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Aerosol optical properties retrieved from airborne high spectral resolution lidar during EUCAARI

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As part of EUCAARI (European integrated project on Aerosol Cloud Climate and Air Quality Interactions) the field campaign LONGREX (LONG Range Experiment) was carried out in May / June 2008 to investigate physical and chemical properties of aerosols on European scale. During the campaign the DLR Falcon research aircraft was equipped with a nadir-looking high spectral resolution lidar (HSRL) and a set of in-situ sensors and conducted a total of 15 research flights from Oberpfaffenhofen, Germany. The advantage of a HSRL over a normal backscatter lidar is the ability to directly measure the climatically important aerosol extinction. The Falcon flights were coordinated with the British BAe-146 (FAAM, Airborne Facility for Atmospheric Measurements), which was mainly operating within the boundary layer. The HSRL on board the Falcon provided direct measurements of the aerosol optical thickness, the aerosols' vertical distribution, and their optical properties at 532 nm as well as atmospheric backscatter and depolarization at 1064 nm. The HSRL measurements were compared to results of satellite based sensors and in-situ instruments, respectively. Due to a persistent high pressure system over Europe during the first half of the campaign, the build-up of pollution aerosol within the boundary layer was favoured and the aerosol layers could be analyzed with respect to ageing and transport. Different source contributions to the aerosol layers could be estimated using backward trajectory and retro-plume calculations