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GOVERNMENT OF ROMANIA

GOVERNMENT OF THE REPUBLIC OF SERBIA

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UNIVERSITY „POLITEHNICA" from TIMISOARA

VRSAC AIR QUALITY MONITORING REPORT

TO:

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Results of the Air Quality Monitoring Campaign in VRSAC

Joint Campaign

Location: Vrsac (Central Bus Station and City Hall)

Coordinates of the AQM stations:

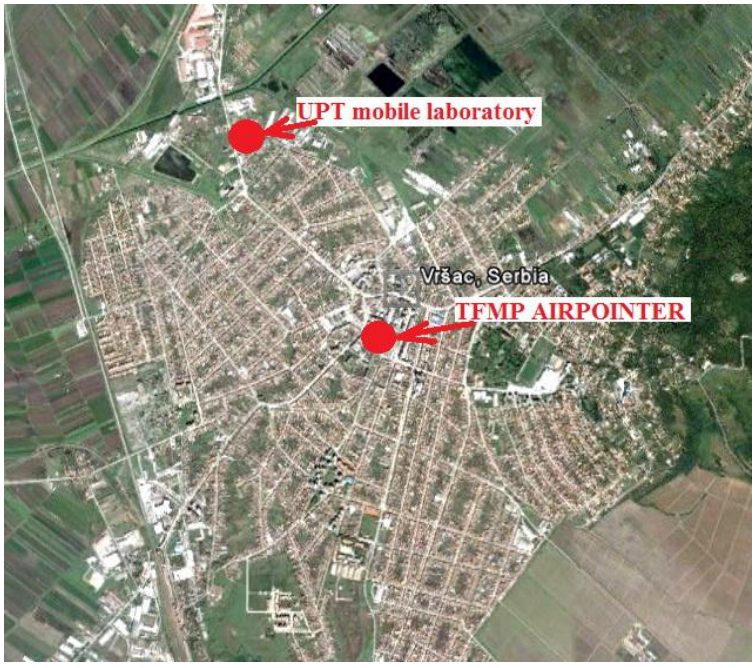
- UPT Mobile laboratory: 45°074900 N, 21°171754 E, altitude 83 m
- TFMP AIRPOINTER: 45°071456 N, 21°175329 E, altitude 92 m

Start on: 6 September 2011 and ended in 11 September 2011

Experts for Romanian team: Francisc Popescu, Nicolae Lontis, Dorin Lelea, Gavrila Trif-Tordai

Experts for Serbian team: Milan Pavlovic, Slobodan Jankovic, Aleksandar Djuric, Aleksandar Pavlovic, Milan Nikolic, Branko Davidovic

