

## ***Interactive comment on “One year of CNR-IMAA multi-wavelength Raman lidar measurements in correspondence of CALIPSO overpass: Level 1 products comparison” by L. Mona et al.***

### **Anonymous Referee #1**

Received and published: 14 April 2009

#### TECHNICAL COMMENTS

Title: The title reads a little awkwardly. The words “in correspondence of” could be replaced by “corresponding to” or “in coincidence with” or “coinciding with”. e.g. “One year of CNR-IMAA multi-wavelength Raman lidar measurements coinciding with CALIPSO overpasses: Level 1 products comparison”. (Note also use of plural - CALIPSO “overpasses”). See also P8442 L12.

Throughout paper different words are used to describe transmittance – e.g. “transmission”, “transmissivity” and “transmittance”. “Transmittance” is the accepted form these days and should be used consistently throughout the paper.

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Throughout whole paper the verb “allow” is used with a following verb in the infinitive. The verb “allow” needs an object and the following infinitive needs a subject e.g. “us” or, more formally, “one”.

e.g. P 8432 line 20: “... this technique allows to determine ...” should be “... this technique allows us to determine...” or “... this technique allows one to determine...”, or recast the sentence as “... this technique allows the determination of ...” or “... this technique allows vertical profiles of aerosol extinction and backscatter coefficients to be determined without any assumptions on the aerosol type and composition ...” or something similar.

Also, in many locations throughout the paper and figure captions “starting from” should be simply “from”. (Page 8437 line 25, 8438/15, 8439/8, 8440/8, 8441/13, 8442/25&27, 8445/11 and Fig. 5 line 2.)

P 8430 L1: “an aerosol lidar system has been operational”

P8430 L 3: “on a continental scale”

P8430 L8: “Since ... measurements have been performed in coincidence with CALIPSO overpasses”

P8430 L12 and P 8433 L9: “... discussed in detail”

P8430 L19: “... a mean difference”

P8431 L 2: “... radiation budget. In fact, the uncertainties ...”

P8431 L15: “there is no information”

P8431 L 23-4: “... allowing, therefore, the aerosol-cloud interactions and aerosol indirect effects to be investigated” would read better.

P8431 L 25-7: “Since mid June 2006, CALIPSO ... has provided ...”

P8432 L3: “ for studying both aerosols and clouds” or “for both aerosol and cloud

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studies”

P8432 L5: “. . . the lidar on board CALIPSO”

P8432 L6 -7: “. . . vertical profiles of aerosol and cloud backscatter coefficients . . .”

P8432 L11-12: “A first guess of the lidar ratio is selected in the CALIPSO retrieval algorithms depending on [or “according to”] the type . . .”

P8432 L15: “the lidar ratio can vary widely”

P8432 L23 “. . . the comparison of final CALIPSO products . . .”

P8433 L7: “. . . as is possible with the elastic/Raman technique.”

P8433 L 12: “. . . lidar system operational [or “operating”] within EARLINET . . .” (See also line 24)

P8434 L11: “interference filters” ?

P8434 L14-15: Not clear. Do you mean “This allows a lidar signal extending from low altitude to the free troposphere to be obtained with good signal counting statistics while not exceeding the linearity the limits of the detector”, or have I misunderstood this completely?

P8435 L13: “Both the system and the algorithms used . . .”

P8435 L19: “PEARL is a high-quality . . .”

P8436 L2-3: “Since 14 June 2006, devoted measurements have been performed at CNR-IMAA in coincidence with CALIPSO overpasses according to the CALIPSO Science Team requests for validation measurements.”

P8436 L11-14: “These kinds of measurements . . . the EARLINET network’s capability [or just simply “EARLINET’s capability”] to investigate the modification of aerosol properties . . . and for combining all this information . . .”

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P8436 L19-20: “the average minimum distance . . . is 66.5 km ...”

P8437 L1-4: “However, before these comparisons can be made, it is necessary . . . related to the Level 2 retrieval algorithms”.

P8437 Eqs (1) and (2) and related text. “tot” should be a subscript, not a superscript, in the equations in order to be consistent with its use in the text and with the other subscripts “par”, “mol” and “O<sub>3</sub>” .

P8437 L17-18: “. . . are not directly comparable to [or “with”] PEARL profiles, so a procedure . . .”

