



# Spatial-temporal variation of air quality in León (Spain)

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## INTRODUCTION

According to WHO data, most of world population breathe air whose levels exceed the limits recommended, harming human health. PM10 concentrations exceeding  $20 \mu\text{g}/\text{m}^3$  increase between 23 % - 46 % the number of respiratory diseases (Aldunate et al., 2006).

In Spain, 40% - 70% of air quality monitoring stations, located in areas with high road traffic, exceed the annual and daily limit values for suspended particles since 2005 (Querol, 2008).

The main objective of this work is to analyze the impact of the spatial and temporal distribution of the atmospheric pollutants, mainly PM10, for 1 year (from March 2016 to March 2017), in the city of León.

The traffic station (LEON1):  
NO, NO<sub>2</sub>, O<sub>3</sub>, SO<sub>2</sub> and PM10



The background station (LEON4):  
CO, NO, NO<sub>2</sub>, SO<sub>2</sub>, PM10 and PM2.5

The suburban station: PM10



Figure 1 - Air quality stations and measured parameters

## MATERIAL AND METHODS

This study comprises data from 3 air quality stations (Fig. 1):

- Traffic (LEON1)
- Background (LEON4)
- Suburban

Two of them (traffic and background), belong to the Air quality control network from Junta de Castilla y León. The traffic station is placed at the west part of León (1.5 km far from the city centre), and the background station is 2.5 km far from the city centre, in the south of León. The suburban station is located in the north-east, in the Faculty of Veterinary Medicine of the University of León (2 km far from the city center).

## RESULTS

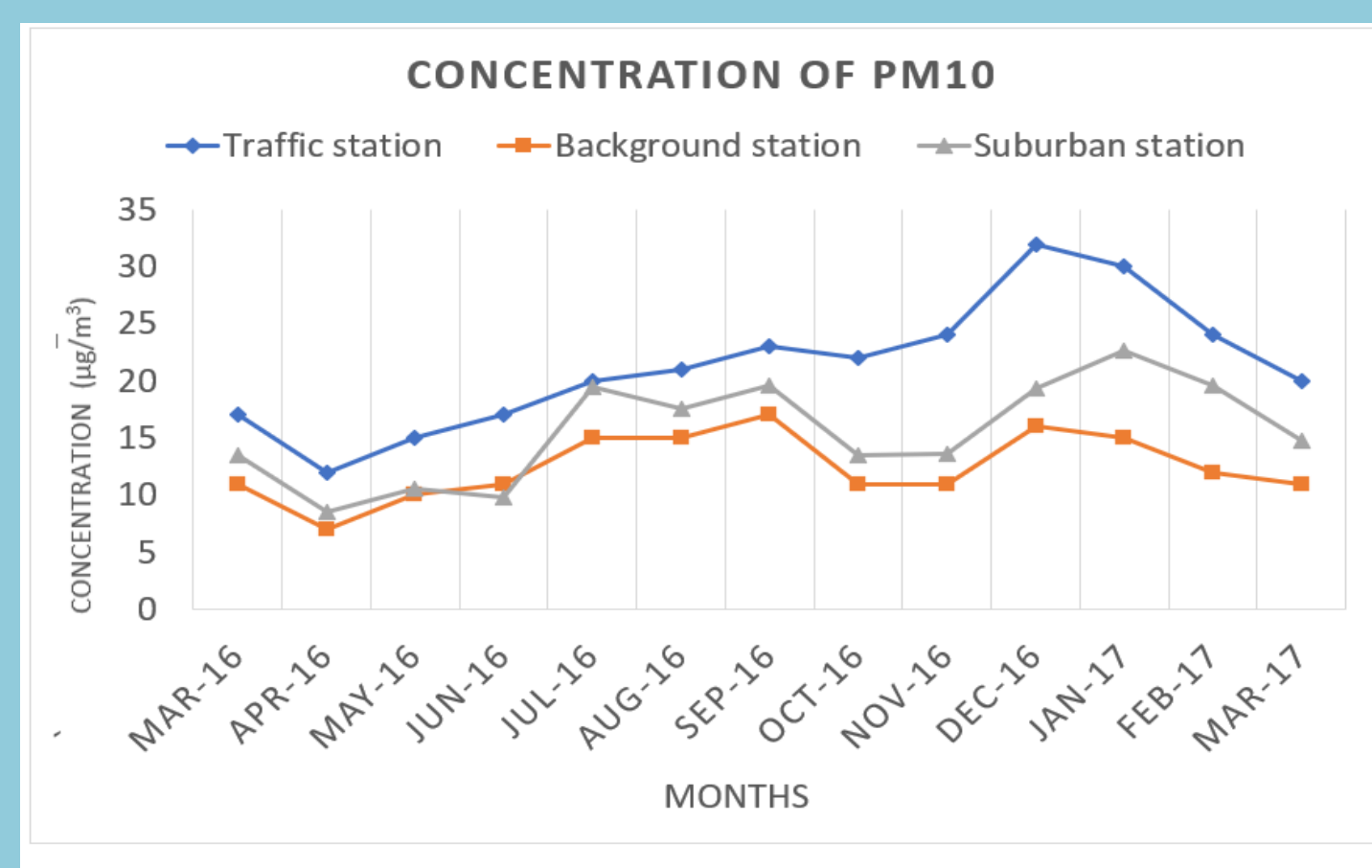


Figure 2 - Monthly PM10 concentrations registered in the three air quality stations from March 2016 to March 2017

