

Interactive comment on “Estimation of background gas concentration from differential absorption lidar measurements” by P. Harris et al.

P. Harris et al.

peter.harris@npl.co.uk

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Response to Referee #1’s comments

on the paper “Estimation of background gas concentration from differential absorption lidar measurements”

by *P. Harris et al.*

We would like to thank the Referee for their positive opinion about our manuscript. Our responses to the comments are listed below. Changes to the manuscript are marked in blue.

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Comment 1. *Many mathematical details could be removed to an Appendix.*

Response. While we understand the suggestion of the Referee, we would prefer to keep the current structure of the manuscript introducing necessary mathematical concepts as they appear, to keep the flow of the explanation. We use only a minimum of technical details that are necessary for understanding the paper, and those may become obscure if moved into an auxiliary section.

Comment 2. *The authors should consider to have the same axis limits for similar figures (see Fig16 versus Figures 10, 12, 14).*

Response. Four of the figures showing transformed residual deviations (figures 5, 10, 12 and 14) use y -axis limits of -4 to 4 , and one figure showing transformed residual deviations (figure 16) uses y -axis limits of -10 to 10 . While we understand the suggestion of the Referee, we would prefer to keep the smaller limits for the larger number of figures so that the detail of the deviations in those figures is more clearly visible. The larger limits for the single figure are needed to show the behaviour of the transformed residual deviations before the window set to contain the plume. We have included a sentence in the first paragraph of the results section to make clear that the limits are different in this case.

Comment 3. *In Figures 4 and 6 are the units and labels of x-axis correct? Are the limits -1500 to 1500 km or m? Please check and correct accordingly.*

Response. The units and labels are not correct. We have changed the labels to be consistent with the other figures in the manuscript, and to correspond to units of kilometres.

We hope that the revised manuscript is now suitable for publication in *Atmospheric Measurement Techniques*.

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