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Characterisation of multiple aerosol layers originating from various sources above the Sahel region by a synergism of sunphotometer, scatterometer and airborne compact UV LIDAR.

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A new payload for an ultra-light aircraft has been designed. This payload including the LAUVA (Lidar Aérosols UltraViolet Aéroporté) system now developed and commercialized by the LEOSPHERE company in France.

LAUVA is an eye safe, rugged and compact backscattering lidar system emitting at the wavelength of 355 nm. We have operated this airborne configuration in the Sahel from the city of Niamey (Niger) during the first campaign of the African Monsoon Multidisciplinary Analysis (AMMA) in January-February 2006.

The flight plans were defined to measure the aerosol optical properties in the planetary boundary layer between 0 and 5 km above the sea level. We took advantage of the great lidar capability of pointing in different lines of sight in order to retrieve the vertical profile of the aerosol backscatter to extinction ratio (BER) during a transport event with a mixing of dust and biomass burning aerosols. These aerosols were originating from different sources as showed using backtrajectories at different starting heights in the planetary boundary layer.

The synergy between lidar (355 nm), scatterometer (880 nm) and sunphotometer allowed us to identified different aerosol structures from the spectral dependency (a) of the aerosol extinction coefficient. Three types of aerosol layers have been identified to be associated with BER (a) close to 0.008 (1.5), 0.025 (0) and 0.012 sr-1 (0.5) for biomass burning (BB), dust (D) and a mixing between BB and D, respectively.