfectly into section 4 on Evaluation.

To clarify our evaluation approach, we detailed the specific context, including the noisy and time-limited constraints during the workshop, and refer to relevant references on survey methods.

We explained why a quantitative survey didn't seem feasible given the workshop conditions. We also mentioned that we initially attempted a survey but discontinued it after two participants because we found the approach unsuitable.

However, we believe that, with the developed context and the justification, including references, it should remain in the Methods section (as it relates to the methodology).

These explanations are in the section 2.2: Line 93: “In such interactive and time-constrained workshop settings, standardized surveys may introduce response and participation biases and offer limited quantitative reliability (Tourangeau et al., 2000), Groves et al., 2009). They may also alter interaction dynamics and potentially reduce participant engagement (Bryman, 2016). Nevertheless, we attempted to administer a questionnaire once. However, this approach was not only challenging to implement, but also prone to introducing biases, and it was perceived as fostering implicit expectations of reciprocity, thereby shaping participants’ responses. It was therefore discontinued after two administrations.”

- The last few sentences of Section 2.3 need some refining.

See previous answer, we substantially reworked this part.

- I suggest cutting the sentence “We assume that the commitment and testimonies of energy and general satisfaction of all those involved - students, researchers, teachers, and visitors - must be taken into account and discussed in the results.”

Yes, we changed this sentence to make it more digestible: Line 104: “We assumed that participants’ commitment, energy, and overall satisfaction are important aspects to consider. These elements are therefore discussed in the Results section.”

- I also do not understand the meaning of the following sentence in the context of workshop evaluation “The work with teachers (see Leite et al., 2022) helps to set up the researchers' interventions in schools”.

We clarified this point by moving this part to the section 2.1 and change the explanation as follow : Line 82: “Exchanges with teachers (see Leite et al., 2022) prior the workshops supported the implementations of school-based interventions by helping define appropriate timing and the duration of each activity, understand children’s perceptions and fears regarding environmental issues, and address the activities in practice. In addition to researchers, both undergraduate and graduate students participated in the events (Table 1).”

- I would reorder the sentences that remain as follows
 - We did not collect any information during the workshop...
 - We also did not conduct a survey because?? ...
 - We did, however conduct interviews... please elaborate here in one sentence. How many? With whom? To what end?

As suggested, we re-ordered the paragraph. As mentioned earlier, we added details on the justification on the choice to not perform quantitative surveys. We precised the role of teacher prior the implementation of the survey (see previous answer) and the semi-structured interviews after the implementation: Line 99: “Two teachers who participated in the NanoEnvi project by hosting biosensors in their classrooms took part in semi-structured interviews reflecting on their experience and on the children’s response to the activities (see Leite et al., 2022). In this study, we draw specifically on the sections referring to the workshop conducted in their classrooms. The teachers were informed about the research project and the potential publication.”

- Minor detail – by animation, do you mean workshop? If so, just use the term workshop more generally.

We harmonized by using “workshop” everywhere.

1. Hands-on workshop

Section 3.1

- The workshop was held at outreach events designed to explain NanoEnvi? Maybe to clarify you could say that you capitalized on a series of NanoEnvi outreach projects to conduct the workshops.

Following this suggestion, we changed: Line 115 “The purpose of the events was generally to explain the NanoEnvi project. » to “We capitalized on a series of NanoEnvi outreach projects to conduct the workshops. They were...”

- Below Table 1, you say the workshop set up was designed for the launch of NanoEnvi. You could put this background context in section 2.1.

We added Line 63: “We initially designed and proposed this workshop for the launch of the NanoEnvi participatory program in April 2018 in Toulouse (France).”

- Instead of “sequences”, consider using the word “components”.

The term “sequence” was changed to “components” in 12 occurrences.

I assume the pilot project where bark measurements were made by children was successful and contributed to the development of the workshop, specifically component 3?

The 2013 experiment helped in the design of the workshop. We clarified this Line 130: “which helped inform the development of Component 4. »

Section 3.4

- Change “for children of 8 years old” to “for children of 8 years of age or older”

Done

1. Evaluation

Section 4.4

- I am not sure what the last sentence means. “However, it could be argued that too few researchers are proposing this type of workshop, and the communication around the citizen science project sheds light on our team.”
Cut?

We have removed this sentence.

Overall

- Consider using past tense since the research and work were completed.

We changed the tense in all the manuscript.

Thank you for devising this lovely project. I would have loved to participate!

We are grateful to the reviewer for their thorough and constructive review, as well as for the insightful suggestions, which we believe have led to significant improvements in the manuscript.

Response to reviewer 1 – RC1

We thank Reviewer 1 for their time and comments. Our responses are provided in bold below.

