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Interactive comment on "Dust mass, CCN, and INP profiling with polarization lidar: Updated POLIPHON conversion factors from global AERONET analysis" *by* Albert Ansmann et al.

Anonymous Referee #3

Received and published: 3 May 2019

Review of the paper by Ansmann et al.,

The paper presents an update of the POLIPHON method, which has been already introduced by the authors in a series of papers. In the current paper the authors provide a very comprehensive overview of the method. The updates presented concern the potential applicability of the method on a global scale and thus the application of POLIPHON on satellite lidar data. The paper is well written and structured and should be accepted for publication in AMT after considering few remarks listed below.

Comments:

Page 2, line 22. The authors should also mention that their study is relevant not only to

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Discussion paper

PollyNET but also to lidar networks with long-term measurements and well established QA procedures (e.g. EARLINET)

Page 5, line 27. All stations selected from AERONET correspond to stations in the proximity of deserts, except Leipzig. The inclusion of Leipzig can confuse the reader. What is the significance for the inclusion of Leipzig. If the authors would be interested to examine the possible variability of the conversion factors as function of the distance from the source, then they should examine also other AERONET stations, with variable distances from the desert (there are plenty in the Mediterranean). Please comment.

Page 7, lines 12-17. Is it possible that in Capo Verde one might still expect the influence of smoke particles in large AOTs?

Page 7, line 21. The authors should make a comment here why they think that a product with an overall error of a factor 2-3 is useful and relevant.

Page 8, line 19. The authors probably mean "selected" rather than "elected".

Page 8, line 22. How do the authors distinguish at 10km dust from cirrus?

Page 8, line 25-30. The trajectory analysis provides some indication for the origin of the observed layers. Are there any model simulations available that confirm and further support this multi-source structure? The inclusion and discussion of figure 7b, to my view could be omitted. It just opens a new discussion, which is left incomplete.

Conclusions. (page 10, lines 14-17). This statement is confusing as written. The authors first they suggest to use globally valid conversion factors and then recommend to use regional ones. Maybe each suggestion should be followed with an uncertainty estimate. Please consider to rephrase the recommendations, since these are the ones to be followed by a potential user of POLIPHON.