



CLIMATE DETECTIVES 2020 – 2021

RURAL VS URBAN AIR QUALITY

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RESEARCH QUESTION

How healthy is the air we breathe in Aljarafe (Seville)?

SUMMARY OF PROJECT

According to the World Health Organization (WHO), air pollution represents a significant environmental risk to health. Lower pollution levels are related with better cardiovascular and respiratory health of the population in long and short term. Industrial activity and engine combustion are the main sources of polluting emissions from the outside air. These activities are often concentrated in large population centers. In this project we compare how population density affects air quality in our closest environment, comparing the data collected by the stations of the Air Quality Measurement Networks in Spain (Ministry of Ecological Transition).

We will focus on two representative standard parameters of air quality:

- Nitrogen dioxide (NO₂): epidemiological studies have revealed that prolonged exposure to NO₂ is associated with increased symptoms of bronchitis or decreased development of lung capacity in children. WHO guidelines set an annual average value of 40 micrograms per cubic meter of NO₂ to protect the population from its harmful effects.
- Particles (PM₁₀): prolonged exposure to air suspended particles (less than 10 microns in size) has adverse health effects in urban populations. The WHO Air Quality Guide (GCA) establishes an annual average of 20 micrograms per cubic meter of PM₁₀ and the gradual reduction of concentrations is promoted.

We have compared daily maximum concentrations of these parameters in three stations located in urban areas (Seville), semi-urban areas (Aljarafe) and rural areas (San Nicolás del Puerto) respectively. Images from Copernicus Sentinel 5P satellite of the European Space

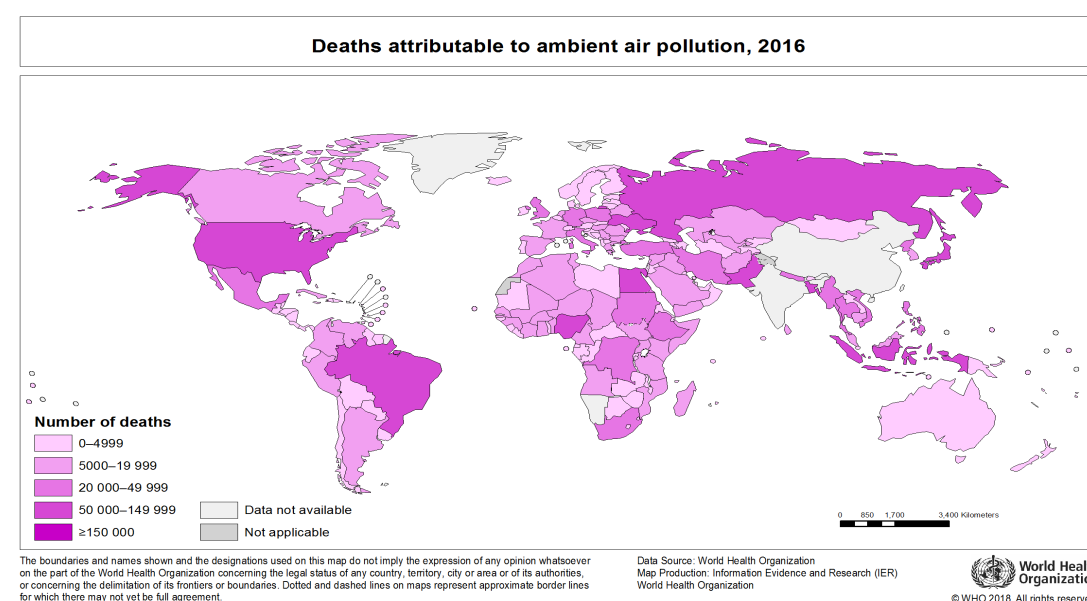


Figure 1: Death attributable to ambient air pollution in 2016

MAIN RESULTS

Analyzing air quality data we conclude that:

Mairena del Aljarafe has the highest percentage of days with "good" air quality (43.8%), compared to Seville (38.8%) and San Nicolás del Puerto (20.3%).

The percentage of "bad" or "very bad" air quality days is lower in Mairena del Aljarafe (2.1%), compared to Seville (6.0% bad + 2.5% very bad) and San Nicolás del Puerto (3.8% bad).

The amount of particles (PM) is lower during periods of confinement (November 23th-December 12th and January 23th-February 13th). Daily maximums of PM are observed (December 19 and January 14) at the Seville station coinciding with the end of the second wave and before the start of the third wave of Covid-19.

