

Interactive comment on “Recovering Long-term Aerosol Optical Depth Series (1976–2012) from an Astronomical Potassium-based Resonance Scattering Spectrometer” by A. Barreto et al.

Anonymous Referee #2

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The manuscript: “Recovering Long-term Aerosol Optical Depth Series (1976–2012) from an Astronomical Potassium-based Resonance Scattering Spectrometer” by Barreto et al., presents AOD time series from 1976 until 2012. The paper includes as well the comparison of AOD Mark-I results with the measurements from AERONET and GAW networks, which have instruments in the same station. Long time series are important to better understand the radiative properties of aerosols and their influence on earth climate. To find aerosol information from the earliest 90 is difficult, so all possible effort to get long time series are valuable to improve the current aerosol climate models prediction. However, there are some aspects in this paper that require attention by the

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authors before the paper is ready for publication.

Comments:

The introduction has information that is not really relevant for the paper. All the volcanic eruption description (pag. 4095 Para. 15 and follow paragraphs until pag. 4096 Para. 5) does not contribute with the aim of the paper. Instead I recommend the author to make a better description of different methods used to get extended time series like the proposed by Lindfors A. et al 2013.

The method has to be rewritten. The method has to be supported by the mathematics and statistics used to end up with the AOD values you are presenting. It will help to better understand your results. There is not information about how you are treating the error propagation in your data, what is the uncertainty of your measurement? And how are you doing the cloud screening to your results? It is a really important part that has to be added in detail.

Pag 4102 Para. 15: You are saying: “The only exception for these thresholds was set during the period from 1992 to 1993, when the Mt. Pinatubo eruption (June 1991) released huge amounts of 15 volcanic aerosols into the stratosphere leading to an important decrease in solar radiation input as well as important positive anomalies in AOD. For this reason, the threshold in AOD for the Langley analysis was set in 0.3, an order of magnitude higher”. From where did you come out with the 0.3?

Pag 4102 Para. 25: Talking about V0 calculation you said: “The yearly V0 variation of Mark-I solar spectrometer determined from the Langley 25 analysis is shown in Fig. 3. A total of 24 402 V0 s have been obtained using this technique, being the rest of days without V0 information (about 16% of them) recovered by means of a cubic spline smoothing process. These values were subsequently reprocessed when a deficient calibration was observed, being the most important calibration problems associated to the existence of a fictitious diurnal cycle on AOD data. This problem in calibration procedure was identified by Cachorro et al. (2004, 2008)”. Add one figure where you

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show how the data were looking before and after you apply the K-ciclo, it will help you to make a clear and better explanation of the problem and how it was solved.

Add the scatter plots between AERONET and GAW AOD results with Mark-I AOD; it will help again to clarify the results.

In the conclusion you mention: "However, our results indicated that calibration errors are not dependent on the aerosol load and therefore, V_0 can be calculated using this technique in those days with relatively high turbidity (AOD up to 0.3), provided aerosol concentration remains constant" I do not agree with this affirmation taking into account all the considerations and restrictions you are doing to your time series. You are applying K-ciclo to your data because of calibration issues. This part has to be better analysed and explained.

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 4093, 2014.