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PANCEVO AIR QUALITY MONITORING REPORT

TO:

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Results of the Air Quality Monitoring Campaign in PANCEVO Joint Campaign

Location: Pancevo (Sandor Peteffi street, local school)

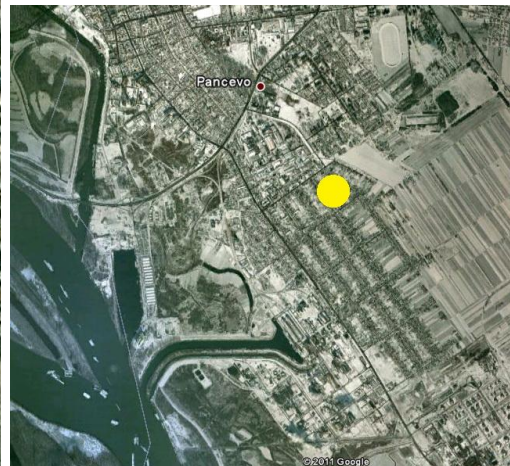
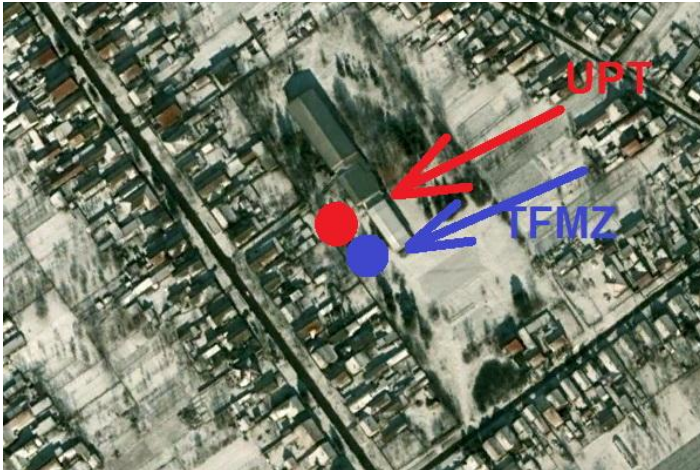
Coordinates of the AQM stations: 44° 51'13.13" N , 20° 40'06.65" E, altitude 76 m

Start on: 17 august 2011 and ended in 22 august 2011

Experts for Romanian team: Francisc Popescu, Nicolae Lontis, Dorin Lelea, Gavril Brateanu

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

1. Overview of the Pancevo monitoring site:



Pančevo (Serbian Cyrillic: Панчево) is a city and municipality located in the southern part of Serbian province of Vojvodina. The City of Pančevo is located in South Vojvodina, at the confluence of the Tamiš and the Danube rivers, at the very edge of the Panonian Plain. It is the economic, cultural and administrative centre of South Banat and one of the most important industrial centres in the Republic of Serbia. Including its 9 surrounding villages, the city area covers 755 km². Pančevo is just 15 km away from Belgrade and 40 km away from the Nikola Tesla International Airport. Its ethnically diverse population numbers 128,447 of which majority are Serb. 67% of them are working-age population and 10% are with college or



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university education which is well over the Republic average. The climate is exceptionally agreeable with the annual average of 12°C.

Today, Pančevo is the centre of oil, chemical, and petrochemical industries whose potential and participation in the gross domestic product exceed that of Montenegro. Over some periods of time, Pančevo was home to great names of Serbian literature like Miloš Crnjanski, Jovan Jovanović Zmaj and Isidora Sekulić. Here, the greatest Serbian comedy writer Branislav Nušić was a trade apprentice, while the world famous physicist Mihajlo Pupin attended Grammar School. Pančevo is also the birth place of our modernist lyricist - Milan Ćurčin, the first Serbian violin virtuoso Dragomir Krančević and the ethnologist Jovan Erdeljanović. Svetislav Kasapinović and Kamenko Jovanović were champions of the political fight for the autonomy of Vojvodina and resistance to the attempts at Germanization and Hungarization of the Serbian population. (source: <http://www.pancevo.rs/>)

Pancevo Air Quality issues:

The Ministry of Science and Environmental Protection - Directorate for Environmental Protection of the Republic of Serbia and the Ministry for the Environment and Territory of the Republic of Italy, in the framework of the Memorandum of Understanding "*Cooperation on environmental protection*", developed a number of initiatives towards the joint promotion of sustainable development.

