



Temporal and spatial trends of chemical composition of wet deposition samples collected in Austria

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Triggered by the occurrence of acid rain a sampling network for the collection of wet deposition samples was initiated in Austria in the early 1980s. Now the data set covers a time period of slightly more than 30 years for the stations being operable since the beginning. Sampling of rain water and snow was and is performed with Wet and Dry Only Samplers (WADOS) on a daily basis. Chemical analysis of rain water and snow samples comprised anions (chloride, nitrate, sulfate) and cations (sodium, ammonium, potassium, calcium and magnesium) as well as pH and electrical conductivity.

Here we evaluate and discuss temporal trends of both, ion concentrations and wet deposition data for twelve sampling stations, which were operable for most of the observation period of 30 years.

As expected concentrations and wet deposition loads of sulfate and acidity decreased significantly during the last three decades – which is also reflected by a strong decrease of sulfur emissions in Austria and neighboring countries. Regarding nitrate the decrease of concentrations and wet deposition loads is less pronounced. Again this is in accordance with changes in emission data. In case of ammonium even less stations showed a significant decrease of annual average concentrations and depositions. Reasons for that might be twofold. On one hand emissions of ammonia did not decrease as strongly as e.g. sulfur emissions. Furthermore local sources will be more dominant and can influence the year to year variability.

Seasonality of ion concentrations and deposition loads were investigated using Fourier analysis. Sulfate, nitrate, ammonium, acidity and also precipitation amount showed characteristic seasonal patterns for most of the sites and for concentrations as well as deposition loads. However the maxima in ion concentrations and deposition loads were observed during different times of the year. Concentrations of basic cations and chloride, on the contrary, hardly showed any seasonality. However, as deposition loads of these ions are influenced by the seasonality of precipitation amount, the deposition data shows some seasonality for some ions and stations as well.

Spatial distributions changed over the observation period. Differences obtained within the more recent years tend to be smaller compared to results reported for the 1980s and 1990s.

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