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Interactive comment on "Comparison of aerosol properties retrieved using GARRLiC, LIRIC, and Raman algorithms applied to multi-wavelength LIDAR and sun/sky-photometer data" *by* V. Bovchaliuk et al.

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(1) - short comment (2) - answer on short comment

(1) I would like to make the following comments, related to the consistency within the paper.

If I understood correctly, the Aeronet retrievals are given for comparison purpose only (in addition to the three methods discussed).

case 1) LIRIC and Raman retrievals are missing and basically do not contribute to the

inter-comparison among the three methods

(2) Yes, unfortunately there were no Raman channels at that time, that is why article doesn't include Raman retrievals. But, the event by itself is very interesting and I included it for GARRLiC/BASIC/AERONET comparison.

According to Chaikovsky et al. (Chaikovsky, A., Dubovik, O., Holben, B., Bril, A., Goloub, P., Tanré, D., Pappalardo, G., Wandinger, U., Chaikovskaya, L., Denisov, S., Grudo, Y., Lopatin, A., Karol, Y., Lapyonok, T., Amiridis, V., Ansmann, A., Apituley, A., Allados-Arboledas, L., Binietoglou, I., Boselli, A., D'Amico, G., Freudenthaler, V., Giles, D., Granados-Muñoz, M. J., Kokkalis, P., Nicolae, D., Oshchepkov, S., Papayannis, A., Perrone, M. R., Pietruczuk, A., Rocadenbosch, F., Sicard, M., Slutsker, I., Talianu, C., De Tomasi, F., Tsekeri, A., Wagner, J., and Wang, X.: Lidar-Radiometer Inversion Code (LIRIC) for the retrieval of vertical aerosol properties from combined lidar/radiometer data: development and distribution in EARLINET, Atmospheric Measurement Techniques Discussions, 8, 12 759–12 822, doi:10.5194/amtd-8-12759-2015, http://www.atmos-meas-tech-discuss.net/8/12759/2015/, 2015.) the results of the LIRIC inversion using only the data from 355 and 532 nm wavelengths were found to be rather unsatisfactory for the coarse mode, that is why LIRIC inversion had not been applied to this event too.

(1) cases 2) and 3) column integrated variables (table 2): please provide Aeronet CRI and LIRIC CRI

(2) According to Chaikovsky et al. (reference above), the LIRIC algorithm uses AERONET inversion products such as column volume concentration, volume specific backscatter, and extinction coefficients as a priori information. The specific products include backscatter (β), extinction (σ) and volume concentration (V) profiles, Angström exponent (α) values, and LIDAR (LR) and depolarization (δ) ratios. LIRIC doesn't retrieve CRI values. In attached supplement file you will find modified article's Tables 2 and 3 with AERONET CRI.

(1) vertically resolved variables: please use fine and coarse modes for GARRLIC to be consistent with LIRIC retrievals

(2) Because of high predominance of coarse particles, GARRLiC retrieval of fine mode has high errors and the results were found to be rather unsatisfactory. That is why both Dakar events were retrieved by using the configuration of single mode inversion. In attached supplement file you will find updated Figure 16 which have LIRIC (fine, coarse and total) and GARRLiC (total) volume concentrations. I didn't plot errors to stay figure clear. As you can see, fine mode particles have small contribution in total volume concentration. Similar situation is for event on 29 March 2015.

(1) For consistency, the same input (photometer + lidar) should be used in both LIRIC and GARRLIC. Apologises if I missed something!

(2) In both LIRIC and GARRLiC algorithms have been used same photometer and lidar data. Probably you were noticed that LIRIC and GARRLiC vertical profiles have different number of points. GARRLiC retrieval is time consuming, that is why during the GARRLiC data preparation phase lidar signals were reduced by averaging into 60 points. It reduce time of retrieval and errors in upper altitudes.

Please also note the supplement to this comment:
http://www.atmos-meas-tech-discuss.net/amt-2016-40/amt-2016-40-AC4-supplement.pdf

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