On the basis of the conclusion of the activities undertaken by the UNEP Balkan Task Force, that identified the South Zone Industrial Complex (SZIC) of Pančevo as one of the most critical environmental hot spots in the Republic of Serbia, and on the basis of the "Environmental monitoring and sustainable requalification of selected industrial areas in the Republic of Serbia" undertaken by the the Ministry for the Environment and Territory of the Republic of Italy, in October 2004 the Ministry of Science and Environmental Protection of the Republic of Serbia and the Ministry for the Environment and Territory of the Republic of Italy launched the "Pančevo Action Program" within the event "L'Italia a Belgrado 2004" as a pilot integrated project promoted and financed by the Italian Ministry of Environment, Land and Sea.

The SZIC consists of three plants: HIP Azotara (fertilizer plant), HIP Petrohemija (petrochemical plant) and NIS Refinery (petroleum derivatives).

Several environmental problems had to be urgently addressed in the Pančevo area, such as:

- surface water pollution and ground water contamination, caused by uncontrolled release of chemicals during NATO bombing of the Industrial Complex in 1999, as well as past and present emissions of chemicals and the past subsoil and sediments contamination;
- air pollution from industrial emissions;
- contamination of surface soil from spills and leaks of hydrocarbons, as consequence of the NATO bombing, and from the uncontrolled disposal of hazardous wastes;
- risks of industrial accidents (including explosion and contamination from toxic substances) affecting the safety of the industrial and adjacent residential areas.

The South Zone Industrial Complex of Pančevo represents a strategic resource for Serbian national economy. It is located close to the town and it is strictly linked with it, in economic, social and environmental terms. These environmental risks involve the 130,000 inhabitants in



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the Municipality and 7,000 workers in the industrial areas; air emissions affect the city and the region of Belgrade, while the wastewater discharges into the Danube could have downstream and even trans-boundary effects on the water quality of the rivers.

In the sector of air quality, a dedicated Industrial Air Pollution Management System was designed and installed. The objective was the preliminary assessment of the actual industrial air pollution situation in the Pančevo area through the installation of saturation stations equipped with passive samplers (measuring SO₂, NO_x, NH₃, O₃, BTEX and total NMHC) and supplementary methods (targeted on particulate matter samplers - PM₁₀ and PM_{2,5}). During the project, a dedicated training sessions has been organized in Serbia and in Italy in order to provide the local technicians with proper know-how and expertise in the use of air monitoring instruments. In addition, two mobile units was provided: an Emergency Monitoring Mobile Unit, able to quickly sample and analyze hazardous pollutants in case of industrial accidental release and an Industrial Emission Control Mobile Unit, able to characterize the emitted pollutants and to evaluate the calibration of the future Continuous Emission Monitoring systems. This project was preparatory to the identification, prioritisation and design of the needed emission reduction measures on the main industrial sources.

(source: <http://www.taskforcecee.com/activities/view/pancevo-action-program>)





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2. Results obtained during PANCEVO AQM campaign:

The AIRPOINTER and UPT Mobile Laboratory were used in the same location in Pancevo AQM campaign. 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.