NO₂ levels in San Nicolás del Puerto (rural environment) are significantly lower than in Seville (urban) and Mairena del Aljarafe (semi-urban areas).

Images from Copernicus Sentinel 5P satellite of the ESA confirms a higher air pollution (based on NO₂ levels from January 14th) in the metropolitan area of Seville.

NO₂ Sevilla, NO₂ Aljarafe y NO₂ San Nicolas

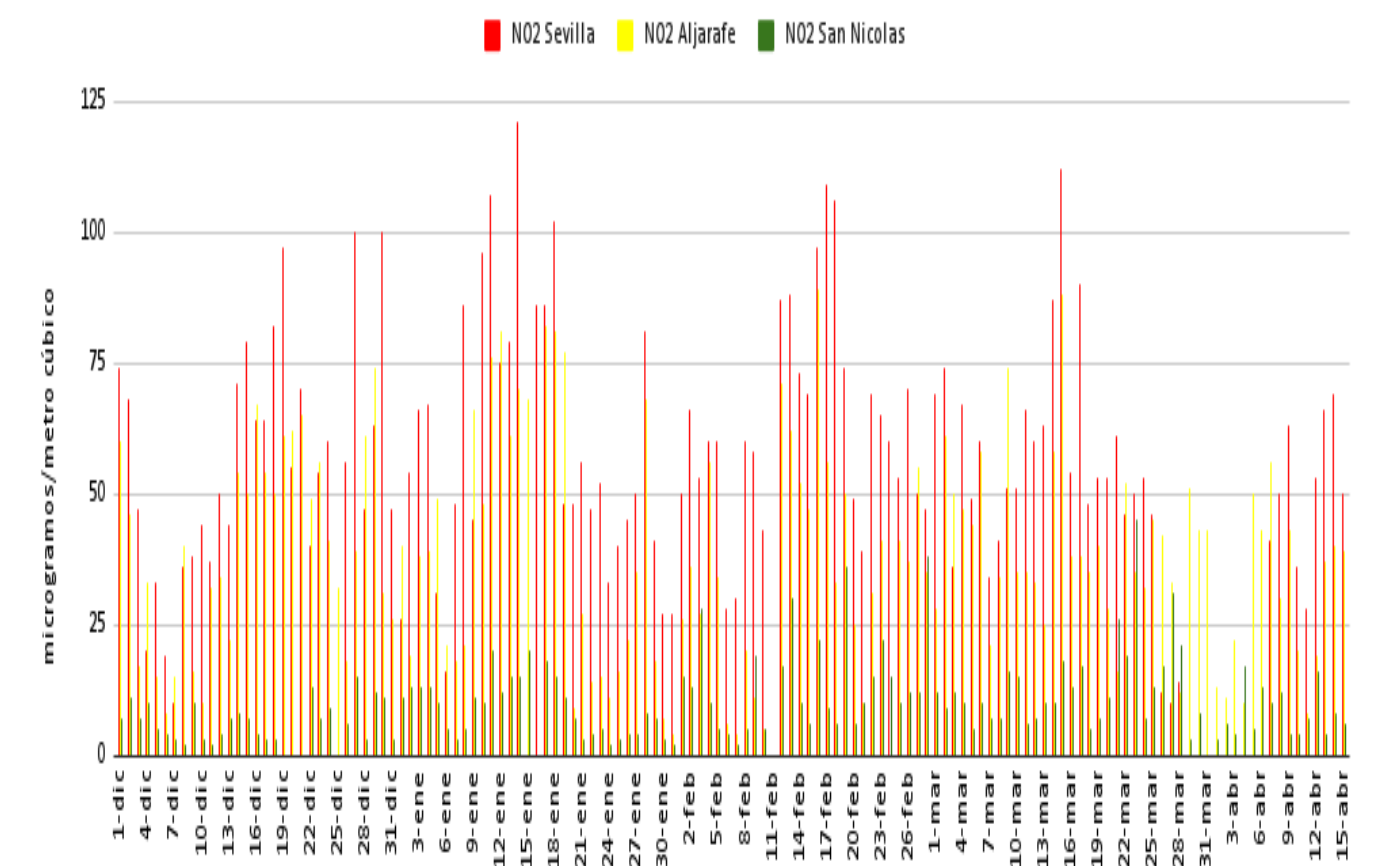


Figure 2: Daily maximums of NO₂ ppm comparison in Seville (Urban area), Mairena del Aljarafe (Semi-urban area) and San Nicolás del Puerto (Rural area)