1. Overview of the Vrsac monitoring sites:



Spatial location of the AQM stations

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Vršac (Serbian Cyrillic: Вршац) is a town and municipality located in Serbia. In 2002 the town's total population was 36,623, while Vršac municipality had 54,369 inhabitants. Vršac is located in the Banat region, in the Vojvodina province of Serbia. It is part of the South Banat District.
Vrsac is a really small baroque town, a place of culture, art and entertainment, with stunning architecture. It is the birthplace of eminent Serbs such as Paja Jovanovic, Jovan Sterija Popovic, Vasko Popa and Bora Kostic. Vrsac lies on the crossroads, a fact that makes it geographically, culturally and commercially interesting for it has good road connections with Novi Sad and Belgrade, as well as vicinity with Romanian border. Vrsac is an open town. It is a town on a wine route. The first documents that mention vineyards in this region are from the 15th century. In 1494, at the court of Ugrian king Vladislav II, a 50 liter barrel of wine from this region was worth 10,5 gold forint. In 1660 and 1664, Turkish traveller Evlija Celebija wrote about Vrsac describing the vineyards on the slopes where sweet red wine is grown. Vrsac has over 1750 ha of vineyards at its disposal, as well as the biggest wine cellar in central Europe. Villages Veliko Srediste and Gudurica have to be mentioned since with Vrsac they form one of the most interesting wine routes in Serbia (Vrsac - Veliko Srediste - Gudurica). In that area, almost every house has its own wine cellar and each wine is a unique brand.
The Slavs settled in this region in the 6th century, and the Slavic tribe known as the Abodrites (Bodriči) was recorded as living in the area. The Slavs from the region were Christianized during the rule of the duke Ahtum in the 11th century. When duke Ahtum was defeated by the Kingdom of Hungary, the region was included in the latter state.
Information about the early history of the town is scant. According to Serbian historians, medieval Vršac was founded and inhabited by Serbs in 1425, although it was under administration of the Kingdom of Hungary. The original name of the town is unknown. There are several theories that its first name was *Vers*, *Verbeč*, *Veršet* or *Vegenje*, but these theories are not confirmed. The name of the town appears for the first time in 1427 in the form *Podvršan*. The Hungarian 12th century chronicle known as Gesta Hungarorum mentions the castle of Vrscia in Banat, which belonged to Bulgarian duke Glad in the 9th century. According to some interpretations, Vrscia is identified with modern Vršac, while according to other opinions, it is identified with Orşova. According to some claims, the town was at first in the possession of the Hungarian kings, and later became property of a Hungarian aristocrat, Miklós Perényi, ban of Severin. In the 15th century, the town was in the possession of the Serbian despot Đurađ Branković. According to some claims, it was donated to the despot by Hungarian king Sigismund in 1411. According to other sources, Vršac fortress was built by Đurađ Branković after the fall of Smederevo.
From 1918, the town was part of the newly formed Kingdom of Serbs, Croats and Slovenes (later renamed Yugoslavia). According to 1921 census, speakers of German language were most numerous in the town, while 1931 census recorded 13,425 speakers of Yugoslav languages and 11,926 speakers of German language. During the Axis occupation (1941–1944), Vršac was part of autonomous Banat region within German-occupied Nedić's Serbia. Many Danube Swabians collaborated with the Nazi authorities and many men were conscripted into the Waffen SS. In 1944, one part of Vršac citizens of German ethnicity left from the city, together with defeated German army.

The city's Romanian minority have a Romanian-language theater, schools and a museum. Romanian-language instruction takes place at a kindergarten, an elementary school, a high school and a teachers' university. The cultural organization and folklore group "Petru Albu" hold many cultural events in Vršac and nearby Romanian-populated villages. In 2005, Romania opened a consulate in Vršac.

Vršac is a town famous for well-developed industry, especially pharmaceuticals, wine and beer, confectioneries and textiles. The leading pharmaceutical company in Vršac (and nationwide) is the Hemofarm Group, which helped start the town's Technology Park.

Source: http://en.wikipedia.org/wiki/Vršac

2. Results obtained during Vrsac AQM campaigns:

The AIRPOINTER and UPT Mobile Laboratory where used in different locations in Vrsac AQM campaigns. The Univeristy "Politehnica" from Timisoara AQM Mobile laboratory was stationed in the Vrsac Main Bus Station and the Technical Faculty "Mihajlo Pupin" Airpointer station was stationed in the Vrsca City Hall perimeter. Instruments characteristics, performances and principles of operations were described in previous reports. In the next figures the concentrations measured for relevant air pollutants are presented.