O3, SO2, NO, NO2 and NOx hourly mean concentration recorded in PANCEVO

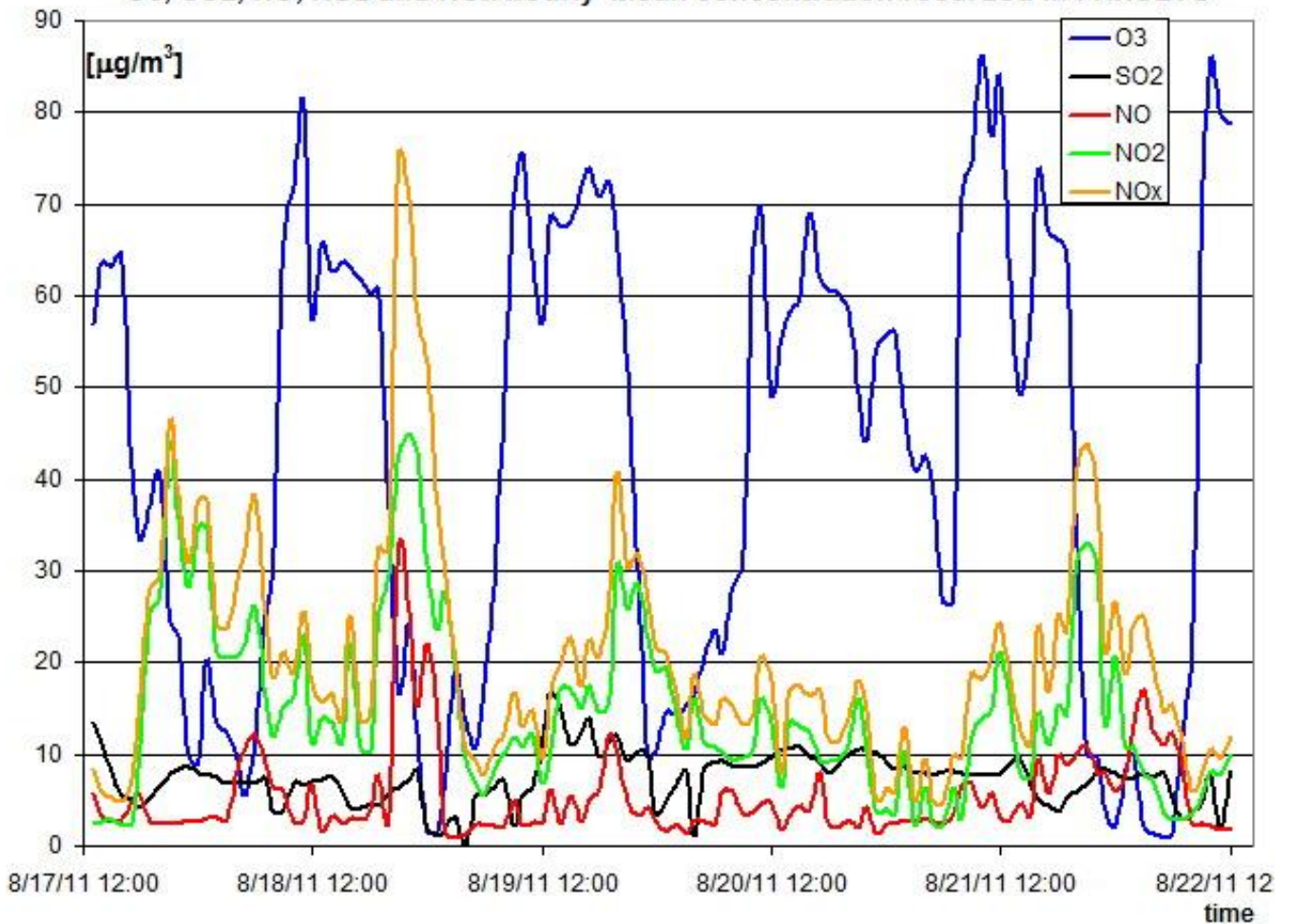


Fig 1. Hourly mean values recorded for NO, NO2, NOx, O3, SO2 in Pancevo, with UPT Mobile Laboratory



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VOC (NonMethane Hydrocarbon) concentration recorded in PANCEVO 10 second instantaneous values

