We thank Dr. Matteo Ottaviani for constructive comments and remarks, which helped to improve the paper. W address all comments point-by-point.

Comment#1(Matteo Ottaviani):

Dear Editor / Authors,

I offer some general comments in response to this submission. The manuscript is generally well written and worth consideration, but the following point should be addressed before publication.

Specific Comments

C1- A point that remain very unclear to me is how many RSP measurements were processed in total. The paper would greatly benefit from a comprehensive table listing them all (including the AERONET stations coincident measurements).

R1-In the paper, we processed 14 measurements in total. The following table include details of those measurements. We will include it in the paper.

Table 1. Information of used RSP measurements

Measurements	Campaign	Co-located AERONET site	Longitude and Latitude	Date
1	PODEXB	Fresno_2	119.77302W, 36.78537N	20130116
2	PODEXB	Fresno_2	119.77302 W, 36.78537N	20130120
3	SEAC4RS	Baskin	91.73866 W, 32.28222 N	20130909
4	SEAC4RS	Baskin	91.73866 W, 32.28222 N	20130909
5	SEAC4RS	Baskin	91.73866 W, 32.28222 N	20130909
6	SEAC4RS	Baskin	91.73866 W, 32.28222 N	20130909
7	SEAC4RS	Calipso_Carthage	94.06627 W, 32.06434 N	20130909
8	SEAC4RS	Upper_Buffalo	93.203 W, 35.8258 N	20130906
9	SEAC4RS	Upper_Buffalo	93.203 W, 35.8258 N	20130827
10	SEAC4RS	Leland_HS	90.89285 W, 33.402128 N	20130909
11	SEAC4RS	Leland_HS	90.89285 W, 33.402128 N	20130830
12	PODEXB	DRAGON_Porterville	119.05505 W, 36.03179 N	20130120
13	PODEXB	DRAGON_Drummond	119.74139 W, 36.70556 N	20130120
14	PODEXB	DRAGON_Visalia	119.39301 W, 36.31411 N	20130122

C2- substitute “fine mode” for “small mode”.

R2- Thanks. We modified them.

C3- Remove symbols from figures 2, 4 and 10 (keep only colored lines), they are not needed and create confusion.

R3- Thanks. We removed symbols.

C4- Can Figures 7, 8 and 9 be condensed in a single, 6-panel figure? Also, adjust the axis ranges so that data don’t get all crammed in a corner.

R4- We adjust the axis range now and we consider that combing figure 8 and 9 would be a choice.

C5-Figure 3. Caption: correct two occurrences of misspelled “panel” and substitute “before” and “after” with “accounting for” and “not accounting for”.

R5- Thanks. Modified.

C6-Figure 4: Why does the variance of the coarse mode benefit from the smallest spectral range?

R6- The difference between the different spectral ranges for the coarse mode variance is very small compared to the requirement, so we consider the performance of the different spectral ranges as

'equal' for this parameter. The slight difference might be explained by the fact the the 75% of converged cases are not exactly the same for the different spectral ranges.

C7-Figure 6: It would be nice to add in the caption some more information on the scenario. Where is (-91.7, 32.3) located? What is the closest AERONET station? What aerosol load/type was being measured? You can also comment on the fact that the fit looks satisfactory although the Solar Zenith angle is close to the thresholds commonly assumed to avoid problems with the plane-parallel approximation.

R7- Thanks. We modified the description and include AERONET site and aerosol loading (aerosol optical thickness). We do not expect significant errors due the plane-parallel assumptions for this SZA.

Page 2793

C8- Change title to "Aerosol retrievals from multiangle, multispectral photopolarimetric measurements: importance of spectral range and angular resolution".

R8- Thanks. Modified.

Page 2796

C9- Line 1-2: In what sense these studies are based on linear error propagation, if they contain inversion retrievals? How much smaller were the number of aerosol scenario?

R9- In these studies the retrieval error has been calculated using the Jacobian assuming errors are within the linear regime and the global minimum can be found. The studies of Hasekamp and Landgraf (2008), Hasekamp (2010), and Ottaviani et al. (2013) use 2 different aerosol scenarios, while Knobelspiesse et al (2012) us 6 aerosol scenarios.

