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Evolution of NO_x emissions in Europe with focus on road transport control measures

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Abstract. European emission trends of nitrogen oxides since 1880 and up to present are presented here and are linked to the evolution of road transport emissions. Road transport has been the dominating source of NO_x emissions since 1970, and contributes with 40% to the total emissions in 2005. Five trend regimes have been identified between 1880 and 2005. The first regime (1880–1950) is determined by a slow increase in fuel consumption all over Europe. The second regime (1950–1980) is characterized by a continued steep upward trend in liquid fuel use and by the introduction of the first regulations on road traffic emissions. Reduction in fuel consumption determines the emission trends in the third regime (1980–1990) that is also characterized by important differences between Eastern and Western Europe. Emissions from road traffic continue to grow in Western Europe in this period, and it is argued here that the reason for this continued NO_x emission increase is related to early inefficient regulations for NO_x in the transport sector. The fourth regime (1990–2000) involves a turning point for road traffic emissions, with a general decrease of emissions in Europe during that decade. It is in this period that we can identify the first emission reductions due to technological abatement in Western Europe. In the fifth regime (2000–2005), the economic recovery in Eastern Europe imposes increased emission from road traffic in this area. Western European emissions are on the other hand decoupled from the fuel consumption, and continue to decrease. The implementation of strict measures to control NO_x emissions is demonstrated here to be a main reason for the continued Western European emission reductions. The results indicate that even though the effectiveness of European standards is hampered by a slow vehicle turnover, loopholes in the type-approval testing, and an increase in diesel consumption, the effect of such technical abatement measures is traceable in the evolution of European road traffic emissions over the last 15 years.

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