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Characterization of aerosol over the eastern Mediterranean by polarization-sensitive Raman lidar measurements during A-LIFE – aerosol type classification and type separation

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Supplement

In the comparison of aerosol type classification from in-situ, AERONET sun-photometer, and lidar measurements we show evidence of aerosol layers classified as pure mineral dust by the lidar and sun-photometer and as polluted or moderately polluted layers by the in-situ classification scheme. The in-situ optical properties (Scattering and Absorption Angstöm exponent) show the presence of pollution mixed in those layers according to the Cappa et al., 2016 classification scheme. In addition, the climate-relevant intensive aerosol optical properties (asymmetry parameter and single scattering albedo) are affected by the presence of pollution. Table S1 gives an overview of the in-situ measured optical properties. A detailed investigation on how pollution affects Arabian and Saharan dust optical properties were done by Teri et al., 2024.

Table S1: In-situ intensive optical properties measured in the Falcon aircraft cabin during the A-LIFE field experiment for days and overpasses that were classified as pure aerosol types by the lidar classification scheme but as moderately polluted or polluted dust cases from the in-situ classification. Shown is the date, start time, height of the overpass over the lidar site and the optical properties the Scattering Angström Exponent (SAE), the Absorption Angström Exponent (AAE), the type classification following Cappa et al., 2016, the Asymmetry parameter (g) and the Single Scattering Albedo (SSA).

Date	Start time /UTC	Height/km	SAE	AAE	Type	g	SSA
5 April	8:50	1.57	1.8	1.8	Mixed BC/CrC	0.59	0.89
6 Arpil	4:30	1.57	1.1	1.9	Mixed Dust/BC/Brc	0.57	0.89
21 April	11:52	1.57	0.7	1.8	Mixed Dust/BC/BrC	0.64	0.89
22 April	6:10	1.59	0.6	1.9	Mixed Dust/BC/BrC	0.58	0.90
25 April	8:07	1.54	2.1	1.9	Mixed BC/BrC	0.52	0.90
27 April	7:17	1.57	-0.1	2.5	Dust dominated	0.60	0.93
29 April	7:09	1.58	0.4	1.9	Mixed Dust/BC/BrC	0.6	0.88

Reference:

Cappa, C. D., Kolesar, K. R., Zhang, X., Atkinson, D. B., Pekour, M. S., Zaveri, R. A., Zelenyuk, A., and Zhang, Q.: Understanding the optical properties of ambient sub- and supermicron particulate matter: results from the CARES 2010 field study in northern California, Atmos. Chem. Phys., 16, 6511–6535, https://doi.org/10.5194/acp-16-6511-2016, 2016.

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