P8437 L 25 and elsewhere: “met” should be “meteorological”

P8437 L23-24: “. . . can be obtained from a collocated radiosounding . . . approximated using a modeled atmosphere”. Note that “collocated” is used elsewhere (e.g. P8444 L16). Consistency is needed.

P8438 L1-5: “particles’ ” or, preferably, “particulate”.

P8438 L 13-16: “. . . PEARL measurements allow the CALIPSO-like attenuated backscatter to be calculated if the ozone . . .” “. . . we deal explicitly with the calculation of these molecular terms . . .”

P8439 L7: “satisfying” should be replaced by “satisfactory” here and elsewhere (P8446 L2, P8451 L29).

P8441 L4: “. . . their better performances with respect to the standard . . .”

P8441 L10: “. . . on the previous day . . .”

P8441 L14-15: “. . . evident that the CALIPSO vertical profile . . .”

P8441 L22: “. . . a clear signature . . .”

P8442 L7: “. . . CALIPSO does not detect the cirrus cloud . . .”. It is probably more correct to say that the cirrus cloud was not below the CALIPSO orbit.

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P8442 L14: “coefficient” or “vertical profiles of backscatter and extinction coefficients”

P8442 L18- 24: “. . . the original horizontal resolution of 1/3 km. . . horizontal scale of 5 km, corresponding to the horizontal resolution of . . . The typical horizontal distance . . . is about 60 km . . .overpass of Potenza.”

P8443 L1-3: “. . . the vertical resolution of the PEARL profiles is degraded . . . to allow a quantitative comparison.” (But see comment above in Specific Comments on which resolution is actually coarser.)

P8443 L23-24: “. . . with a complex orography . . . acquired with imperfect spatial coincidence.” Also P8448 L 11 “. . . expect an imperfect agreement”.

P 8444 L2: “. . . different geometrical and optical extents in the . . .” although “properties” would be better still than “extents”. See also P 8445 L9.

P 8444 L10: “. . . a cirrus cloud not detected. . .”

P 8444 L14-16: “. . . lower than the real one. . .” “For CALIPSO data, the influence of multiple scattering on Level 1 data has been observed . . .”

P8445 L14: “Level 1 data have no information about . . .”

P8445 L21-22: “. . . the closest 50-km clear sky scene . . . is chosen as the molecular reference.”

P 8446 L 9: “5 m” should be “5 km”

P8446 L22: “non-negligible effects”, also “Non-cirrus cloud cases” in next section.

P8447 L12: “interested by” ? Do you mean “. . . the altitude range occupied by cirrus clouds . . .” ?

P8449 L13: “. . . (5 cases) and a more-distant overpass around 83 km ..”

P 8449 L14-15: “The closest overpass is located North East of Potenza”. (Considering Fig. 1 though, should this not be “North West of Potenza”?)

P 8449 L20: “Also, in these cases ...”

P8450 L8: “... which are, except for the calibration constant ...”

P8450 L13-14: “... allows us to identify any errors and potential biases ...”

P8450 L17-19: “Only after a [satisfactory?] check of the unprocessed data will comparisons with Level 2 products allow us to check and improve CALIPSO retrieval algorithms and assumptions.”

P8451 L4-8: “For clear sky conditions, the comparisons show good agreement between the CALIPSO on-board lidar and the ground-based lidar. Apart from the PBL region, the mean difference ... is always within its [or preferably “one”] standard deviation ... Widely scattered values ...”

P8452 L3: “... such as the possible influence ...”

References: There is no apparent consistency between the supply of the names of all co-authors and the use of “et al.”.

Amodeo et al. reference: Is the “0277-786X/07/\$18” actually part of the citation? Similar comment applies to Mattis et al. reference.

The references of all the authors whose names begin with “W” are misplaced and should appear immediately following the Vaughan reference.

Figure 1 caption: Use either “overpassing Potenza” or “passing over Potenza”

Figure 3 caption: “... difference in CALIPSO-like ... resulting from the use of ...” “... the thin line reports ...”

Figure 9, 3rd panel should be labeled “17 November 06”

Figure 9 caption: “PEARL profiles are averaged over 30 minutes centered on the CALIPSO overpass of CNR-IMAA.”

Figure 9: There are spurious lines on some panels that should be removed.

Figure 11 and Figure 12 captions: “ ... for all non-cirrus night-time cases.” “ The standard deviations ...”

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 8429, 2009.

ACPD

9, C206–C212, 2009

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