

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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Dear Referee,

The authors appreciate the work of the nonlinear least squares (NLLS) regressions using in the Multi-Atmospheric Layer Transmission (MALT) model, which is perhaps the most successful method for atmosphere measurements. The authors also understand that the MALT offers numerous advantages, and the most attractive feature to authors is the process of generating single-beam backgrounds, which is one of the sources of errors, is not required for MALT.

Since certain groups of the OP-FTIR users are mainly and still using regular spectral processes and chemometric methods for atmospheric gas measurements, authors only focused on different single-beam background generations, analytical window selections, multivariate regression models (CLS and PLS), and the corresponding errors in this study. Also, one of the purposes of this study is to evaluate the instrument, software, and quantitative methods provided by the United States Environmental Protection Agency in agricultural fields. Thus, the authors did not consider the MALT method in this paper. As mentioned, the companion paper concentrated on the quantitative methodology and this paper focused on the error analysis of these methods. For the CLS non-linearity, the polynomial function was applied in this study to solve the non-linear response of the CLS-calculated concentration to the actual concentration. More details can be found in the supplementary materials.

We do have a unique gas measurement system that can be used for either benchmarking the independent instrumentation or building quantitative models. Authors still engage in optimizing the quantitative methodology for the atmospheric measurement societies. Thus, the authors will consider the MALT method in the future and seek for more collaborations.

Sincerely,

Authors

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