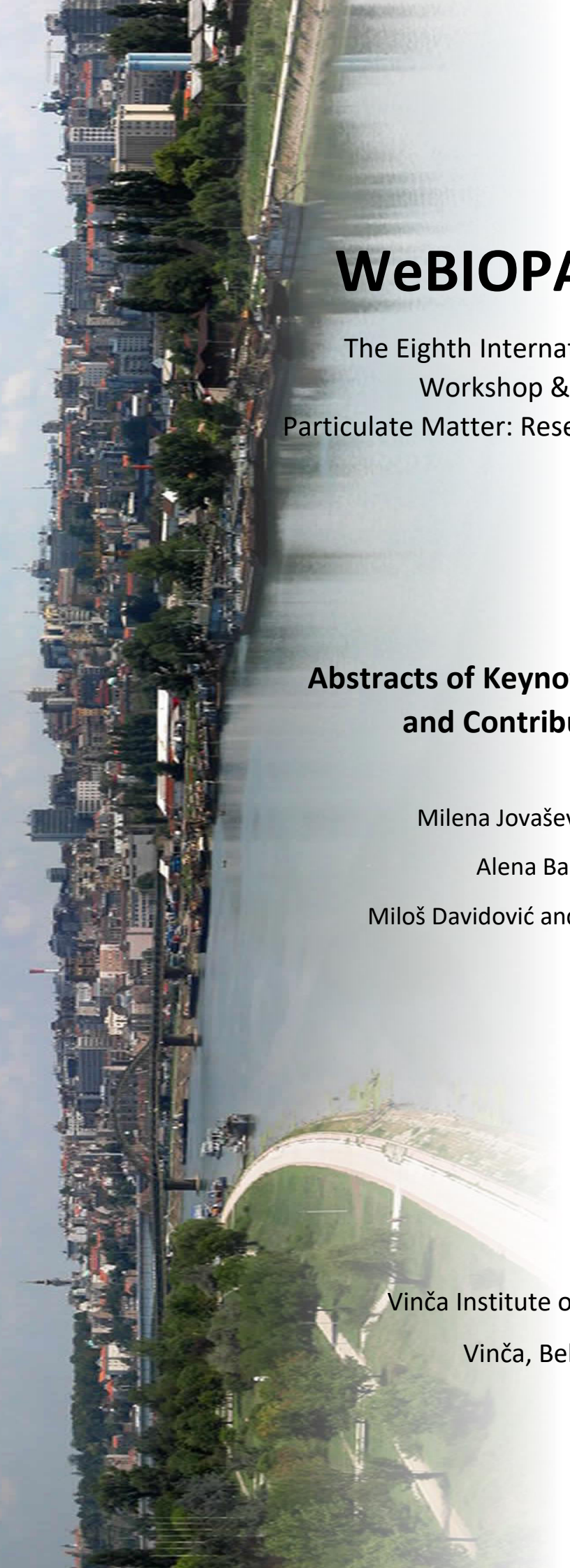

WeBIOPATR 2021

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

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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

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PREFACE

Dear Colleagues,

Welcome to the 8th WeBIOPATR Conference, to be held at the premises of the Vinca Institute of Nuclear Sciences, Serbia, 29.11.–1.12.2021, as a combination of online and face-to-face event.

The International Workshop and Conference, Particulate Matter: Research and Management – WeBIOPATR is a biennial event held in Serbia since 2007. The conference addresses air quality in general and particulate matter specifically. Atmospheric particulate matter arises both from primary emissions and from secondary formation in the atmosphere. It is one of the least well understood local and regional air pollutants, has complex implications for climate change, and is perhaps the pollutant with the highest health relevance. It also poses many challenges to monitoring.

By WeBIOPATR, we aim to link the research communities with relevance to particulate matter with the practitioners of air quality management on all administrative levels, in order to facilitate professional dialogue and uptake of newest research into practice. The workshops usually draw an audience of about 70 and attract media attention in Serbia. It enjoys support of the responsible authorities, Ministry of Education, Science and Technological Development, Ministry of Health, Ministry of Environment, and the Serbian Environmental Agency whose sponsorship is indispensable and gratefully acknowledged. We also enjoy support of international bodies such as the WHO.

