We thank the reviewer for his productive comments that helped us improve the contents of the manuscript. All issues raised are hereby one by one addressed.

Page 2876, Line 10 : You can also add the role of anthropogenic sulfate aerosols and its major impact on aerosol optical properties in E. Mediterranean (Sciare et al., 2005).

It has been added.

Page 28278, section 3.1: Few words could be added on the calibration check/stability over the 3 year period as well as on the uncertainties associated with AOD retrievals

Calibration and check/stability issues are already given in section 2.2. Regarding uncertainties associated with AOD retrievals we have made the following estimations which were included in the text.

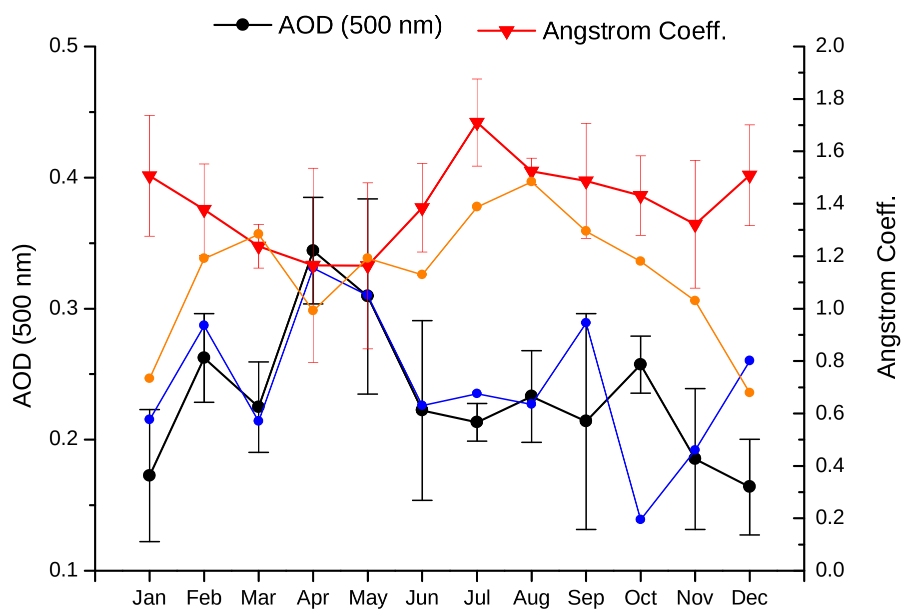
" The most important uncertainties associated with the AOD retrieval from the MFR is the estimation of I_0, the total ozone correction at ozone absorbing wavelengths and the presence of thin clouds, the latter being hard to quantify. The standard deviation of I_0 calculated during clear-sky, clean days during the period of interest, ranged between 2.5% and 7%, with higher values for shorter wavelengths. This translates into an uncertainty of 0.02-0.06 for AOD at 500 nm, for an optical air mass in the range 3 to 1, respectively. Regarding ozone correction, given an uncertainty of about 3% to derive vertical columns of ozone from satellites (e.g. Ladstatter-Weissenmayer et al., 2007), then an uncertainty of 0.001-0.0015 for AOD (at maximum ozone absorption wavelengths) is calculated, which is one order lower than the uncertainty from I_0. "

Page 28280, section 2.3.3: The cluster analysis is based on air masses backtrajectory arriving at an altitude of 1,500m which is considered here as representative of aerosol transport in the free troposphere. This choice may be adequate to properly capture any long range transport of dust aerosols. What's about anthropogenic aerosols which are preferentially transported in the boundary layer? This may alter some conclusions latter in the text. To which extent? (Table 2 & cluster analysis). Please provide arguments here.

First of all, trajectories at e.g. 500-1000 m suffer from high uncertainties and thus the same analysis would be hard to trust. The altitude of 1500 m over Athens is indeed representative of the free troposphere year round, however during summer it is quite close to the boundary layer or sometimes inside the boundary layer. Lelieveld et al., (Science, 2002) have considered that no big differences are expected between the boundary layer and the lower free troposphere so they have investigated transport as uniform within the first 4 km. Finally, we do not expect that long range transport might occur entirely inside the boundary layer, and the cases of BL transport would be of more local to regional extent which is well captured by Class 5 of stagnant conditions.

