

Klimerko

SEE 10: 11-12 April 2022, Ljubljana, sLOVEnia

SEE Klimerko network IoT - Data good enough

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Founder @descOn @_klimerko_



Descon Community - DescOn Flickr IoT events 2015 - 2020



Event in 2015



Event in 2016



Event in 2017



Event in 2018



Events in 2019, 2020

AIR HARMFUL ACROSS SERBIA

"If Serbia were an EU member, Belgrade would be among the worst-ranked cities (321st out of 323) by concentrations of PM2.5, the biggest air polluter and the most harmful one to human health. The EU's most-polluted list is dominated by Polish and Italian cities, but it also includes those in Croatia, Romania, and Slovenia.

The National Ecological Association (NEA) has warned that the International Day of Clean Air finds Serbian citizens exposed to horrific pollution levels in all segments of the environment. Not even 7,500 premature deaths in Serbia due to excessive air pollution, according to NEA, is enough to make state institutions address the problem and protect the health of Serbian citizens, who held a protest over the issue a few days ago." *

more on

<https://balkangreenenergynews.com/belgrade-most-polluted-european-city-with-over-1-million-people/>



THE STORY ABOUT KLIMERKO

Descon “Klimerko”- open hardware, open software air quality device for open data citizen science network

Github code: DesconBelgrade

<https://github.com/DesconBelgrade/Klimerko>

Citizen Initiative VazduhGradjanima.rs

Klimerko.org

Thanks to DescOn, Haklab Belgrade, Internet
Society Serbia Belgrade Chapter

GENERAL CHARACTERISTICS

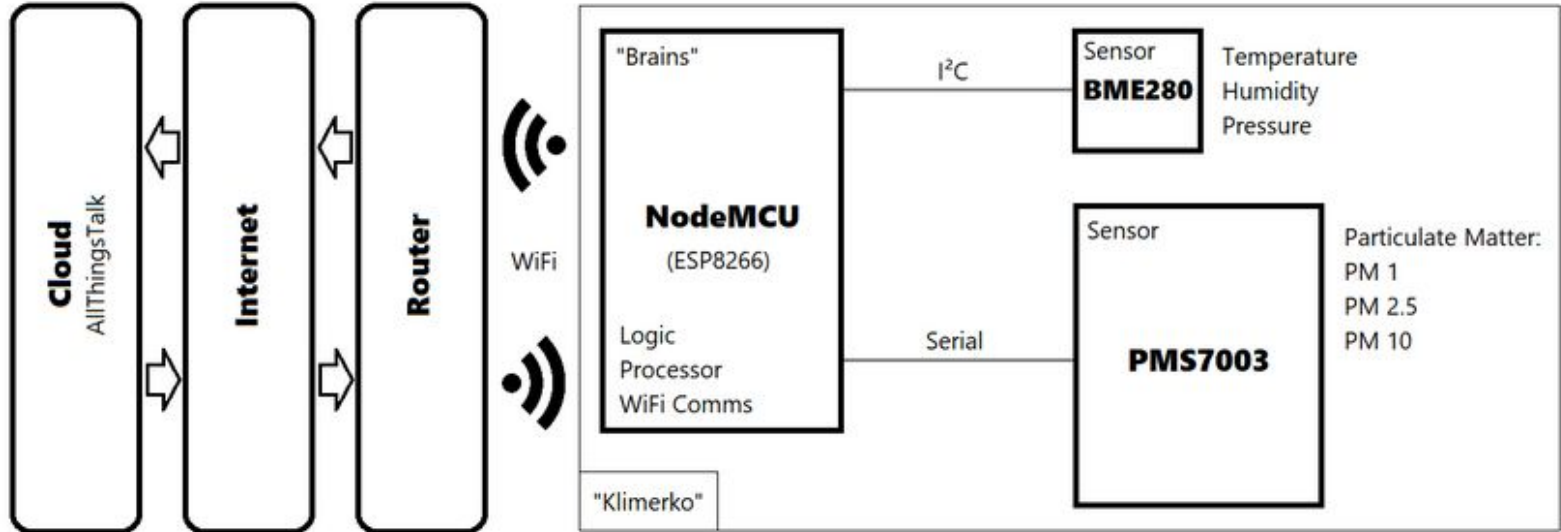
Klimerko is DIY air quality measuring device that measures Particulate Matter in the air as well as Temperature, Humidity and Pressure.




