

# Know what you breath: understanding and communicating air quality in urban parks

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T. Faria<sup>1\*</sup>, A.C. Sabino<sup>2</sup>, R. Lopes<sup>3</sup>, S.M. Ameida<sup>1</sup>  
<sup>1</sup> Centro de Ciências e Tecnologias Nucleares, Instituto Superior Técnico, Portugal  
<sup>2</sup> Divisão de Energia e Sustentabilidade Ambiental, Câmara Municipal de Loures  
<sup>3</sup> Innovation Point S.A, 4700-727 Braga, Portugal  
 \*tiagofaria@ctn.tecnico.ulisboa.pt

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## Introduction

Within the scope of the PAB\_LivingLab project, a set of activities are being developed in Municipal Park Adão Barata, located in Loures, Portugal, to promote circular economy, energy efficiency, sustainable transports and raise awareness aiming at conducting behavioral change. One of the objectives of this project is to reduce the impact of the air pollution in the health of the citizens, through massive awareness, engineering and technological approaches.



## Methodology

An air quality monitoring system was installed in Park Adão Barata, to generate information that is integrated into an IoT platform and communicated to the park users through information screens. This system uses the Qart Box sensors that are periodically subjected to an intercomparison exercise with reference equipment for quality assurance.

The HYSPLIT (Hybrid Single-Particle Lagrangian Integrated Trajectory) model was used to perform 4-day backward trajectories, ending in Park Adão Barata, Loures that were used to identify the origin of high levels of PM.

## Results

Continuous monitoring, over one year, of air pollutants in the park revealed significant variations in concentration levels throughout the day and week, with peaks of particulate matter (PM).

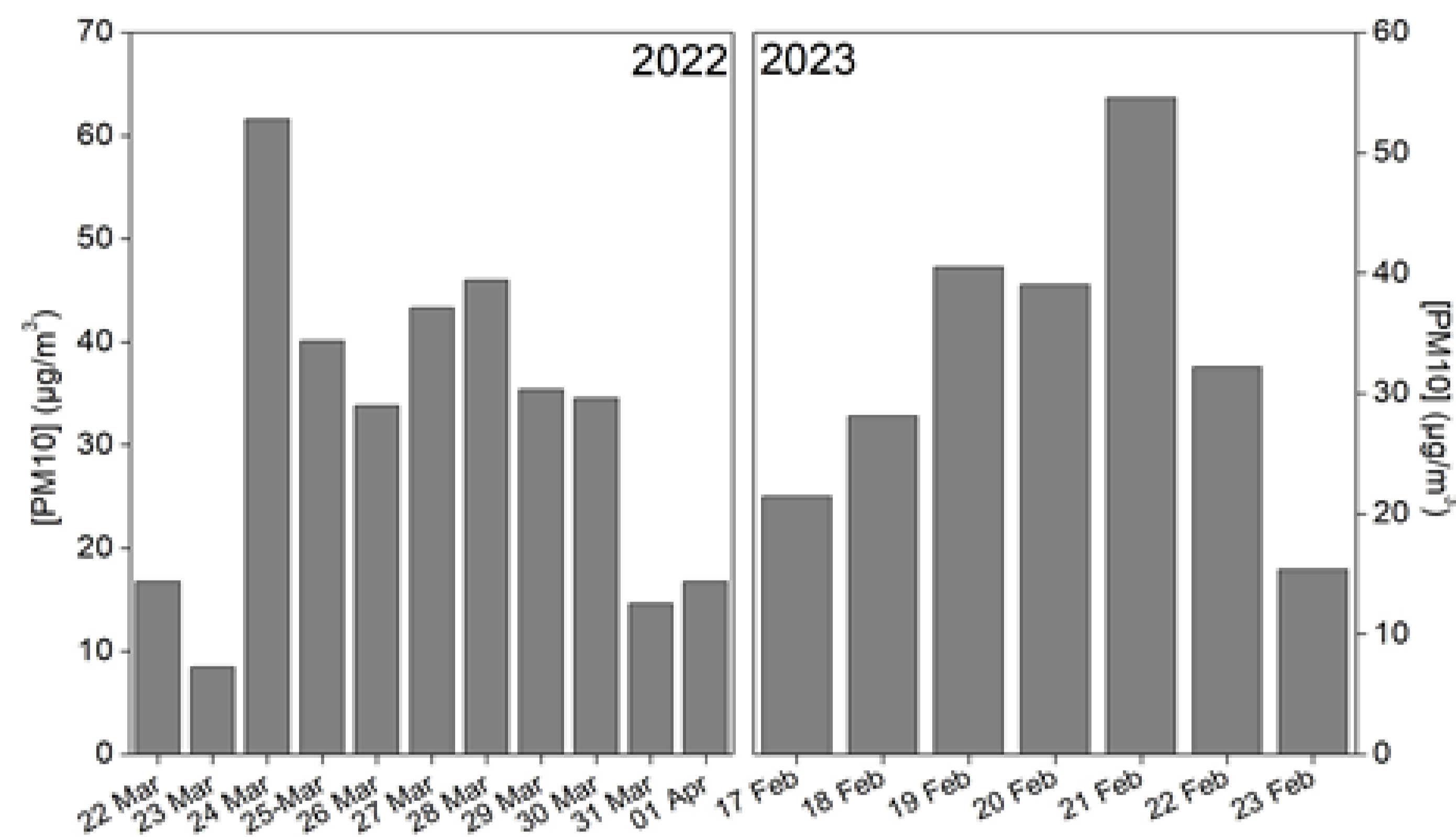


Fig. 1 - PM10 daily average mass concentrations measured in March 2022 and February 2023.

