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RESEARCH THE EFFECTS OF ROAD TRAFFIC ON AIR QUALITY IN URBAN AREAS USING SOFTWARE MODEL AERMOD

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ABSTRACT
This paper presents the results of an assessment of emissions of harmful substances from road traffic (line sources) on the air quality of the urban area of the city of Zenica File transfer software model Aermod. Dispersion modeling results indicate that CO and PM10 emissions from road transport have a significant impact on the formation emisionih values in air Zenica valley. However, NOx emissions significantly affect the formation of concentrations of this pollutant in the air and on air quality Zenica valley.

Key words: emissions from road transport, dispersion modeling of pollutants, air quality.

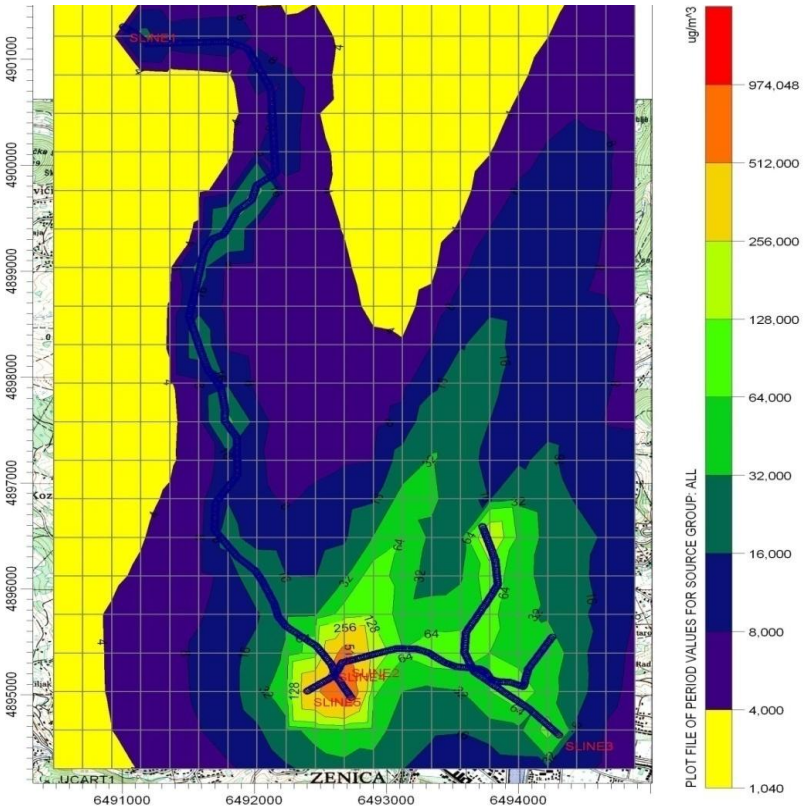
1. INTRODUCTION
The main source of pollution and threats to air quality in urban areas, in addition to heating buildings, is road traffic, which is considered a major source of CO, NOx, volatile organic compounds (VOCs) and many other pollutants. [1]
The emission of pollutants from motor vehicles depends primarily on the intensity and structure of traffic, driving dynamics (free flow, delays), power source and duration, age and general condition of the vehicles, the type and quality of fuel, motor mode and grade fuel combustion. Therefore the pollution of air by burning fuel in motor vehicles at the present time becomes the most important issue of urban areas around the world. [2,3]
In this work analyzes the effects of road traffic or line sources on the air quality in the urban area of Zenica modeling the dispersion of emitted pollutants (CO, NOx, and PM10) from road traffic using the software program Aermod.

2. RESULTS DISPERSION MODELING OF CO, NOx, AND PM10 USING THE AERMOD
For the purpose of modeling the dispersion concentration of pollutants (CO, NOx, and PM10) emitted from road traffic, or line sources collected data on emissions of pollutants (Table 1), meteorological parameters (Table 2) and orographic characteristics (relief) investigated geourbanog space.