Page 28281, line 10: The newly established "Athens-NOA" AERONET station has been operating uninterrupted since February 2009 and constitutes the continuation of these measurements at the same site. Could you briefly compare the 2 datasets (at least on a seasonally /yearly perspective)? The fact that similar (seasonal) pattern (AOD *and angstrom exponent) are observed between these 2 datasets may strengthen the results (representativeness) reported here.*

We made the comparison between our dataset (black and red) with data from AERONET (blue and orange) for year 2009 (except for Jan for which we used 2010 data due to a gap in 2009). Regarding AOD we see a complete coincidence in both patterns and levels, with small discrepancies in Oct and Dec probably due to interannual variability. The Angtrom exponent from AERONET captures the lower values in spring relative to summer but fail in winter when it presents much lower values. We cannot think of a reason for that other than the interannual variability which is supported by the fact that during these months higher AODs were also encountered.



Page 28282, section 3.2: The aim of this section is to investigate the role of local (urban) emissions and local transport pattern. Sea breeze may play a role here with advection of coarse (sea salt) particles. No ? Can the diurnal variability of relative humidity (i.e. liquid water content onto sulfate aerosols) play a role here?

Sea breeze system is expected to play a significant role, especially in May and June (later in summer we have the northerly strong winds called Etisians that dominate over the sea breeze), by means of local circulation patterns. The sea breeze cell that brings air from the sea and inlands (which more or less coincides with the transport of pollutants from the harbor and the center of the city to E-NE suburban sites), starts at about 8 UTC and is in full evolution between 11-13 UTC. That could partly explain the almost concurrent AOD increase but it cannot discriminate if this is due to sea salt or urban particles. Moreover, if it were sea salt advection then a decrease in the angstrom exponent would be also expected which is not the case. Overall, I suppose that only with chemical analyses such issues could be clarified. About RH, it is so strongly driven by temperature that again we do not think that it could help us interpret the AOD diurnal cycle. In all cases, we have added some discussion and a reference on the sea breeze role.

Is there any PM data available in the region of Athens (Air quality network) to validate AOD diurnal variations?

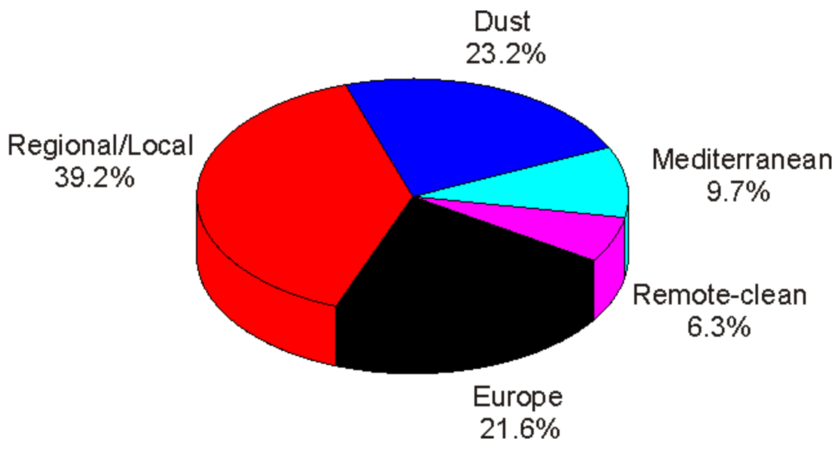
PM10 data are available, and we thank the reviewer for his suggestion, since these data seem to be in conjunction with our findings, strengthening our conclusions of local transport patterns. In particular, urban-traffic sites present a sharp maximum around 8 UTC, while suburban stations (like the one that our instrument has operated) show a steady increase after 8 UTC and until 14-15 UTC, which is exactly the overall pattern for AOD as well. Respective discussion has been now added into the text.

Diurnal variations are presented here for each season but with no distinction of air masses origin (which is discussed later in section 3.3). Is there sufficient amount of data from the 5 classes (cluster analysis) to investigate their corresponding AOD diurnal variation? Long range transport would likely exhibit poor diurnal variations whereas local emissions (class 5?) may exhibit larger variations.

As the reviewer mentions, long range transport would likely exhibit poor diurnal variations, so there is no meaning in further studying the diurnal variation per class. Moreover, all these different constraints reduce the number of days falling in each case so that an increase in uncertainty occurs.

