



AIR QUALITY MONITORING AND INFORMING IN FEDERATION OF BIH

Enis Omercic, Expert Advisor, Federal Hydro meteorological Institute of Bosnia and Herzegovina

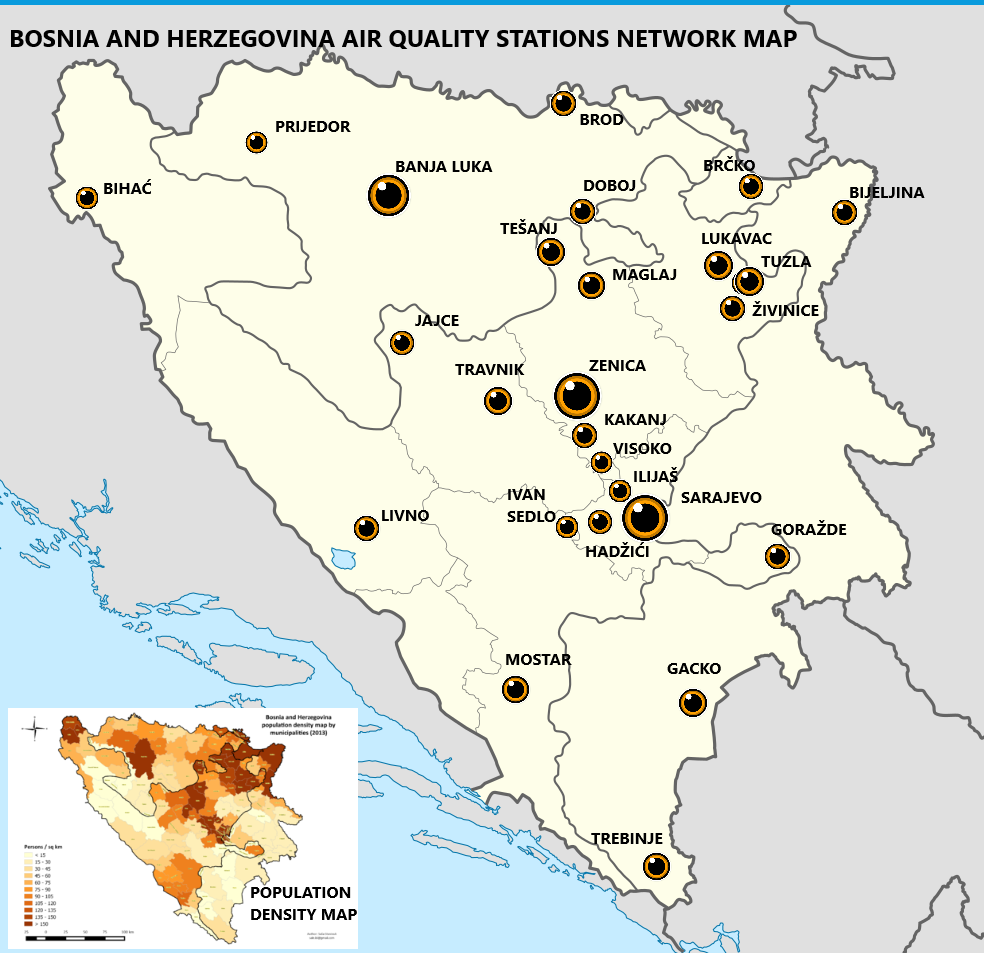
Petrovac, Montenegro, April 2023.

BACKGROUND



- ❖ Cities in Bosnia and Herzegovina are among most polluted cities in Europe.
- ❖ It is an old problem – result of unfavorable geographical, infrastructural and socio-economical conditions.
- ❖ Most of population live in valleys, temperature inversion occurring during the cold part of the year, industrial and heating systems are coal and wood base.
- ❖ Monitoring and informing on AQ in real-time exist and are still advancing.
- ❖ Hydro Met offices in country use weather prediction models on larger resolution than its needed for adequate AQ prediction.
- ❖ AQ modeling is non-existing.
- ❖ Neither national nor lower levels of governance do not calculate impact of future emission sources in spatial planning or permit issuing. There is need for more precise prediction of AQ and calculation of impact of planned future objects (emission sources or other buildings) on AQ.
- ❖ Short and long terms plans for AQ improvement and countermeasures are undeveloped and incomplete.

