Atmospheric Chemistry and Physics
An Interactive Open Access Journal of the European Geosciences Union

Atmos. Chem. Phys., 6, 1895-1904, 2006
www.atmos-chem-phys.net/6/1895/2006/

Seasonal and diurnal characteristics of water soluble inorganic compounds in the gas and aerosol phase in the Zurich area

R. Fisseha[1,*], J. Dommen[1], L. Gutzwiller[2], E. Weingartner[1], M. Gysel[1,3], C. Emmenegger[4], M. Kalberer[4], and U. Baltensperger[1]
[1]Paul Scherrer Institut (PSI), 5232 Villigen, Switzerland
[2]Bundesamt für Energie BFE, 3003 Bern, Switzerland
[3]School of Earth, Atmospheric and Environmental Sciences, Univ. of Manchester, P.O. Box 88, Manchester M60 1QD, UK
[4]Laboratory of Organic Chemistry, ETH Hönggerberg, CH8093 Zürich, Switzerland
[*]now at: ICG-II: Troposphäre, Forschungszentrum Jülich, 52425 Jülich, Germany

Abstract. Gas and aerosol samples were taken using a wet effluent diffusion denuder/aerosol collector (WEDD/AC) coupled to ion chromatography (IC) in the city of Zurich, Switzerland from August to September 2002 and in March 2003. Major water soluble inorganic ions; nitrate, sulfate, and nitrite were analyzed online with a time resolution of two hours for the gas and aerosol phase. The fraction of water soluble inorganic anions in PM10 varied from 15% in August to about 38% in March. Seasonal and diurnal variations of nitrate in the gas and aerosol phase were observed with more than 50% of the total nitrate in the gas phase during August and more than 80% of nitrate in the aerosol phase during March exceeding the concentration of sulfate by a factor of 2. Aerosol sulfate, on the other hand, did not show significant variability with season. However, in the gas phase, the SO_2 concentration was 6.5 times higher in winter than in summer. Nitrous acid (HONO) also showed a diurnal variation in both the gas and aerosol phase with the lowest concentration (0.2–0.6 µg/m^3) in the afternoon. The primary pollutants, NO, CO and SO_2 mixing ratios were often at their highest between 04:00–10:00 local time due to the build up of fresh vehicle emission under a nocturnal inversion.

Final Revised Paper (PDF, 489 KB) Discussion Paper (ACPD)

Citation: Fisseha, R., Dommen, J., Gutzwiller, L., Weingartner, E., Gysel, M., Emmenegger, C., Kalberer, M., and Baltensperger, U.: Seasonal and diurnal characteristics of water soluble inorganic compounds in the gas and aerosol phase in the Zurich area, Atmos. Chem. Phys., 6, 1895-1904, 2006. Bibtex EndNote Reference Manager