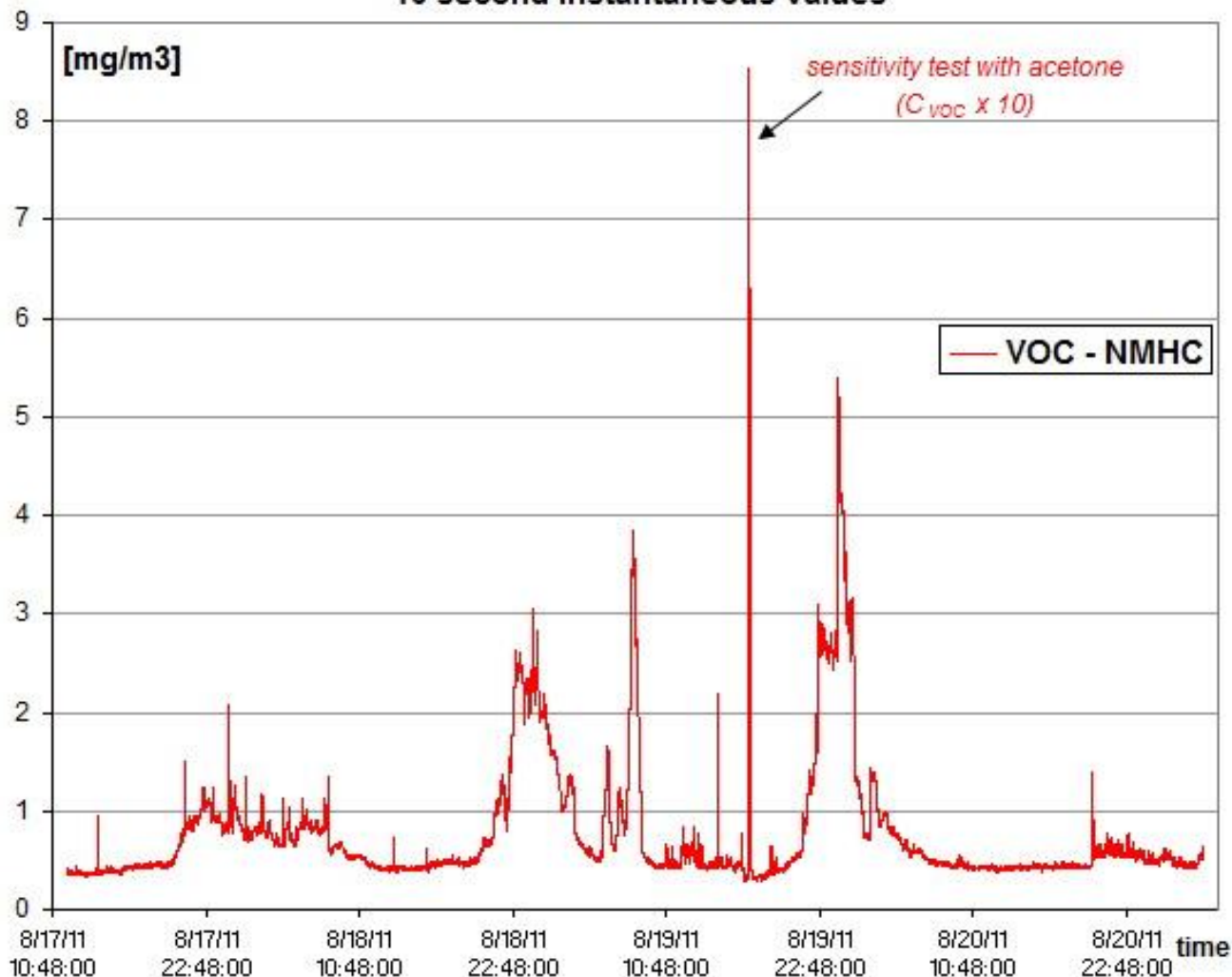


Fig 2. 10 seconds instantaneous values recorded for NMHC (VOC) in Pancevo, with UPT Mobile Laboratory

Table 1. Daily mean values for relevant pollutant concentration in ambient air

Time	O ₃	SO ₂	NO	NO ₂	NO _x	CH ₄	NMHC	THC	CO	CO ₂	PM10 LSV3	PM10 dustrack
	µg/m ³	µg/m ³	µg/m ³	µg/m ³	µg/m ³	mg/m ³	mg/m ³	mg/m ³	mg/m ³	ppm	µg/m ³	µg/m ³
08/17/11	44.76	7.56	3.47	15.59	19.05	3.95	0.47	4.42	0.32	330.07	49.044	46.27
08/18/11	39.21	6.33	6.87	21.92	28.79	4.41	0.67	4.88	0.50	369.24	36.962	38.14
08/19/11	44.59	7.85	5.61	17.44	23.05	4.51	0.94	4.59	0.40	399.82	39.855	40.82
08/20/11	40.30	8.48	3.48	12.65	16.13	4.39	0.89	4.58	0.41	372.08	35.062	37.31
08/21/11	53.08	7.50	5.13	11.97	17.11	3.99	0.48	4.47	0.33	348.27	41.307	43.05
08/22/11	27.03	6.34	7.67	8.20	15.87	5.14	1.17	5.59	0.61	438.55	40.185	39.92

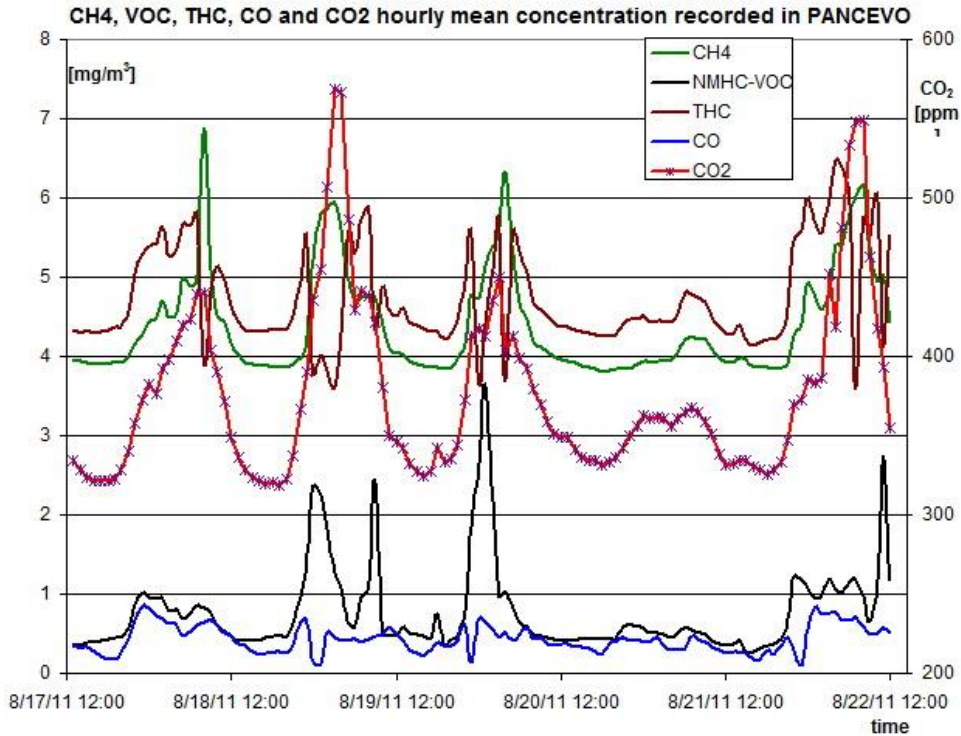


Fig 3. Hourly mean values recorded for CO₂, CH₄, NMHC, THC and CO in Pancevo, with UPT Mobile Laboratory

