

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

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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. 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). The concentrations registered the days before, during and after the event have been analyzed and statistically compared. From the data of province capitals, the PM₁₀ exceedances according to the current legislation have been analysed. A deeper study has been conducted in order to check the influence of latitude and longitude on PM₁₀ concentration.

Furthermore, a meteorological analysis has been carried out to study the behavior of air masses crossing the Iberian Peninsula during the intrusion event.

In León city (NW Spain), a more detailed analysis has been developed in order to compare the impact on air quality of this event with intrusions from last 15 years.

The results show a significant increase in the values of PM₁₀, throughout mainland Spain being more striking in the cities of the South and Northwest of Spain (Fig. 1). Thus, 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 16 and 17 UTC.

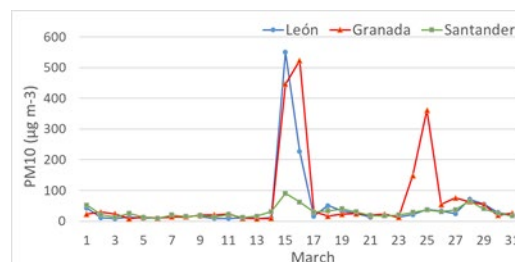


Fig. 1. Evolution of PM₁₀ concentration in three Spanish cities at different latitudes.

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