Answer to Reviewer #1

The authors greatly acknowledge the anonymous reviewer for carefully reading the manuscript and providing constructive comments. In the following lines we answer the questions and comments from reviewer #1.

According to the comments from reviewer #1 we will include an accurate description of averaging procedure and filtering in the revised version of the manuscript. In the next lines we present the way we will address this topic:

The cloud screening procedure proposed in this work assumes that clouds influence more than aerosol the short term variability of star photometry measurements. With this assumption, Harrison and Michalsky (1994) developed an algorithm to eliminate cloud-affected data in multifilter rotating shadow-band radiometer's measurements based on temporal series analyses. Following a similar approach, the cloud screening procedure for star photometer data consists basically of calculating the moving average $\delta_{Ae}^{i,M}(\lambda)$ for every aerosol optical depth, $\delta_{Ae}^{i}(\lambda)$, retrieved from star irradiance measurements:

$$\delta_{Ae}^{i,M}(\lambda) = \frac{1}{n-1}\sum_{\substack{j=1 \\ j\neq i}}^{n} \delta_{Ae}^{j}(\lambda)$$

Where 'n' is the number of data included in a temporal interval Δt which can vary from some minutes up to several hours. In the moving average computation the averaging window is slid along the whole data series and it is important to note that the i-value of the variable, $\delta_{Ae}^{i}(\lambda)$, is not included in the computation of its corresponding moving average. Moreover the cloud screening algorithm also generates the standard deviation $\sigma^{i,M}$ series associated with the moving average $\delta_{Ae}^{i,M}(\lambda)$:

$$\sigma^{i,M}(\lambda) = \sqrt{\frac{1}{n-2}\sum_{\substack{j=1 \\ j\neq i}}^{n} \left(\delta_{Ae}^{j}(\lambda) - \delta_{Ae}^{i,M}(\lambda)\right)}$$

Where we have replaced the n-1 of the standard deviation definition by n-2 because the point 'i' is not included in the moving-average computation. Next we compute the differences $\Delta\delta_{Ae}(\lambda)$ between each data, $\delta_{Ae}^{i}(\lambda)$, and its corresponding moving average, $\delta_{Ae}^{i,M}(\lambda)$:

$$\Delta\delta_{Ae}^{i}(\lambda) = \delta_{Ae}^{i}(\lambda) - \delta_{Ae}^{i,M}(\lambda)$$

The next step is designed to detect outliers in $\delta_{Ae}^{i}(\lambda)$ temporal series. Thus the algorithm flags each $\delta_{Ae}^{i}(\lambda)$ that presents $\Delta\delta_{Ae}(\lambda)$ larger than three times its $\sigma^{i,M}$. Finally, from these outliers $\delta_{Ae}^{i}(\lambda)$ data, the $\delta_{Ae}^{i}(\lambda)$ with the largest positive deviation is eliminated from the database. The procedure is repeated until no outlier is detected. In this way this smoothing procedure rejects cloud contaminated data.

Moreover, the cloud screening algorithm uses temporal window that includes all the night.

As reviewer #1 suggests the references will be revised in order to reduce their number in the revised version of the manuscript.

Reviewer #1 technical comments will be taken in consideration in the preparation of the revised manuscript. Special attention will be paid to avoiding repetitions, reducing excessive details, like those on the lidar system, and including additional information, like that on relative optical air mass.

Concerning the reviewer's comment on Figure 2a, the revised version will include an appropriate explanation of the histograms. Basically we have studied the absolute difference between two consecutive aerosol optical depth retrievals at each wavelength. Large differences in aerosol optical depth are not expected for the short period that the instrument takes in acquiring two consecutive measurements. This concept was implemented in the cloud screening algorithm used in AERONET network (Smirnov et al., 2000) that uses a threshold value of 0.02 for a triplet of measurements obtained within 90 s. However, the star photometer used in this work takes around 5 minutes in obtaining two different measurements at the same wavelength, and thus another threshold value have to be found out.

Figure 2a shows the frequency histograms of the absolute differences in consecutive retrievals of aerosol optical depth. The data plotted correspond to the whole period used in this study. According to AERONET cloud-screening procedure, differences between consecutive measurements larger than 0.02 are not expected for cloud-free data. According to Figure 2a in our data series more than 90% of the cases present absolute differences bellow 0.03. Taking into account methodological differences between CIMEL and star photometer procedures we consider that a value of 0.03 for the differences between consecutive measurements is an appropriate threshold for selecting cloud-free data. This threshold value of 0.03 is assumed for all the wavelengths at 380, 436, 500, 670, 880 and 1020 nm**.**