OVERVIEW OF THE AQ MONITORING NETWORK IN BOSNIA AND HERZEGOVINA



- ❖ First measurements since 1954 in Zenica
- ❖ More than 40 stations in 1980's
- ❖ Stopping and degradation in 1990's
- ❖ Today, Hidrometeorological Institutes in BiH run the largest networks in country.
- ❖ Both are assigned to provide official information on state of air quality.
- ❖ Some local networks and operators (municipalities, cantons, industries) run their own AQ stations or station networks
- ❖ Applied methods and equipment are similar to those used in EU countries
- ❖ NGOs using low cost sensors (mostly for PM monitoring)
- ❖ Commonly measured pollutants are:
 - ❖ PM₁₀/PM_{2.5}, O₃, SO₂, CO, NO_x, H₂S
 - ❖ Other pollutants (BaP, benzene, PAHs, VOCs, metals) are not measured regularly or not measured at all

DATA COLLECTING ISSUES

- ❖ Data from 25 automatic AQ stations are directly transferred to computer in FHMI
- ❖ 6 stations are still not connected (5 local and one international)
- ❖ IT issues are constant problem (lack of staff, equipment, and finance, no possibilities to outsource)
- ❖ Currently, we are using two systems – older one (HORIBA_IDA ZRW) for everyday use and RAVEN system for EEA reporting. RAVEN should soon become main data collecting and dissemination system – some works are still ongoing for connecting 5 more stations from Tuzla Canton network, and should provide new visual data presentation – website.
- ❖ Employment of one person with IT or similar background which should work in AQ Division is ongoing.
- ❖ RAVEN data collecting system is more reliable than existing one but demands more operational time for underemployed AQ division.

QA/QC – MAINTENANCE, CALIBRATIONS, QUALITY CHECKS

- ❖ Automatically transferred data to web sites („near-real-time data“ or hourly data) are uncontroled and unvalidated.
- ❖ Daily reports passing first level validation.
- ❖ Quality assurance procedures are adopted but just partly implemented
- ❖ Poor financing and lack of staff is common problem to all operators which affect quality of monitoring and data. In general, quality is gradually getting better – higher percentage of valid data in recent years.
- ❖ Data collecting system provide most of technical information on state measuring equipment.
- ❖ Operators mostly provides informations (on request) on service activities and calibrations, which helps to get clearer view on data due validation.
- ❖ Validation and data checks are constant day-to-day work during the year. At the end of the year second data control is done in combination with logical controls, technical information, interstation comparisons and consultations with local operators. These are verified data.



DATA PUBLISHING

- ❖ Real-time data (1 hour values) are presented on FHMI website (uncontrolled and invalidated) both in measured values and as a Air Quality Index. Independent and NGO sites use these data, often without source credits. Directly are transferred to EEA (using RAVEN)
- ❖ Daily reports are presented on web site and Facebook page, often with written information on state of AQ for day before, recent day and with forecast for next days. First control of data passed.
- ❖ New web site visualisation is in preparation
- ❖ Mobile app is off (in reconstruction after server provider change)

BOSNA I HERCEGOVINA
FEDERACIJA BOSNE I HERCEGOVINE
Federalni hidrometeorološki zavod
Sarajevo

BOSNIA AND HERZEGOVINA
FEDERATION OF BOSNIA AND HERZEGOVINA
Federal Hydrometeorological Institute
Sarajevo

Sektor životne sredine
Odsjek za kvalitet zraka

Dnevni izvještaj o stanju kvaliteta zraka u Federaciji BiH za 02/03.03.2023. godine

Tokom jučerašnjeg dana kvalitet zraka je bio ozbiljno narušen na većem broju mjernih mjesta u Federaciji BiH, a slično je stanje i jutros. Nezdrav zrak je prisutan u dolini rijeke Bosne, Sarajevu, Tuzli i njenoj okolini.

