

Aerosol characterization in the North-Center (Castilla y León) of Spain

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The Atmospheric Optic Group (GOA-UVA) at the University of Valladolid is the responsible of the photometric Palencia site belonging to AERONET-PHOTONS-RIMA, which is located in the Castilla y León region, in the north-center of Spain. Routine measurements are carried out since 2003. We take for our study the time period between 23-Jan-2003 and 01-Jul-2008. The instrument which has been taking measurements is a CIMEL sun photometer that provides the necessary data for a complete statistics. The data from Palencia site are included in AERONET at level 2.0 (Holben et al 1998), except the period 02-Aug-2006 until 10-Apr-2007 that are still in 1.5 level.

We have carried out a characterization of the aerosol in Palencia site. This classification is based on the aerosol optical properties derived from direct sun and sky radiance measurements: Aerosol Optical Depth (AOD), Angström exponent (AE) between 440 and 870 nm and inversion products, e.g. size distribution, phase function, single scattering albedo, etc.

The total number of measurement days was 1518 out of 2192 days since its deployment, which represent the 69.2% of the analysed period.

The background aerosol at the site presents low turbidity, especially in autumn (figure 1). The predominant type is clean continental aerosol. At Palencia most of the high AOD events were registered in summer (mostly June and July), but some episodes were also observed in spring. These episodes were analyzed following the methodology described in Toledano et al. (2007), using threshold values in AOD and AE to discriminate aerosol types. From this analysis we found that the events not corresponding with the background aerosol in our station are due to desert dust events that arrive from Sahara (9.6% of days), contamination events that reach the site from Europe or due to recirculation of polluted air masses from our own country (11.6% of days), or both mixed (7.0% of days). Also few episodes of biomass burning from forest fires (1% of days) are detected, with high values of the AOD and AE.

The mean AOD (440 nm) is 0.15 (STD 0.12). The maximum AOD achieves 1.2 during a desert dust event in July 2004. The majority of AOD data (79% of days) are below 0.2.

Figure 2 shows the monthly means of the AE. The mean value is 1.34 (STD 0.45) with almost no variation along the year. This parameter indicates fine particle predominance which is typical of the continental aerosol.

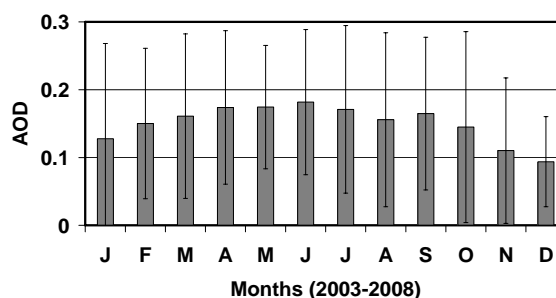


Figure 1. Monthly average of the Aerosol Optical Depth (AOD) during 2003-2008 at Palencia site. Bars in boxes are the standard deviation.

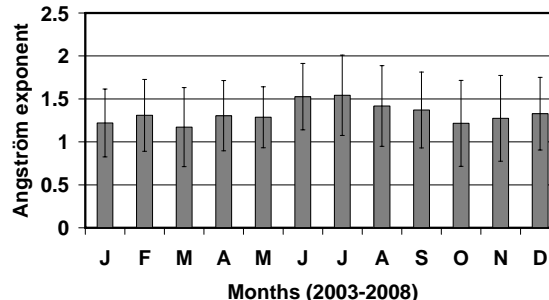


Figure 2. Monthly average of the Angström exponent during 2003-2008 at Palencia site. Bars in boxes are the standard deviation.

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