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Title: Modeling Air Pollution of Vehicular Traffic in Szeged, Southern Hungary

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EU urban areas host 80 % of the population and generate 75 to 85 % of gross national product. They play an essential role in the vitality and competitiveness of Europe. However, this vitality is today endangered by the impact of non-sustainable urban means of transport. Private car use generates pollution, high energy consumption, noise, congestion and accidents. Reducing emissions, improving air quality, reducing accidents and congestion, reducing social deprivation, and thus increasing the quality of life in urban areas, requires modal shift from private transport to public and sustainable transport. The aim of the study is to analyse how air pollution of vehicular traffic changed on the main roads of the Szeged regions between 1995-2007.

The ambient air quality effects of the traffic emissions were evaluated using the CALINE4 dispersion model. CALINE4 is a Gaussian dispersion model specifically designed to evaluate air quality impacts of roadway projects. Each roadway link is treated as a separate emission source producing a plume of pollutants, which disperses downwind. Pollutant concentrations at any specific location are calculated using the total contribution from the overlapping pollution plumes originating from the sequence of roadway links. In CALINE4, a specific computational scheme called the Discrete Parcel Method is used to model NO₂ concentrations. A simplified set of controlling reactions is assumed. On the other hand, CO is considered as inert gaseous component.

Annual mean concentrations, as means of all the receptors for both CO and NO₂ on the major roads of the Szeged region modelled in one meter height, show clear increasing trends. Annual mean CO and NO₂ concentrations on some major roads of the Szeged region, considered in the function of the receptors, indicate higher values in the downtown and lower ones towards the outskirts. Furthermore, they show slight (CO) and definite (NO₂) increasing trends. Annual mean CO and NO₂ concentrations on the major roads of the Szeged region are indicated using CALINE4 model for each year between 1995-2007. However, CO load for the starting year (1995) and years 2006 and 2007 are only analysed. The annual mean concentrations clearly indicate the increase of CO levels and a much more definite increase of NO₂ concentrations from the beginning by the end of the period examined. The difference of the concentrations is especially striking between years 2006 and 2007. This denotes to the highly increased traffic through Szeged from Romania and Bulgaria after they entered the European Union on January 1, 2007. Vehicular traffic of Szeged is permanently increasing. However, in year 2007 an especially striking increase of vehicular traffic was experienced.

Due to the EU membership of Romania and Bulgaria (January 1, 2007) number of trucks and lorries going through Szeged from these new EU countries quadrupled in 2007 compared to that in 2006. This increased traffic means a remarkable load of the road no. E43. As a result, remarkably higher vehicle originated air pollution can be experienced as it is clearly indicated by CALINE4 dispersion model.