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Microphysical properties of Sahara dust collected during the Fennec campaign in 2011

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Ground measurements of the atmospheric particles are extremely important in order to integrate aerial and remote sensing measurements. In situ aerosol filters collection and in situ measurements of aerosol properties were performed at two locations: Bordj Badj Mokthar in Algeria (Supersite 1) and Bir Moghrein in Mauritania (Supersite 2) in June 2011, as part of the Fennec project over the central Sahara.
At Supersite 1 an automatized system consisting of an Aerosol Sampling Station (LASS1) and an integrated Reflectometer-Nephelometer allowed simultaneous collection of aerosol particles on Nuclepore filters (coarse and fine mode) and continuous measurement of the scattering and absorption properties of the aerosol particles. At the Supersite 2 in Mauritania a second Aerosol Sampling Station (LASS2) was also operational during the Fennec campaign collecting filters continually.
Filters were sent back to laboratory for a series of analysis to obtain the optical and microphysical properties of the sampled aerosol particles. Gravimetric analysis of each individual filter gives the concentration of aerosol particles in $\mu g/m^3$. Particle size distribution is obtained by scanning electron microscopy and the spectral reflectance of the filters from (350-2200nm) is being measured to derive the spectral mass absorption coefficient and refractive index of the aerosol particles.
Preliminary analyses of Supersite 1 for 463nm, 525nm and 637nm wavelength show single scattering albedo 0.94, 0.96 and 0.98 respectively. X-Ray Fluorescence analyses of some of the filters from this location indicate Si, Fe, Al and Ca as the main constituent elements of these particles. At Supersite 2, it was observed periods of very clean conditions with concentrations below 10 $\mu g/m^3$ (June 6-7, Maritime Phase) and periods of high dust concentration, with peaks of 70 $\mu g/m^3$ (June 20-21, Heat Low Phase). Scanning electron microscopy analysis show high shape heterogeneity of particles and also the presence of relatively low density particles aggregates that require further investigation.
The concluding goal of this research is to combine laboratorial and in situ measurements of dust concentration and optical properties with analysis obtained from Lidar, Aeronet and flights data simultaneously measured at these two supersites during the Fennec campaign. This integration is particularly important in the characterization of local emission events of dust and transport from dust sources. In addition, it will provide accurate information of the microphysical properties of dust particles from these regions.