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Review of "Aerosol optical depth in the European Brewer Network" by Javier López-Solano et al.

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The paper, as I see it, is intended to present a near-real time aerosol optical depth (AOD) product based on the Brewer spectrophotometer direct-sun observations as it will be implemented in EUBREWNET. This is an extremely useful and scientifically important product. The AOD calculations within the Brewer community have evolved in the last 25 years and are well documented in scientific publications. These include numerous publications showing comparisons with other instruments. What is new for Europe and what should be the focus of the paper in my opinion is the idea of harmonization of the data through consistent, centralized processing and quality control at the EUBREWNET data centre. A brief description of a very well known algorithm would be appropriate, however calling this "our algorithm" is a little misleading unless the paper clearly shows what is new in this implementation of the AOD calculations. The paper describes very well the criteria for data selection and the corrections that will be implemented to the data. It also nicely shows how the RBCC-E calibrates their reference Brewers. I have some questions about this process though (these are listed below).

The paper confirms previously published findings that well-maintained and properly calibrated Brewers will provide reliable AOD data. Having EUBREWNET centralized data processing and quality control will be a great contribution to the scientific community.

Some general comments:

The authors should choose to either present the future AOD from Brewers that calibrated by RBCC-E only, and this would be a sub-set of the data in the EURBEWNET database; or present and refer to all Brewers in the EUBREWNET but then clearly state that RBCC-E is only one of several agencies that provide calibrations for the Brewers in question. In fact, RBCC-E regularly reaches only about a half of the Brewers in the database, the rest are calibrated by others.

For the network to be reliable some comments on sustainability of funding for RBCC-E and EUBREWNET database centre might be useful.

Following are line-by-line comments

Abstract: please be consistent in the usage of verb tenses: "algorithm to be used" means it is not yet used, "provides" means it is already working.

P1 L7 the uncertainty does not include that from the air mass factor calculations, which can be significant. Please address this.

P1 L8 Some of the "future improvements" can be easily implemented. Can you comment why you have decided not to do this now?

P2 L17 "we have developed" is more like "we have implemented", no?

P2 L21 to know that the accuracy is increasing you would have to know the true answer for TOC. How do you assess the accuracy?

P2 L23 this implies that RBCC-E is the only organization that provides calibration to the Brewers that are part of EUBREWNET. Please address this. This comment applies to many parts of the paper and will not be repeated every time RBCC-E is mentioned.

P2 L30 The wording suggests that calibration is transferred every year to all participating Brewers, while this is not the case. Please be more precise.

P3 L10 suggest adding "by" between "section" and "providing"

P3 L24 it may not be extremely important, but there is another Brewer type, MK V, that has an 1800 l/mm grating with a FW3 and measures in the UV and the visible 600-650 nm range.

P3 L25 suggest removing "the effect of" since the double monochromator actually reduces the stray light, not just effects of it

P3 L28 suggest "made up **of**" instead of "made up by". Also, suggest wording the rest of this sentence differently since it is only FW2 that adjusts the intensity, not both FW1 and FW2. Besides, you clearly say this in the next sentence.

P3 L31 suggest "passing through the filter wheels". Also replace "spectrometer" with "monochromator"

P4 L2 some of the characterization are obtained without a calibration campaign, e.g. DT, potentially TC, filters…

P4 L7 functions must be plural

P4 L8 Is it just one ETC that is determined?

P4 EQ1 - this equation from 1983 is a concept that is impossible to use in practice: what is m? Some effective air mass factor? Using one variable for the product of tau and m that represents the slant total optical depth is better I think and can be expanded into its components with corresponding AMFs. Also, this equation is only valid for monochromatic light, but the Brewer measurements are clearly not that. Please either address this or reduce this whole description of the algorithm that is published elsewhere and only highlight your contribution (what is new).

P5 L20 What is your rationale for using instrument-specific Rayleigh coefficients (which is not the standard now), but not improve the AMF calculations? Also, the formula for AMF is missing the instrument altitude, it's a lucky coincidence for IZO to have the ozone layer above the station close to 22km, but for Brewer #033, that is not far away, that is not true.

P5 L28 this assumes that most of aerosol is in the troposphere. Is this a correct assumption?

P6 L4 suggest removing "one" from "each one of"

P6 L7 suggest using "separately" instead of "by separate"

P6 L18 "criteria" instead of "filters"

P6 L22 Will it be appropriate to apply location-specific criteria for the AMF cutoff? Many Brewers are in high latitudes and if they are MKIII they can likely successfully measure at higher SZA, no?

P6 L25 suggest adding "test" between "lamp" and "filter"

P7 L3 "our Brewer" is, I assume, an IZO Brewer. Since not authors are from IZO I suggest refer to the reference Brewer as RBCC-E reference or similar

P7 L5 Please describe what stable conditions are and how you objectively decide they are stable

P7 EQ7 - again, you cannot use EQ1 literally and make it linear before explaining what m is. Same in line 16.

P7 L25 Do you (and how) monitor stability of the Brewer during the 1-2 months of calibration? If you average the results you assume the Brewer didn't change. Also, most points are collected at noon and only a few at larger SZA. Do you bin the data for Langleys?

P7 L28 and other places: please avoid using the word "usually". Try to either describe the conditions when this is true and/or provide frequency of this.

P7 L29 maybe "filter wheel" is better here than "filter"

P8 L1 It is not clear why the difference will have lower uncertainty. If I take two measurements with same uncertainty then the difference between them will likely have double the uncertainty, no?

P8 L5 Why not use a matrix-based solution for all filters? It is described in cited literature and can easily be further improved.

P8 L25 Uncertainty from AMF calculations is missing in the analysis.

P17 L5 the TC are not always relative, especially in recent years' calibrations

P17 L19 How do you plan to address the difficult question of objectively assessing whether the Brewers are "well maintained and calibrated"?