Atmos. Chem. Phys. Discuss., 14, C286–C288, 2014
www.atmos-chem-phys-discuss.net/14/C286/2014/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Ground based measurements of immersion-freezing in the eastern Mediterranean" *by* K. Ardon-Dryer and Z. Levin

P. Seifert

seifert@tropos.de

Received and published: 4 March 2014

Dear authors,

I enjoyed reading your overview on the investigation of freezing efficiency for dusty and clean scenarios, specifically Fig. 9. Given your results, it is worth to note that we found a similar behaviour as shown in Fig. 9 in a 11-year remote-sensing study on mixed-phase cloud occurrence under dusty and dust-free conditions. From the dataset we also derived a temperature shift of the dusty and the dust-free curves for the frozen (ice-containing) fraction of whole cloud-layer systems. More or less, our results can be

recognized as a 'large-scale, long-term evaluation' of your results.

I recommend to you to take a look on the respective publication of Seifert et al. (2010) (by coincidence, it's also Fig 9 in that publication).

Even more interestingly, one could put your Figure 9 into context with Fig 3 of Kanitz et al. (2011). There, the ice-containing fraction of clouds is shown for several long-term datasets from contrasting locations. Your curves for the blank filters and pure water are similar to our observations at locations with very clean aerosol background, namely Cape Verde and Punta Arenas. Please take into account that even though Cape Verde is located close to the Saharan desert, the middle and upper troposphere at heights above 4 km ($\sim$0°C) did not contain significant amounts of dust during the observational period. (See Fig 7.19 in here: http://www.qucosa.de/fileadmin/data/qucosa/documents/7116/2010-Dissertation-Patric_Seifert.pdf or abstract of Tesche et al. (2011))

In addition, for the introduction section it could also be noted, that a global effect of deserst dust on ice formation in layered clouds is clearly visible in combined observations of Cloudsat and Calipso. See the abstract of the publication of Zhang et al. (2012).

Kanitz, T., P. Seifert, A. Ansmann, R. Engelmann, D. Althausen, C. Casiccia, and E. G. Rohwer (2011), Contrasting the impact of aerosols at northern and southern midlatitudes on heterogeneous ice formation, Geophys. Res. Lett., 38, L17802, doi:10.1029/2011GL048532.

Seifert, P., A. Ansmann, I. Mattis, U.Wandinger, M. Tesche, R. Engelmann, D. Müller, C. Perez, and K. Haustein, Saharan dust and heterogeneous ice formation: Eleven years of cloud observations at a central european earlinet site, Journal of Geophysical Research, 115, 2010.

TESCHE, M., GROSS, S., ANSMANN, A., MÜLLER, D., ALTHAUSEN, D., FREUDENTHALER, V. and ESSELBORN, M. (2011), Profiling of Saharan dust and biomass-

burning smoke with multiwavelength polarization Raman lidar at Cape Verde. Tellus B, 63: 649–676. doi: 10.1111/j.1600-0889.2011.00548.x

Zhang, D., Z. Wang, A. Heymseld, J. Fan, D. Liu, and M. Zhao, Quantifying the impact of dust on heterogeneous ice generation in midlevel supercooled stratiform clouds, Geophysical Research Letters, 39, 2012.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 471, 2014.