It's a nice work to "make the invisible visible" and thus improve engagement—is compelling and timely, fitting well within the rise of citizen science and environmental justice initiatives.

Overall, I would like to give a major review as this requires a good amount of revision in terms of rewriting the paper. The representations and flow need to be improved.

Some other areas to improve – a) very few references were included, especially comparing other citizen science projects with similar nature – should add much more insights from the existing citizen science projects; b) results section requires major rewriting – major sub-sections in results are inadequately written; c) evaluation methods (depending upon objectives – improved awareness etc.) were not adequately discussed.

We appreciate the reviewer's positive feedback and recognition of the relevance of our approach. We addressed the three points raised for improvement below.

A) We have added several references in different parts of the manuscript (notably in the Methods section and in Sections 5.2 and 5.3 of the Discussion). These references support our choices regarding survey methods and contextualize the use of bark as a biomonitoring medium and environmental magnetism. They also reinforced the discussion on interdisciplinary communication and engagement between scientists and the general public.

We have added 24 new references:

1. Brignole, D., Drava, G., Minganti, V., Giordani, P., Samson, R., Vieira, J., Pinho, P., and Branquinho, C.: Chemical and magnetic analyses on tree bark as an effective tool for biomonitoring: A case study in Lisbon (Portugal), *Chemosphere*, 195, 508–514, <https://doi.org/10.1016/j.chemosphere.2017.12.107>, 2018.
2. Bryman, A.: *Social Research Methods*, 5th edn., Oxford University Press, Oxford, 2016
3. Castañeda-Miranda, A. G., Chaparro, M. A. E., Böhnelt, H. N., Chaparro, M. A. E., Castañeda-Miranda, R., Pacheco-Castro, A., Martínez-Fierro, M. L., Solís-Sánchez, L. O., and Ornelas-Vargas, G.: *Bursera fagaroides* bark as a bioindicator for air particle pollution using magnetic properties, *Journal of South American Earth Sciences*, 108, 103217, <https://doi.org/10.1016/j.jsames.2021.103217>, 2021.
4. Chaparro, M. A. E., Chaparro, M. A. E., Castañeda-Miranda, A. G., Marié, D. C., Gargiulo, J. D., Lavornia, J. M., Natal, M., and Böhnelt, H. N.: Fine air pollution particles trapped by street tree barks: In situ magnetic biomonitoring, *Environmental Pollution*, 266, 115229, <https://doi.org/10.1016/j.envpol.2020.115229>, 2020.
5. Conkova, M. and Kubiznakova, J.: Lead isotope ratios in tree bark pockets: An indicator of past air pollution in the Czech Republic, *Science of The Total Environment*, 404, 440–445, <https://doi.org/10.1016/j.scitotenv.2008.04.025>, 2008.
6. D'Este, P. and Robinson-García, N.: Interdisciplinary research and the societal visibility of science: The advantages of spanning multiple and distant scientific fields, *Research Policy*, 52, 104609, <https://doi.org/10.1016/j.respol.2022.104609>, 2023.

