

**Dafina Kikaj, Senior Scientist
National Physical Laboratory
Teddington, UK**

15th October 2024

**Dr David Griffith, Editor
Atmospheric Measurement Techniques**

Dear Dr Griffith,

Please find below our response to your comments on our paper: **“Direct high-precision radon quantification for interpreting high frequency greenhouse gas measurements”**.

We would like to thank you for taking the time to look over our manuscript and provide us with comprehensive constructive feedback.

Best regards,

Dafina Kikaj
(on behalf of all co-authors)

With apologies for the long response time, 2 referees have now submitted reports which recommend acceptance in AMT, require no major revisions but request a number of valid minor and technical corrections or enhancements. I encourage the authors to incorporate responses to these comments and prepare a revised manuscript. No major revisions are required.

In addition I have some further, minor technical suggestions that could be included at this stage:

Abstract (and conclusion) - use of "precision" when in most case you mean "accuracy" or sometimes "accuracy and precision". Please revise this usage.

Thank you. We acknowledge this distinction and have made the necessary revisions in the manuscript to ensure that "accuracy" and "precision" are used appropriately.

L62: it would be useful here to specify ^{222}Rn rather than just Rn to distinguish from other isotopes in this context

Corrected!

L200 and many instances thereafter: please use L min^{-1} not L m^{-1} for flows. In SI "m" is the symbol for metre. There also cases further on where you have correctly used L min^{-1} . Reviewers also noticed this, please check the MS for all instances and correct them.

We apologise for this omit. It is corrected now throughout the whole manuscript.

p14: Flows are given as m s^{-1} . Is this really a linear flow rate of metre/s? Flow rate is usually measured as vol/time, but I do not think you mean $\text{m}^3 \text{s}^{-1}$. Reviewers also noted this, please clarify.

This is a linear flow rate. We have corrected this now.

L366 I was confused by your use of a micro flow meter to estimate over pressure in Pa. Can you clarify this, please?

The main detector delay volume (and entire inlet line downstream of the Becker stack blower) is kept at positive pressure with respect to ambient conditions (usually between 100-200 Pa). This overpressure minimises the likelihood that ambient radon/thoron progeny at high ground-level concentrations will directly enter the detector in the event of a leak developing in the detector's delay volume or inlet line.

During normal operation the detector's overpressure is monitored using a micro mass airflow sensor located within the data logger box (via the ta port in the detector's bulkhead; Figure 9). At the time of commissioning a hand-held differential pressure sensor is usually used to relate flow rate reported by the micro mass flow sensor to a differential pressure between the tank and ambient atmosphere for a range of overpressure values (between 80 – 180 Pa).