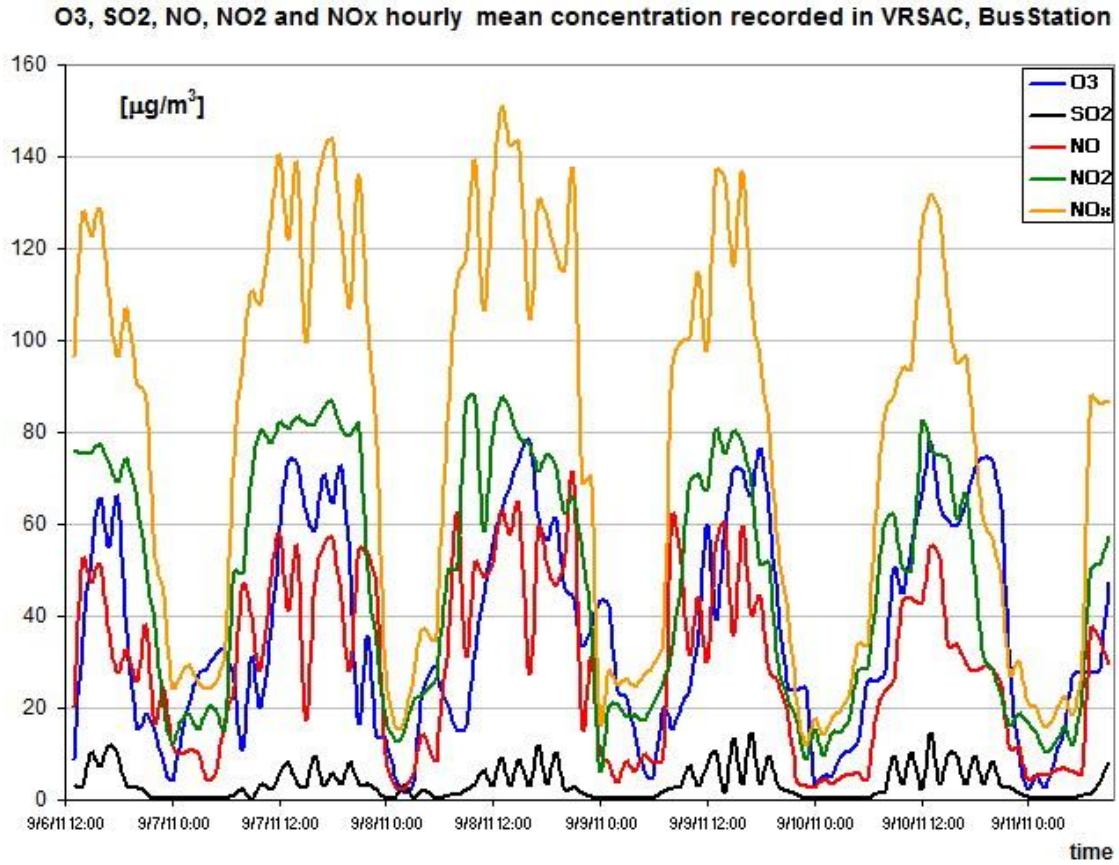

Fig 1. Hourly mean values recorded for NO, NO2, NOx, O3, SO2 in Vrsac at Buss Station, with UPT Mobile Laboratory

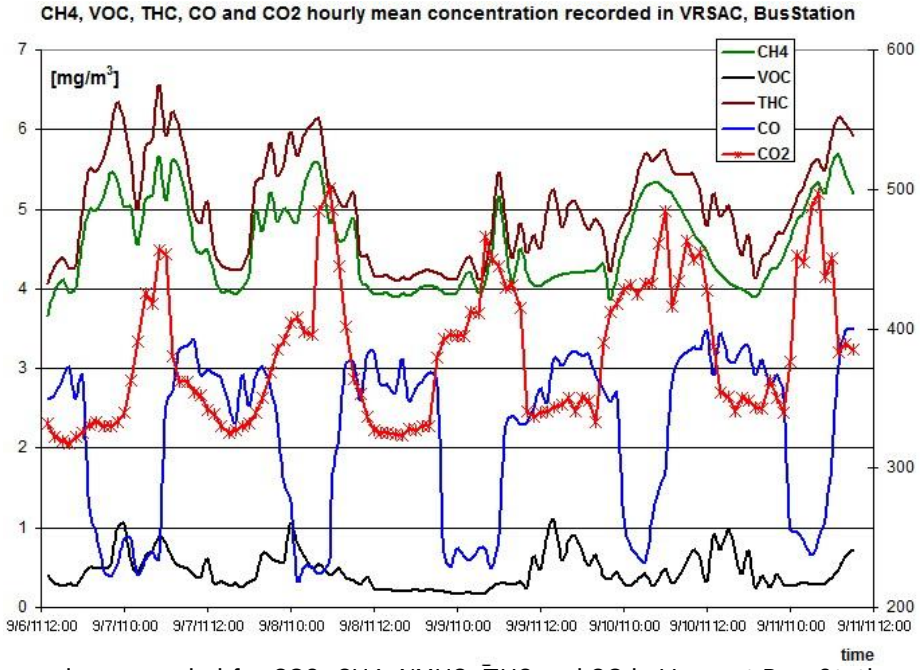

Fig 2. Hourly mean values recorded for CO2, CH4, NMHC, THC and CO in Vrsac at Buss Station, with UPT Mobile Laboratory