Page 2805

C10- Line 4: I cannot see this improvement. Please clarify.

R10- For AOT, fine mode radius and imaginary part of refractive index of coarse mode, the advantage can be found in the figure. However, It would be proper to delete the description "while for the other parameters the performance is similar" to avoid confusing.

C11- Line 27: Why are case with low optical depth excluded? It would be interesting to see the performance at those low values as well.

R11- Low AOT means that there are few aerosols, then those derived aerosol properties may be not reliable. In Figure 1, we include all the available cases of SSA and refractive index and make comparison with AERONET values. We will include all the cases in the paper.

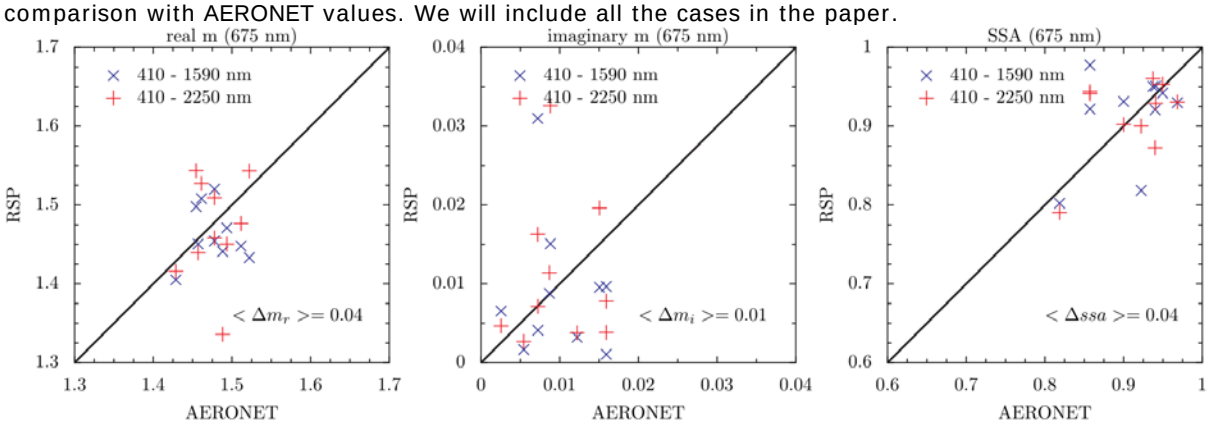

Figure 1. Available refractive index and SSA values comparisons

Page 2806

C12- Line 4: it is worthwhile explaining why it s difficult.

R12- We made a comparison between AERONET and RSP for fine and coarse modes effective radius in Fig. 2. For fine mode aerosol, it agrees well. In coarse mode aerosol, the retrieved AOTs of coarse mode aerosol are relatively small (mostly less than 0.1) which make the retrieved values less reliable. We will include the comparison in our paper.