KLIMERKO

Parts

This diagram shows an overview of how Klimerko works





AIR TO THE PEOPLE

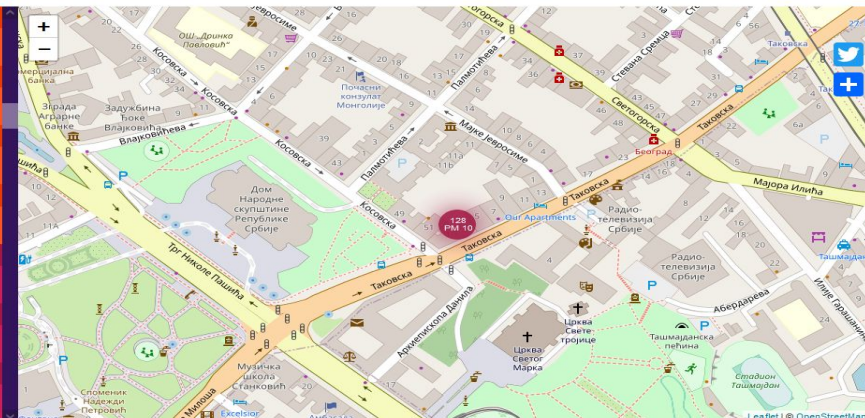
<https://youtu.be/LdLfDc-AIAc> **EN**

<https://youtu.be/sZpNltdOzio> **RS**

Application - Air to the People/Citizens

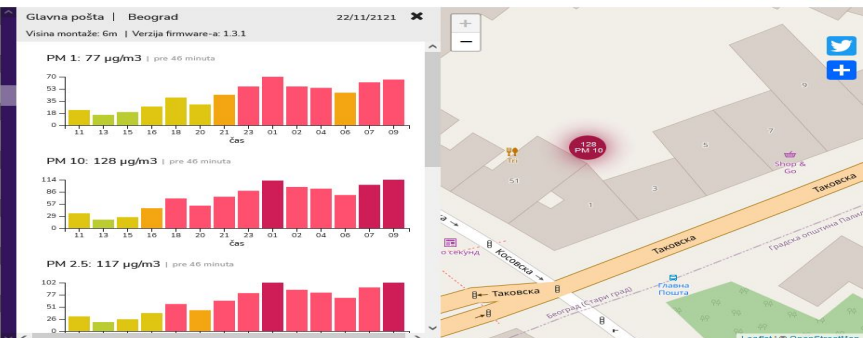
Vazduh gradanima

✓ Klimerko Juzni Bulevar	Crveni Krst	>
Kvalitet vazduha	PM 10	
Zagađen	92 µg/m ³	
✘ Descon Klimerko	Crveni Krst	>
Kvalitet vazduha	PM 10	
Zagađen	95 µg/m ³	
✓ Descon Polyhedra	Crveni Krst	>
Kvalitet vazduha	PM 10	
Zagađen	63 µg/m ³	
✘ RAF - Zvezdara	Crveni Krst	>
Kvalitet vazduha	PM 10	
Zagađen	63 µg/m ³	
✘ Descon Klimerko Dedinje	Dedinje	>
Kvalitet vazduha	PM 10	
Jako zagađen	131 µg/m ³	
✓ Descon Klimerko Zoo vrt	Dorćol	>
Kvalitet vazduha	PM 10	
Jako zagađen	101 µg/m ³	
✓ Descon Klimerko Rex	Dorćol	>
Kvalitet vazduha	PM 10	
Jako zagađen	161 µg/m ³	



Vazduh gradanima

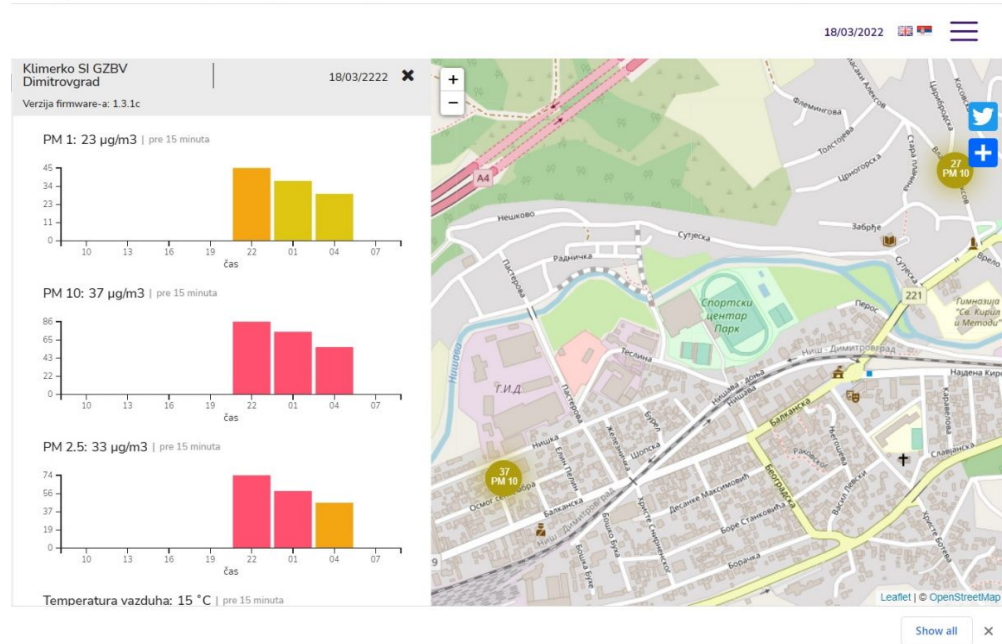
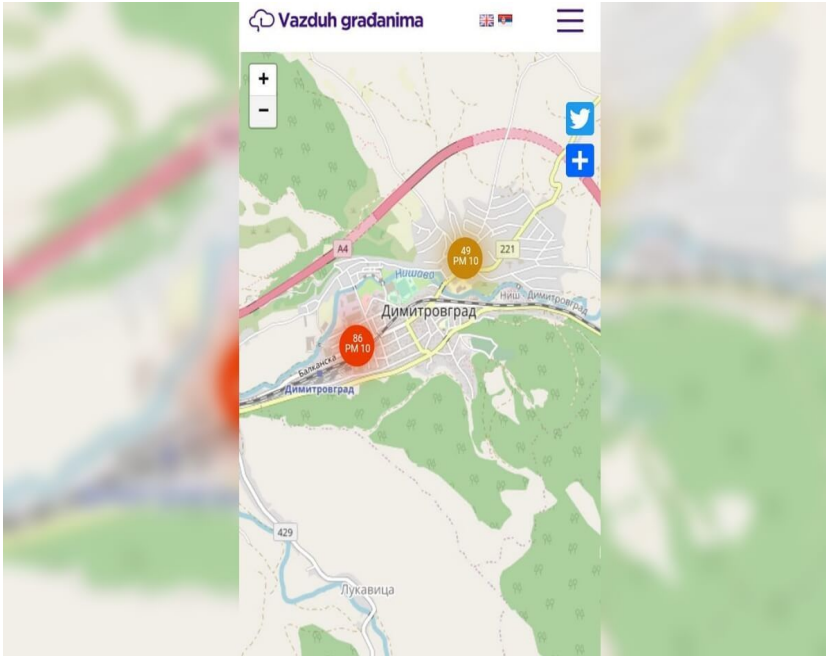
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✓ Descon Klimerko Rex	Dorćol	>
Kvalitet vazduha	PM 10	
Jako zagađen	161 µg/m ³	



