

Interactive comment on “SI²N overview paper: ozone profile measurements: techniques, uncertainties and availability” by B. Hassler et al.

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We would like to thank the reviewers for the helpful comments and suggestions that helped to improve our manuscript. Answers to the individual reviewer comments are listed below. Original comments are printed in black, answers are printed in blue.

Anonymous Referee #1

This paper is generally well written and is a nice introduction to the instruments and measurement techniques used for ozone profile measurements. It contains very useful reference material for a reader looking for instrument characteristics, operational periods and data availability. The only information missing from the “quick reference”

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tables is a table of instrument uncertainties. It would be nice to have that table included in this work (but not an absolute necessity for publication).

We tried to add a column about instrument uncertainties to the tables using different concepts, but we were unable to find a convincing, short and concise way. We basically failed, because no consistent way is used in the community to define instrumental uncertainty, e.g. the information on satellite uncertainty relates to different properties: some numbers only include uncertainties of the instrumental performance and instrumental calibration, while others cover the retrieval and the post-processing, etc. We therefore decided to only have the uncertainties described in the paragraph of each instrument, where some additional explanations can be added.

In this reviewer's opinion this work should be published after a few minor corrections are made:

P9861 line 18 “other” should be capitalized.

We capitalized “Other”.

P9862 line 28 “painstaking” is editorializing and should be removed

We removed the word “painstaking”.

P9863 line 11 “artefacts” ⇒ artifacts

We corrected the word.

P9867 line 28 the replacement of the instrument at the station ⇒ the replacement of an instrument at a station

We changed the sentence as suggested.

P9869 line 10 “spatial resolution of 100km” what does this mean?

We changed the sentence to clarify its meaning.

P9870 line 22 suggest: “by retrieving... ,thus reducing”

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We changed the sentence as suggested.

P9870 line 24 change "on" to "of"

We changed "on" to "of".

P9871 line 15 remove "long-term"

We removed the word "long-term".

P9874 line 13 tenth ⇒ tens

We corrected the word "tens".

P9874 line 25, 27 verbs change tense. Suggest "scanned"

We changed "scan" in line 27 to "scanned" as suggested.

P9876 line 14 stray comma after "calculated"

We removed the comma after "calculated".

P9879 line 23 "however" sounds negative. Suggest: ". . .mission and is currently still in operation"

We changed the sentence as suggested.

P9880 line 4 change "in" to "of"

We changed "in" to "of".

P9882 line 21 remove "negligible"

We removed "negligible".

P9883 line 1 change "measurement" to "method"

We changed the word as suggested.

P9888 line 12 remove "supposedly"

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We removed the word "supposedly".

P9890 line 22 "reasonably well"? Please quantify or remove.

We removed "reasonably" from the sentence.

P9896 line 1 profiles ⇒ profile

We changed "profiles" to "profile".

P9896 line14 add "scanning" to nadir viewing

We added "scanning" to "nadir viewing".

P9896 Line 20 the row anomaly section seems to have been split in two. Please move to next page (lines8-13)

We moved the sentence from line 20 about the row anomaly to the next page, before the sentence starting in line 8.

P9898 line 9 profiles ⇒ profile

We changed "profiles" to "profile".

P9898 line 18 observation ⇒ observations

We changed "observation" to "observations".

P9898 line 23 something is missing from: "Owing to the non. . ."

We changed the sentence to "Owing to the non-sun-synchronous orbit of the ISS, measurements of the atmosphere are taken at different local times."

P9899 line 3 change "within" to "by" and fix sentence structure.

We changed "within" to "by an" and fixed the sentence structure.

P9901 move "data" to after "time series"

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We moved "data" to after "time series".

Figure 1 could use some larger symbols to show the station locations. Also, yellow sometime does not show up well on some computer screens/hardcopy. Suggest using another color.

We increased the symbol size for stations in this figure and changed the order of plotting to layer the symbols in the best way to see all of them in case they are located all at the same spot.

Anonymous Referee #2

This is part of an ambitious and highly valuable series of three overview papers for a project ('SI2N') intended to result in an integrated assessment of ozone trends, derived from many data sources. This paper is a detailed summary of the characteristics of the measurement techniques and data sets to be used; it is a critical piece of the larger puzzle represented by the three overview papers. I recommend publication after the minor issues and questions below have been addressed.

p 9866 ln 11: "below 26 km" Should this be above rather than below?

The whole description of ozonesonde measurement techniques, uncertainties and biases was rephrased, reorganized and extended in the revised manuscript. The sentence should make more sense now.

p 9866 ln 4-15: The discussion of bias among sondes is confusing and may be partly contradictory. In ln 5-8 a low bias of 5% is discussed, while on ln 14-15 the bias between sondes and between sondes and other techniques is < 5%. Please re-write.

The whole description of ozonesonde measurement techniques, uncertainties and biases was rephrased and reorganized. We hope that the description of the biases is clearer in the revised manuscript.

p 9867 ln 15 'essentially no a priori dependence' That is identically the same as say-

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ing it has no smoothing error, but in lines 9-10 smoothing error of 5-20% is quoted. More generally, Umkehr is a fundamentally low vertical resolution technique of remote sensing, which will always have a priori dependence by its very nature.

We changed this part of the Umkehr paragraph to clarify the explanation about smoothing errors and a priori dependence.

p 9870 line 2: The FTIR height information comes primarily from the pressure broadened line shape, and the instrument line shape is critical for profiles of the absorbers, not only for trends.

We agree that the instrument line shape is not only critical for trends, but also for the determination of the absorber profiles. We changed the sentence in the manuscript accordingly.

p 9900 Comment on why HIRDLS and SABER were not included in the study

Both, HIRDLS and SABER are mentioned in Section 3.6 (Additional instruments) of the manuscript. We chose to only briefly describe them (in contrast to assigning them their own section, like SAGE for example) because they were either not part of the SI2N initiative (with papers in the special issue), or have their main focus on tropospheric or mesospheric rather than stratospheric measurements. We detailed this reasoning in the text. To make it clearer that this reasoning is not just valid for TES (as it appears to be in the manuscript in the discussion form), we added a new paragraph break before the description of TES.

Table 1a; FTIR retrieves height information primarily from the pressure-broadened line shape, as does the microwave measurement

We adjusted the entry in Table 1a.

Table 1b; the native vertical grid of FTIR should really be same as microwave

We corrected the entry in Table 1b.

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