

# Extraordinary Saharan dust outbreak in mainland Spain (March 2022): Impact on PM10 levels



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## 1.- INTRODUCTION

Dust from large arid zones can be transported hundreds of kilometers away from the source. Several studies have pointed out that the high PM concentrations registered during dust outbreaks have a noteworthy potential impact on human health (Querol et al 2009), climate (Cruz et al., 2021) or visibility (Goudie, 2014).

The Sahara Desert has been shown to be an important source of PM10 in Spain (Oduber et al., 2019). Most dust outbreaks are recorded in spring and summer and they do not usually reach the northwest of the Iberian Peninsula. On March 14 to 16 of 2022, an extraordinary intrusion of Saharan dust took place affecting all mainland Spain.

**The present work focuses on determining the spatial-temporal distribution of the aerosol concentration during this natural episode.**

## 2.- METHODS

The PM10 data were obtained from the websites of the different Air Quality services from the Autonomous Communities listed in the site <https://www.miteco.gob.es> (Ministry for the Ecological Transition and the Demographic Challenge).

Table 1: Air quality monitoring stations considered in this study.

| Autonomous Community | Provinces or city | Station name              | Station type        |
|----------------------|-------------------|---------------------------|---------------------|
| Andalucía            | Jaen              | Ronda del Valle           | Background Urban    |
|                      |                   | Roger de Flor             | Urban Traffic       |
| Aragón               | Zaragoza          | Renovales                 | Background Urban    |
|                      |                   | Santander Centro          | Urban Traffic       |
| Castabria            | Santander         | Tetuán                    | Background Urban    |
|                      |                   | Toledo                    | Background Suburban |
| Castilla la Mancha   | Toledo            | Leon1                     | Urban Traffic       |
|                      |                   | Leon4                     | Background Suburban |
| Castilla y León      | León              | A Coruña - Riazor         | Urban Traffic       |
|                      |                   | A Coruña - Torre Hércules | Background Suburban |
| Galicia              | La Coruña         | Leganes                   | Urban Traffic       |
|                      |                   | Rivas Vaciamadrid         | Background Suburban |
| Madrid               | Madrid            | Valencia -Pista de Silla  | Urban Traffic       |
|                      |                   | Valencia -Avda. Francia   | Background Urban    |
| Valencia             | Valencia          | San Basilio               | Suburban Traffic    |
|                      |                   | Mompean                   | Background Urban    |

