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Ground-based polarization sensitive Raman lidar measurements of dust and pollution in the Eastern Mediterranean during the A-LIFE field experiment

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Aerosols are key players in the Earth's climate system. One major contribution to the atmospheric aerosol load is mineral dust which is often transported over thousands of kilometers. Large field experiments have been performed to study the properties, composition and effects of mineral dust close to its source region as well as long-range transported over several days. The focus of most of these studies was on the investigation of properties and effects of widely undisturbed mineral dust layers. In contrast, in April 2017 the A-LIFE field experiment (https://www.a-life.at/) took place at Cyprus to investigate mineral dust from different source regions as well as mixed with absorbing aerosols from biomass burning events over Europe or from transported and local pollution. A-LIFE was conducted as closure study combining airborne and ground-based in-situ and remote sensing measurements with trajectory analysis and modelling efforts. Three major Saharan dust events and two Arabian dust events were observed during our measurement period. Furthermore it was found that pollution, either long-range transported or from local sources, was omnipresent during the whole measurement campaign.

Ground-based polarization sensitive Raman lidar measurements were performed to characterize the optical properties of Saharan dust and mineral dust from the Arabian Peninsula and to investigate possible differences. In addition it is studied if and how local and transported pollution alter the optical properties of mineral dust layers. The vertical aerosol distribution was found to be very variable during our measurement period with aerosol layers reaching up to 10 km height during major dust events.

In our presentation we will give an overview over the performed lidar measurements and the general measurement situation, and we will show differences of optical properties of Saharan and Arabian dust as well as of polluted dust. Furthermore we will compare our findings to results found during former field experiments.