Application for Android
and MacOs.

Our data have been
included in 3 applications:
AirCare,
Xeco.INFO and
VG (Air to the People).

Air to the citizens



ADOPTION ACROSS THE SEE REGION



March 2022 www.bit.ly/3DSw9C0

reddit Use App

r/serbia

pijaca • 9d Join

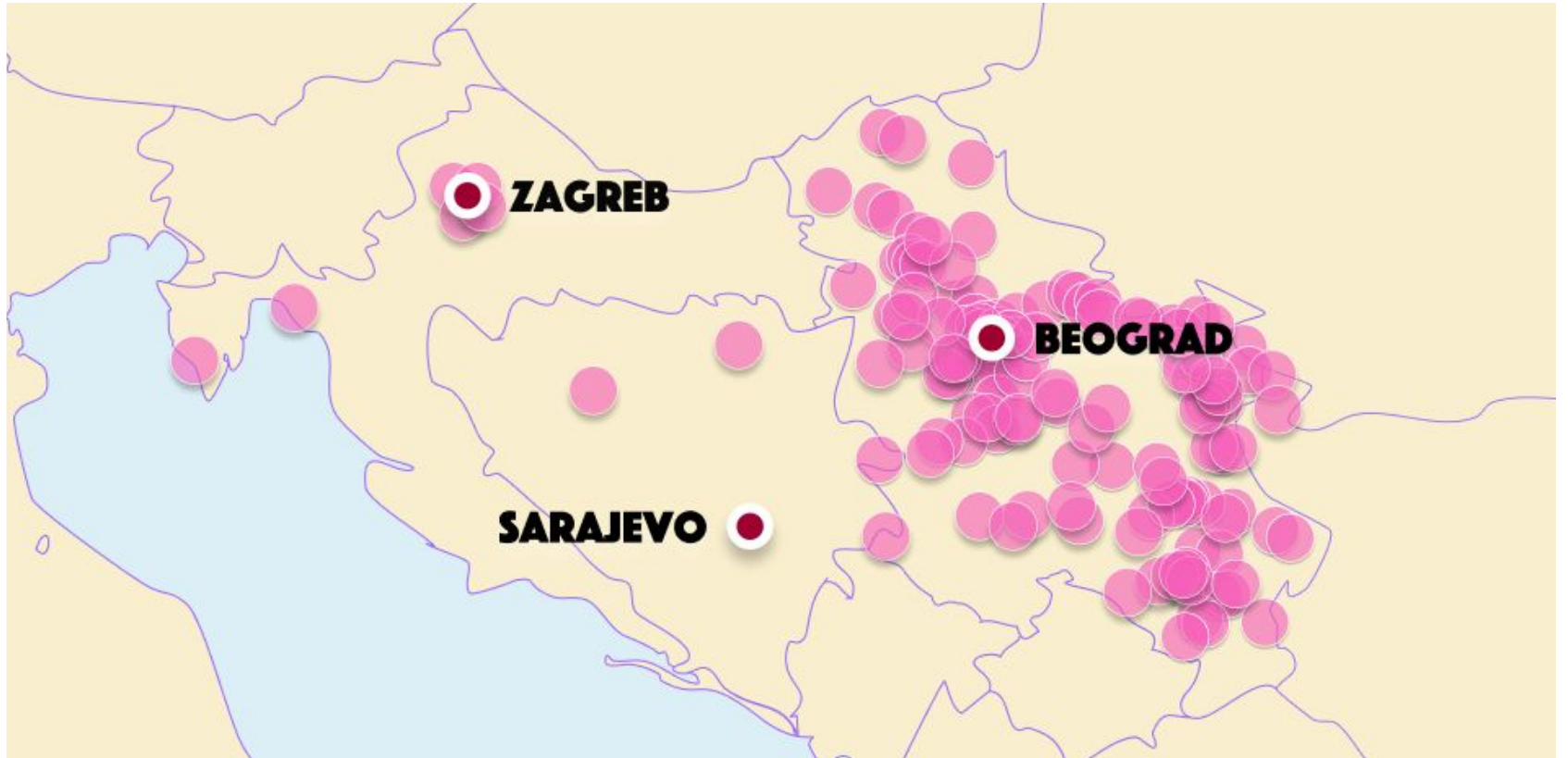
Internet društvo Srbije će besplatno deliti uređaje za merenje kvaliteta vazduha, jedino što treba da se uradi je da se postavi i poveže na wifi. Prednost imaju Južna i Istočna Srbija.