ACTIONS TO HELP LESSEN TO THE PROBLEM

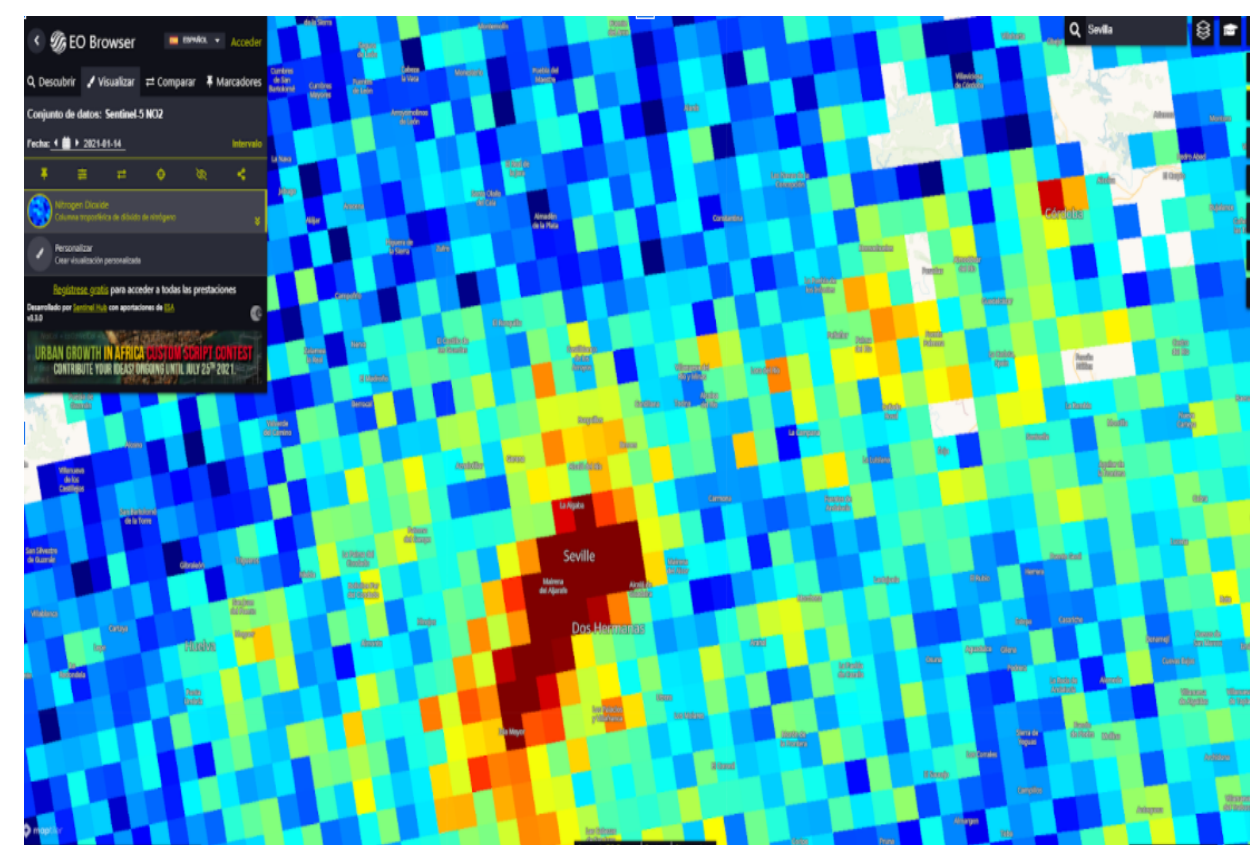


Figure 3: Images from Copernicus Sentinel 5P satellite of the ESA on January 14th. Red spots represent high NO₂ levels around the metropolitan area of

In PMAIR Team we have developed our own website including data and conclusions obtained between the period of December 1, 2020 to April 15, 2021 are published. Our work and results are published and shared with our community.

We have concluded that small actions, such as using public transport, electric vehicles and betting on renewable energies could help to diminish the air pollution in our environment.

An activity is planned to improve the visibility of our project, its conclusions and to help make our colleagues aware of the importance of care for the environment.