The 1st WeBIOPATR Workshop was held in Beograd, 20.-22. May 2007, associated with a project funded by the Research Council of Norway. The 2nd workshop was held in Mećavnik, Serbia, 28.8.-1.9.2009. WeBIOPATR2011 was held in Beograd 14.-17.11.2011 and for the first time, included a dedicated student workshop. WeBIOPATR2013 was held in Beograd 2.-4.10. 2013. It covered the traditional PM research and management issues, discussions on how to encourage citizens to contribute to environmental governance, and how to develop participatory sensing methods. WeBIOPATR2015 was held in Beograd 14.-16.10. 2015. Dedicated sessions were devoted to sensor technologies for air quality monitoring, utilizing information and input from the EU FP7 funded project CITI-SENSE (http://co.citi-sense.eu) and the EU COST action EuNetAir (www.eunetair.it). WeBIOPATR2017, the 6th conference, was held in Beograd 6.-8.9. 2017, with a wider than before Western Balkan participation. The 7th WeBIOPATR2019 was held 1.-4.10. 2019 at the Mechanical Faculty, University of Belgrade. It has attracted a record of over 50 contributions, and brought together scientists from 12 countries, documenting that the issues of atmospheric pollution, with their wide implications for climate change, human health and ecosystem services, are no less important today. This year's event will be with similar number of contributions that have been accepted.

In the past two years, all our lives were affected by the COVID-19 pandemic. We have adapted our ways of life and work – and now we hope that the new format of the conference

will be a success, for the participants physically present as well as for those who will participate online.

We are very grateful to our unrelenting national and international partners for their financial and scientific support for this event. In addition, WeBIOPATR2021 is supported by the VIDIS project, https://vidis-project.org/, funded by the EC H2020 Framework Programme for Research and Innovation, area "Spreading excellence and widening participation". VIDIS (2020-2023) is coordinated by Vinca Institute, Grant agreement number 952433.

Welcome to Vinca and online and have a stimulating and productive time!

Milena Jovašević-Stojanović and Alena Bartoňová

TABLE OF CONTENTS

9.3 VARIATION OF BLACK CARBON CONCENTRATION IN COLD AND WARM SEASONS IN SKOPJE URBAN AREA

D. Mirakovski (1), B. Boev (1), A. Zendelska (1), I. Boev (1), M. Hadzi-Nikolova (1), T. Sijakova-Ivanova(1), Gorgi Dimov (1), Nikolinka Doneva (1)

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South-East Europe and particularly continental parts of the Balkan peninsula are among the areas with highest ambient air pollution levels in Europe. Most of the regional capitals exceed the EU annual limit value, and when considering the stricter WHO guidelines, all cities exceed the $PM_{2.5}$ annual mean guideline (Almeida et al, 2020). The objective of our study was to assess Black Carbon concentrations in $PM_{2.5}$ size-segregated aerosols and to estimate the contribution of fossil fuel combustion (BC ff) and biomass burning (BC bb) to equivalent black carbon (eBC) concentrations in the urban area of Skopje, North Macedonia.

Measurements were conducted intermittently at one urban background and one urban traffic-exposed sites, from January to August 2021. The aerosol light absorption coefficients were retrieved using a 7-wavelength aethalometer (Rack Mount Aethalometer Model AE33, Magee Scientific Corp., Barkley, CA, USA). Aethalometer readings were corrected in real-time for multiple scattering in the filter matrix and loading effects, using the DualSpot Technology® (Drinovec et al., 2015). Using the Aethalometer model (Sandradewi et al. 2008), the absorption coefficients produced from the aethalometer were utilized to estimate the contribution of biomass burning and fossil fuel to total BC concentrations. $PM_{2.5}$ samples were collected on PTFE filters using a low volume sampler (Sequential sampling system with automatic filter changer and Peltier cooler, PNS 18, DM-6.1, Comde-Derenda GmbH, Germany) and analysed for potassium (K) and other major ad trace elements using an X-Ray fluorescence (NEX CG II EDXRF Spectrometer, Applied Rigaku Technologies, Inc., Tokyo, Japan). One-hour averaged data for fine particulate concentrations ($PM_{2.5}$), carbon monoxide (CO) and nitrogen dioxide (NO2) were obtained respectively from a co-located monitoring station, part of the State Monitoring Network, operated by the Ministry of Environment and Physical Planning (MOEPP).

Measured equivalent black carbon concentrations were similar to other pollutants connected with low efficiency combustion processes like $PM_{2.5}$ and CO - exhibiting strong seasonal variation at both sites, ranging from high 6.96 ± 6.82 (urban background) and 6.24 ± 6.54 (traffic exposed site) during the cold season, to significantly lower 1.41 ± 1.16 (urban background) and 2.78 ± 2.03 (traffic exposed site) during the warm season. During the cold season, the mean relative contribution (%) of biomass burning reached 52.18 ± 15.22 % of the total black carbon concentration at the urban background site and 32.35 ± 19.22 % at the traffic-exposed site, and exhibited a strong diurnal pattern with maximum values during the evening and late-night hours. The mean relative contribution of biomass burning significantly lower during the warm season, reaching 16.27 ± 8.28 at the urban background site and 7.65 ± 6.03 % at the traffic-exposed site, with no clear diurnal pattern.

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