



Origin of elevated ozone concentration at Huelva (southwest of Spain)

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Study area is located in the gulf of Cádiz, southwest of the Iberian Peninsula. Huelva town, the biggest town of this geographical zone, is situated on the coast and in its surroundings there are three large industrial chemical complexes. These factories emit several pollutants into the atmosphere, such as ozone precursors (NO_x and COVs). Department of Applied Physics (University of Huelva) and the Atmospheric Soundings Station “El Arenosillo” (National Institute of Aerospace Technology - INTA) started in 2000 year to study the surface ozone concentrations in this area. We have performed a measuring network with four ozone stations. Three stations are located on the coast (“El Arenosillo”, “Cartaya” and “Huelva” town), whereas the last one was located at (“Valverde”), 45 km far from the coast. Analysers Dasibi 1008-RS were used to take ozone data, which are based on the photometric technique.

The exceedances number of the threshold defined in the European Directive was evaluated during the period of study. Thus, the information threshold value was exceeded many times with maximums up to higher than $200 \mu\text{g m}^{-3}$. On the other hand, in relation the threshold to protect human health, during summer its exceedances was around 35% at El Arenosillo and 40 % in Valverde, and showing these facts that there is an ozone pollution problem in this region. The days with ozone episodes (days where is reached $140 \mu\text{g m}^{-3}$ for hourly maximum and $120 \mu\text{g m}^{-3}$ the eight-average concentrations) were found from April to October with 70 % between July and August.

Finally, we have demonstrated that every ozone event occurs along three steps. The meteorological scenario of the first stage is characterised by an advection northwest situation, in general caused for the presence of an anticyclone in the Atlantic Ocean and low pressures close to the British Islands. In the second step there are high ozone

concentrations as consequence from sea-land breezes. The average ozone concentrations during this step are about $160 \mu\text{g m}^{-3}$, but sometimes are reached up to the $200 \mu\text{g m}^{-3}$. Each event finishes with a northwest or southwest wind flow that produces an effect of atmospheric ventilation. The longest ozone occurred from 29 June to 14 August 2003. During this period the information threshold was exceeded consecutives days in the majority of stations, and it served us to develop hypothesis that explain the ozone behaviour in this geographical area.