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Discussions

Interactive comment on "Monte Carlo method for determining uncertainty of total ozone derived from direct solar irradiance spectra: Application to Izaña results" *by* Anna Vaskuri et al.

Anonymous Referee #1

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General Comments – This is a useful study presenting a new approach to more fully assess the uncertanties associated with measuring total ozone column with different instruments. Its advantages are that a more complete uncertainty assessment is arrived at, though the method does rely on subjective apportioning of each type of error to random, correlated or unfavourable categories. Some points of improvement would make this a very useful study for both users of ground-based data and the instrument community e.g. which are the main sources of uncertainty for each instrument type and how do these compare with the often quoted intercomparison uncertainty budgets.

Specific Comments: – P1 L14: "The reason often is that the correlations are not

known". It would be better to insert "unknown" into the previous sentence before "correlations" and remove this sentence entirely.

P1 L17: This would be better phrased as a complete uncertainty budget being necessary to understand long term environmental trends, rather than increased uncertainties improving the reliability of long term trends.

P2 L5: Better as "...excluding the remainder of the sky". Also should state field of view of each instrument here or a later point in the field campaign section.

P2 L6: This section may be better called "The Izaña field measurement campaign and instrument description", and include some additional details on each instrument - e.g. the field of view and other pertinent details. Alternatively the uncertainty tables would be better moved to later in the manuscript where the individual contributions are discussed.

P2 L15: "mountain Teide ...." » "Mount Teide at *an* altitude..."

P2 L16 "Station pressure of 772.8 hPa was monitored during the campaign with a standard uncertainty of 1.3 hPa" » "Station pressure was monitored during the campaign and determined to be 772.8 hPa with a standard uncertainty of 1.3 hPa"

P4 L4: "The tables also give division of the uncertainty components to different correlation types as described in Section 4." » "The tables also attrribute uncertainty contributions to different correlation types as described in Section 4." I think this is what you mean, either way needs a rephrasing to clarify.

P10 L2 "equal *to* unity"

P10 This section on the MC description is clearly the core of the study and where the error estimates are derived, but needs more work and clarification. The details and reasoning behind the approach may be in Karha et al 2017, but it would assist reader of this manuscript to relate MC model and, for example, its sinusoidal terms to physical sources of uncertainty, and how these are calculated for random, unfavourable, and full

correlations. At present this isn't clear.

P16 L3 If Brewer #183 is included as a reference instrument, then it would be useful to include a similar uncertainty budget for this instrument, even if only summarised. Also the community would find it useful to put these results into context and comparison with those observed at instrument intercomparisons, and often quoted as a measure of instrument or data quality. i.e. for Brewers is the actual uncertainty determined by the MC methodology much large than expected from the intercomparison error, and, what is the primary source (so efforts can be made to reduce it).