

Name of research institute or organization:

EMPA Dübendorf, Swiss Federal Laboratories for Materials

Title of project:

National Air Pollution Monitoring Network (NABEL)

Project leader and team:

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Project description:

The national air pollution monitoring network NABEL consists of 16 monitoring stations distributed all over Switzerland. It is operated by EMPA (Air Pollution/Environmental Technology Laboratory) under the supervision of the Swiss Agency for Environment, Forests and Landscape (BUWAL). The NABEL monitoring stations represent all important levels of air pollution. The monitoring station at Jungfraujoch is of special importance within NABEL as it represents a very low polluted site. It serves as a background station for the lower free troposphere in central Europe. In addition, the Jungfraujoch site is used for field tests and comparisons of trace gas monitors at low concentration levels. The experience gained by operating instruments at such low pollution conditions is extremely valuable for the operation of the whole NABEL network.

The main task of NABEL is to provide high quality long-term measurements of air pollutants. The data series allow to detect trends in the air pollution levels, i.e. they reveal the degree of success of taken reduction measures. The measurement programme at Jungfraujoch includes the continuous measurement of the following gaseous pollutants: Ozone (O₃), carbon monoxide (CO), nitrogen monoxide (NO), nitrogen dioxide (NO₂), and the sum of nitrogen oxides (NO_x). In addition, a selection of VOC's (alkanes, aromatics) are measured with a time resolution of four hours. Daily samples are taken for determination of gaseous SO₂ and for particulate sulphur. Finally, 48-hours samples of total suspended particulate matter (TSP) are collected and analysed for total mass as well as for lead and cadmium concentrations (yearly means).

As during the years before, the measurements were carefully continued in 2002, leading to a high data availability. E.g., for the continuously measured compounds O₃ and CO, 94% of the 10min mean values are available. For the nitrogen oxides, the data availability is lower (NO: 87%, NO₂: 70%, and NO_x: 80%) which is due to the complexity of the highly sensitive instrument (CRANOX-system, EcoPhysics). NABEL data are freely available for scientific use, requests should be addressed to BUWAL.

In February 2002, one of the frequent Saharan dust events was observed (Saharan dust events occurs about 5-10 times per year). As shown in Figure 1, the 48hours-TSP measurements were elevated from 13.02.-20.02.02 due to dust-loaded airmasses. Evaluation of 48h backward trajectories confirmed that the airmasses arriving during that period at Jungfraujoch had its origin over the Saharan desert (not shown).

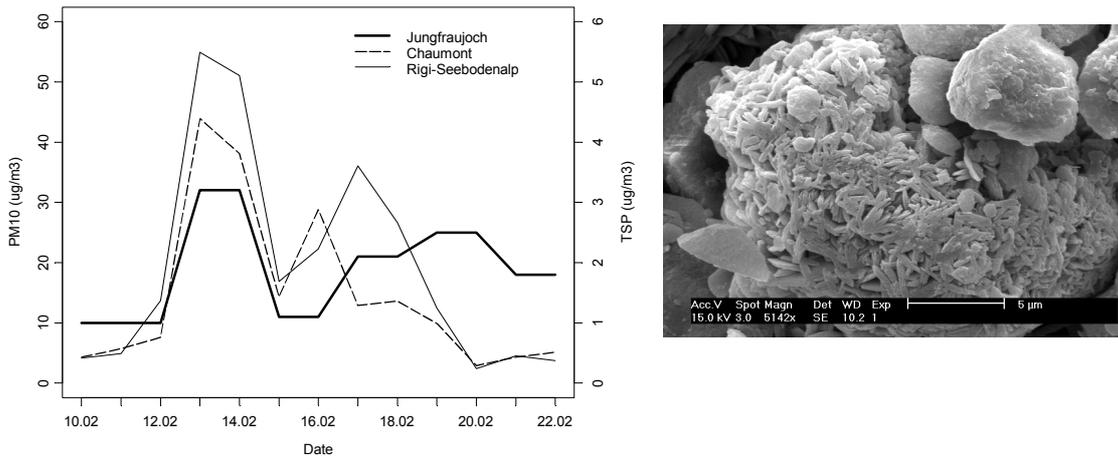


Figure 1. Left: 48 hours-measurements of total suspended particulate matter (TSP) at Jungfrauoch and daily PM10 at the rural and elevated NABEL sites Chaumont and Rigi-Seebodenalp from 10.02.02 to 22.02.02. Airmasses loaded with dust from the Saharan region were arriving in Switzerland at 13.02.02 and caused a distinct increase of the TSP and PM10 level. Right: Secondary electron microscopy image from a Saharan dust particle collected at Jungfrauoch (Filter from 13./14.02.02. Courtesy of Ralf Kägi, EMPA Dübendorf). The rounded rod-shaped gypsum crystals are nicely visible.

Key words:

Air quality assessment, air pollution, long-term measurements.

Internet data bases:

<http://www.empa.ch>

Collaborating partners/networks:

Bundesamt für Umwelt Wald und Landschaft (BUWAL), Global Atmosphere Watch (GAW).

Scientific publications and public outreach 2002:

NABEL, Luftbelastung 2001, Schriftenreihe Umwelt Nr. 343 Luft, Bundesamt für Umwelt Wald und Landschaft, Bern 2002.

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