

ANALYSES OF MODIS AEROSOL PRODUCTS OVER THE IBERIAN PENINSULA

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In order to investigate the optical properties of atmospheric aerosol over the Iberian Peninsula we use almost 9 years of MODIS aerosol derived products. The Moderate Resolution Imaging Spectroradiometer (MODIS) sensor on the Terra and Aqua satellites is retrieving daily global aerosol products over land and ocean in a variety of spectral bands from blue to thermal infrared every 1–2 days with a 16-day repeat cycle. Terra and Aqua (both with a 705km orbit) are in a sun-synchronous, near polar, circular orbit. Aqua crosses the equator daily at 01:30 p.m. LT as it moves north (ascending mode) in contrast to Terra, which crosses the equator at 10:30 a.m. daily (descending mode). Since its first launch (18 December 1999), the MODIS aerosol algorithm has been continuously updated and evaluated by the MODIS scientific team. This resulted in a complete set of products, being the last version that called Collection 005 (C005), that are based on MODIS algorithm version Global time-series of aerosol parameters have been produced from MODIS/Terra (EOS AM-1) since its launch in December 18, 1999 and from MODIS/Aqua (EOS PM-1) since 4 May 2002. The pre-launch uncertainty (theoretical error) of the MODIS aerosol optical depth (AOD) is $\pm 0.05 \pm 0.15$ (AOD) over land and $\pm 0.03 \pm 0.05$ (AOD) over ocean. The spatial resolution of MODIS (pixel size at nadir) is 250 m, 500m and 1000 m, depending on the spectral band. The aerosol C005 dataset used in this study is part of the MODIS Terra Level-3 daily gridded atmospheric data product available on the MODIS web site <http://modis.gsfc.nasa.gov/>. The data cover the broader Iberian Peninsula (35°N–45° N and 10°W–5° E) for the period 1 March 2000 to 28 February 2009 (almost 9 complete years). The MODIS Atmosphere Daily Global Product is stored on an equal angle latitude-longitude grid with a horizontal resolution of $1^\circ \times 1^\circ$. Thus, 150 cells are available for each day of the 9-year study period.

The present study focuses on the AOD at the wavelength of 550nm (AOD550) and Angström exponent over land, because it is near the peak of the solar spectrum and thus associated with large radiative effects, and because AOD is usually given at this wavelength by the various available aerosol datasets. Spatial and temporal features of the aerosol optical properties have been analyzed.

This region is of particular importance because it is a crossroad where aerosols from different sources are superimposed and mixtures of different kinds of particles converge (e.g. Lyamani et al., 2006) such as fine anthropogenic aerosols from Europe, desert dust from North Africa and maritime aerosols from the Mediterranean Sea. In addition, in the Mediterranean basin aerosols exert a strong climatic effect especially in summer, due to the cloud-free conditions and high solar radiation intensity.

Marked spatial gradients have been evidenced due to the existence of different climatic regions and the influence of different source regions for aerosol particles. On the other hand, the seasonal features reveal large aerosol load in summer, with particles coming from North Africa, specially in the South-eastern (SE) part of the Iberian Peninsula, and a relevant contribution of biomass burning particles specially in the North-western (NW) of the Iberian Peninsula (IP).

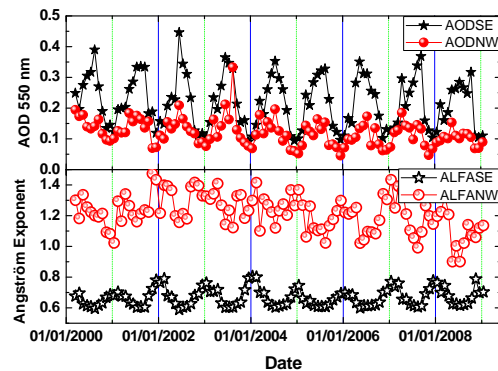


Figure 1. Aerosol optical depth (550 nm) and Angström exponent series for SE IP and NW IP for the period 2000-2009.

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Lyamani, H. et al. (2006), *Atmos. Environ.*, 40, 6465-6476.