

PM₁₀- Exposure Assessment For A City In Europe From 1950 - 2050

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Background

For most epidemiological studies the exposure pattern in the past is unknown since measurement of air quality data in Germany started 1980. To close the gap for the time before and the development in the future an air quality assessment is made by taking the main emitters into account. Road transport is one of the main emitters. Therefore the development of the emissions of two wheelers, passenger cars, light and heavy duty vehicles and busses are considered. The contribution of other emitters is important for the development of the urban background levels. With the correlation of measured air quality and emission data in the time from 1980 until 2000 it is possible to recalculate the air quality in the past and to predict the air quality from 2003 onwards according to the expected emissions.

Features

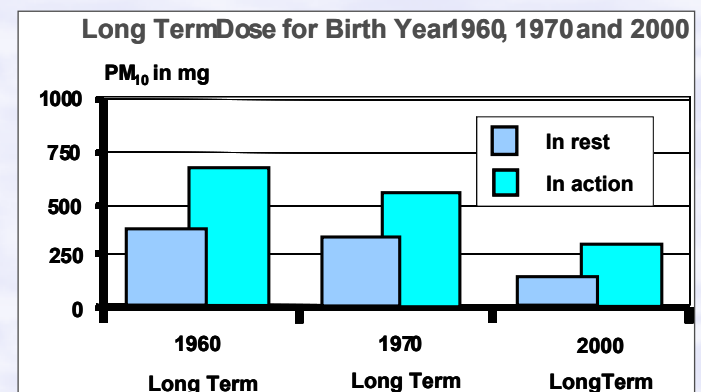
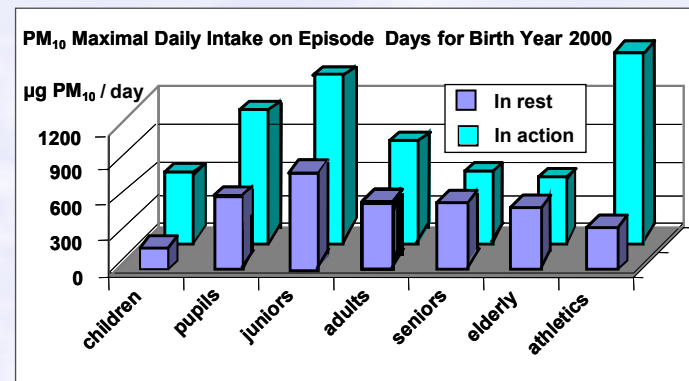
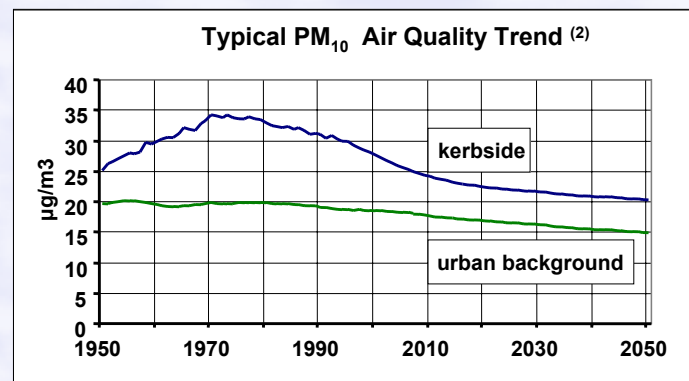
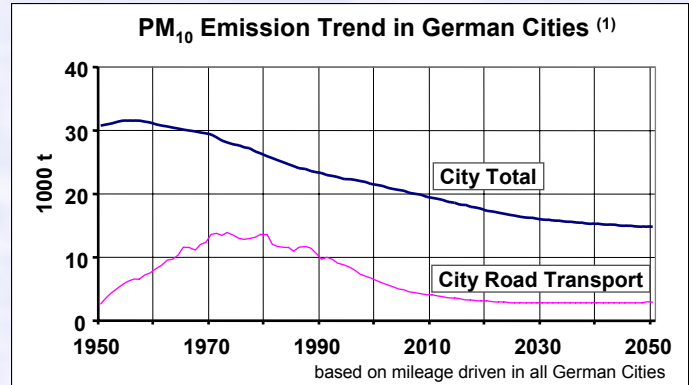
Emission data for most sources are available from the German Umweltbundesamt (UBA). For road transport the German UBA has developed an emission model TREMOD which allow the forecast in the future until 2020. This model is expanded until 2050 and also for the time before 1980 back to 1950. PM₁₀ is chosen as component and Munich is chosen as a typical city. PM₁₀ air quality data are available from "Bayerisches Landesamt für Umweltschutz" in Munich. A simple box model allows to derive the air quality in the missing time period from correlations in the periode where both emission and air quality data exist.

Findings and Conclusions

PM emissions from road transport before 1980 were lower than in the time from 1970 to 1980. PM emission of other sources, e.g. coal burning, were higher in the fifties and declined with the increasing use of heating oil. With the increase of vehicles since 1950 also PM₁₀ air quality concentrations increased near kerbside, while urban background levels were almost constant until 1990. Later on the introduction and permanent improvement of diesel technology and diesel fuel quality led to declining PM-emissions from passenger cars and duty vehicles. PM-emissions reduction have an ongoing trend in the future. The contribution of road transport is declining and therefore PM₁₀ air quality in the future is slowly improving as well. Even at sites where most inhabitants are exposed the EU air quality standard derived by WHO coming into force in 2010 will be met at normal meteorological conditions.

PM₁₀ Exposure for different age groups is dependent from the birth year. With short term (98%-Percentiles)-Values in 2000 as an example Juniors in action have the highest daily intake within age groups. Athletics during their exercise do have the highest daily intake. Based on annual means the max. daily intake (not shown here) is about a third of that.

With the assumption that 20% of the inhaled particles of this size class are deposited and 90% are cleared with time the whole life dose (90 years) for somebody with the birth years 1960, 1970 and 2000 on the basis of annual means is calculated. In 2000 the long acting PM₁₀ dose is less than 1/2 compared with 1960.



(1) based on UBA emission inventories, Berlin

(2) Based on Measurements of Bayerisches Landesamt für Umweltschutz, Augsburg