Interactive comment on "Advancements in the Aerosol Robotic Network (AERONET) Version 3 Database – Automated Near Real-Time Quality Control Algorithm with Improved Cloud Screening for Sun Photometer Aerosol Optical Depth (AOD) Measurements" *by* David M. Giles et al.

Anonymous Referee #2

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This is a seminal work providing in depth analysis of the new algorithms used by AERONET/CIMEL aerosol network.

Here are some comments that hopefully improve the already high standards article.

L68 PHOTONS (PHOtométrie pour le Traitement Opérationnel de Normalisation Satellitaire) and (RIMA) Red Ibérica de medida Fotométrica de Aerosoles.

L134-135 This is true only if V(lamda) error is independent of air mass. E.g. not true if theoretically signal non linearity errors are involved. Have the instruments been tested for non linearity issues ?

L160 what is the impact in AOD due to the pressure uncertainty?

A table summarizing the uncertainty budget that is related to all factors included in section 2 for V2 and V3 pointing out in which aspects the V2 uncertainty has been improved based on the new V3 QA/QC procedures presented here, would give more value to the whole manuscript.

L59-63 It would be informative to mention other less dense existing surface based networks e.g. SKYNET, GAW-PFR.

L173-174 what happens with these (A and B) calculations due to the change of the 935nm filter over time?

L199 & 205 can O3 and NO2 climatology be found somewhere on the AERONET web page?

L206-214 Interesting results on this aspect can be found in Arola and Koskela, 2004

L245-253 it would be interesting to report a summary of the results found for the temperature dependence on AOD based on the characterization of almost all instruments, as mentioned. Is this temperature dependence more or less similar for all instruments / Are all instruments characterized for temperature dependence ?

L310 it has to be explained why this formula is used. Is it purely empirical?

L409 I think (whichever is greater) is not correct and is not needed. It is sufficient: less than 3 or less than 10%.

Cloud screening algorithms: A common issue is the AOD rejection from the cloud algorithms for dust related high and with high temporal variability, AOD cases. As accurate and also complete dust aerosol series is extremely important for aerosol-

radiative forcing global studies; are there any aspects of this new algorithm that are applied in such cases ? Could the authors include an example or an assessment of such cases ? (such as the very nice examples they already have for other cases)

Very high AOD events could impact the sun-photometer's AOD retrieval based on the diffuse / forward scattered light entering the field of view of the instrument resulting an underestimation of the calculated AOD. Are there any control/corrective measures for such cases ?

It is unclear to me why figure 20 cases (in XX') axis differ for the two figures. Aren't we talking about the same data only analyzed for different air masses ? If not it can be clarified.

There is a number of publications pointing out small but systematic differences in wv retrievals from AERONET and the ones from other instruments/methods (GPS, microwave radiometers) is V3 results lead to better results for such comparisons?

From the point of view of the AERONET user. There are a lot of issues presented here that contribute to the better interpretation of case studies, climatologies related with AERONET/AOD data. For such cases (lets say for example an analysis of a high AOD affected area with frequent dust events that is unknown how many of them have been captured and how many of them have been rejected by the cloud algorithm) the AERONET user could have two options:

a. To cite this paper speculating that part of his/her results could be related with various QA/QC definitions presented here.

b. To actually use and/or modify accordingly such QA/QC algorithms in order to have more solid conclusions. So the question is: will these algorithms be available to the AERONET users ?

Again, this is a very high quality paper and the authors have done a terrific job in terms of analysis, interpretation and presentation of sun-photometric quality control

and assurance procedures for AOD and WV retrievals.