Geophysical Research Abstracts, Vol. 9, 04297, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04297

Black carbon aerosol determination from a European high-alpine glacier (Colle Gnifetti, Swizerland).

F. Thevenon (1), F. S. Anselmetti (1), S. Bernasconi (1), M. Sigl (2) and M. Schwikowski (2)

(1) ETH Zurich, Department of Earth Sciences, Switzerland (Florian.Thevenon@yahoo.fr), (2) PSI Villigen, Department of Analytical chemistry, Switzerland

Despite their major environmental effects, time series of black carbon aerosols, as found in alpine ice cores, are rare and, due to varying analytical techniques, difficult to be compared. In order to characterize the combustion products stored in ice-cores, optical and chemical methods have been calibrated using the international BC-ring trial standards, and applied to the temporally longest available Alpine Glacier record (Colle Gnifetti).

Microgram-level elemental carbon distribution (quantification limit <0.5 μg of C) of carbonaceous particles stored into the Colle Gnifetti ice-core has been analyzed after a thermal treatment at $315\pm5^{\circ}$C. Calibration tests show that this thermal treatment removes 50% of the carbon from modern aerosol samples, and 43% of the carbon from the NIST urban dust SRM 1649a. The automated optical counting of the black particles trapped in the ice (using automated transmitted light microscope, pixel resolution of 0.2 μm) has been calibrated using a soot reference material (N-Hexane, 0.853 gC/g, SD=0.038, n=5). Our results demonstrate that both, thermal and optical methods allow reproducible microgram-level black carbon determination in the environment. The Colle Gnifetti black carbon aerosol record shows that the fossil fuel combustion during the eighteen and nineteen centuries was responsible for a large increase in the emission of carbonaceous aerosols.