

A43F-01 Investigating mineral dust mixtures in the Eastern Mediterranean: results of the A-LIFE aircraft field experiment

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3005 - West (Level 3, West, MC)

Abstract

In April 2017, the A-LIFE aircraft field experiment (www.a-life.at) was carried out in the Eastern Mediterranean. The overall goal of the ERC-funded A-LIFE project was to investigate the properties of mixtures of absorbing aerosols (in particular mineral dust and black carbon) during their atmospheric lifetime.

In 22 research flights (~80 flight hours), outbreaks of Saharan and Arabian dust, as well as pollution, biomass burning, and dust-impacted clouds were studied, and a unique aerosol and cloud data set was collected. 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 CyCARE (October 2016 – March 2018) organized by the Leibniz Institute for Tropospheric Research, and with the PreTECT initiative of the National Observatory of Athens.

Aerosol source apportionment was achieved with the Lagrangian transport and dispersion model FLEXPART version 8.2. Based on FLEXPART model results and aerosol measurements, the observations were classified into 12 aerosol types consisting of four main aerosol types (Saharan dust, Arabian dust, mixtures with and without coarse mode). Each of the four main aerosol types was further separated into three sub-classes (clean, moderately-polluted and polluted). For each of the 12 aerosol classes, microphysical and optical aerosol properties were derived. One outstanding finding of A-LIFE is that scattering properties of polluted dust mixtures do not show the typical dust signature, but rather show a wavelength-dependency of the scattering coefficient which is typical for pollution. This means that optical properties of mineral mixtures are frequently dominated by the pollution.

We will give an overview of the A-LIFE field experiment and available data sets, compare the properties of the different aerosol mixtures, and discuss the question which aerosol component (natural vs. anthropogenic) dominates the properties in mixed aerosols. We will also compare the A-LIFE dust observations with results from other field experiments (SAMUM, SALTRACE, ATom).

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