We would like to first express our thanks to the **REFEREE #2** for his/her constructive comments. The responses to these are below after the reviewer points that are in bold.

This paper describes an interesting new approach to assess the AOT for fine mode aerosols in cloudy observations from AERONET. Instead of screening for clouds and retrieving fine and coarse mode AOT, the coarse mode AOT in aerosol-cloud mixed observations is attributed to cloud optical thickness, giving the fine mode AOT in cloud conditions. Given this the study tries to assess the magnitude of cloud enhancement in the fine mode.

While the approach is interesting, the paper lacks a sound scientific approach and clear presentation. In my opinion there is a need for a better description of the new approach and the expected impact, results to show the new approach works as expected, or not, and a conclusion. Instead many measurements are presented, explanations are presented, but it is not clear whether the method by itself can be trusted or not. Instead a large number of measurements are shown, which by itself do not prove the underlying new approach.

We provided a brief note already earlier during the open discussion regarding this point "whether the method by itself can be trusted or not". Many of these clarifications/justifications are now included also in our revised manuscript to explain the quality assurance included in the AERONET measurement data set that we applied and thus to justify their use in our study. We also included some illustrative plots, both in the manuscript and in the Supplement, to indicate how the L1 fine mode AOD is indeed a meaningful measurement also in cloudy conditions.

The paper should be restructured so to follows a clear scientific approach: state the problem, describe how this problem is going to be resolved and then discussion and conclusion. In it's current form there are too many figures, which do not add to the understanding of the problem, and new discussions are started in the middle of the manuscript. Furthermore, the text is sometimes hard to follow due to strange reasoning or formulations.

We have improved the manuscript as the reviewer suggested. There are only limited number of plots (of key results) in the actual manuscript, while many of the earlier plots are now in the Supplement. The text itself has been also clarified.

Specific comments are below:

line 50: "..(e.g. due to the aqueous process including nitrate or sulfate". This is a strange sentence: What processes are meant here? "Nitrate" and "Sulphate" are not 'processes'.

This is clarified. With these we mean the cloud processing occurring such as formation of sulphate in cloud droplets or redistribution of nitrate aerosol between different sized aerosol particles during cloud droplet formation and evaporation.

lines 59-61: Based on its assumptions, SDA identifies cloud optical depth as the coarse mode AOD component and therefore effectively computes the fine mode AOD also in mixed cloud-aerosol observations.

The assumptions used by the SDA algorithm are not discussed, however, they are vital to assess how this new method works. E.g., from this sentence it is not even clear whether SDA attributes coarse mode AOT to clouds in only mixed phase conditions or all conditions. In the latter case, does the fine mode AOT relate well to the original fine mode AOT (in cloud-free observations)?

In the revised version we have explained, and demonstrated by some example cases, how SDA works in difference cases of cloudiness. These examples cover cirrus clouds, when fine mode AOD is not cloud contaminated (case GSFC August 11, 2010; in the Supplement), as well as a example day of rapid cumulus variability (case BLDND from Dragon campaign, July 5, 2011; in the revised manuscript).

line 65: AERONET SDA product has been used to some extent, i.e. for rapid AOD increases in the vicinity of cumulus. Again an unclear sentence. Do you mean to say that SDA has been used 'to study' rapid AOD increases?

This sentence has been clarified.

lines 82-86: The spectral deconvolution algorithm (SDA) product, and its ability to separate coarse and fine mode AOD and provide useful fine mode AOD also in cloudy conditions, is vitally important in our study. O'Neill et al. (2001, 2002) developed SDA algorithm that utilizes spectral total extinction AOD data, … These sentences are bad English. Please rephrase.

These sentences have been rephrased.

line 98: insert 'mode' after 'coarse'

Done.

line 99: remove the comma

Done.

lines 106-107: we included fine mode AOD and AE at 500 nm, from both Level1 and Level2 SDA measurements, the latter for all-sky conditions and the former for clear-sky conditions. I'm not sure about this one, but I expect this to be the other way around: L1 being all-sky and L2 only clear-sky.

Right, this should have been the other way around. It is now corrected.

lines 122-130 should be part of the Introduction, not results.

This was re-organized, to some extent, and part of this text is now in the methods section.

line 145 and figures 5 to 14. There are far too many figures here that do not add too much information. These figures should be merged into two Figures maximum.

In the revised version there is less figures included in the actual text, and many of the plots from different locations are now placed in the Supplement to make manuscript more easy to read. Also merging is conducted.

Line 299: We performed the analysis on a seasonal basis and found that consistently the highest cloud related 300 AOD enhancements occur in sites in East-Asia.. Please, write concisely, these kind of statements make the manuscript very hard to read: make an analysis on the basis of seasonality and find a region that stands out.

This is clarified.