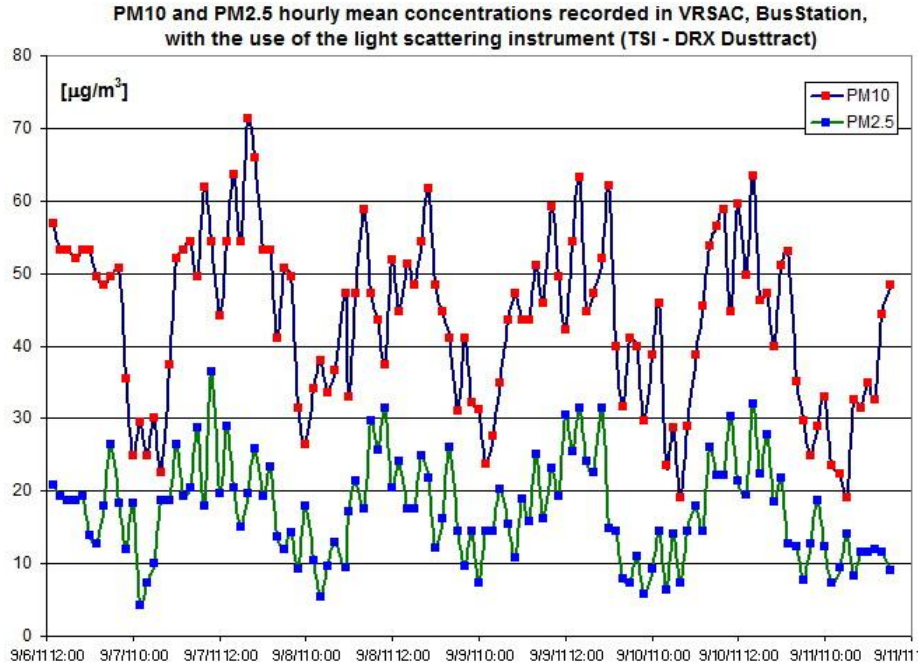

Fig 3. Hourly mean values recorded for PM10 and PM2.5 in Vrsac at Buss Station with Dustrack (light scattering), with UPT Mobile Laboratory

