The A-LIFE field experiment in the Eastern Mediterranean – Overview and early results

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In spring 2017, the A-LIFE aircraft field experiment (Absorbing aerosol layers in a changing climate: aging, lifetime and dynamics; www.a-life.at) was conducted in the Eastern Mediterranean. The overall aim of the ERC-funded A-LIFE project is to investigate the properties of absorbing aerosols (in particular mineral dust – black carbon mixtures) during their atmospheric lifetime to gather a new data set on key parameters of mixtures of absorbing aerosols and their distribution throughout the tropospheric column and to study potential links between the presence of absorbing particles, aerosol layer lifetime and particle removal.

For A-LIFE, the German Aerospace Center (DLR) research aircraft Falcon was equipped with an extensive in-situ aerosol payload, a wind lidar and meteorological sensors. Between 3 and 29 April 2017, the Falcon was based in Cyprus and carried out measurements of the entire atmospheric column from the ground up to 12 km in the Mediterranean. Altogether, 22 research flights (~80 flight hours) were conducted and several outbreaks of Saharan, Arabian and Middle East dust, as well as pollution, biomass burning, and dust-impacted clouds were studied. During a number of flights, coordinated observations including overflights of the ground-based sites in Cyprus (Limassol, Paphos, Agia Marina), Crete (Finokalia), and over Austria (Vienna, Sonnblick Observatory) were performed. The A-LIFE campaign was carried out in close coordination with the 18-month field observations conducted in the framework of the *Cyprus Clouds, Aerosol, and Rain Experiment* (CyCARE; October 2016 – March 2018) organized by the Leibniz Institute for Tropospheric Research (TROPOS) in Leipzig, and with the PreTECT initiative of the University of Athens.

Highlights during the A-LIFE field experiment include a sequence of six flights between 19 and 22 April 2017 which studied a Saharan dust outbreak and dust-impacted clouds between Malta, Crete and Cyprus while the dust outbreak moved eastwards across the Mediterranean. The event was also captured by the ground-based in-situ instrumentation and the lidars. Another highlight is a sequence of four flights between 26 and 29 April 2017 which investigated Arabian/Middle East dust at altitudes below 4 km and Saharan dust aloft. In most cases, a strong vertical layering of different aerosol types was observed. An unexpected observation during the measurements in the Eastern Mediterranean region was that the dust very frequently extended up to altitudes above 9-11 km. In addition, the fine mode scattering properties in Arabian dust mixtures which also contained a significant black carbon contribution did not show the typical dust signature, but rather showed a wavelength-dependency of the scattering coefficient.

In our presentation, we will give an overview of the A-LIFE study, show early results covering profiles of dust microphysical and optical properties, and discuss similarities and differences between Saharan and Arabian/Middle East dust. We will also compare the A-LIFE observations with results from other dust field experiments (SAMUM, SALTRACE) over Africa, Cape Verde and in the Caribbean