

Long-term aerosol and trace gas observations at Georg von Neumayer Station (GvN)

General information. The first Air Chemistry Observatory at the German Antarctic station Georg von Neumayer (GvN) was operated for 10 years from 1982 to 1991. The focus of the established observational programme was on characterizing the physical properties and chemical composition of the aerosol, as well as on monitoring the changing trace gas composition of the background atmosphere, especially concerning greenhouse gases. The observatory was designed by the Institut für Umweltphysik, University of Heidelberg (UHEI-IUP). The experiments were installed inside the bivouac lodge, mounted on a sledge and put upon a snow hill to prevent snow accumulation during blizzards (http://www.awi-bremerhaven.de/GPH/AirChemistryObservatory/gallery_01.html). All experiments were under daily control and daily performance protocols were documented. A ventilated stainless steel inlet stack (total height about 3-4 m above the snow surface) with a 50% aerodynamic cut-off diameter around 7-10 μm at wind velocities between 4-10 m s^{-1} supplied all experiments with ambient air. Contamination free sampling was realized by several means: (i) The Air Chemistry Observatory was situated in a clean air area about 1500 m south of GvN. Due to the fact that northern wind directions are very rare, contamination from the base can be excluded for most of the time. (ii) The power supply (20 kW) is provided by a cable from the main station, thus no fuel-driven generator is operated in the very vicinity. (iii) Contamination-free sampling is controlled by the permanently recorded wind velocity, wind direction and by condensation particle concentration. Contamination was indicated if one of the following criteria were given: Wind direction within a 330° - 30° sector, wind velocity $<2.2 \text{ m s}^{-1}$ or $>17.5 \text{ m s}^{-1}$, or condensation particle concentrations $>2500 \text{ cm}^{-3}$ during summer, $>800 \text{ cm}^{-3}$ during spring/autumn and $>400 \text{ cm}^{-3}$ during winter. If one or a definable combination of these criteria were given, high volume aerosol sampling and part of the trace gas sampling were interrupted.

Surface ozone. Starting at 1982 through Jan-14-1991 surface ozone was measured with an electrochemical concentration cell (ECC). Surface ozone mixing ratio are given in ppbv = parts per 10^9 by volume. The averaging time corresponds to the given time intervals in the data sheet. The accuracy of the values are better than ± 1 ppbv and the detection limit is around 1.0 ppbv.

High volume aerosol sampling: Aerosols were sampled on two Whatman 541 cellulose filters in series and analyzed by ion chromatography at the UHEI-IUP. Generally, the sampling period was seven days but could be up to two weeks on occasion. The air flow was around 100 m³/h and typically 10000-20000 m³ of ambient air was forced through the filters for one sample. For further information see http://www.awi-bremerhaven.de/GPH/AirChemistryObservatory/gallery_05.html. Concentration values are given in nanogram (ng) per 1 m³ air at standard pressure and temperature (1013 mbar, 273.16 K). Uncertainties of the values were approximately ±10% to ±15% for the main components MSA, chloride, nitrate, sulfate and sodium, and between ±20% and ±30% for the minor species bromide, ammonium, potassium, magnesium and calcium.

Note: a selective data retrieval of these data (except ionic composition of the aerosol) is available under <http://www.awi.de/php/AirChemistry/index.php>

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