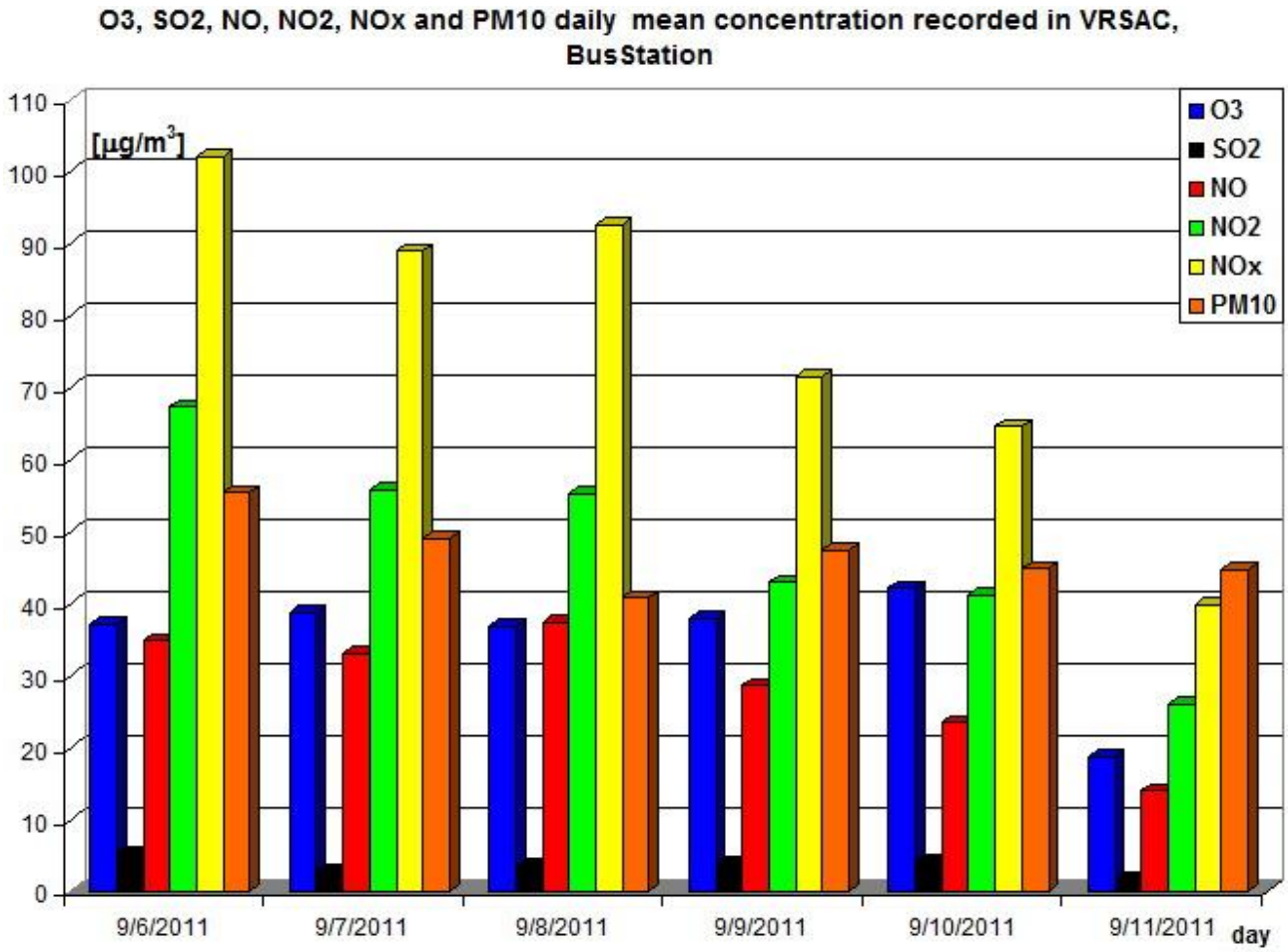

Fig. 4. Daily mean values recorded for O_3, SO_2, NO, NO_2, NOx and PM10 in Vrsac at Buss Station, with UPT Mobile Laboratory

Table1. Daily mean values recorded for Vrsac Bus Station site

Time	O_3 µg/m^3	SO_2 µg/m^3	NO µg/m^3	NO_2 µg/m^3	NO_x µg/m^3	CH_4 mg/m^3	NMHC mg/m^3	THC mg/m^3	CO mg/m^3	CO2 ppm	PM10 LSV3 µg/m^3	PM10 dustrack µg/m^3
09/06/11	37.05	5.35	34.80	67.36	102.15	4.49	0.40	4.89	1.97	326.44	55.430	51.98
09/07/11	38.72	2.88	33.12	55.83	88.95	4.78	0.55	5.33	2.20	364.92	49.070	47.15
09/08/11	36.86	3.52	37.42	55.29	92.71	4.45	0.38	4.83	2.10	378.42	40.770	43.03
09/09/11	37.88	3.83	28.58	42.93	71.51	4.21	0.45	4.66	2.07	384.08	47.450	43.81
09/10/11	42.12	4.17	23.39	41.18	64.57	4.56	0.48	5.04	2.50	403.58	44.830	42.18
09/11/11	18.65	1.69	13.95	25.94	39.89	5.14	0.39	5.52	1.82	422.25	44.700	31.93

