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Assessments of cadmium concentrations in atmospheric precipitation in context of trends in emissions of this heavy metal in the Czech Republic and surrounding states

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Assessments of cadmium concentrations in atmospheric precipitation in context of trends in emissions of this heavy metal in the Czech Republic and surrounding states

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Precipitation quality and atmospheric deposition have been subjects of a long-term monitoring at a large number of stations in the Czech Republic. In this contribution cadmium concentrations in atmospheric precipitation are evaluated at CHMI localities and relationship between trends in precipitation concentration and emissions in the Czech Republic and surrounding states are assessed.

Trends are evaluated in the period 1997-2004, because in 1997 the special weekly bulk sampling for heavy metals analysis was introduced at CHMI localities. We assessed precipitation concentration at 11 localities CHMI, where concentrations have been measured at least 7 years continuously. Statistically significant decrease in cadmium concentration was recorded at 6 localities (Rudolice, Svratouch, Ústí nad Labem, KoŽetice, Hradec Králové, Pøimda).

Cadmium is bound mainly to the fine particles (aerodynamic diameter up to 2,5 μm). Almost all cadmium is bound to particles up to 10μm. Therefore this metal could be transported for a long distance.

According to published data from MSC-East (Meteorological Synthesizing Centre-East) in the period 2000-2003, cadmium deposited in the Czech Republic was emitted in the Czech Republic (at interval 18-56 %), in Poland (13-33 %), in Germany (8-17 %) and in Slovakia (2-15 %). The rest of deposited cadmium originated in Austria, Hungary, France, Italy, Switzerland and from re-emissions (global and nature resources).

Cadmium emission data are available in the Czech Republic since 1990. The emission data will be presented only for years 1997 -2003 in accordance with the deposition data of this heavy metal. Presented cadmium emissions were calculated on the basis of using relevant capacity data and emission factor database.

Trend of cadmium emission in the Czech Republic during the years 1997 -2003 was slightly decreasing with mild increase in 1999 and 2000. The emission decreased by 23% during these years. These slight changes for each individual year were caused by changes of capacity data (different fuel consumption and production in the individual sectors, the change of structure of fuel etc.).

Trend of cadmium emission in surrounding states (Germany, Poland and Italy) which are the most important contributors to deposition of this heavy metal in the Czech Republic is also decreasing during these years (according published data from MSC-West).