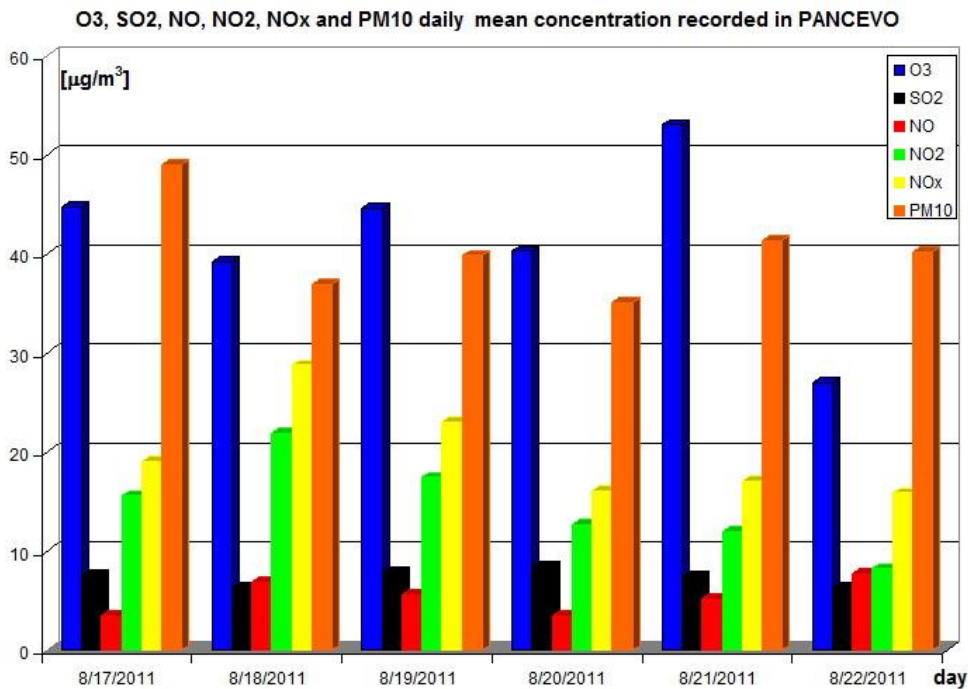


Fig. 4. Daily mean values recorded for O₃, SO₂, NO, NO₂, NO_x and PM₁₀ in Pancevo, with UPT Mobile Laboratory



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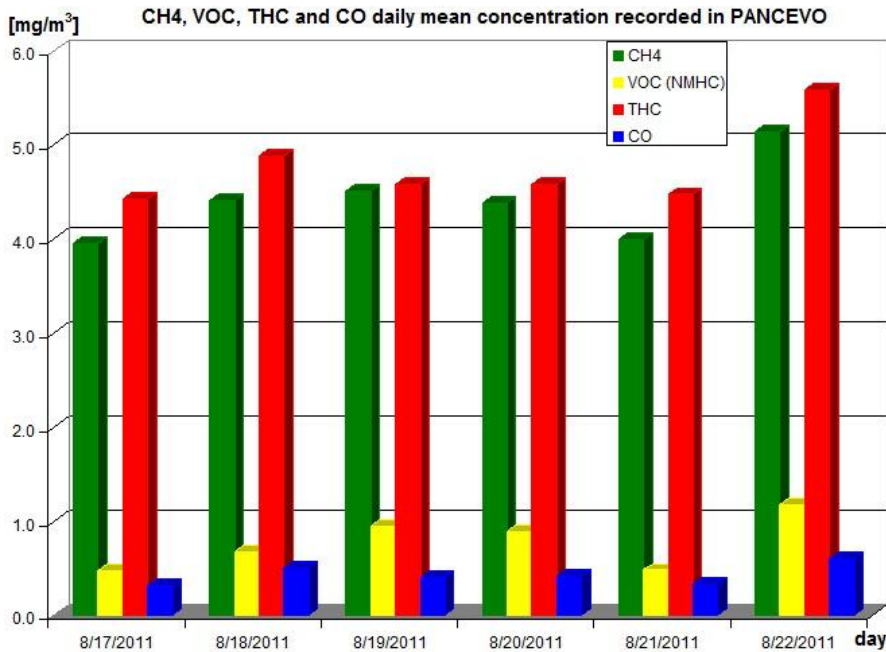