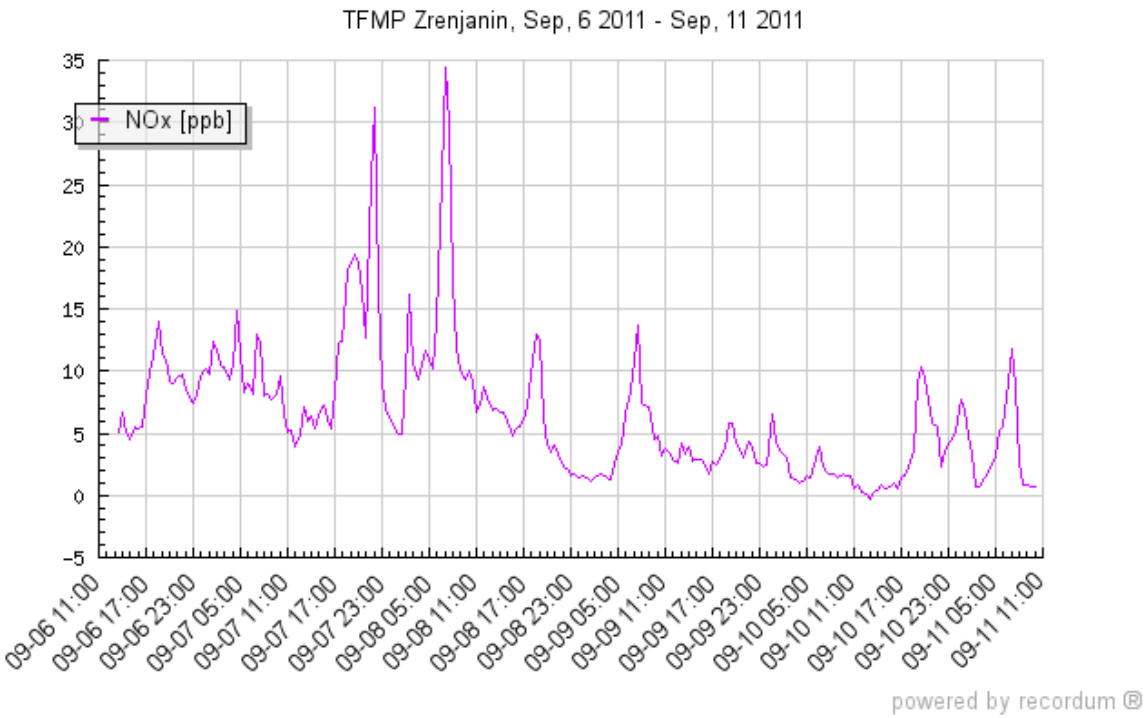

Fig 5. 3 minute mean values recorded for NOx in Vrsac at Municipality with AIRPOINTER

