**EGUsphere-2026-648: "Aerosol microphysical properties and CCN/INP information from lidar and ceilometer profiles: POLIPHON update", by Ansmann et al.**

This paper presents an update of the conversion factors used in the POLIPHON method for deriving the mass concentration and both CCN and INP concentrations related to five key aerosols at four relevant wavelengths regarding the vertical aerosol observations from active remote sensing networks (ceilometers, lidars) and space lidar missions. In addition, this update is performed by applying an approach (least-squares estimation, LSE) different from that used in previous works of the authors. Therefore, the outcomes of this work are rather relevant, representing an extension of the conversion factors at other wavelengths and for other types of aerosol, and hence it deserves to be published. However, some issues should be deeply discussed before it is accepted for publication.

General comments:

1) The title of the work should be modified, because it is ambiguous. Neither lidar nor ceilometer profiles are used to obtain the conversion factors for retrieving the aerosol microphysical properties and CCN/INP information needed for determining mass and CCN/INP concentrations. Instead, the AERONET products are used to obtain the conversion factors, which would be applied with the ceilometer and lidar extinction profiles (explicitly not shown in this work).
2) In a previous work of the authors (Ansmann et al., 2029b), a relevant, noteworthy variability in the conversion factors for dust in dependence of the regional/continental dust source was investigated. This matter deserves to be commented and discussed in the present work, where that variability has not been taken into account. Section 4.4, as it is now, is incomplete, leading to confused conclusions.

*Ansmann, A., Mamouri, R.-E., Hofer, J., Baars, H., Althausen, D., and Abdullaev, S. F.: Dust mass, cloud condensation nuclei, and icenucleating particle profiling with polarization lidar: updated POLIPHON conversion factors from global AERONET analysis, Atmospheric Measurement Techniques, 12, 4849–4865, 2019b.*
*https://doi.org/10.5194/amt-12-4849-2019*

Specific comments:

1) Page 2, lines 47-57: Authors explain why they used in this work a better approach (LSE) for retrieving CCN-related conversion factors, different from that previously used (e.g., Mamouri and Ansmann, 2016), which is based on the methodology of Shinozuka et al. (2015), due to the discrepancies found with the findings of Kulkarni et al. (2025) in the case of continental aerosol pollution, and for preventing noisy $n_{50}$ values and removing potential outliers. However, it is not explained for the other aerosol types ($n_{100}$, $n_{250}$, …), which the Shinozuka's approach could be suitable for. It should be discussed and clarified.
2) Page 13, Table 5: Please, clarify in more detail why the interval of AOT (532 nm) is restricted up to 0.5 for mineral dust cases, as there could likely be higher AOT values. This can affect the selection of cases used in the LSE approach.
3) Pages 18-19, Figures 3-4: It should be included the corresponding figures for all the aerosol case studies shown in Table 7, and not only for mineral dust (IZA, Fig. 3) and continental pollution aerosol (BEI, Fig. 4). That is, include, please, also the figures for marine aerosol (AMS) and continental pollution (PRE).
4) Page 29, Figure 9: Please, indicate which one of the conversion factors shown in Ansmann et al. (2019b), and denoted as A19,d, is used in this Figure to represent the 2016 conversion method for dust. Different regional/continental conversion factors depending on the mineral dust source are shown in A19.

5) Pages 31-32, Summary and concluding remarks: It is mentioned about the conversion factors for volcanic ashes (though not included explicitly in this work), as well as for the stratospheric volcanic sulphate aerosol in the manuscript in overall. But the tropospheric volcanic sulphate aerosol is not mentioned. Authors should introduce some discussion, at least, regarding those also relevant types of aerosol omitted. This would improve the work. As a reference, but you can find more, see Córdoba-Jabonero et al. (2023).


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https://doi.org/10.1029/2024JD042565


Other minor comments:

1) Page 1, line 18: Revise the final of the sentence: "…with high vertical resolutions and this continuously".
2) Page 2, line 35: Add a 'line feed' before "(1) The aerosol profiling …".
3) Page 3, line 61: Correct 'POLIPHPON' by 'POLIPHON'.
4) Page 3, Figure 1: Correct 'LIidar' in the first box of the figure by ''LIdar.
5) Page 6, line 131: Correct 'particles density' by 'particle density'.
6) Page 10, Table 3: In the first column, add a space between 'Lanzhou' and '(SACOL)'.
7) Page 10, line 235: The wavelength of 532 nm is missing.
8) Page 13, line 296: Correct 'AERONT' by 'AERONET'.
9) Page 15, Table 6: For marine particles, the expressions for the conversion factors $c_{s,m,amb}/4$ and $c_{v,m,amb}/8$ in the 2nd column should be replaced by $c_{s,m,amb}$ and $c_{v,m,amb}$, for consistency with $s_{m,amb,j}$ and $v_{m,amb,j}$ in the 4th column that already appear corrected by

‘1/4’ and 1/8’, respectively. The same corresponding modifications for the Continental aerosol pollution.

10) Page 16, line 351: Remove the comma after ‘conversion factors’.
11) Page 17, Table 7: Please, consider revising the number of decimals of the quantities. They could be rounded to 2 decimals in overall. The same for the rest of tables with values, when possible and consistent.
12) Pages 25-26, Tables 13-14: Please, include the SD values also in these tables as in Table 12. This will clarify the dispersion among the computed values of the conversion factors.
13) Page 29, Figure 9: In the caption, replace the comma after ‘red dashed’ by a semicolon.
14) Page 30, line 511: Replace ‘significant’ by ‘significantly’.
15) Page 30, lines 539-540: The term ‘at lower extinction’ is twice repeated. Please, remove one.