WeBIOPATR 2021

The Eighth International WEBIOPATR
Workshop & Conference
Particulate Matter: Research and Management

Abstracts of Keynote Invited Lectures and Contributed Papers

Milena Jovašević-Stojanović,

Alena Bartoňová,

Miloš Davidović and Simon Smith, Eds

Vinča Institute of Nuclear Sciences

Vinča, Belgrade 2021

ABSTRACTS OF KEYNOTE INVITED LECTURES AND CONTRIBUTED PAPERS

The Eighth WeBIOPATR Workshop & Conference

Particulate Matter: Research and Management

WeBIOPATR 2021

29th November to 1st December 2021

Vinča, Belgrade, Serbia

Editors

Milena Jovašević-Stojanović

Alena Bartoňová

Miloš Davidović

Simon Smith

Publisher

Vinča Institute of Nuclear Sciences

Prof. Dr Snežana Pajović, Director

P.O.Box 522

11001 Belgrade, Serbia

Printed by

Vinča Institute of Nuclear Sciences

Number of copies

150

ISBN 978-86-7306-164-1

Vinča, Belgrade 2021.

www.vin.bg.ac.rs/

SCIENTIFIC COMMITTEE

Aleksandar Jovović, Serbia
Alena Bartoňová, Norway
Antonije Onjia, Serbia
David Broday, Israel
Dikaia Saraga, Greece
Griša Močnik, Slovenia
Ivan Gržetić, Serbia
María Cruz Minguillón, Spain
Milena Jovašević-Stojanović, Serbia
Miloš Davidović, Serbia
Saverio de Vito, Italy
Selahattin Incecik, Turkey
Slobodan Ničković, Serbia
Simone Barreira Morais, Portugal
Zoran Mijić, Serbia
Zoran Ristovski, Australia
Zorana Jovanović-Andersen, Denmark

ORGANIZING COMMITTEE

Aleksandra Stanković, Serbia
Alena Bartoňová, Norway
Andrej Šoštarić, Serbia
Anka Cvetković, Serbia
Biljana Filipović, Serbia
Branislava Matić, Serbia
Lidija Marić-Tanasković, Serbia
Uzahir Ramadani, Serbia
Ivan Lazović, Serbia
Sonja Dmitrašinović (Secretary), Serbia
Marija Živković (Secretary), Serbia
Milena Jovašević-Stojanović, Serbia
Miloš Davidović, Serbia
Mira Aničić Urošević, Serbia
Mirjana Perišić, Serbia
Nenad Živković, Serbia
Tihomir Popović, Serbia
Vesna Slepčević, Serbia
Viša Tasić, Serbia

CONFERENCE TOPICS

1. **Atmospheric Particulate Matter - Physical and Chemical Properties**
    i. Sources and formation of particulate matter
    ii. Particulate matter composition and levels outdoors and indoors
    iii. Environmental modeling
    iv. Nanoparticles in the environment
2. **Particulate Matter and Health**
    i. Exposure to particulate matter
    ii. Health aspects of atmospheric particulate matter
    iii. Full chain approach
    iv. COVID-19 and particulate matter
3. **Particulate Matter and Regulatory Issues**
    i. Issues related to monitoring of particulate matter
    ii. Legislative aspects
    iii. Abatement strategies

Organizers

Vinča Institute of Nuclear Sciences, University of Belgrade, National Institute of the Republic of Serbia, Serbia

Public Health Institute of Belgrade, Serbia

NILU Norwegian Institute for Air Research, Norway

The 8th WeBIOPATR Workshop and Conference,

Particulate Matter: Research and Management, WEBIOPATR2021

is supported by:

Virtual centre for
Distributed atmospheric
Sensing for reduction of pollution pressures

EC H2020 Framework Program for Research and Innovation,
area "Spreading excellence and widening participation",
VIDIS project (2020-2023) coordinated by Vinča Institute of Nuclear Sciences,
Grant agreement number 952433.

Ministry of Education, Science and Technological Development of the Republic of Serbia

11.2 EFFECT OF SUBSTITUTION OF OLD COAL BOILERS WITH NEW BIOMASS BOILERS ON THE CONCENTRATION OF PARTICULATE MATTER IN AMBIENT AIR: A CASE STUDY MIONICA

D. Todorović, A. Jovović, S. Milošević, M. Obradović, N. Karličić, D. Radić
University of Belgrade Faculty of Mechanical Engineering, Belgrade, Serbia
dtodorovic@mas.bg.ac.rs

Residential and commercial solid fuel burning in stoves, small and medium combustion plants have been designated as the largest sources of fine particles with serious impacts on air quality, climate and human health. Having in mind the age and condition of the plant, as well as domestic raw lignite of poor quality which is widely used in these plants, this problem becomes even more pronounced in Serbia during the heating season. An additional reason for such high dust emissions certainly lies in the fact that most of these combustion units, in addition to being in very poor condition, work without any flue gas system for dedusting, also the mentioned lignite is low in calorific value with high ash and moisture content. Replacement of such combustion units with modern biomass boiler units is certainly appropriate, and in places where natural gas is not available, this energy source is the best solution.

In this paper and for the case study of Mionica town, the influence on the concentration of PM in ambient air will be presented by replacing two old coal boilers with new biomass boilers. Namely, two old boilers (2x950 kWth) covered the heat demand of the sports centre as well as primary and secondary school, these boilers were replaced with two new biomass boilers of the same installed thermal capacity.

In order to analyse the influence of boilers substitution on PM concentration in ambient air, the regulatory air dispersion model, recommended by the US Environmental Protection Agency (US EPA) AERMOD, is used, which is based on the Gaussian model. Air dispersion modeling within this Study includes only sources which are associated with this Case Study. Other sources of emissions and background pollution are not included. The aim of this Study is not to show the air quality in the domain, but rather to provide a representative assessment of the impact of boilers substitution on PM concentration in the model domain. For the purpose of this Study NASA digital maps SRTM1 - Shuttle Radar Topography Mission (resolution ~ 30m, or 1 arc-sec) are used and processed by the AERMAP, while meteorological, data processed by the AERMET, are site specific MM5 (Grid Cell 12 km x 12 km), giving an hourly-modelled meteorological data set for full five consecutive calendar years. The results presented in this paper were obtained using a model which includes the emissions of TSP, PM10 and PM2.5 from the old and new boilers. An emission inventory has been prepared based on combustion calculations and emission factors (EMEP/EEA, 2019) for old coal fired boilers, while for new biomass boilers, site-specific measurements and PM size distribution factors (US EPA, AP 42, 2003) have been used.

Modelling results consist of graphical (isopleth diagrams) ground level concentrations for TSP, PM10 and PM2.5 and various average periods.

REFERENCES

European Environment Agency, 2019. EMEP/EEA air pollutant emission inventory guidebook 2019 Technical guidance to prepare national emission inventories.

US EPA, AP 42, Fifth Edition, 2003. Volume I Chapter 1: External Combustion Sources, 1.6 Wood Residue Combustion in Boilers