



The scavenging of atmospheric pollutants by snowfall at Hornsund, Svalbard

W.E. Krawczyk (1), P. Glowacki (2)

(1) University of Silesia, Faculty of Earth Sciences, Sosnowiec, Poland, (2) Institute of Geophysics PAS, Warsaw, Poland (wieslawa.krawczyk@us.edu.pl / Fax: +48 32-2915865 / Phone: +48 32-3689319)

Results of measurements of pollutants scavenged from air masses passing over southern Svalbard in winter precipitation during 1990-2005 are presented. It is assumed that the polar winter extends from October to April, the period with air temperature below 0°C and snowfall dominating. Snows were sampled at the Polish Polar Station in Hornsund (77°00'N 15°33'E). Specific conductivity and pH were measured in daily snowfall samples. Ion concentrations have been determined by ion chromatography since the winter of 2001/2. Ions of marine origin were subtracted, assuming that all chlorides are of marine origin. The FLEXTRA trajectory model was applied to discover the origin of the air masses arriving at Svalbard and track the paths of pollutant transport. Precipitation totals ranged from 134 mm (2000/1) to 349 mm (1995/6). In 15 years of research average (v/w) snowfall pH was 4.96, ranging from 4.21 (1991/2) to 5.68 (2001/2). The lowest snow pH, 3.6, was recorded on December 7, 1991. Mean specific conductivity was 75 $\mu\text{S cm}^{-1}$; it ranged from 18 $\mu\text{S cm}^{-1}$ (1996/7) to 248 $\mu\text{S cm}^{-1}$ (1993/4). Solute loads transported along with the precipitation ranged from 1.75 t km⁻² (1996/7) to 27.9 t km⁻² (1993/4), with an average of 8.3 t km⁻². The sources of the polluted air masses were mostly in northern and central Europe.