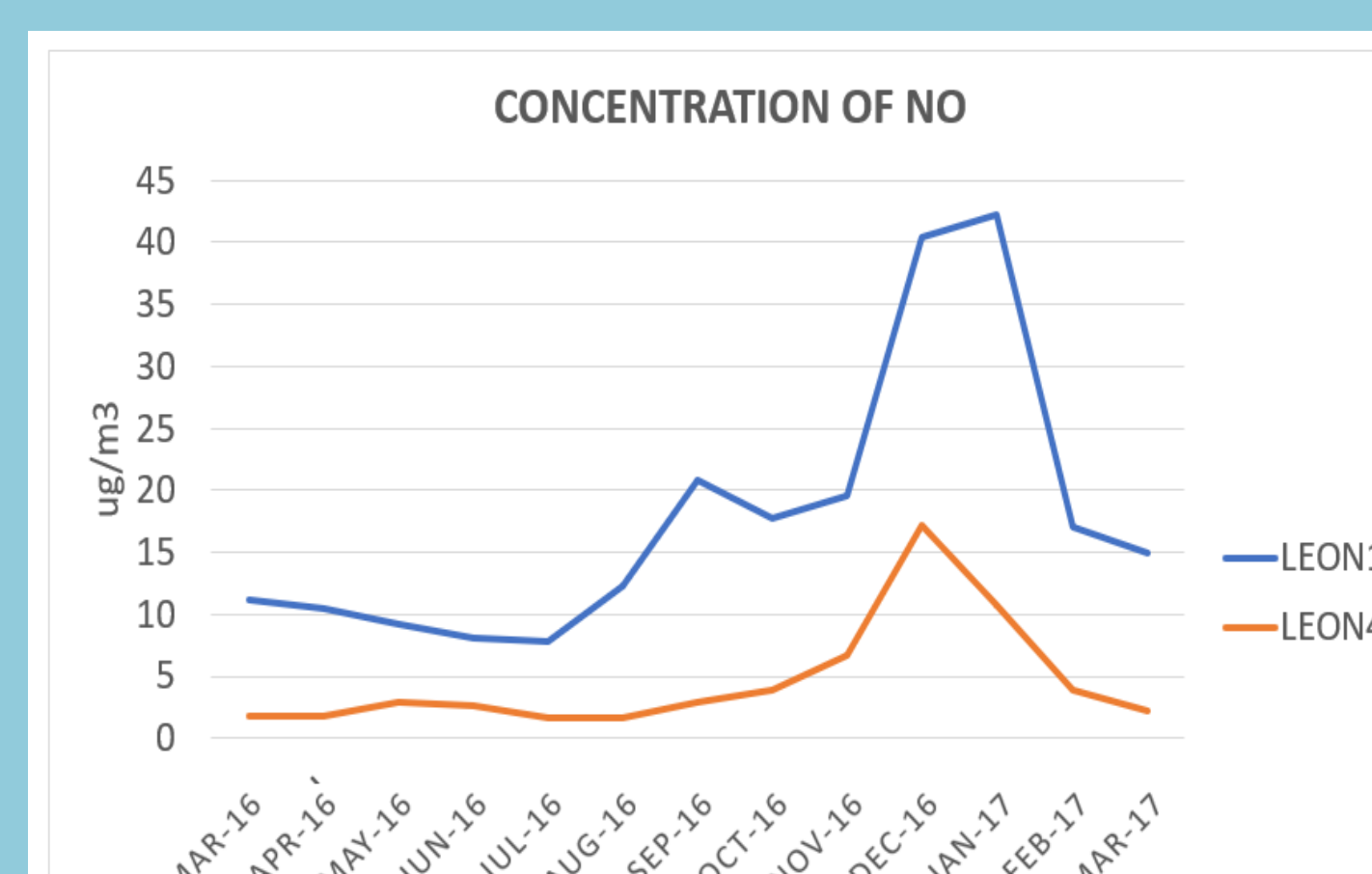


Figure 3 - Monthly NO<sub>2</sub> and NO concentrations registered in the three air quality stations from March 2016 to March 2017

