

Interactive comment on “Sources of error in open-path FTIR measurements of N₂O and CO₂ emitted from agricultural fields” by Cheng-Hsien Lin et al.

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The authors thank reviewers for all comments for improving the quality of this paper. More details and deeper discussions suggested by the reviewer will be incorporated in the modified manuscript. The point-to-point responses are as follows: 1. Two citations were suggested a. Errors in absorbance measurements in infrared Fourier transform spectrometry because of limited instrument resolution (R.J. Anderson and P.R. Griffiths, *Anal. Chem.*, 47, 2339-2347 (1975)). b. Extending the range of Beer's law in FTIR spectrometry. Part I: Theoretical study of Norton-Beer apodization functions (C. Zhu and P. R. Griffiths, *Appl. Spectrosc.* 52, 1403-1408, 1998).

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2. A discussion as why the effect of increasing the temperature above ambient and changing the relative humidity reduces the accuracy to which the concentration of the analytes can be predicted would have been useful. Response: We did mention the temperature-broadening effect in the manuscript. More discussions will be addressed in the modified manuscript.

3. Define zero-filling factor (ZFF) Response: In this study, the zero-filling factor (ZFF) stood for a power of two (i.e., 2^n , $n = 1, 2, \dots, m$), so that 'ZFF of one' meant that one interpolated data point was artificially added within each resolution (0.5 cm^{-1}) to increase the resolution of instrument which was 0.25 cm^{-1} . I think that it would be clearer to express ZFF as two instead of one.

4. S-OPS abbreviation. Response: The term of the S-OPS was defined in the text at the page 6.

5. Clarify the physical paths that we used: not only 150 m, but 50 and 100 m. Response: Three path lengths (physical path = 50-, 100-, and 150-m) were used in the field OP-FTIR experiment. Only the path length of 150-m was used to study the effect of water vapour, temperature, and wind speed on the quantification of N_2O and CO_2 concentrations in the field. The path lengths of 50-, 100-, and 150-m were used to investigate the effect of the path length on gas quantification. That would be a good idea to simplify the path length from three different paths to one path of 150-m in Figure-1.

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