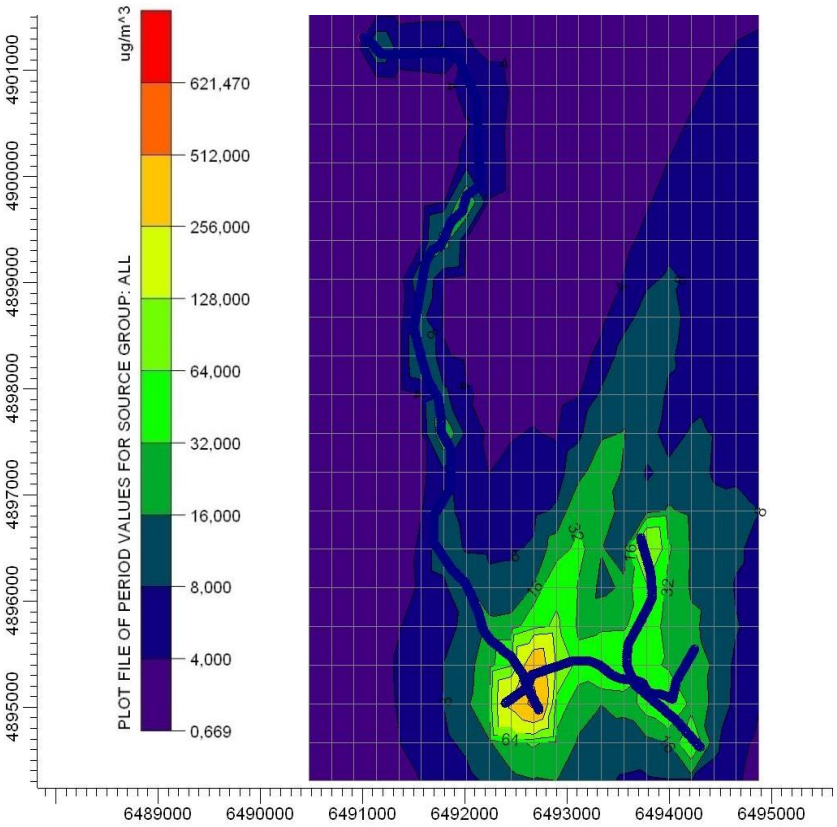
Table 1. Annual emissions of CO, NOx and PM10 along selected stocks roads the urban area of the city of Zenica.

Roads	Part of section M17 (main road)			Institut Section			Tetovo Section		
Pollutant	CO	NO_x	PM_{10}	CO	NO_x	PM_{10}	CO	NO_x	PM_{10}
Emissions(t/g)	70.323	45.144	3.564	125.29	80.443	6.358	22.33	14.333	1.463
The emission per kilometer (t/km)	0.803	0.517	0.044	96.382	61.875	4.895	2.992	1.914	0.198
Emissions(g/km vehicle)	0.407	0.253	0.022	7.161	4.598	0.363	1.243	0.792	0.077

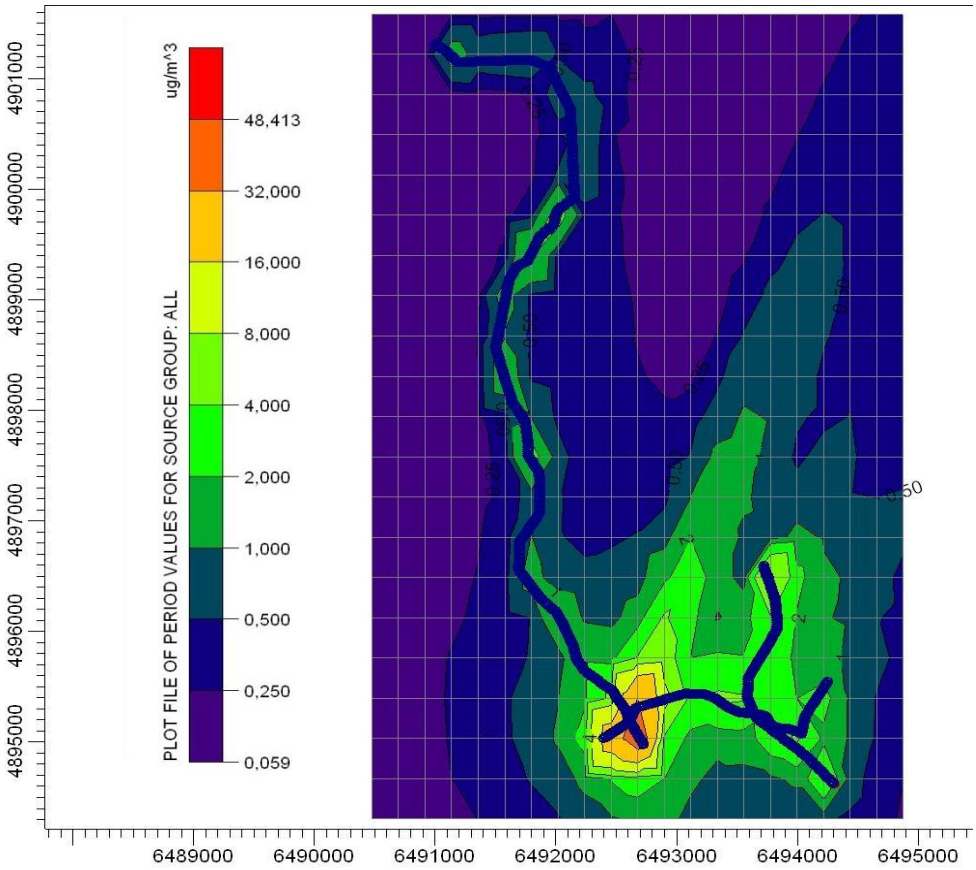
Modelling the dispersion of pollutants CO, NOx, and PM10 emitted from road traffic, were performed using the software package Aermod in order to determine the impact of road traffic on air quality in the area defined geourbanom or influence the value of emission values specified pollutants. [4]
In the picture 1 are given the average annual values of CO emissions in the form of izopoluta obtained by modeling using software models Aermod, which originate from line sources (road traffic) on roads analyzed geourbanog area of Zenica.
In the picture 2 the average annual values of NOx emissions in the form of izopoluta obtained by modeling using software models Aermod, which originate from line sources in the analyzed roads geourbanog area of Zenica.
In the picture 3 presents the average annual value of the emissions of particulate matter PM10 in the form izopoluta obtained by modeling using software models Aermod, which originate from line sources in the analyzed roads geourbanog area of Zenica. By analyzing the results of modeling of CO, NOx and PM10, presented in Figures 1.2 and 3 reveals that the highest concentration of all pollutants analyzed are registered at the crossroads at the Faculty of Metallurgy and Materials in Zenica, and then along the other investigated geourbanom shares of roads in the town of Zenica . Accordingly, Preparation results show that the area of the intersection at the Faculty of Metallurgy and Materials in Zenica busiest emissions originating from road traffic.



