



Possible impact of increased fraction of NO₂-emissions due to road traffic on air pollutant concentration in Central Europe and North-Rhine Westphalia

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Reduction of total NO_x-emissions is one of the major objectives of the current European legislative standards in particular with respect to road traffic. Air quality regulations as formulated in the air quality directive 2008/50/EC however are aiming on NO₂ and not on total NO_x (NO+NO₂). With respect to NO₂-concentrations two limit values have to be fulfilled for the year 2010: an annual mean value of 40 µg/m³ and an hourly value of 200 µg/m³ with 18 permitted exceedences per year. Near roadside measurement sites quite often show annual values higher than 40 µg/m³. During recent years very often no tendency for a further decrease of NO₂-concentrations could be seen even though the total NO_x-emissions clearly have decreased. This might be due to the increase of the fraction of NO₂ (f-NO₂) in the vehicle's total NO_x-emissions due to exhaust treatment technology aiming on a reduction of NO_x and not of NO₂. To investigate the impact of an increased f(NO₂) several model simulations with the complex three-dimensional chemical transport model EURAD have been performed. The numerical calculations cover the European scale as well as the urban background scale with horizontal grid resolution down to 5 km. The results show the expected increase of NO₂-concentrations in ambient air if f(NO₂) is increased and total NO_x has been held constant. However, it could clearly be seen that also the ozone concentrations as well as particulate matter (PM₁₀) show an increase. With respect to PM₁₀ the number of exceedences of the daily limit value of 50 µg/m³ increased with increasing f(NO₂).