Anonymous Referee #2

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The paper presents continuous measurements from a single wavelength elastic lidar in Corsica in order to characterize the aerosol loading and its vertical distribution. They use the synergy of sunphotometer and satellite data in their analysis. There are many similar papers in the literature for the Mediterranean. However the large spatial variability of the aerosols in the area and the complex situation concerning aerosol sources can justify additional information over a less studied area like Corsica. Therefore in principle the paper could be relevant for ACP.

I have however major concerns concerning the analysis of the lidar data, which leads to conclusions that can hardly be justified. The authors show in Figure 5 monthly mean extinction profiles at 355nm. It is obvious in all these average profiles that there are two serious problems.

The first one has to do with the systematic questionable calibration of the lidar signals in an aerosol free-region. The authors claim that they systematically observed significant aerosol loading at 6 and 7 km (see Figure 5), without showing if and where their signals indicate an aerosol free region. It is highly uncertain that on a monthly basis such layers persist and if this should be true, this has to be verified after a thorough quality control of the lidar signals.

The second problem has to do with the cloud screening of the signals. Again in the monthly average profiles it is obvious that such spikes eventually correspond to clouds layers not filtered properly, rather than systematic dust layers, which usually are much thicker.

ANSWER. We have identified that the degradation in the quality of the extinction retrieval comes from the choice of the reference signal in the upper part of the profile. The cloud screening is not involved in this issue. Selecting a constant altitude whatever is the signal-to-noise-ratio (SNR) has introduced artifacts in the retrieval of the extinction profiles, including spikes and remaining relatively high extinction coefficient in the upper range of the profile. We now use the SNR to delimit the useable part of the profile. The SNR is estimated for each altitude by computing the mean of standard deviation of the range corrected lidar signal at 3 successive altitudes. A threshold value of SNR=10 is still acceptable for most of the profiles and removes spikes and drift in the mean extinction coefficient. However it removes also most of the profiles for which we have identified high AOD and high altitude transport. So the results presented in the last section are affected by a large uncertainty in the extinction coefficient profiles. We suspect that this problem is caused by the dust deposition on the telescope that reduces emission and reception. The case study on the dust event in June-July 2012 is not affected by this problem because during this period an operator was on site. Further investigation on the noise reduction is required to provide accurate estimate of the extinction profiles at high altitude for those cases.

CORRECTION. Although we have solved the issue regarding most of the data presented in this paper, the discussion can't be based on analysis of high AOD events since those cases remains problematic and required further analysis. Such analysis is not possible within the limited time frame requested for revision. As a consequence, we believe it is not worth submitting the present revised version of the manuscript.

The fact that lidar measurements are in good agreement with the sunphotometer should be

expected since the lidar measurements are constrained by the AOD from the sunphotometer.

ANSWER. Lidar are working day and night why satellite and sun photometer only provide daytime measurements. Moreover not all the lidar retrievals are constrained by AOD measurements. So there could be a difference.

Finally with a single wavelength elastic lidar the separation of aerosol types in the vertical can be highly speculative.

ANSWER. This final remark is not founded. We never claimed that we were able to separate the contribution of different aerosol type in the vertical. Moreover we have categorized cases studies that were dominated by identified aerosol types. This was stated in the former section 4. Our point of view it that investigating the vertical structure of the atmosphere with single wavelength elastic backscattering lidar has still an interest for atmospheric scientist, especially in areas where no measurements were never made before and despite the difficulties for analyzing the dataset.