Figure 5. Daily mean values recorded for CH4, NMHC, THC and CO in Pancevo, with UPT Mobile Laboratory

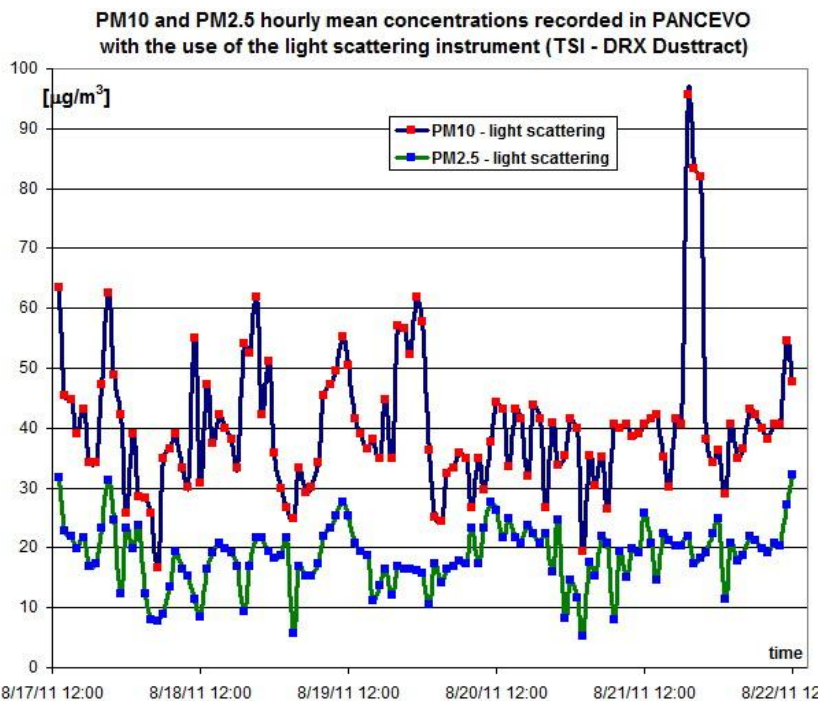


Figure 6. Hourly mean values recorded for PM10 and PM2.5 in Pancevo with Dustrack (light scattering), with UPT Mobile Laboratory



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O3, SO2, NO, NO2, NOx and PM10 hourly mean concentration recorded in PANCEVO

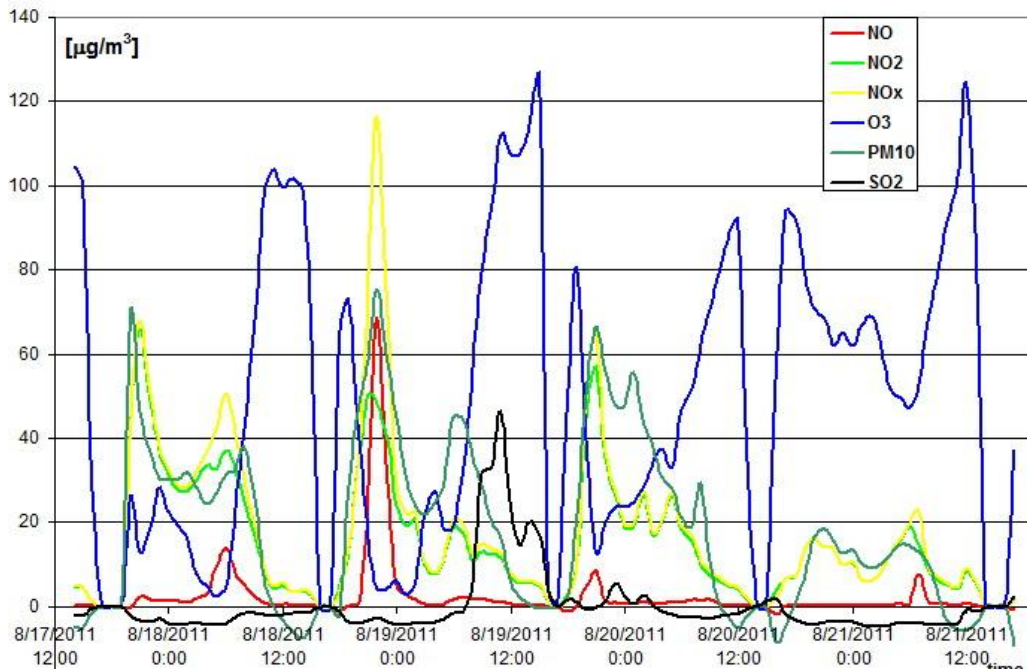


Fig 7. Hourly mean values recorded for NO, NO2, NOx, O3, SO2 in Pancevo, with AIRPOINTER

