

Interactive comment on “N₂O isotopocule measurements using laser spectroscopy: analyzer characterization and intercomparison” by Stephen J. Harris et al.

Anonymous Referee #1

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The authors present a very comprehensive and thoughtfully planned study to evaluate the performance of the three common N₂O isotope laser spectrometers, Picarro CRDS, Los Gatos ICOS, and Aerodyne QCLAS. Most importantly, they found that significant matrix and trace gas composition affected the precision and accuracy of all instruments with these interferences scaling with N₂O mole fraction. The authors do a great service for the community by proposing a step-by-step workflow to properly deal with these interferences.

I really appreciated Table 4 overviewing the many experiments performed because it helped orient me as I read through Section 2.4. Testing of instruments. Although I

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hesitate to ask the authors to add any more to this already massive manuscript, I think that readers would benefit from an additional overview table summarizing the main findings for each of the three types of N₂O isotope laser spectrometers. This would help readers implement step 1 of the proposed workflow, choosing the right laser spectrometer for one's application, and also help readers implement the general workflow as appropriate for the specific spectrometer type (e.g., dealing with CH₄ interference is less important for QCLAS). Some readers may view this instrument intercomparison as an effort to determine which spectrometer outperforms the others. The addition of this summary table would also help convey the important point that there is not one spectrometer with superior performance across all applications.

The manuscript is well-written, but given the complex and detailed nature of the study, the experimental set-ups and results were inherently confusing to wade through. I have inserted specific comments in the attached PDF supplement to help highlight the take-home messages from the experiments and to clarify some points for readers who may be less familiar with N₂O isotope laser spectrometry.

Please also note the supplement to this comment:

<https://www.atmos-meas-tech-discuss.net/amt-2019-451/amt-2019-451-RC1-supplement.pdf>

Interactive comment on Atmos. Meas. Tech. Discuss., doi:10.5194/amt-2019-451, 2019.

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