

## WINTER SAHARAN DUST INTRUSION AT LEON (SPAIN): BIOGENIC AND NON-BIOGENIC AEROSOL TRANSPORT

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Keywords: aerosol, dust, pollen, Saharan intrusion

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Due to its proximity to the African continent, Spain is a country exposed to frequent Saharan dust intrusions, mainly in summer, associated to the presence of an anticyclone in the North of Africa. In spring and autumn, these intrusions are mainly due to a depression located in the W or SW of Portugal. Less usual are those intrusions occurred in winter. The Saharan particles have a mineral origin and are essentially constituted by quartz, clay, silicon oxide, iron and carbonates. Furthermore, they appear frequently covered with organic matter (bacteria and viable spores, grains of pollens) (Griffin, 2007). Dust plays an important role in processes affecting climate, biogeochemistry and air quality. In Spain, some studies have reported strongest effects of coarse particles on total daily mortality during Saharan dust intrusions (Perez *et al.*, 2008).

This study aims to analyse the transport of biogenic and non-biogenic aerosols during a winter Saharan dust intrusion at León (Spain) occurred in February 21 and 22, 2016. Data collected from 15 to 28 February, at the university campus of León, Spain (42° 36' 50" N, 5° 33' 38" W, 846 m asl) were studied. Different instruments were used: i) a Hirst-type volumetric trap VPPS2000 (Lanzoni©) for hourly collection of pollen grains; ii) an optical particle counter (PCASP-X) and iii) a high resolution nanoparticle sizer (SMPS Model 3938) for the continuous monitoring of particle size distributions; iv) a CE318 Sun Sky photometer that performs automatic multiband optical measurements to provide quantification and physical-optical characterization of the aerosols. Furthermore, a Davis Weather Station was used for continuously registering the temperature and humidity at the sampling place. Additional data provided by the regional air quality network (<http://www.medioambiente.jcyl.es/>) related to PM<sub>10</sub>, PM<sub>2.5</sub>, O<sub>3</sub>, SO<sub>2</sub>, NO<sub>x</sub> were also taken into account.

The evolution of aerosol size distribution was examined in depth. The aerosol size fractions associated with health problems were evaluated following the Spanish standard UNE 77213, which is equivalent to the ISO 7708:1995. From the experimental size distributions, the inhalable, thoracic fractions, tracheobronchial and respirable fractions were assessed for healthy adults and high-risk groups. A detailed analysis of the synoptic meteorological situation was also carried out.

The different instruments showed an important increase in the load of particles concentrations in the city of León, reaching hourly PM<sub>10</sub> concentrations higher than 115 µg/m<sup>3</sup> in the air quality stations on 22 February, and minimum ratios PM<sub>2.5</sub>/PM<sub>10</sub> of 0.13. Although the presence of pollen in the atmosphere was scarce, pollen types non characteristic of this area in this period of the year were identified. The Hirst-type volumetric trap registered a daily pattern in the particle concentration, with minimum values observed between 19:00 and 04:00 UTC.

This work was partially supported by the Spanish Ministry of Economy and Competitiveness (Grant TEC2014-57821-R), the University of León (Programa Propio 2015/00054/001) and AERORAIN project (Ministry of Economy and Competitiveness, Grant CGL2014-52556-R, co-financed with FEDER funds).

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