Vest (News)



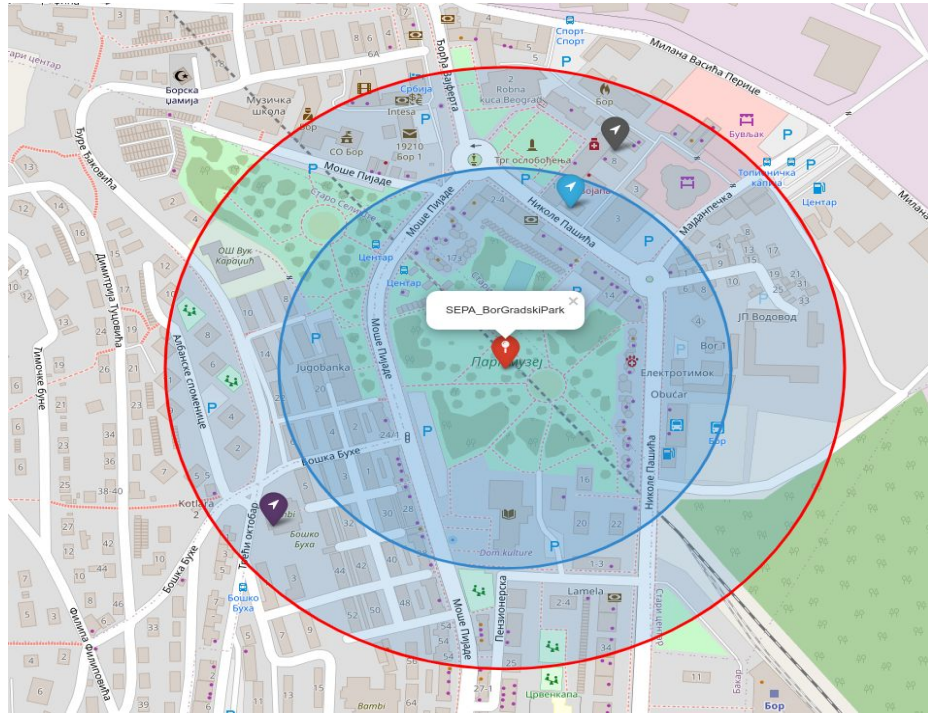
https://www.reddit.com/r/serbia/comments/tr5a9m/internet_dru%C5%A1tvo_srbije_%C4%87e_besplatno_deliti/?utm_source=share&utm_medium=mweb

Klimerko SEE network



Data comparison - Position of Klimerko stations - BOR

Figure 1: Position of the analysed Klimerko stations in Bor compared to the appropriate SEPA station; blue pin - Descon Klimerko ELCOMP, gray pin - Descon Klimerko KCBor, purple pin - Klimerko - B.Buha, Bor; blue circle - 200 m distance from SEPA station, red circle - 300 m distance from SEPA station, Feb 2022



