



Multi-year results of lead and cadmium measurements in atmospheric air and precipitation at the background areas of Eastern Europe

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The evaluation on background atmospheric lead and cadmium pollution were prepared for the territory of Eastern European region (EER) for 2005-2013 in comparison with results of 1982-1988 [1].

We used the data of regular measurements at 13 background monitoring stations within EER located significantly far from industrial areas and cities: Schmücke, Zingst and Neuglobsow, Eastern Germany; Churanov, Kosetice and Svatouch, Czech Republic; K-puszta, Hungary; Leba and Diabla Gora, Poland; Prioksko-Terrasny, Voronezh, Caucasian and Astrakhan biosphere reserves, Russia. All stations use the same or identical analytical methods for measuring lead and cadmium in atmospheric aerosols and precipitation. The information for the assessments was obtained from the databank "Background Monitoring" (IGCE, Russia) and regular annual reports of EMEP-CCC (NILU, Norway)[2].

The spatial distribution of background concentrations of Pb and Cd in air and precipitation was not uniform for 1980s [1]: values were decreased eastward been correspondent to the changes geographically of anthropogenic emissions of these trace elements. Over the European territory of former USSR (ETR) the diminution of concentrations was traced from the central part to Arctic and to southern areas of mountainous Caucasus.

The seasonal averages were 20-90 ng/m³ in air and 10-60 µg/dm³ in precipitation at background areas of western EER (East Germany, Czech Republic, Hungary and Poland) while ones below 20 ng/m³ and less 10 µg/dm³ were observed over ETR, correspondingly. The similar spatial distribution was of Cd with mean seasonal values up to 1.6 ng/m³ in air and below 2 µg/dm³ in precipitation at western EER, and <0.5 ng/m³ in air and <1.0 µg/dm³ in precipitation over ETR.

For 2005-2013 the airborne metals were decreased to tend of more uniform distribution throughout the Eastern Europe: by 5-10 times in western EER, while at ETR by 2-3 times only of Pb in air and of Cd in precipitation. The concentration of cadmium in air and lead in precipitations remained practically unchanged.

Multiyear averages were 2-6 ng/m³ of Pb and 0.06-0.2 ng/m³ of Cd in air, together with 0.6-3.0 µg/dm³ and 0.03-0.23 µg/dm³ in precipitation, correspondingly. Estimation of long term trends was done to be presented here. The calculated annual wet deposition fluxes of lead were 0.42-3.5 mg/m² and 0.02-0.26 mg/m² of cadmium. However the ranges of their values were narrower at western part of EER: 0.42-1.6 mg/m² for lead, and 0.017-0.062 mg/m² for cadmium.

These changes of atmospheric heavy metals pollution in EER at background stations are consistent with decreasing their emissions widely in Europe: by a factor of 10 for Pb and by a factor of 2 for cadmium in the past 20 years [3].

References

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