Page 28284, section 3.3: This part of the manuscript is particularly interesting as it brings new insights on the regions contributing to AOD above Athens. Although the contribution of local emissions cannot be removed from each of the classes investigated here (unless you apply a constant AOD of 0.1?), it would be interesting to perform a class-based source apportionment of the AOD (i.e. % contribution of each class to the 0.23 yearly average AOD).
Another point here. Is there enough data to investigate the year-to-year variability of the 5 classes?

The type of class-based source apportionment has really been an excellent idea. We have integrated this kind of analysis to different groups rather than the given classes, and we came up with very interesting findings which can partly describe the contribution of different sources/processes to the average AOD. We have added the following pie chart and respective discussion in the manuscript.



Regarding the year-to-year variability of the classes results do not so any worth mentioning differences or trends.

Page 28285, line 5: The fact that the fast trajectories bring lower AOD may also reflect that higher ventilation (i.e. higher dilution of pollution aerosols) of W. European anthropogenic emissions is expected to bring lower AOD.

The reviewer is right. We have added the following complementary statement. "In addition, efficient ventilation is expected under these circumstances, which contributes to higher dilution of aerosol particles over and around significant sources."

Page 28286, line 8: To support the major role of long range transported biomass burning over Greece (double maximum around spring and later summer), you can also refer to Sciare et al. (ACP, 2009) who have shown, from multi-year record, the major role of biomass burning aerosols in the E. Mediterranean and their impact on aerosol optical properties.

This reference (actually Sciare et al., ACP, 2008) has been added both where denoted but also in the introduction.

Page 28288, section 3.3.5. It is hard to believe that stagnant conditions (low wind speed) will bring high levels of sea salts above Athens. Local dust at ground level (resuspension, : : :) or stagnant dust layers in altitude may be better candidate for the observed low angstrom exponent.

One should keep in mind that stagnant conditions are meant at the synoptic scale so that the local see breeze system could be still active over Athens depending on the season. That could bring sea salt over the city. However, we agree that local sources and accumulation is the main reason of the high AOD while the presence of coarser particles could also be dust re-suspension. Regarding remnants of elevated dust layers, it would be very awkward since there is a double assumption here: first that some dust transport took place before the stagnant period and second that dust particles remained there, which is not very likely due to gravitational settling down. Overall, I think it is not an easy task to give an accurate answer to this and we shall rephrase so that our conclusion regarding sea salt is not that narrow. Chemical analyses to check on air composition during stagnant conditions are certainly needed.

Page 28288, section 3.4: The agreement between MFR and MODIS is quite significant showing the consistency of both datasets. Still little explanations are given here to explain why MODIS provides higher AOD during summer? This period is characterized by northern flow (anthropogenic/wood burning). Any idea? The comparison between the 2 datasets (MFR & MODIS) is performed using solely the regression analysis tool. Can you provide more information on this comparison (sample-to-sample comparison and subsequent bias)?

Following the comment of Reviewer 1, who also suggested some reference with very similar results for Cairo, we have been able to give some clues on the reasons of this discrepancy. Relative discussion was included in the text in section 3.4.

Page 28291, line 21: What does mean exactly the end of the sentence ": : : degradation of regional quality". Do you mean degradation of air quality at regional scale? If so, I *am not sure that AOD is the best indicator for that.*

Yes, we actually meant “degradation of air quality at regional scale” so we shall rephrase it. However, we do not mean that AOD is the indicator for this, but just that high AOD indicates strong sources which contribute to the regional AQ. Given the picture regarding PM10 and gaseous pollutants in the extended area (which of course is not part of this work) this statement is unfortunately quite real.

Figure 4: The data are restrained to 1400 UTC. During summer, you may have larger amount of data which may help to better cover the diurnal pattern of AOD and Angstrom exponent. It may be worth to add this data in the Figure.

Our initial intention was to show the same part of the diurnal cycles for all seasons. The reviewer is right that it might be worth to show the entire available set for each season, in both directions both after 14:00 and before 6:00 UTC (that will affect panels b and d of the figure). However, we did not do the same for annually averaged diurnals (panels a and c) since in this case summer values would be higher weighted in the edge hours. In all cases, we have retained only those values with statistical significance, and one should keep in mind that for high optical air masses enhanced noise is introduced in the measurements themselves. The figure and relative discussion has been updated accordingly.

Figure 6: Please provide the number of valid points used for the comparison.

This info (N=740) was added both in the manuscript (section 3.4) and in the figure caption.