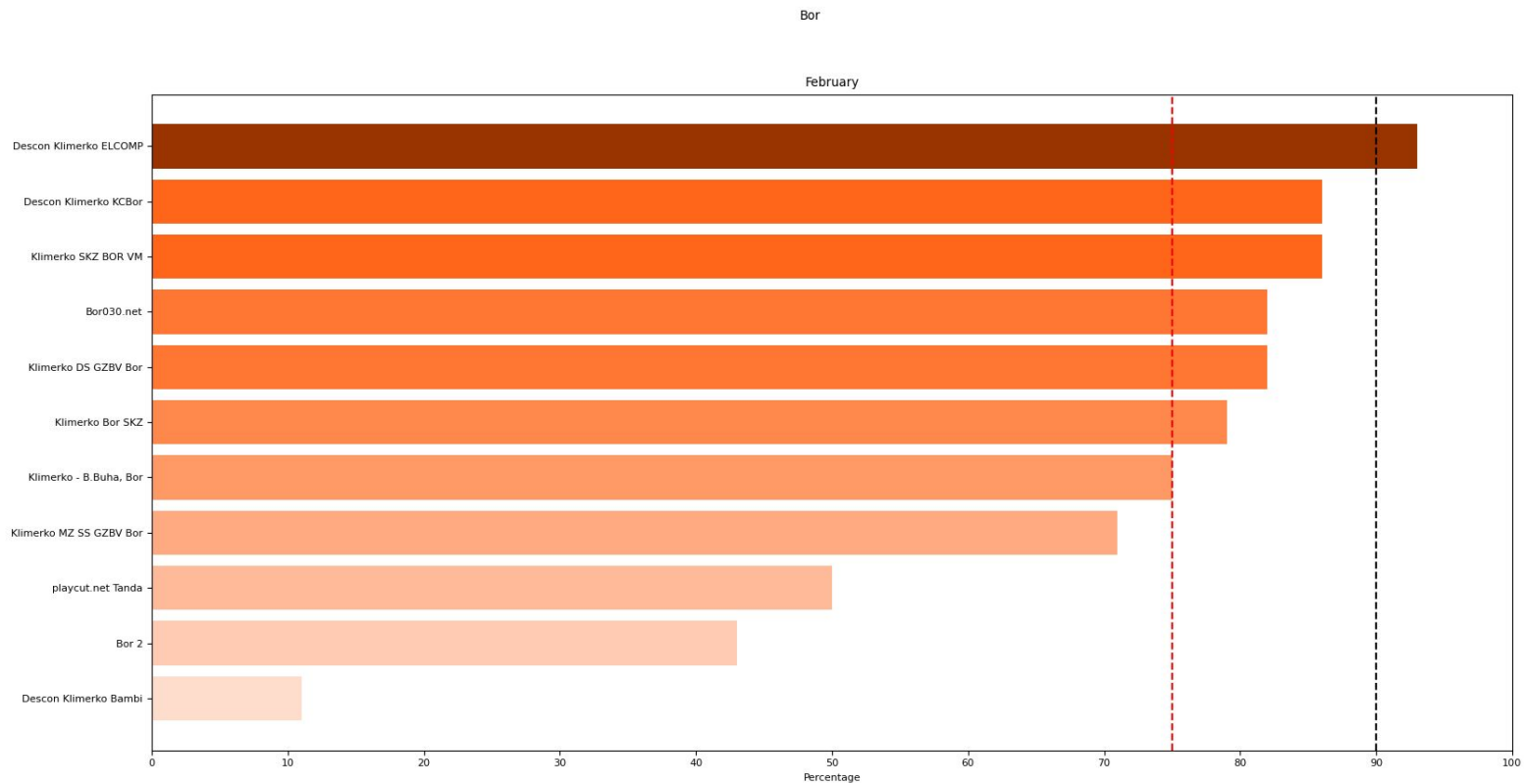


Figure 2: Klimerko stations belonging to Bor and data availability for February '22 in percentages

RESULTS – BOR - Descon Klimerko ELCOMP

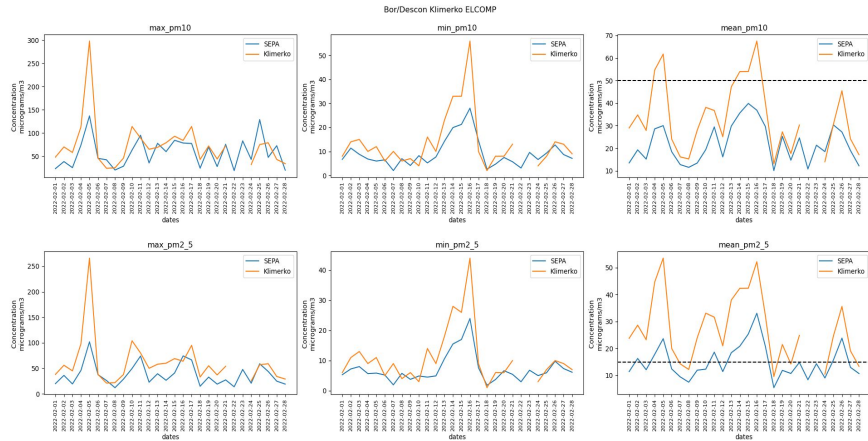


Figure 3: Daily changes in the maximum, minimum and medium concentration of PM10 particles (above) and PM2.5 particles (below) for February. Orange line indicates the appropriate Klimerko station, and the blue one the SEPA station. The black dot line indicates the maximum average allowed value of PM2.5 (15 $\mu\text{g}/\text{m}^3$) and PM10 (50 $\mu\text{g}/\text{m}^3$)

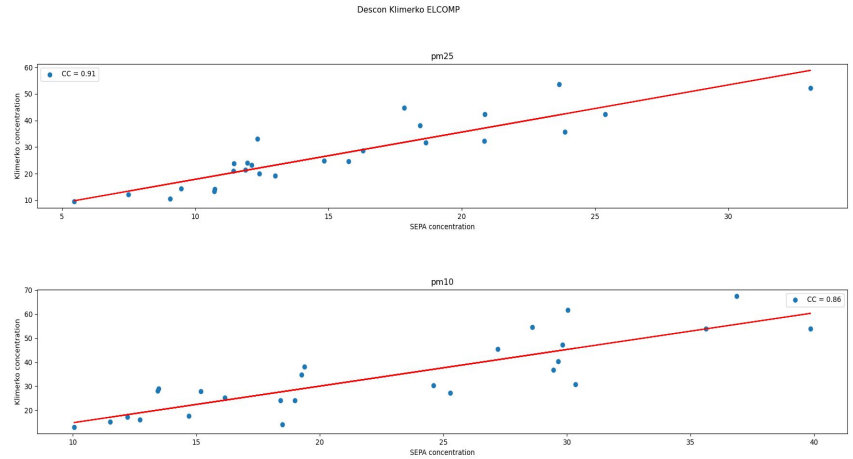


Figure 4: Mean daily concentration correlation ratio for PM2.5 particles (above) and PM10 particles (below) between SEPA and Klimerko stations

RESULTS – BOR - Descon Klimerko ELCOMP

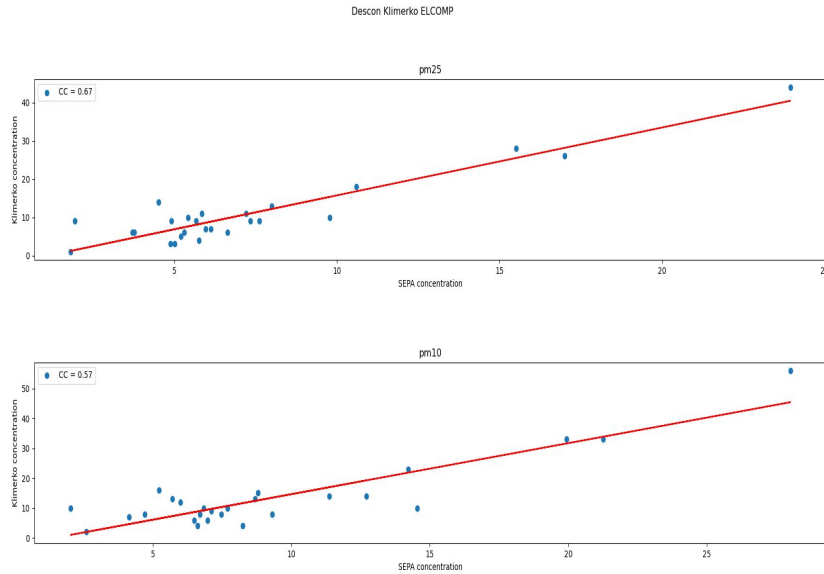


Figure 5: Minimum daily concentration correlation ratio for PM_{2.5} particles (above) and PM₁₀ particles (below) between SEPA and Klimerko stations