Najlošije stanje jučer je bilo u Visokom, Kaknju i dijelovima Zenice gdje su istovremeno bile visoke koncentracije lebdećih čestica (PM10/PM2.5) i sumpor-dioksida. Visok koncentracij lebdećih čestica su uzrok lošeg kvaliteta zraka i u Iliašu, Sarajevu, Maglaju i Tešnju. Na ostalim mjernim mjestima zrak je bio znatno umjerenije zagađen. U Maglaju, Iliaži i Visokom koncentracije sumpor-dioksida (H2S) su bile iznad propisane granične vrijednosti, ali ispod nivoa koji ima negativne efekte na zdravlje ljudi.

Jutros je stanje dosta slično jučerašnjem i takvo će se zadržati u ostatku dana. Ne očekuje se daljnji značajniji porast koncentracija niti dnošenje nivoa zagađenja kakvo je karakteristično za januar ili decembar, ali svakako važe iste preporuke za zaštitu zdravlja građana.

I u subotu će zrak biti zagađen u centralnim i sjevernim dijelovima zemlje, ali se može očekivati postepeno poboljšanje stanja sa izmjenom meteoroloških uslova. U nedjelju i na početku iduće sedmice kvalitet zraka bi trebao biti znatno bolji nego je to slučaj trenutno.

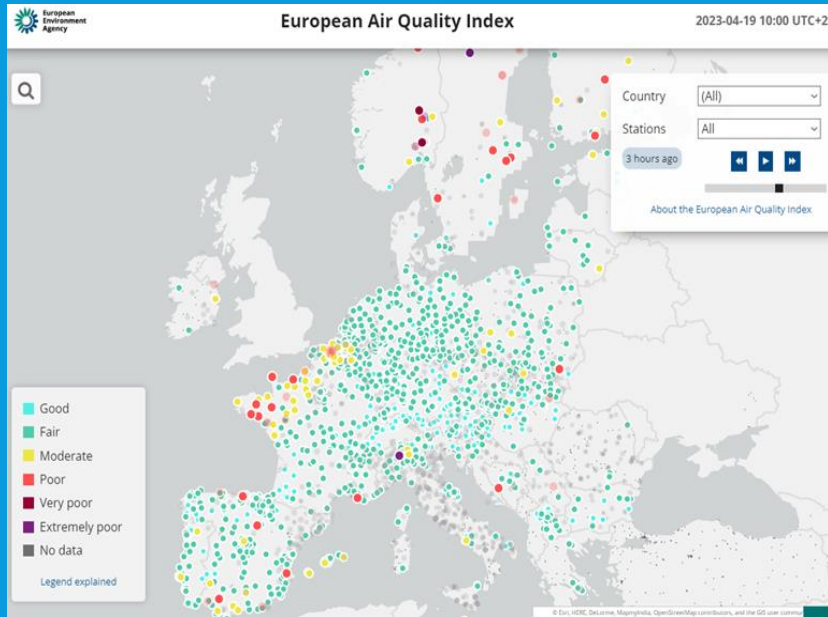
O efektima na zdravlje i savjetima za ponašanje možete pročitati ovdje:
<https://zrakubih.ba/bst/tekst/index-kvaliteta-zraka/>
<http://www.fhmzbih.gov.ba/latinnica/ZRAK/AQI-efekti.php>

Srednje dnevne koncentracije praćenih materija i eventualna prekoćeranja propisanih graničnih vrijednosti su prikazane u tabeli.

