

Validation of Urban Air Quality Modelling in the European Union

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In a first stage a set of 10 urban air quality modelling applications were carried out in the European Union to establish base case studies for the year 1995 and scenario calculations for the year 2010 to meet the new air quality thresholds for NO₂. Apart from this also special emphasis was put on the air quality results of CO, Benzene and PM₁₀ which were also incorporated into the emission inventory.

Depending on the topographically complexity of the domain the meteorological modelling was carried out with an incompressible, hydrostatic or a compressible, non-hydrostatic model. Both prognostic models have the capability of nesting and four data dimensional data assimilation.

The dispersion modelling was carried out with the european urban airshed model. This well documented and published model is a fully three dimensional model with a two way nesting capability. Also the accurate treatment of different emission categories in order to run different emission scenarios for the estimation of the source attribution to the air quality shows the high performance of this model. Special emphasis was put on the treatment to higher level emissions (industrial, combustion) which were emitted in different altitudes up to 250 m above ground level.

In the second stage a validation procedure took place, in which the results of the meteorological model were validated against stations (surface as well as upper air profiles) which were not included in the initialisation practice. Depending on the complexity of the terrain and the meteorological conditions the results show very good agreements on the long time performance (here 3-4 days) as well as on the fluctuations (within hours).

The validation of the dispersion model was due to the amount of considered stations and parameters (O₃, NO₂ and CO) much more complex as the procedure of the meteorological verification. But also here the agreement was quite excellent which can be shown on the basic runs on annual mean conditions as well as on episode conditions of O₃ and NO₂.