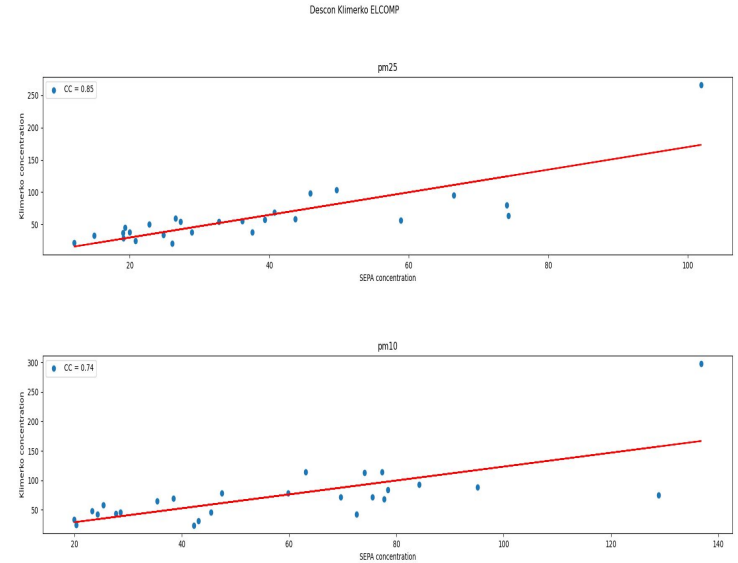
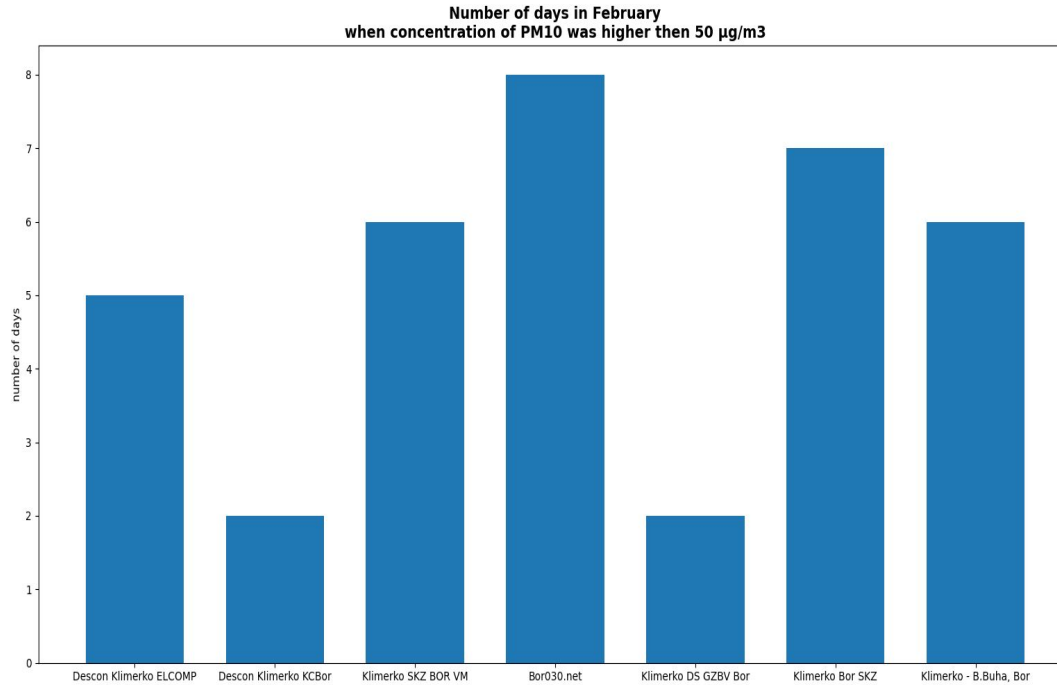


Figure 6: Maximum daily concentration correlation ratio for PM_{2.5} particles (above) and PM₁₀ particles (below) between SEPA and Klimerko stations

RESULTS – BOR - Descon Klimerko ELCOMP



ENCLOSURE - The position of Klimerko stations - NIŠ

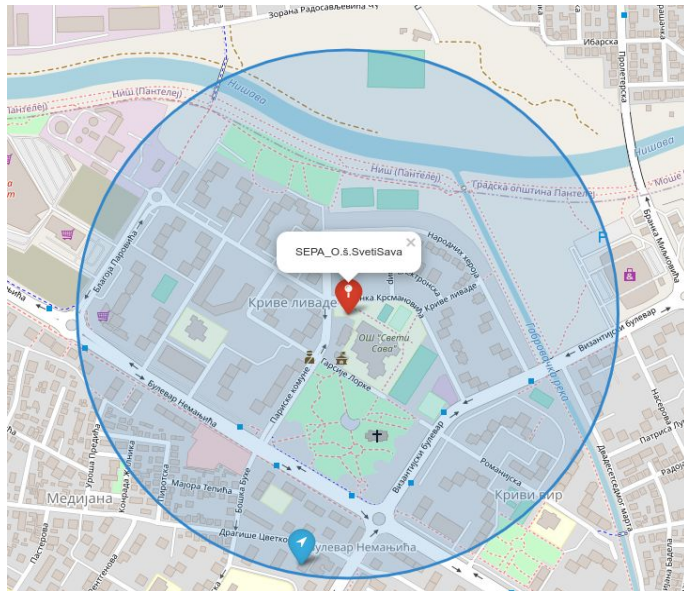


Figure 7: The position of the analysed Klimerko stations in Niš compared to the appropriate SEPA station; blue pin - Klimerko Niš Dragiše Cvetković Post Office; blue circle - distance of 500 m away from the SEPA station

