

Name of research institute or organization:

Department of Geosciences, University of Fribourg, Switzerland

Title of project:

Single particle analysis of aerosols from a Saharan dust event, sampled during CLACE 2008

Project leader and team:

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Project description:

Aerosol particles from Saharan Dust Events (SDE's) have an important influence on the optical properties of the atmosphere. The single scattering albedo shows a wavelength dependant inversion in the range of the visible light during such mineral dust events and was proposed as a recognition feature for SDE's (Collaud Coen et al., 2004). However, the reason for this comportment is still not clear. Size, morphology and chemical composition of particles as well as their concentration in the atmosphere are important factors. Scanning Electron Microscopy (SEM) combined with Energy Dispersive X-ray Spectroscopy (EDS) and automated single particle analysis routines of the EDAX GENESIS software package are powerful tools to obtain these parameters. A selection of particles was also analyzed by Transmission Electron Microscopy (TEM).

Between the 14th and 30th of May 2008 (during CLACE 2008) aerosol particles were sampled at the high alpine research station Jungfrauoch. Within this time period fortunately a remarkable SDE occurred (From 26 May to 30 May). The samples were taken by a "common" PM-10 sampler (flow rate: 4 l/min) and an electrostatic sampler (described in Fierz et al., 2007), which allows to deposit particles directly on a transmission electron microscopy grid (TEM-Grid).

First automated analysis with the SEM shows that number and mass concentrations for particles with sizes between 0.4 and 10 µm were highly increased during the period of the SDE. On May 28 the number concentration reached 30 particles per liter, which is about 10 to 100 times higher than the usual (background) concentration. Different aerosol particles from the SDE could be recognized. The most abundant particles are agglomerates of clays. Other silicates (Quartz, Feldspars), Ca-carbonates, Ca-sulfates and metal oxides/hydroxides are minor components. However, these components are also present in the background samples and are not specific for SDE's. Because of the use of polycarbonate filters (Nuclepore) and the carbon coating of the samples the carbon rich particles could not be analyzed by the above mentioned method. The analysis with the TEM on the contrary showed the appearance of soot and other carbon rich particles. The attained results by the automated SEM analysis could be confirmed by TEM. For a better understanding of the influence of SDE's on optical properties of the Atmosphere further studies are ongoing.

References

Collaud Coen, M., Weingartner, E., Schaub, D., Hüglin, C., Corrigan, C., Henning, S., Schwikowski, M., Baltensperger, U.: Saharan dust events at the Jungfraujoch: detection by wavelength dependence of the single scattering albedo and first climatology analysis, *Atmos. Chem. Phys.*, 4, 2465-2480, 2004.

Fierz, M., Kaegi, R., Burther, H.: Theoretical and experimental evaluation of a portable electrostatic TEM sampler, *Aerosol Science and Technology*, 41, 1-10, 2007.

Key words:

Saharan Dust Event, Mineral Dust, Aerosol composition, SEM, TEM

Collaborating partners/networks:

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