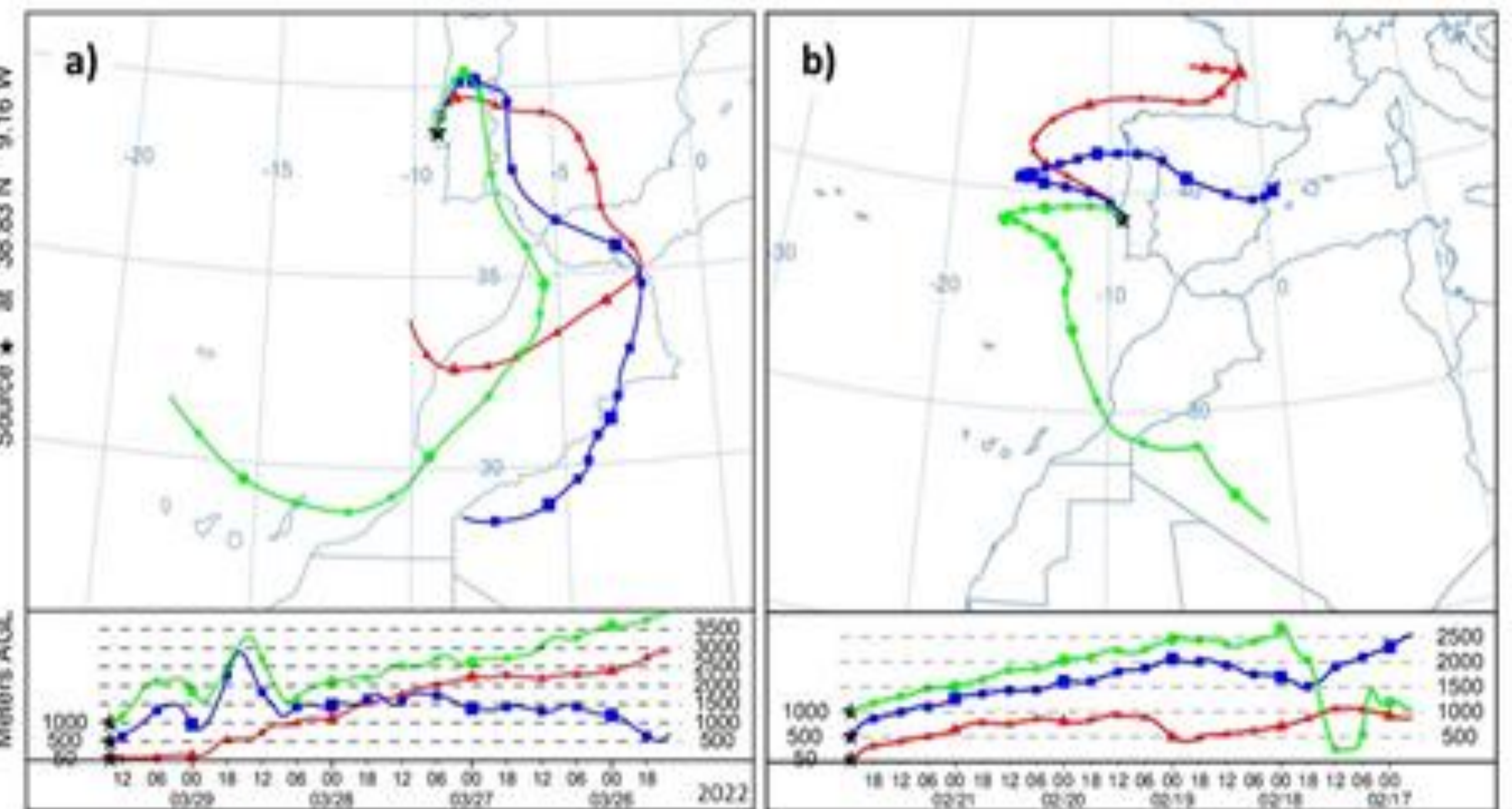


Figure 2 - Hysplit model backward trajectories computed for 29th March 2022 (a) and 21st February 2023 (b).

Several concerning concentration peaks were detected, rendering outdoor sports practice inadvisable. Figure 1 indicates a significant increase in PM concentrations between March 24th and 30th, 2022 and between February 19th and 22nd, 2023. During these periods, daily concentrations of PM10 ranged between 32 and 62  $\mu\text{g}/\text{m}^3$ , with maximum hourly concentrations of 235  $\mu\text{g}/\text{m}^3$  and 180  $\mu\text{g}/\text{m}^3$ , respectively. Results from the HYSPLIT model showed that the days with the highest concentrations were affected by air mass transport from the Sahara desert.

## Conclusion

The findings emphasize the critical importance of ensuring access to air quality information to enhance public awareness of environmental issues and promote effective changes in behaviour, which are essential for minimizing exposure to harmful air pollutants. In this context, IoT solutions represent a valuable opportunity to provide citizens with direct and affordable access to such information.

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