| BOSNA I HERCEGOVINA FEDERACIJA BOSNE I HERCEGOVINE Federalni hidrometeorološki zavod Sarajevo | | BOSNIA AND HERZEGOVINA FEDERATION OF BOSNIA AND HERZEGOVINA Federal Hydrometeorological Institute Sarajevo | | | | | |
|--|------|---|-----------------|-----------------|----------------|------|------------------|
| Srednje dnevne koncentracije zagađujućih materija u FBiH (µg/m ³) | | 02.03.2023. | | | | | |
| Datum | PM10 | PM2.5 | SO ₂ | NO ₂ | O ₃ | CO | H ₂ S |
| Stаница | 102 | 97 | 69 | 51 | 13 | 200 | |
| Sarajevo Bjelevo | 46 | | 38 | 51 | | 1400 | |
| Sarajevo Vijećnica | 99 | | 47 | 49 | 8 | | 20 |
| Sarajevo Ilidža | 83 | 79 | 45 | 49 | | | |
| Sarajevo Ambasada SAD | 93 | 87 | 39 | 35 | | | |
| Sarajevo Vogošća | 14 | | 14 | 1 | 36 | | |
| Ivan Sedlo | | | | | | | |
| Medići | | | | | | | |
| Ilidža Centar | 133 | | 60 | 34 | | | |
| Visoko Centar | 141 | | 235 | 22 | 21 | | 21 |
| Kakanj Doboj | 83 | | 118 | 22 | 13 | 900 | |
| Kakanj Centar | 94 | | 182 | 26 | | | |
| Zenica Centar | 72 | | 128 | 27 | 15 | 1300 | |
| Zenica Radnikovo | 69 | | 45 | 34 | 9 | | |
| Zenica Tetova | 79 | 70 | 87 | 54 | 2 | | |
| Zenica Brist | 79 | | 55 | 16 | 10 | | |
| Zenica Vranluk | | | 42 | | 7 | | |
| Maglaj Centar | 82 | | 116 | | | | 13 |
| Tešanj Vatrogasilni dom | 31 | 30 | 77 | 26 | 8 | | |
| Travnik Centar | 48 | | 21 | 17 | 21 | | |
| Jašće Harmani | 26 | 24 | | | | | |
| Goražde Rasadnik | 45 | 44 | | 25 | 25 | 1600 | |
| Bilhać Nova Cetvrt | 20 | 13 | 12 | 7 | 45 | 400 | |
| Livno Centar | | | | | | | |
| Mostar Bijeli Brijeg | | | | | | | |
| Tuzla Trnovoć | | | | | | | |
| Tuzla Škver | | | 97 | 39 | | 1900 | |
| Tuzla BKC | 61 | | 87 | 33 | | 1800 | |
| Tuzla Bukinje | | | 37 | 35 | 8 | 1300 | |
| Zvornik Centar | | | | | | | |
| Lukavac Centar | | | 18 | 31 | 10 | 1400 | |

Nedovoljno podataka, prekid u komunikaciji ili se ne mjeri
Koncentracije ispod graničnih vrijednosti
Prekoćerana granična vrijednost

* Dnevna granična vrijednost za PM2.5 nije definirana zakonom, dok za PM10 ona iznosi 50 µg/m³. Zato, koncentracija PM2.5 od 50 µg/m³ automatski znači da je prekoračena GV za PM10.
* Prekoraćene granične vrijednosti za ozon se podrazumijeva kao 8-satni prosjek koncentracije veće od 120 µg/m³ unutar jednog dana
* Dnevna granična vrijednost za sumpor-dioksid (H2S) iznosi 5 µg/m³ zbog niskog praga čulne osjetljivosti. Koncentracije koje mogu naškoditi ljudskom zdravlju iznose oko 150 µg/m³ u jednom satu.



