

Long-term Trends of Air Quality at the Czech EMEP and GAW Station Kosecice Observatory

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The Kosecice Observatory (OBK), operated by the Czech Hydrometeorological Institute (CHMI) was established in 1988 as a station specialized in air quality monitoring at the background scale. The observatory is located in free area outside of settlement (49° 35' N, 15° 05' E, 534 m above sea level) and represents the Czech Republic in GAW/WMO (Global Atmosphere Watch), EMEP/ECE (Co-operative Programme for Monitoring and Evaluation of Long-range Transmission of Air Pollutants in Europe) and ICP-IM (International Co-operative Programme on Integrated Monitoring). After 2004, thanks to its well selected location and long-term homogeneous data series, OBK has been included into several European projects focused on air quality research and monitoring (EUSAAR, ACTRIS, ACTRIS-2).

One of the essential tasks of the observatory is to detect the long-term trends of air quality at the background scale of the Czech Republic. Currently, 30-year homogeneous data series of air quality measurements are available. The used statistical method for trend analysis in this study is based on the nonparametric Mann-Kendall test for trend and the nonparametric Sen's method for the magnitude of the trend.

The results show statistically significant drop of mean annual concentrations of sulphur dioxide, reflecting considerable reduction of sulphur emissions. No trend was found by evaluation of nitrogen compounds in the atmosphere, in spite of the fact that the nitrogen emissions declined by half in the period under review. These conclusions are in very good correspondence with the trends at the background level in the neighbouring countries. This is probably caused due the significant changes in the structure of nitrogen emissions (increase in NO_x emissions from mobile sources). Slightly significant downward trend of mean annual surface ozone concentrations was found. More importantly, the number of episodes with target value for human health exceedances dropped significantly during the period under review. Statistically non-significant decrease of PM10 concentrations was detected with the highest annual means in the beginning of the new millennium. Regarding greenhouse gases, statistically very significant upward trend was found by mean annual methane concentrations, on the other hand, no distinct trend was found by carbon monoxide. The reduction of VOCs emissions in Central Europe was reflected in statistically significant decrease of concentrations at the regional level of the Czech Republic. Only isoprene, which is of natural origin, displays an inverse trend. Generally, the deposition of the most measured pollutants including heavy metals display statistically significant downward trend, especially in the first part of the period under review (1988-2000).