CO hourly mean concentration recorded in PANCEVO

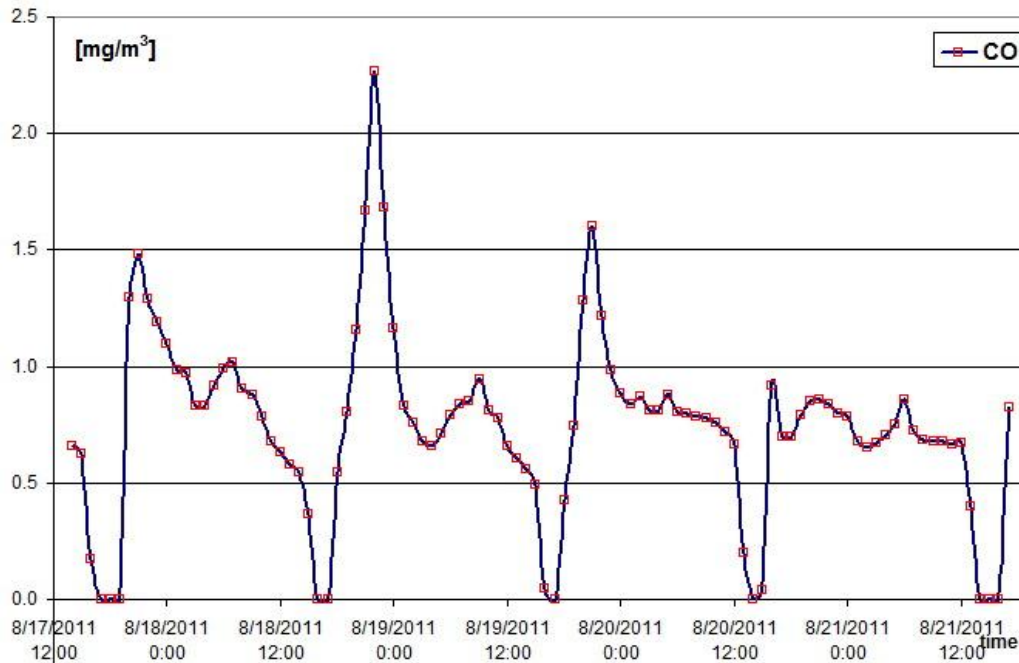


Fig 8. Hourly mean values recorded for CO in Pancevo, with AIRPOINTER



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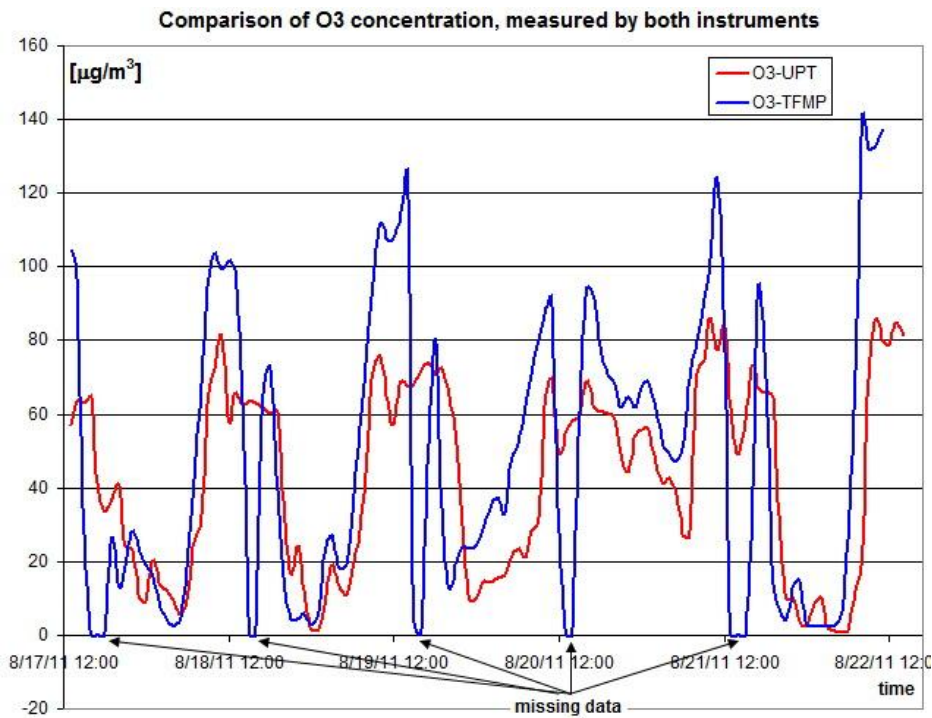