7. Dietz, T.: Bringing values and deliberation to science communication, *Proc. Natl. Acad. Sci. U.S.A.*, 110, 14081–14087, <https://doi.org/10.1073/pnas.1212740110>, 2013.
8. Gonet, T. and Maher, B. A.: Airborne, Vehicle-Derived Fe-Bearing Nanoparticles in the Urban Environment: A Review, *Environ. Sci. Technol.*, 53, 9970–9991, <https://doi.org/10.1021/acs.est.9b01505>, 2019.
9. Groves, R. M., Fowler, F. J., Couper, M. P., Lepkowski, J. M., Singer, E., and Tourangeau, R.: *Survey Methodology*, 2nd edn., Wiley, Hoboken, NJ, 2009.
10. Kousehlar, M. and Widom, E.: Sources of metals in atmospheric particulate matter in Tehran, Iran: Tree bark biomonitoring, *Applied Geochemistry*, 104, 71–82, <https://doi.org/10.1016/j.apgeochem.2019.03.018>, 2019.
11. Li, Y., Wang, B., Zhang, X., Chen, X., Sun, X., and Jia, J.: Source apportionment of trace elements in urban atmospheric particulates using tree bark biomonitoring with receptor modeling: A case study from Hangzhou, China, *Environmental Pollution*, 385, 127114, <https://doi.org/10.1016/j.envpol.2025.127114>, 2025.
12. Löhmus, A., Kiisel, M., and Lõhkivi, E.: Interdisciplinary collaboration for sustainability science: the training challenge, *Humanit Soc Sci Commun*, 12, 1936, <https://doi.org/10.1057/s41599-025-06221-9>, 2025.
13. Lopez, L. S., Basu, A., Blagrove, K., Bove, G., Stewart, K., Bazely, D., and Sharma, S.: Establishing a long-term citizen science project? Lessons learned from the Community Lake Ice Collaboration spanning over 30 yr and 1000 lakes, *Limnol Oceanogr Letters*, 9, 99–111, <https://doi.org/10.1002/lol2.10336>, 2024.
14. Loroño-Leturiondo, M., O'Hare, P., Cook, S. J., Hoon, S. R., and Illingworth, S.: Building bridges between experts and the public: a comparison of two-way communication formats for flooding and air pollution risk, *Geoscience Communication*, 2, 39–53, <https://doi.org/10.5194/gc-2-39-2019>, 2019.
15. Norström, A. V., Cvitanovic, C., Löf, M. F., West, S., Wyborn, C., Balvanera, P., Bednarek, A. T., Bennett, E. M., Biggs, R., De Bremond, A., Campbell, B. M., Canadell, J. G., Carpenter, S. R., Folke, C., Fulton, E. A., Gaffney, O., Gelcich, S., Jouffray, J.-B., Leach, M., Le Tissier, M., Martín-López, B., Louder, E., Loutre, M.-F., Meadow, A. M., Nagendra, H., Payne, D., Peterson, G. D., Reyers, B., Scholes, R., Speranza, C. I., Spierenburg, M., Stafford-Smith, M., Tengö, M., Van Der Hel, S., Van Putten, I., and Österblom, H.: Principles for knowledge co-production in sustainability research, *Nat Sustain*, 3, 182–190, <https://doi.org/10.1038/s41893-019-0448-2>, 2020.
16. Odabasi, M., Tolunay, D., Kara, M., Ozgunerge Falay, E., Tuna, G., Altiok, H., Dumanoglu, Y., Bayram, A., and Elbir, T.: Investigation of spatial and historical variations of air pollution around an industrial region using trace and macro elements in tree components, *Science of The Total Environment*, 550, 1010–1021, <https://doi.org/10.1016/j.scitotenv.2016.01.197>, 2016.
17. Riaux, J., Kuper, M., Massuel, S., and Mekki, I.: Riding the waves of discomforts: Reflecting on the dialogue of hydrologists with society, *Journal of Hydrology*, 626, 130189, <https://doi.org/10.1016/j.jhydrol.2023.130189>, 2023.
18. Rotman, D., Preece, J., Hammock, J., Procita, K., Hansen, D., Parr, C., Lewis, D., and Jacobs, D.: Dynamic changes in motivation in collaborative citizen-science projects, in: *Proceedings of the ACM 2012 conference on Computer Supported Cooperative Work, CSCW '12: Computer Supported Cooperative Work*, 217–226, <https://doi.org/10.1145/2145204.2145238>, 2012.
19. Shirk, J. L., Ballard, H. L., Wilderman, C. C., Phillips, T., Wiggins, A., Jordan, R., McCallie, E., Minarchek, M., Lewenstein, B. V., Krasny, M. E., and Bonney, R.: Public Participation in Scientific Research: a Framework for Deliberate Design, *E&S*, 17, art29, <https://doi.org/10.5751/ES-04705-170229>, 2012.

20. Sut-Lohmann, M., Jonczak, J., Parzych, A., Šimanský, V., Polláková, N., and Raab, T.: Accumulation of airborne potentially toxic elements in *Pinus sylvestris* L. bark collected in three Central European medium-sized cities, *Ecotoxicology and Environmental Safety*, 200, 110758, <https://doi.org/10.1016/j.ecoenv.2020.110758>, 2020.
21. Tastevin, Y. P., Macouin, M., Léon, J.-F., Delville, L., Laffont, L., Gueye, M., Sagna, M. B., Dutrait, C., Cabral, M., and Diaw, M.: Etude scientifique et participative sur la qualité du sol et de l'air et sur la perception des pollutions par les habitants dans la zone Sebikotane-Diamniadio, Sénégal-Résultats du projet AirGeo (2021–2024), 2026.
22. Tourangeau, R., Rips, L. J., and Rasinski, K.: *The Psychology of Survey Response*, Cambridge University Press, Cambridge, <https://doi.org/10.1017/CBO9780511819322>, 2000.
23. Van Mensel, A., Wuyts, K., Pinho, P., Muyschondt, B., Aleixo, C., Orti, M. A., Casanelles-Abella, J., Chiron, F., Hallikma, T., Laanisto, L., Moretti, M., Niinemets, Ü., Tryjanowski, P., and Samson, R.: The magnetic signal from trunk bark of urban trees catches the variation in particulate matter exposure within and across six European cities, *Environmental Science and Pollution Research*, 30, 50883–50895, <https://doi.org/10.1007/s11356-023-25397-8>, 2023.
24. Xu, Y., Xiao, H., Guan, H., and Long, C.: Monitoring atmospheric nitrogen pollution in Guiyang (SW China) by contrasting use of *Cinnamomum Camphora* leaves, branch bark and bark as biomonitors, *Environmental Pollution*, 233, 1037–1048, <https://doi.org/10.1016/j.envpol.2017.10.005>, 2018.