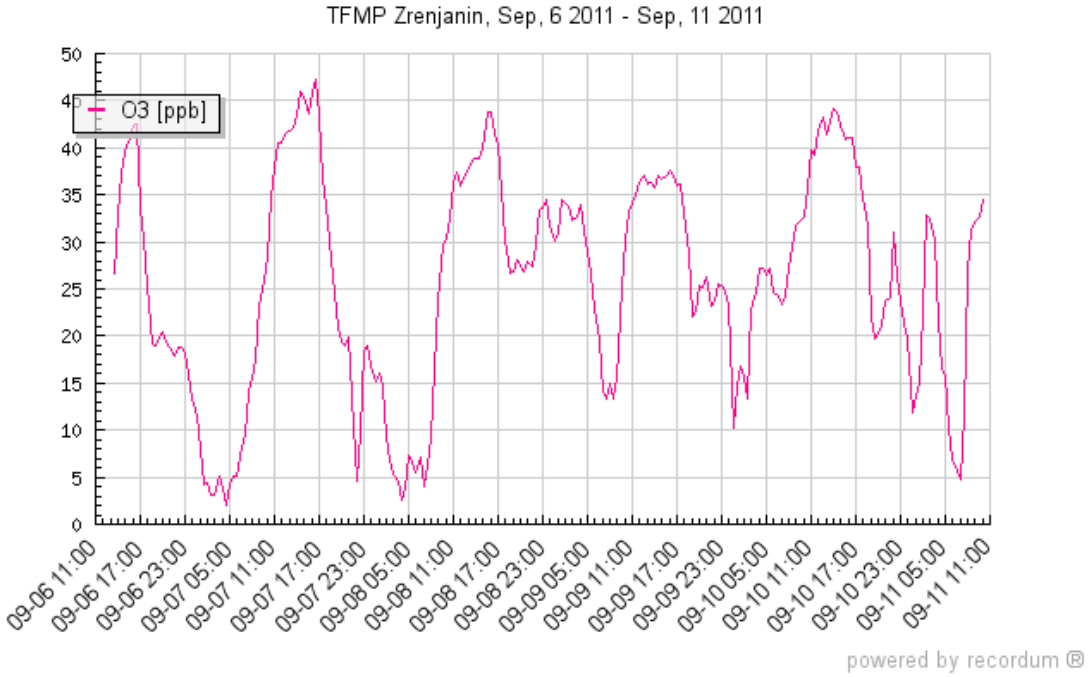

Fig 6. 3 minute mean values recorded for O3 in Vrsac at Municipality with AIRPOINTER

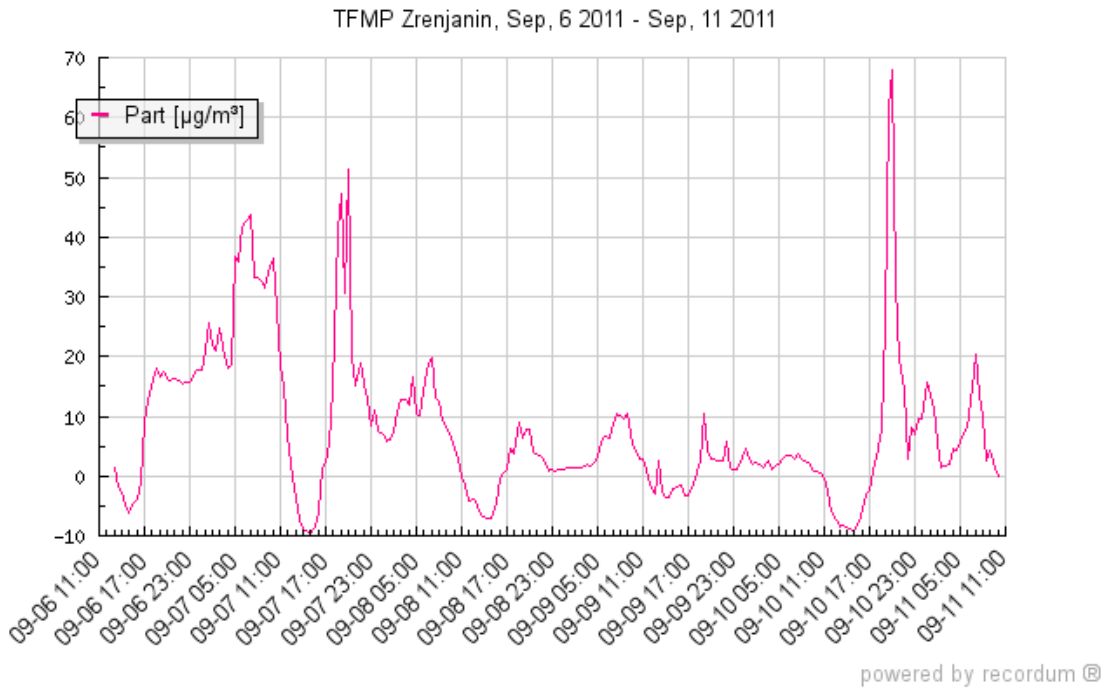

Fig 7. 3 minute mean values recorded for PM10 in Vrsac at Municipality with AIRPOINTER

3. Conclusions for Vrsac AQM campaigns:

For the values recorded at VRSAC Main Buss Station we can draw following conclusions:

1. the PM10 concentration is above and/or very close to the EU admissible limit
2. the NO and NO2 concentrations are under the limit but still very high. The "pics" in the graph are caused exclusively by the buss traffic in/out of the station. The buss traffic starts at 5:00 AM and stops ~ 11:00 PM with a buss coming in or out every 5 minutes, and a total of more than 100 inputs and outputs every day.
3. CO is under the limit and the variation recorded is following the busses traffic in the station
4. VOC concentrations are high and caused by the fuel combustions. The mist probable cause is the age of the buses engines giving and incomplete fuel combustion in the cylinders.
5. Ozone concentrations are high but under the admissible limit

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