AUTOMATSKE MJERNE STANICE

20.4.2023. u 13^h

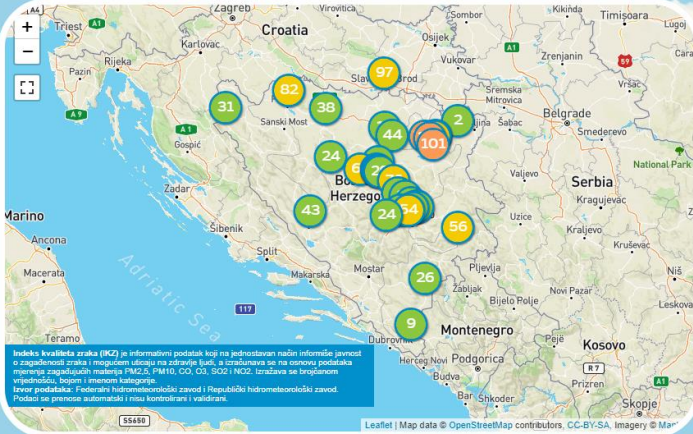
početna kvaliteta zraka

| INDEKS KVALITETA ZRAKA | | | | | | | | | | | | | | | | | | | | | |
|--|----------------|-----------------|-----------------|----|----------------|------------------|-------------------|----|--|--------|--------|---------|----------|-------------|-----------|---------|-----------|---------------------|-----------|--------|-----------|
| INDEKS KVALITETA ZRAKA 20.4.2023. - 13 ^h | | | | | | | | | | | | | | | | | | | | | |
| LOKACIJA | AQI | SO ₂ | NO ₂ | CO | O ₃ | PM ₁₀ | PM _{2.5} | | | | | | | | | | | | | | |
| SARAJEVO | Ambasada SAD | 36 | 1 | 4 | | 19 | 39 | | | | | | | | | | | | | | |
| | Vogošća | 36 | 1 | 4 | | 19 | 39 | | | | | | | | | | | | | | |
| | Bjelave | 41 | 9 | 10 | 3 | 15 | 16 | 41 | | | | | | | | | | | | | |
| | IvanSedlo | 26 | 1 | 0 | | 26 | 16 | | | | | | | | | | | | | | |
| | Viješnica | 13 | 1 | 11 | 4 | | 13 | | | | | | | | | | | | | | |
| | Ilidža | 36 | 4 | 11 | 4 | | 13 | 36 | | | | | | | | | | | | | |
| ILUAŠ | Hadžići | 53 | 3 | 5 | | 21 | 53 | | | | | | | | | | | | | | |
| | Ilijaš | 36 | 3 | 2 | | 36 | | | | | | | | | | | | | | | |
| | Centar | 33 | 9 | 2 | | 20 | 33 | | | | | | | | | | | | | | |
| VISOKO | Doboj | 76 | 76 | 4 | | 19 | | | | | | | | | | | | | | | |
| | Centar | 36 | 30 | 5 | | 38 | | | | | | | | | | | | | | | |
| | Brist | 26 | 11 | * | * | 18 | 26 | | | | | | | | | | | | | | |
| ZENICA | Tetovo | 60 | 29 | 12 | 1 | 17 | 40 | 60 | | | | | | | | | | | | | |
| | Centar | 36 | 21 | 5 | 4 | 35 | | | | | | | | | | | | | | | |
| | Radakovo | 33 | 10 | 3 | 2 | 33 | | | | | | | | | | | | | | | |
| | Vranduk | 12 | * | * | * | 12 | * | | | | | | | | | | | | | | |
| MAGLJ | Maglaj | 43 | 43 | | | 26 | | | | | | | | | | | | | | | |
| | Vatrogasni dom | 21 | 15 | 3 | | 12 | 21 | | | | | | | | | | | | | | |
| TRAVNIK | Centar | 52 | 19 | 2 | 5 | 11 | 23 | 52 | | | | | | | | | | | | | |
| | JAJCE | 22 | 8 | 1 | | 19 | 22 | | | | | | | | | | | | | | |
| GORAŽDE | Rasadnik | 53 | 6 | * | * | 25 | 53 | | | | | | | | | | | | | | |
| | Novi četvrt | 34 | 1 | 0 | 0 | 35 | * | | | | | | | | | | | | | | |
| LIVNO | Centar | 46 | 3 | 2 | 3 | 45 | 17 | 41 | | | | | | | | | | | | | |
| | Bijeli Brijeg | 26 | 4 | 2 | 1 | 27 | 14 | 29 | | | | | | | | | | | | | |
| TUZLA | Trnovac | 36 | | | | 28 | | | | | | | | | | | | | | | |
| | Skver | 70 | 70 | 19 | 12 | 9 | | | | | | | | | | | | | | | |
| | Bukinje | 139 | 139 | 30 | 6 | 7 | | | | | | | | | | | | | | | |
| LUKAVAC | BKC | 95 | 95 | 18 | 15 | * | | | | | | | | | | | | | | | |
| | Centar | 104 | 104 | 20 | 13 | 3 | | | | | | | | | | | | | | | |
| ŽIVINICE | Centar | 21 | 21 | 11 | * | 7 | | | | | | | | | | | | | | | |
| | nema mjerenja | | | | | | | | | | | | | | | | | | | | |
| <table border="1"> <tr> <td>ocjena</td> <td>0 - 50</td> <td>umjeren</td> <td>51 - 100</td> </tr> <tr> <td>za zdravlje</td> <td>101 - 150</td> <td>nezdrav</td> <td>151 - 200</td> </tr> <tr> <td>za osjetljive grupe</td> <td>201 - 300</td> <td>opasan</td> <td>301 - 500</td> </tr> </table> | | | | | | | | | | ocjena | 0 - 50 | umjeren | 51 - 100 | za zdravlje | 101 - 150 | nezdrav | 151 - 200 | za osjetljive grupe | 201 - 300 | opasan | 301 - 500 |
| ocjena | 0 - 50 | umjeren | 51 - 100 | | | | | | | | | | | | | | | | | | |
| za zdravlje | 101 - 150 | nezdrav | 151 - 200 | | | | | | | | | | | | | | | | | | |
| za osjetljive grupe | 201 - 300 | opasan | 301 - 500 | | | | | | | | | | | | | | | | | | |