Picture 1. *Results of modeling the dispersion of CO emitted from line sources in the urban area of the city of Zenica.*



Picture 2: Results of modeling the dispersion of NOx emitted from line sources in the urban area of Zenica.



Picture 3. Results of dispersion modeling of PM10 emitted from line sources in the area of Zenica geourbanom Geourbanom

3. VALIDATION OF RESULTS DISPERZIJE CO, NOx and PM_{10}

Validation of the results was performed by comparing the concentrations of CO, NOx and PM10 obtained by modeling using models Aermod with the results obtained by continuous measurement with automatic monitoring station at the location of Tetovo. [5]
In Table 3 provides an overview of the average and maximum values of modeled emissions originating from line sources in geourbanom in Zenica and the measured average and maximum concentrations of CO, NOx and PM10 obtained by continuous measurement monitoring station in Tetovo.

Table 3: Overview of modeled and measured values of CO, NOx and PM10 in the urban area of Zenica.

Pollutant	$C_{modeled}$	$C_{measured}$	$C_{Model./Max.}$	$C_{measured/Max.}$
	($\mu g/m^3$)			
Carbon monokside (CO)	8	2558	128	3604
Nitrogen oxides (NO_x)	4	11.6	32	45.52
Solid particles PM_{10}	0.5	67.16	8	178.2

According to the results in Table 3 can be concluded that NOx emissions from line sources significantly affect the value of emission air pollutant in Zenica valley. The share of the average modeled in the measured values is 34.4%. In particular, a high proportion have modeled the maximum value of NOx (70.29%) in the measured maximum values. This means that NOx emissions from road transport have a dominant influence on the value of the concentration of NOx in the air or on the quality of air in Zenica valley. This should be borne in mind in terms of the need to take measures to reduce emissions of exhaust gases (especially NOx) from road traffic in urban area of Zenica, which is very sensitive due to the existence of strong industrial emission sources, adverse orographic conditions (deep valley) and complex local meteorological conditions .
Emissions of CO and PM10 from line sources have a significant impact on the formation imisionih values of these pollutants in the air Zenica valley and have no significant impact on air quality. The share of the average modeled in the measured average values of CO is 0.31%, and the proportion of the maximum modeled in the measured maximum value is 3.55%. The share of the average modeled in the measured average values of PM10 is 0.74%, and the proportion of the maximum modeled in the measured maximum value is 4.50%.

4. CONCLUSION

Dispersion modeling of CO, NOx and PM10 emitted from road traffic urban areas Zenica using a software program Aermod and validation of modeled values compared to the values measured concentration of these pollutants can be concluded that CO and PM10 emissions from road transport have a significant impact on the formation imisionih concentrations of these pollutants in the air Zenica valley and have no significant impact on air quality. However, NOx emissions from road transport important in shaping the values of the concentration of pollutants in the air, and the air quality Zenica valley. This should be borne in mind in terms of the need to take measures to reduce emissions of exhaust gases (especially NOx) from road traffic in urban area of Zenica, which is very sensitive due to the existence of strong industrial emission sources, adverse orographic conditions (deep valley) and complex local meteorological conditions .

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