Atmospheric Measurement Techniques Discussions

Atmos. Meas. Tech. Discuss., referee comment RC1
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Comment on amt-2021-67

Anonymous Referee #3

Referee comment on "Improved ozone monitoring by ground-based FTIR spectrometry" by Omaira Elena García et al., Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2021-67-RC1, 2021

This paper presents analyses about optimum strategies to retrieve atmospheric O_3 concentrations from the 20-years FTIR measurements performed at the subtropical Izana Observatory. The idea of this work is to find the optimum strategy and apply it to all NDACC station. 5 different set-ups (including different spectral region and inclusion of temperature profile fit) have been analyzed and compared to coincident Brewer and ECC sondes observations used as reference.

This paper addresses relevant scientific questions within the scope of AMT journal.

General comments:

The idea of homogenizing the retrieval strategy is convincing. The strategy found at IZO indeed enhances precision when comparing to Brewer data. However, the 5 different strategies do not exhibit important differences (biases) among them and the choice of the optimum strategy should be clarified. Applying the selected strategy to other NDACC measurements to verify whether this optimum strategy could be useful to the FTIR community would make the paper gain in scientific impact.

Overall, the paper is well written and structured but the abstract and conclusion sections are too vague and do not provide a concise and complete summary. These sections would need rephrasing to better highlight the main ideas/results of this work. In addition, figures would need clarity improvements. The number of figures should be reduced to fit the main scientific results.

Specific comments:

If the goal is to derive homogeneous O_3 retrievals strategy within NDACC, why not trying the optimized strategy tested from the IZO dataset to another mid-latitude or polar NDACC measurements? This strategy is applied to IZO measurements, where, as stated in the text, is located in very dry atmospheric conditions. What happen to this optimized strategy when O_3 is monitored in a much more humid environment? What would be the effect of H2O line interferences?

There are too many figures. Some of them could be combined or could go in supplement information content. Figure 4 is very busy and hard to analyze. Figure 6 could be improved: use smaller dots in panel a and other colors in panels b and c since the blue and black lines are difficult to distinguish.

The abstract section needs to be reorganized to focus on the key results. Line 7: "provide consistent results" related to what? Line 15: "it" refers to what?

In the introduction section, O_3 trend in the stratosphere is well explained. For consistency, it would be useful to explain O_3 trend in the troposphere as well. Line 38: how many NDACC stations are measuring O_3?

The seasonal O_3 variability seen by the Brewer and the FTIR observations are different. This could be further analyzed and explain in the text. What about the vertical sensitivities of both dataset?

Lines 419-421: it is claimed that the best performance is for set-ups using narrow windows and temperature fits for upper tropospheric region. To my point of view, the set-up 1000T seems to be more appropriate for this region (Figure 9). The authors might want to distinguish the best set-up appropriated for different specific altitudes.

Section 3.2.2 is hard to follow and needs to be rewriting to easily analyze Figure 4.

Line 224-225: According to Figure 4, the measurement noise and ILS are between 0.1 to 0.6%, not 0.1-0.2%

The FTIR measurements acquisition takes 10 minutes as stated in the manuscript. Why choosing a coincidence criterion of 5 minutes when comparing the Brewer to the FTIR data? What is the expected temporal variability of O_3 at IZO within 5 minutes?

Technical comments:

Line 221: change “do depent” to “do depend”

Figure 4: rephrase legend to 1000T, MW4T similarly to the other figures.

Line 264: to ‘summarize’ instead of to ‘sum up’.