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## Influence of Saharan-Sahel dust outbreaks on pollen exposure in the Iberian Mediterranean areas

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Airborne particulate matter such as mineral dust comes mainly from natural sources, and the arid regions of Sahara and Sahel in Africa release large amounts of the aerosols dispersed worldwide. There is evidence of concomitant presence of desert dust particles and bioaerosols such as pollen grains in the atmosphere, which produce a significant decline in air quality during the dust intrusions events. However, there is little knowledge about the influence of dust episodes on pollen exposure in allergy sufferers as well as the causes that may produce a potential effect of the intrusions on airborne pollen levels. This potential effect on the airborne pollen concentrations is analysed in the Iberian Mediterranean region in this study. Mediterranean countries are strongly affected by Saharan-Sahel dust intrusions, and the Iberian territory, specially the central and southern areas, suffer frequently great incidence of dust episodes due to its geographic location. In this study firstly, the simultaneous occurrence between airborne pollen peaks and Saharan-Sahel dust intrusions were analysed and compared with the behaviour in the days before and after the dust intrusions in the central and south-eastern Iberian Peninsula. Secondly, the weather conditions favouring high pollen concentrations during dust episodes namely prevalent winds, air mass pathways and variations in other meteorological variables like air temperature, relative humidity or atmospheric pressure were studied.

Pollen peaks often coincided with dust episodes during the pollen season in the central Iberian Peninsula. The increase of the airborne pollen concentrations during the dust episodes is clear in inland Iberian areas, although this was not the case in coastal areas of the southeast where pollen concentrations could even be seen to decrease when easterly winds from the sea prevailed during dust intrusions. Total pollen concentrations and also pollen types such as *Olea*, *Poaceae* and *Quercus* showed an increase in the central Iberian Peninsula during the dust episodes when two meteorological phenomena occurred simultaneously: 1) prevailing winds came from large areas of the main wind-pollinated pollen sources at medium or short scale (mainly from western and southwestern areas); and 2) optimal meteorological conditions that favoured pollen release and dispersal into the atmosphere (mainly high temperatures and low humidity). Both these conditions often occur during Saharan-Sahel dust intrusions in the centre. The findings suggest that the proportion of long-range transport is lower than those produced in medium and short distance by dust intrusions of air masses. Therefore, maximum pollen peaks are most likely to

occur during dust episodes in the central Iberian Peninsula dramatically increasing the risk of outbreaks of pollinosis and other respiratory diseases in the population. The negative effects of the mineral dust on public health are well known, even more so when allergenic biological agents are co-transported together by the air mass movements coming from desert areas. The findings of this study have very relevant implications for defining health-emergency alerts for severe Saharan-Sahel dust outbreaks.