

Atmos. Meas. Tech. Discuss., referee comment RC1  
<https://doi.org/10.5194/amt-2022-325-RC1>, 2023  
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## Comment on amt-2022-325

Anonymous Referee #1

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Referee comment on "Total column ozone retrieval from a novel array spectroradiometer" by Luca Egli et al., Atmos. Meas. Tech. Discuss., <https://doi.org/10.5194/amt-2022-325-RC1>, 2023

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### General comments:

The manuscript "Total Column Ozone Retrieval from Novel Array Spectroradiometer" published by Egli et al., presents a study on the use of a relatively new array spectroradiometer for ground-based measurements of total ozone column in the atmosphere. The new array spectroradiometer has the potential to provide more accurate and precise measurements compared to traditional methods such as those using Dobson instruments, grating spectrophotometers, etc. The study also provides a comparison of total column ozone retrievals between the proposed method and established methods. This helps to demonstrate the potential of the new system and the associated retrieval technique.

One of the strengths of this study is that it presents an approach for measuring total column ozone that is new, fast and automated, while utilizing available, easy to acquire software packages and hardware. The study also leverages on the established instrumentation and expertise at PMOD for standard calibrations.

However, I believe that this manuscript would still benefit from a chapter on error analysis containing a detailed error budget. I understand that some of the aspects of the methodology have already been done elsewhere, nevertheless it would be useful and important to include such a chapter. For example, I would be interested in knowing the signal to noise ratios of the spectra, typical wavelength shifts, how the uncertainty in the LSQ retrieval is calculated, and so on, without much digging through literature.

In conclusion, this manuscript fits well within the scope of AMT. Therefore, I recommend its publication after addressing the general comments and some of the comments and corrections below.

## Specific comments:

- The authors refer to the “low cost” of the Koherent system but do not provide any estimates of the costs involved and how they compare to available systems like the Brewer, BTS-Solar, etc.
- Can the authors please comment on any effects of UV radiation on the degradation of the optical fiber and if this would have noticeable effects over time?
- Why use an optical fiber instead of adopting a similar design to the BTS-Solar?
- BTS2048-UV-S-F array spectroradiometer: According to specifications, this spectroradiometer has a calibrated measurement range of 200 nm to 430 nm. Why do the authors truncate the upper wavelength range to 345 nm? Would it not be useful to include the maximum range covering the Fraunhofer lines at around 393 nm? I think this will make it easier to determine any wavelength shifts, will it not?
- Two-point calibration: I don’t quite understand the rationale of changing the absorption coefficients in addition to adjusting the ETC. It seems to me that the absorption coefficient is simply used as a “tuning parameter” in this case. Aren’t the slit functions well determined, as well as the ozone cross sections? How would the authors explain the need to change the absorption coefficient?
- The authors refer to minimal least squares, what do they mean by “minimal”. A sentence or two explaining this would be sufficient.

## Technical Corrections and Suggestions:

P.1, Line 24: “within less than 0.7%” --> within 0.7%

P.2, Line 45: “In the Dobson instruments, prisms are selecting ...” --> In the Dobson instruments, prisms are used to select ...

P2, Line 46: “Most of the Dobsons are manually operated and require therefore ...” --> Most of the Dobsons are manually operated and therefore require ...

P2, Line 52: “contrary to single ...” --> in contrast to single ...

P2, Line 52 and 69: “suffer from stray light ...” --> suffer from the effects of stray light ...

P2, Line 53: “The Brewers were formed to a network of automatic stations, which required few ...” --> The Brewers were used to form a network of automated stations, which required less ...

P2, Line 53: "best consistency ..." --> greatest consistency

P2, Line 60: "irradiance ratio at the top of the atmosphere" : irradiance ratio of what?

P2, Line 76: "Similarly as Pandora ..." --> Similar to the Pandora ...

P2, Line 83: "Contrary to the ..." --> In contrast to the ...

P2, Line 83: "fiber coupled" --> fiber-coupled

P9, Line 363: "clears sky" --> clear sky

P9, Line 369: "The two-years ..." --> The two-year ...

Fig. 1. Caption: "... spectra on morning of 15 September ..." --> spectra on the morning of 15 September