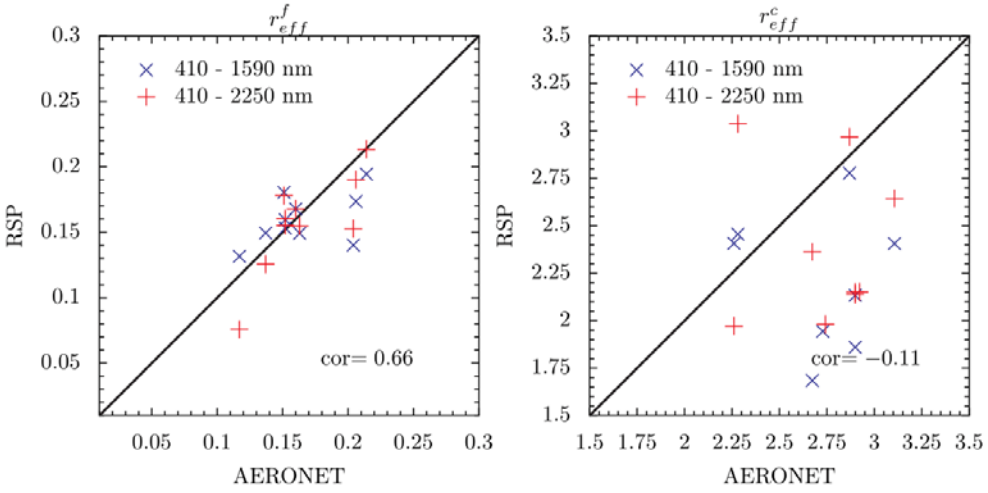

Figure 2. Comparisons of fine and coarse mode effective radius

C13- Line 15: In Sec. 2 you state that “In order to reduce this effect we average RSP measurements over a distance of 5km so that mis-registrations between viewing angles become small compared to the effective pixel size”. It would be good to include a figure that shows how this averaging still does not remove the oscillations due to surface inhomogeneities.

R13- Yes, that's true. There are cases that averaging still does not remove the oscillations. You can find them in Figure 6 in the paper. For example, at 670 nm band at scattering angle around 100 degree, there are still some oscillations.

Technical corrections

Page 2794

C14- Line 2: here multi-angle and photo-polarimetric are spelled differently.

C15- Line 7: over “the” continental US.

C16- Line 20: correct “multi-angle” or be consistent in the title.

Page 2795

C17- Line 8: correct “multi-angle” or be consistent in the title.

Page 2796

C18- Line 13: "The RSP data used in this paper".

C19- Line 19: over “the” continental US.

Page 2797

C20- Line 15: remove “in the atmosphere”.

R14:20- Thanks for the corrections. We modified them now.

Page 2798

C21- Line 10: Redundant sentence: “Here we describe particles as a mixture of spheres and spheroids with the aspect ratio distribution proposed by Dubovik et al. (2006).”

R21- Thanks, We delete “for spheroids and spheres” in the sentence.

Page 2799

C22- Line 4: if the vectors are indicated by bold font, what’s the use of the parentheses?

R22- Modified.

C23- Line 12: Why not particles / mˆ3?

R23- It is a total column, not density.

C24- Line 24: correct to “This may be different if “Brown Carbon” type aerosols are included in the analysis”.

Page 2801

C25- Line 4: correct to “We also retrieve the height of the aerosol layer Gaussian height distribution”.

R24:25- Modified.

C26- Line 20-ff: I’d see these details more readable in a table.

Page 2802

C27- Line 9-ff: Same as above, it would be nice to condense all this information in a table (especially the parameters describing the surface).

R26:27- Thanks. We put them into tables now.

Page 2804

C28- Line 7: how much is chi adjusted?

R28- The Chi2 can change between 1.25 and 3.5. For example, the chi2 thresholds for seven wavelength case when the number of viewing angles increase from 2 to 49 are as following.

Table 2. Adjusted Chi2 for the seven wavelength case

Number of viewing angles	2	3	5	7	9	11	13	15	17	21	25	33	49
Chi2	1.7	3.3	1.9	2.3	2.0	2.2	1.9	2.1	2.0	1.9	2.0	2.4	2.1

C29- Line 13: It's worth mentioning that these thresholds need be met to yield climatological parameters of appropriate accuracy, not to make them seems a requirement applicable to APS only.
R29- Thanks. We add: "needed for climate research" in the sentence.

C30- Line 16: Correct to "change from 2 to 3" and "do not improve further".
R30- Modified

C31- Lines 20-24: I don't think you need to repeat values that are well visible in the figures.
Page 2805
C32- Line 10-ff: again, perhaps the paragraph reporting the numerical values is not needed
Page 2806
R31:32- Thanks for the suggestion. Actually, we would like to keep the numbers in the text as well.

C33- Line 17: Correct to "we include only cases where the sampled scattering range includes the 85-155 degrees interval".
C34- Line 26: correct to "spectrally dependent".
C35- Line 27: correct to "it can be applied to all RSP channels".
R33:35- Modified