B) We rewrote and reworked some parts of the results (see responses to RC2). Notably, we substantially rewrote Section 3.4 to explain the approach behind the activity. We have removed Section 4.4. «4.4 Perspectives from science fair organizers. The success of the dissemination protocol presented here could be seen in the fact that we were invited to perform it at events unrelated to our citizen science projects (see Table 1).»

C) We discussed our choice regarding the evaluation and the choice to not perform a quantitative survey in the section 2.2 by adding references and context (see responses to RC2). To clarify our evaluation approach, we detailed the specific context, including the noisy and time-limited constraints during the workshop, and referred to relevant references on survey methods. We explained why a quantitative survey didn't seem feasible given the workshop conditions. We also mentioned that we initially attempted a survey but discontinued it after two participants because we found the approach unsuitable.

Here are a few other suggestions –

Abstract – please make the abstract more focused. Specifically mention the objectives and methods. It needs to answer what environmental magnetism project and link to air pollution monitoring. Passive sensor to monitor what? Requesting to make the abstract a bit more specific.

To clarify that, we added Line 21: “to promote participation in science and foster dialogue between citizen and researchers. The workshop demonstrates the use of tree bark as a biomonitor of urban air quality through magnetic methods.”

We precisised line 24: “The workshop, originally developed to engage with residents and introduce our approach and underlying concepts prior to participation in the NanoEnvi participatory research project,..”

Line 27: “to monitor air quality” to explain the purpose of passive sensor”

We added Line 34: “These results led us to identify four key lessons: protocol evolution, science-society dialogue, inter-science communication, and eco-anxiety mitigation, highlighting the potential of hands-on geoscience outreach activities to strengthen science–society interactions.”

Methods

- There is no 2.2 section.

Yes, indeed (changed) – Line 68.

- In section 1 or 2, it's important to mention the objective and aim for the study. Is it improving citizen awareness or testing new methods for crowd-sourcing data in future or something else? The objective is not clear. "To promote encounters and get our experiences out of the laboratory" – is a bit generic – need to add some specific and tangible one.

We clarified the project's goal (see responses to RC2), by specifying that it aims to promote broad participation in science through improved geoscience communication. We also reworked Section 2.1 to explain the project's goal and the context of the workshop.

- Although a reference has been provided, it would be good to provide details of how tree bark works to detect air pollution. Section 3.4 needs to be more improved. Please take time (possibly add pictures in supplementary) to explain in more detail.

Section 3.4 have been expanded to explain how bark collect PM (see responses to RC2). This point has also been expanded in the method section 2.1 (with references). We added two files in supplementary information (SI.1: “color scale” and SI.2: “worksheet provided to participants” that accompanied the component 4).

- How were participants introduced in the method linking the passive monitoring by tree bark? How did you address issues like "what if we buy a low-cost sensor instead of the passive method?" from the participants?

The method of passive monitoring using tree bark was introduced during component 4 of the workshop and was further explained during the lecture that sometimes accompanied the workshop (section 3.5). We clarified this point in the section 3.4 by explaining the method (see responses to RC2).

"what if we buy a low-cost sensor instead of the passive method?": This point was occasionally discussed, as some workshop participants were also involved in a participatory campaign using low-cost sensors (non-academic). These exchanges occurred after the workshop, during the registration process of participants willing to join the participatory project involving passive sensors, and are therefore beyond the scope of the present paper. In this manuscript, we focused on describing the workshop developed to engage citizens and presented our approach as an initial step in the broader participatory project. The workshop has also been implemented in other contexts (we have clarified this point). Therefore, this issue is beyond the scope of the present manuscript. However, we note that participants generally did not perceive passive sensors as less effective than connected low-cost sensors, but were interested in the differences between the two approaches. The respective advantages and limitations of both methods were discussed, and participants expressed a need for support in interpreting the results from low-cost sensors.

- Why was a survey not conducted? Please provide some reasons.

As mentioned earlier and in response to RC2, we added references and context in the section 2.2 to explain our choice.

Results

- Section 4.2, 4.3, 4.4, 4.5 – are inadequate.
and need some rewriting and addition of information. These sections depend a lot on the overall objective of the study. So depending upon the objective, some sections can be scrapped off and some sections can be explained in detail.

We have removed the section 4.4.

We thank the reviewer for their valuable feedback, which will help improve the manuscript's structure, literature coverage, and methodological rigor.