ENCLOSURE - The position of Klimerko stations - NIŠ



Figure 8: The position of the analysed Klimerko stations in Niš compared to the appropriate SEPA station; blue pin - Klimerko Niš Ćele Kula; blue circle - distance of 400 m away from the SEPA station

RESULTS – NIŠ

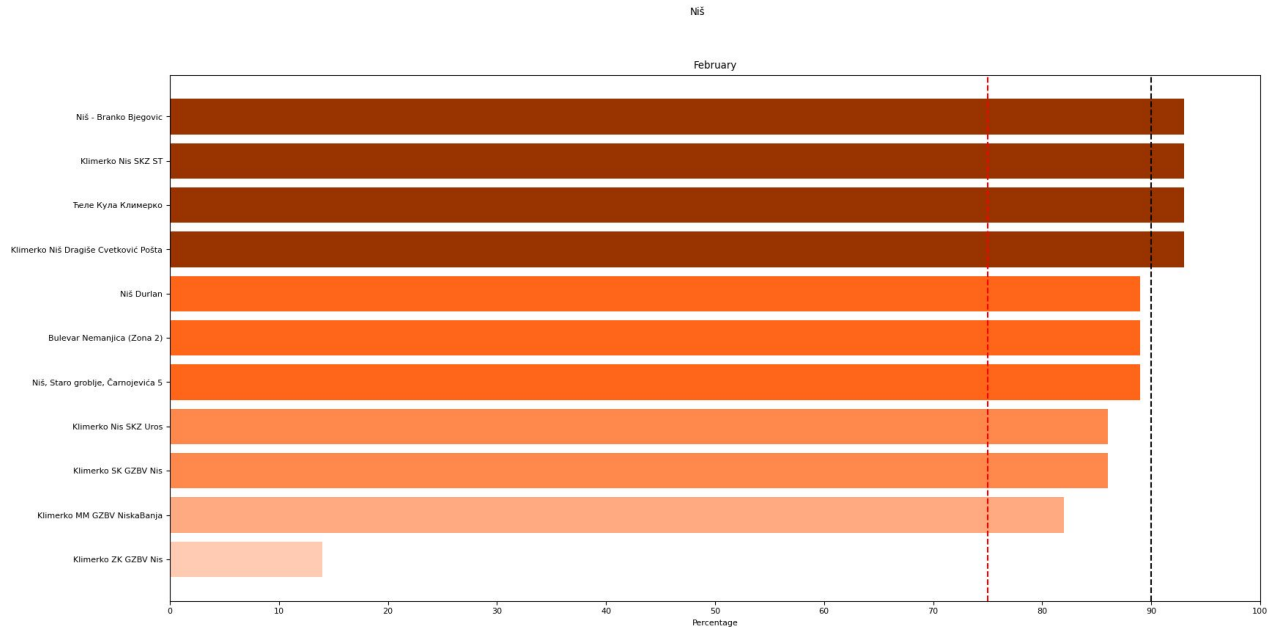


Figure 9: Klimerko stations belonging to Niš and the data availability for February '22 in percentages