Podaci se automatski objavljuju sa mjernih mjesta i nisu kontrolirani i validirani

KVALITET ZRAKA

- Saopćenje za javnost
- Index i satne vrijednosti
- Prosječne dnevne vrijednosti
- Mogući efekti na zdravlje
- Metodologija izrade indeksa kvaliteta zraka
- Zakonska regulativa
- Izveštaji



Indeks kvaliteta zraka (IKZ) je informativni podatak koji na jednostavan način informiše javnost o zagađenosti zraka i mogućem uticaju na zdravlje ljudi, a izračunava se na osnovu podataka iz mernih stajanja kvaliteta zraka (PM₁₀, CO, CO₂, NO₂, NO, O₃, SO₂). Izražava se brojevnim vrijednošću, bojom i imenom kategorije. Izvor podataka: Federalni hidrometeorološki zavod i Republički hidrometeorološki zavod. Podaci se prenose automatski i nisu kontrolirani i validirani.

Leaflet | Map data © OpenStreetMap contributors, CC-BY-SA, Imagery © Mapbox



Kvalitet zraka i rezultati istraživanja u BiH
Zagađenje zraka nije sezonski problem, potrebne mjere
01.11.2022.
Švedska finalizira rezultate raspodjele izvora zagađenja

Pružite besplatnu aplikaciju sa informacijama o kvalitetu zraka



Pratite nas na društvenim mrežama

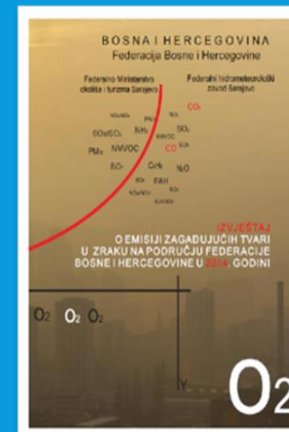


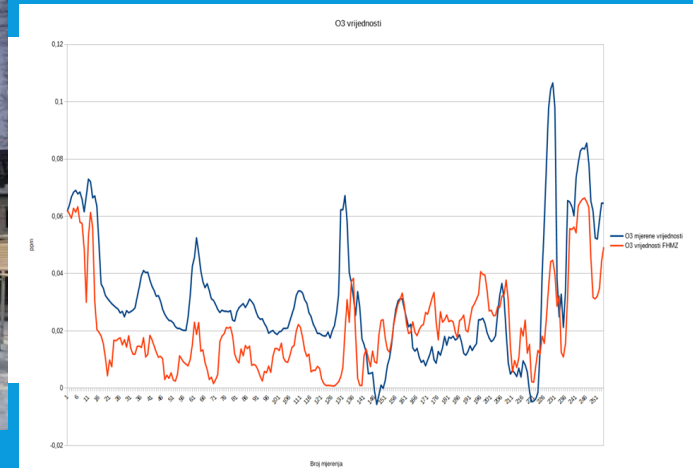
Kontaktirajte nas



DATA REQUESTS AND SHARING

- ❖ Low number of web site visits – poor design, people do not trust institutions, we do not provide sensationalistic informations and titles.
- ❖ Relatively good cooperation with media. Hostings on TV, radio, other media whenever we can (during winter these requests are more often). Media often do not recognize us as a prime data provider.
- ❖ Lot of data requests by e-mail from citizens, researchers, students, media (gradually growing number)
- ❖ School visits are common in spring and autumn.
- ❖ For now, only reports are downloadable from FHMI web site. We plan to move more data for public use on web site in future





IQAir Air Quality Community Air Purifiers Face Masks For Business News Support

IQAir Earth
3D animated air pollution map

How to best protect from air pollution?