## 3.- RESULTS

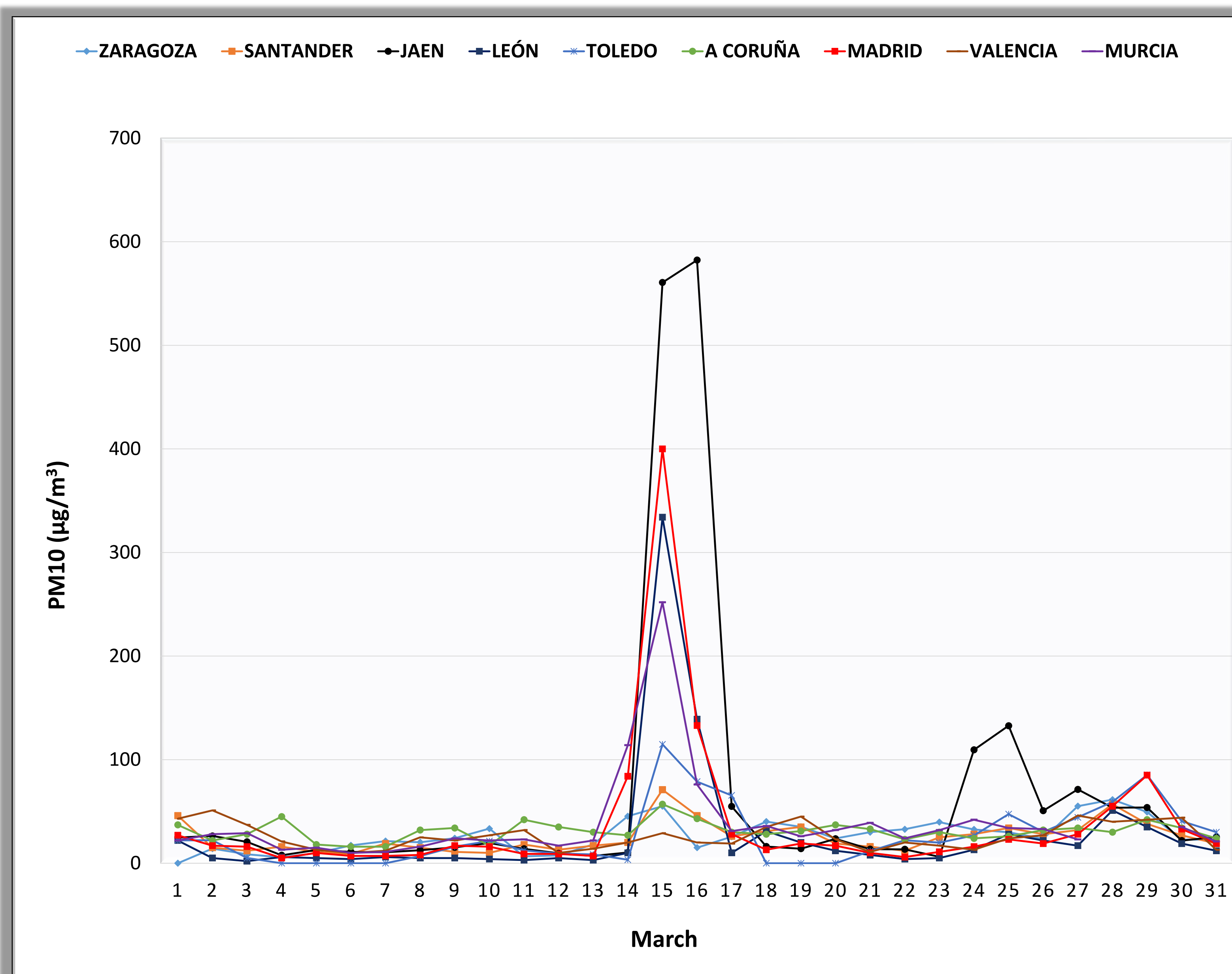


Fig. 1. Evolution of PM10 concentration in different Spanish cities located at different latitudes. Urban and suburban background stations.

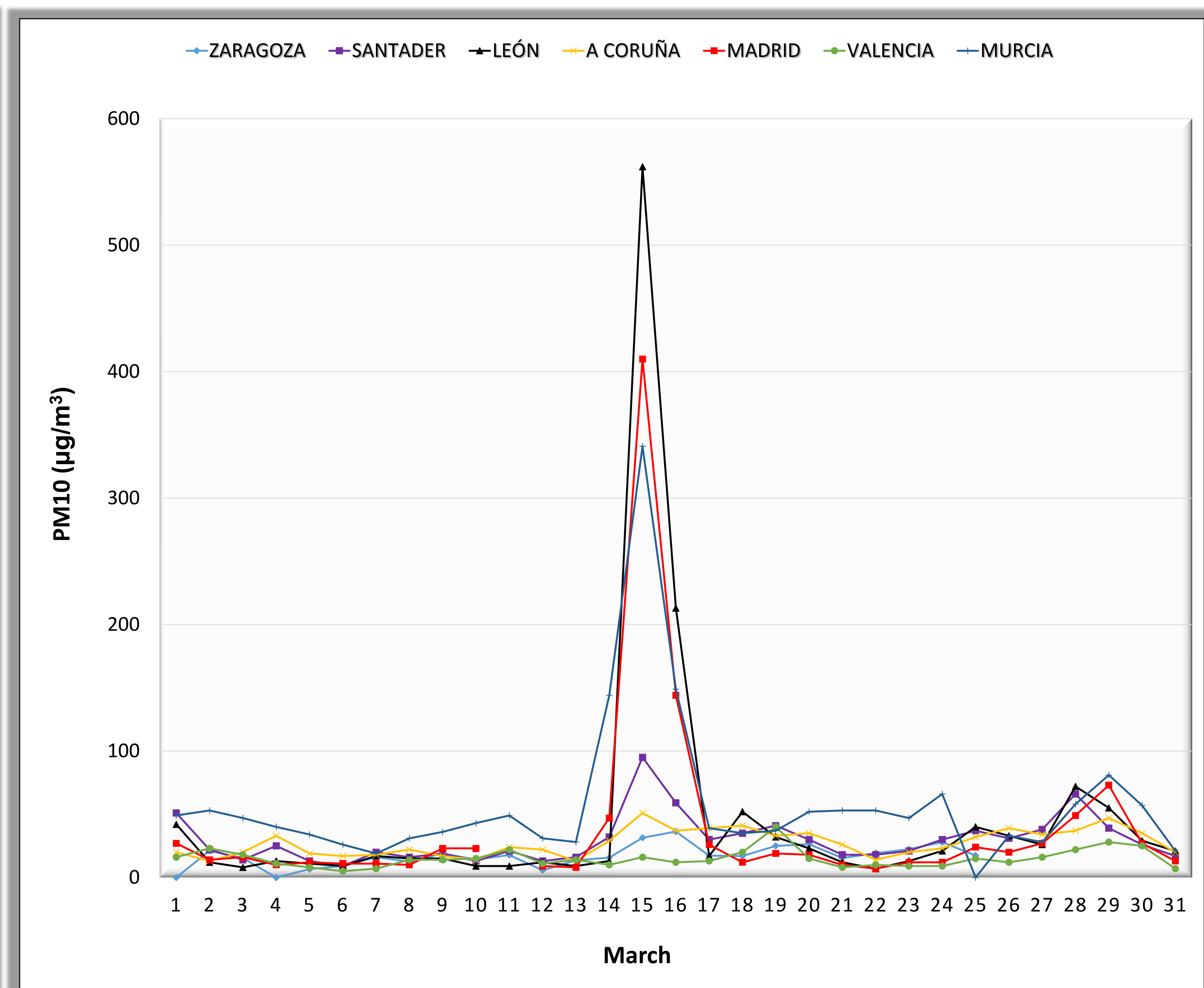


Fig. 2. Evolution of PM10 concentration in different Spanish cities located at different latitudes. Urban and suburban traffic and industrial stations.

## 4.- CONCLUSIONS

- The results show a significant increase in the values of PM10, throughout mainland Spain being more striking in the cities of the South and West of Spain.
- On the 15th and 16th March in almost all the cities, the PM10 concentration exceeds the daily limit value ( $50 \mu\text{g}/\text{m}^3$ ) established by European Directive (2008/50/CE).
- In León, a maximum daily concentration of  $562 \mu\text{g}/\text{m}^3$  was registered, with an hourly peak of  $830 \mu\text{g}/\text{m}^3$  on 15 March between 1600 and 1700 UTC.

## 5.- References

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## 6. Acknowledgments

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