Figure 7. Comparison of the 1 hour mean values recorded for O₃ concentration in ambient air with AIRPONTER and UPT Mobile Laboratory

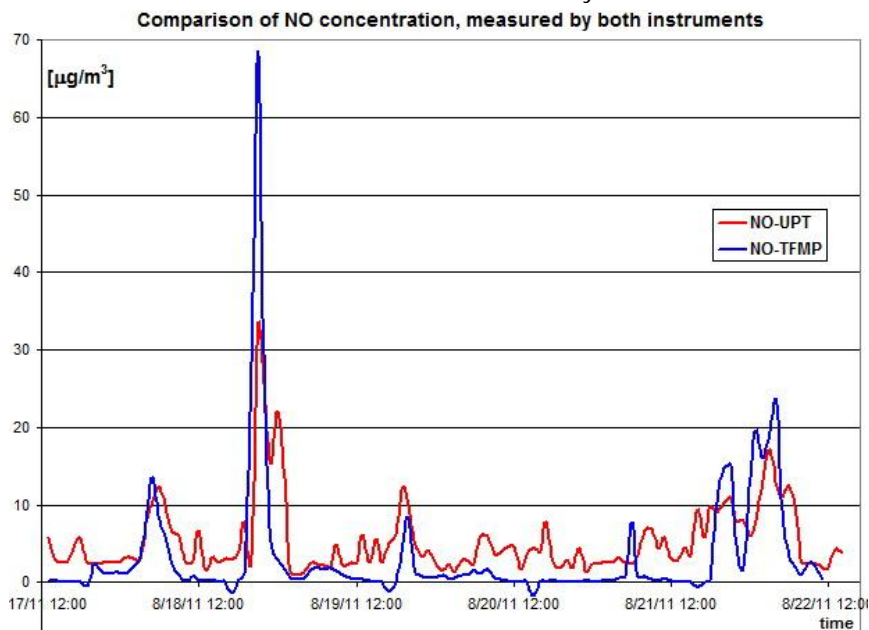


Figure 8. Comparison of the 1 hour mean values recorded for NO concentration in ambient air with AIRPONTER and UPT Mobile Laboratory



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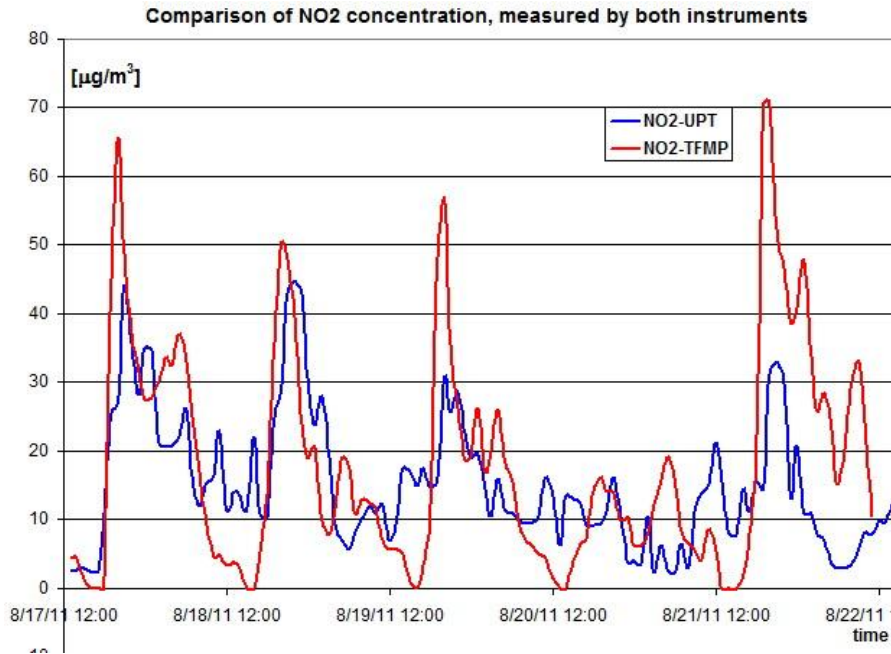


Figure 9. Comparison of the 1 hour mean values recorded for NO₂ concentration in ambient air with AIRPONTER and UPT Mobile Laboratory

3. Conclusions

In the case of the Pancevo campaign the main concern is given by very high concentration recorded for NMHC (non methane hydrocarbons) or more commonly known as VOC's (volatile organic carbon). The instrument records all VOC's as a total with the exception of Methane. The recorded values are of concern because the high values are not accidentals (pics) but over large period of time, in three days from sixth.

As the literature shows the problem of VOC's concentration in Pancevo air is well known and various programs exists in an attempt of the authorities to solve the problem.

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