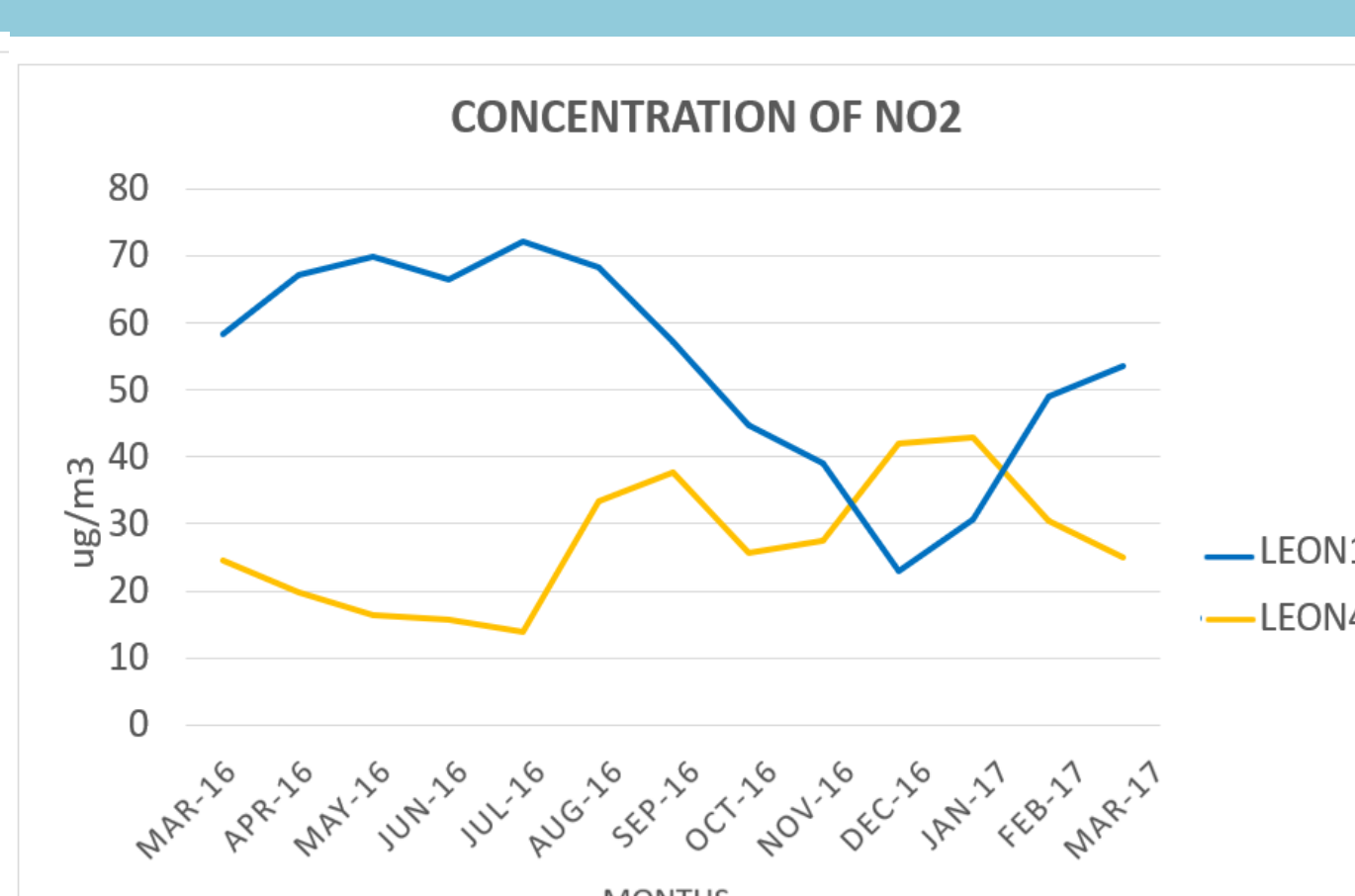


Figure 4 - The week where the concentration of PM10 was higher, 01/01/2017-07/07/2017

Different PM10 concentrations were observed throughout the studied year (Fig. 2) with the highest concentration corresponding to the traffic station, followed by the suburban and the background stations. The annual pattern shows a maximum in winter for the traffic and suburban stations, probably due to the use of domestic heating devices and the reduction of the mixing layer height. Figure 3 shows the NO<sub>2</sub> and NO concentrations throughout the period studied. It can be observed that the NO<sub>2</sub> concentration decreases in December, in the traffic station. This concentration decrease may be related to the Christmas holiday period, on the other hand we have at that same time the week with the highest concentration of PM10 that covers the first week of the new year (Fig. 4)

## CONCLUSIONS

- In general, the concentration of contaminants in LEON1 (Traffic) has been higher than in LEON4 (background).
- The stipulated daily PM10 limit values published in the BOE of the Spanish government are exceeded on holidays, is the case of the first week of the year, probably due to use domestic heating and road traffic, this situation happens in a lesser extent on other holiday periods throughout the year.



### References

- Aldunate, P., et al. (2006). *The effects of air pollution by PM10 on health city of La Paz*. Rev Acta Nova: 422- 442
- Querol, X. (2008) *Air quality, particles and metals*, Rev. Esp. Public health, vol.82

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