

Interactive comment on “Day and night columnar aerosol properties at Granada (Spain) retrieved from sun-and star-photometry” by D. Pérez-Ramírez et al.

Anonymous Referee #2

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The paper reports the results of photometer measurements taken at a single station in Spain for a period of 4 years. Aerosol optical depth (AOD) and Ångström exponent (AE) are given as tabulated statistics over the whole period and as seasonal means as well as in graphical form showing time series, histograms and Gobbi type diagrams. Daylight results are compared to other Aeronet stations in Spain. All tables and figures are described and discussed in detail in the Results section.

The scientific approach and organisation of the paper is sound and good. However, I would rate the scientific significance fair for the following reasons:

The scientifically most important result of this work seems to me that no statistically

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significant difference in aerosol optical properties at night or day was found when one might expect some due to diurnal variations in atmospheric dynamics or anthropogenic aerosol sources. Perhaps such differences are washed out by statistical averaging over several years. I would therefore suggest adding a section dealing with e.g. case studies for single days in different seasons or an analysis of weekly patterns in day versus night time observations.

While night-time observations may be valuable for studying aerosol processes on short time scales, their long-time climatological mean is rather unimportant in the context of radiative forcing unless additional aerosol properties, single scattering albedo resp. emissivity, in the thermal radiation wavelength domain are considered. What is the scientific value of night-time observations that are bracketed by accurate day-time measurements?

The authors claim their work to be the first analysis of day- and night-time observations although they cite the work of Herber et al. who already did some pioneering work in Polar night observations ten years ago. Maybe they should emphasize that the novelty of their work lies in the continuity of observations over day-night-day cycles. This would then naturally lead to a motivation to study this cycle on timescales shorter than years.

Although the comparison with surrounding Aeronet stations might be useful in relating the day time AOD results at Granada with a wider context, it only slightly improves the value of this paper with respect to ACP focus on studies with general implications for atmospheric science rather than investigations that are primarily of local or technical interest. This concern is supported by the authors in their conclusions (L533) cautioning that their findings are only applicable to a particular site and particular period. . I think that the scientific potential of their data set is not adequately exploited by the paper as it is now and suggest a major revision.