

## ANALIZA PROSTORNE I VREMENSKE DISTRIBUCIJE ZAGAĐUJUĆIH MATERIJA U BEOGRADU

### ANALYSIS OF THE SPATIAL AND TEMPORAL DISTRIBUTIONS OF AIR POLLUTANTS IN BELGRADE

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*Zagađenje vazduha predstavlja jedan od najvećih problema u 21. veku. Povećana upotreba fosilnih izvora energije, ubrzana industrijalizacija i sve veća upotreba različitih hemikalija doveli su do zagađenosti vazduha u meri koja štetno deluje na zdravlje ljudi i životnu sredinu u celini. Cilj ovog rada jeste određivanje kvaliteta vazduha na osnovu prostorne i vremenske distribucije zagađujućih materija u vazduhu u realnom vremenu, u Beogradu tokom 2021. godine.*

*Kvalitet vazduha je određivan analizom prostorne i vremenske distribucije SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2,5</sub>, CO, benzena and prizemnog O<sub>3</sub>. Podaci monitoringa vazduha, automatskim referentnim metodama i gravimetrijskom metodom za PM<sub>10</sub>, preuzeti su sa sajta Agencije za zaštitu životne sredine.*

*Koncentracija NO<sub>2</sub> bila je prekoračena na godišnjem i dnevnom nivou na mernim stanicama Mostar (42.8 µg/m<sup>3</sup>) i Despota Stefana (56.7 µg/m<sup>3</sup>), dok je stana granična vrednost prekoračena na mernim stanicama Mostar, Vračar, Despota Stefana i Omladinskih brigada. Granične vrednosti PM<sub>10</sub> na dnevnom nivou od 50 µg/m<sup>3</sup> bile su prekoračene na svim mernim mestima, dok su srednje godišnje vrednosti PM<sub>2,5</sub> čestica bile iznad graničnih vrednosti od 25 µg/m<sup>3</sup> na mernim stanicama Zemun (25.8 µg/m<sup>3</sup>) i Despota Stefana (25.1 µg/m<sup>3</sup>). Prekoračenje osmosatnih graničnih vrednosti O<sub>3</sub> od 120 µg/m<sup>3</sup> zabeleženo je na svim mernim stanicama u Beogradu, osim na lokaciji Zeleno brdo. Takođe, prekoračenje satnih koncentracija O<sub>3</sub> od 180 µg/m<sup>3</sup> zabeleženo je na mernim stanicama Stari grad, Omladinskih brigada, Dragiša Mišović i Vinča.*

*Dobijeni rezultati ukazuju da je vazduh bio III kategorije (prekomerno zagađen vazduh) u 2021. godini u Beogradu, usled prekoračenja graničnih vrednosti NO<sub>2</sub>, suspendovanih čestica PM<sub>10</sub> i PM<sub>2,5</sub> i prizemnog O<sub>3</sub>. Takođe, na određenim lokacijama u Beogradu zabeležen je manji broj prekoračenja graničnih vrednosti.*

**Ključne reči:** zagađenje vazduha; prostorna i vremenska distribucija; praćenje kvaliteta vazduha

*Air pollution is one of the biggest problems of the 21<sup>st</sup> century. The increasing use of fossil energy, accelerated industrialization and the increasing use of various chemicals have led to air pollution to levels harmful to human health and the environment. The aim of this study was to assess*

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*air quality based on the spatial and temporal distribution of pollutants in the air in real time in Belgrade during 2021.*

*The air quality was determined by analyzing spatial and temporal distribution of SO<sub>2</sub>, NO<sub>2</sub>, PM<sub>10</sub>, PM<sub>2.5</sub>, CO, benzene and ground-level O<sub>3</sub>. Data obtained by automatic reference methods as well as by the gravimetric method for PM<sub>10</sub>, were taken from the Serbian Environmental Protection Agency.*

*The concentration of NO<sub>2</sub> was exceeded on an annual and daily limit value at the location Mostar (42.8 µg/m<sup>3</sup>), and Despot Stefan (56.7 µg/m<sup>3</sup>), while the hourly limit value was exceeded at the measuring stations Mostar, Vračar, Despota Stefana and Omladinskih brigada. The daily limit values of PM<sub>10</sub> > 50 µg/m<sup>3</sup> were exceeded at all measuring points in Belgrade, while the average annual values of PM<sub>2.5</sub> were above the limit values (25 µg/m<sup>3</sup>) at the Zemun (25.8 µg/m<sup>3</sup>) and Despot Stefan (25.1 µg/m<sup>3</sup>) locations. Exceeding the eight-hour limit values of O<sub>3</sub> > 120 µg/m<sup>3</sup> were recorded at all measuring stations in Belgrade, except at the Zeleno brdo. Also, hourly concentrations of O<sub>3</sub> > 180 µg/m<sup>3</sup> were exceeded at the measuring stations Stari grad, Omladinskih brigada, Dragiša Mišović and Vinča.*

*Results indicate that the air quality was category III (excessively polluted air) in Belgrade during 2021 year, due to exceeding the limit values of NO<sub>2</sub>, suspended particles PM<sub>10</sub> and PM<sub>2.5</sub> and ground O<sub>3</sub>. Also, the results indicate that at certain locations in Belgrade, a smaller number of limit values were exceeded.*

**Key words:** *air pollution; spatial and temporal distribution; air quality monitoring*