RESULTS – Čele Kula Klimerko

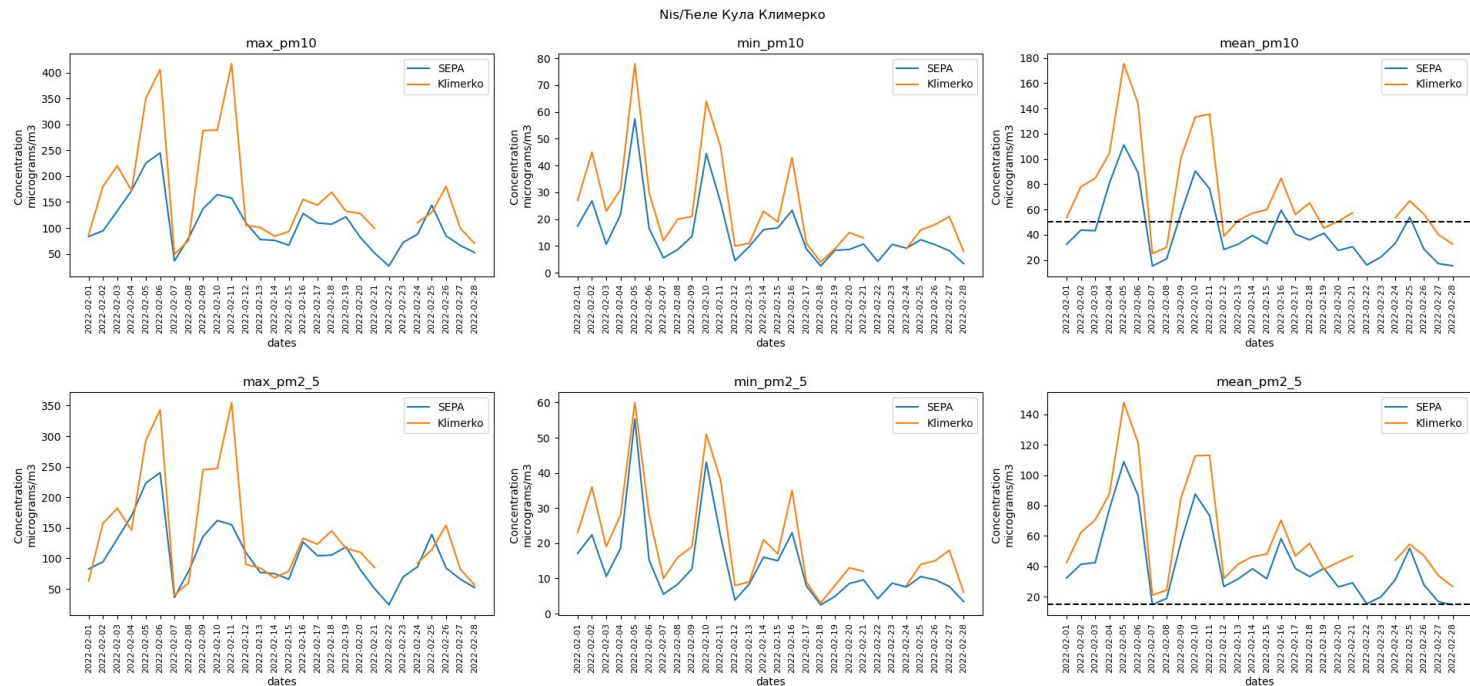


Figure 12: Daily changes in the maximum, minimum and medium concentration of PM10 particles (above) and PM2.5 particles (below) for February. Orange line indicates the appropriate Klimerko station, and the blue one the SEPA station. The black dot line indicates the maximum average allowed value of PM2.5 (15 $\mu\text{g}/\text{m}^3$) and PM10 (50 $\mu\text{g}/\text{m}^3$)

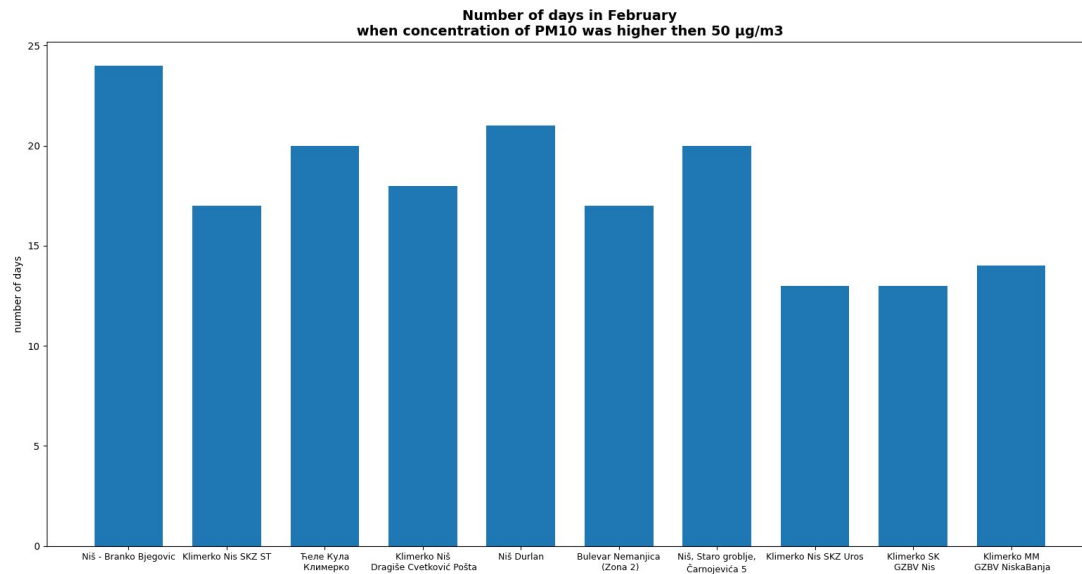


Figure 14: Visual presentation of the valid Klimerko stations in Niš and of the number of days in February when concentration of PM10 particles was higher than 50 µg/m³

REFERENCE

[1]https://www.epa.gov/sites/default/files/2018-01/documents/collocation_instruction_guide.pdf

[2] https://www.sepa.gov.rs/download/izv/Vazduh_2020.pdf

[3]<http://data.sepa.gov.rs/dataset/kvalitet-vazduha>

[4]<https://ads.atmosphere.copernicus.eu/cdsapp#!/dataset/cams-europe-air-quality-forecasts?tab=overview>

[5][https://www.who.int/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-quality-and-health](https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health)

DATA GOOD ENOUGH

Key Indicators

Building a community
36 new Chapter members
Interest from BiH Chapter
Advocacy

New IoT application
New device features

New firmware release
Dec 15, 2021

<https://github.com/DesconBelgrade/Klimerko/releases/tag/2.0.0>

Network Impact

Air to the people 2.0
- Internet society Foundation

Better Air to the people
- AI, Propulsion Foundation
5 TV and Radio interviews
local press

Scholls for better air
- UNICEF Serbia

Citizens for Better Air
Open Society www.bitly/3DSW9c0

Outcome

Over 320 devices in Serbia only
Real time data available Transparency of air quality
data

Huge interest in the SEE region
Project visibility in media

Network is growing:
320 stations have been installed by the citizens
since 2019

In Croatia, mozemo.zrak.hr have acknowledged our
work and adopted our Open software and made they
version of Klimerko.

In Republika Srpska 2 devices but many more coming
online

Join us @DescOn 7.0: Belgrade, May 28, 29th, 2022

Belgrade

DESCON 7.0