Reduce your air pollution exposure in US Embassy in Sarajevo, Sarajevo

Face mask

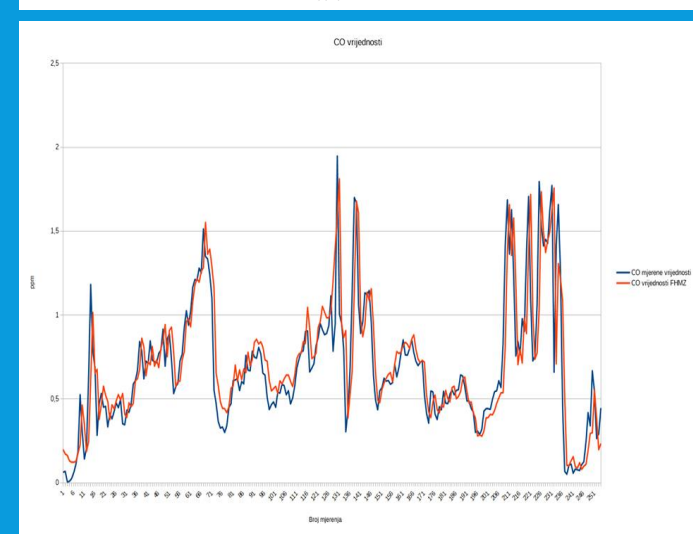
Air purifier

Air quality monitors

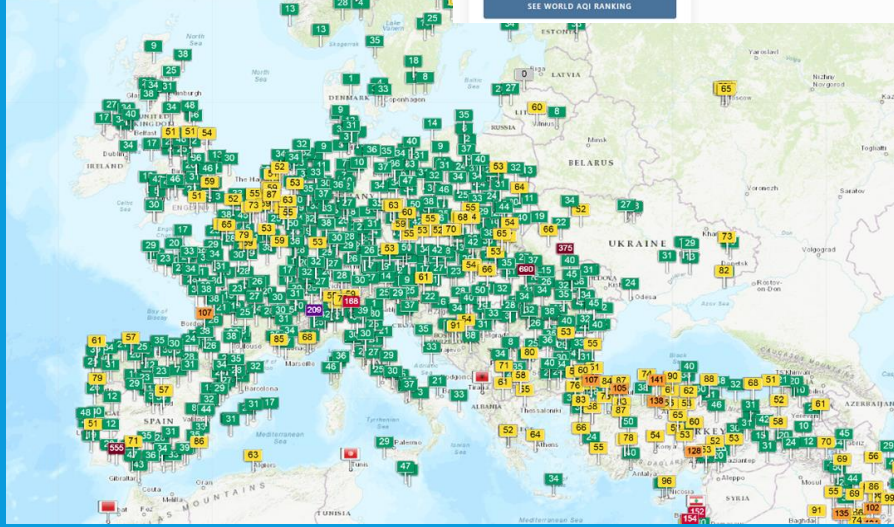
| # | STATION | US AQI |
|---|------------------------|--------|
| 1 | Kurtehačica | 91 |
| 2 | US Embassy in Sarajevo | 76 |
| 3 | Sarajevo - Otočka | 65 |
| 4 | Sarajevo - Bjelave | 61 |
| 5 | Sarajevo - Ilidža | 61 |
| 6 | Đorđići | 59 |
| 7 | Mustafe Bušulađica II | 54 |
| 8 | Sarajevo - Vijećnica | 33 |

07:00, Apr 19 (local time)

[SEE WORLD AQI RANKING](#)



World's Air Pollution: Real-time Air Quality Index



THANK YOU FOR YOUR ATTENTION!