

Interactive comment on “Long-term visibility variation in Athens (1931–2013): A proxy for local and regional atmospheric aerosol loads” by Dimitra Founda et al.

Anonymous Referee #1

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In this article, Founda and coauthors describe the long term trend in visibility in Athens, Greece and compare this trend to meteorological variables, visibility changes at a non-urban site in the area, and satellite-derived aerosol optical depth values. The rapid degradation of visibility after 1950 and slight recovery since 2005 are correlated with meteorological conditions associated with air mass origin, PM10 surface measurements, and aerosol optical depth; these relationships suggest that visibility is a proxy for local and regional atmospheric aerosol levels. This trend and associated analyses provide a novel dataset for understanding long term changes in aerosol concentration near Athens. I'd suggest publication after the following comments have been addressed.

Major comments: 1) While the grouping of 3 periods of visibility trends are appropriate

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when discussing changes over time, the middle period (1949-2003) is not appropriate when discussing frequencies (Figure 5) and seasonality (Figure 6) because the early part of the period has substantially different visibility conditions from the later period. When not showing a time series, the 1949-2003 period needs to be separated into several periods of more similar visibility conditions.

2) I think that a more comprehensive comparison between emissions changes and visibility trends would help improve the article. Figure 11 needs to have emissions on the y-axis as a magnitude rather than a rate of change, and plotting other types of emissions (NO_x, EC, OC, etc) would be interesting to see if available. If the emission data could be segregated by air mass origin, it would be interesting to see if increases/decreases of emissions in certain parts of Europe have affected the visibility in Athens.

3) To add value in the visibility-satellite AOD comparison, I'd suggest examining the much longer-term dataset of AOD values from the Advanced Very High Resolution Radiometer (AVHRR) satellite. Although AVHRR retrieves AOD only over ocean grid cells, selecting the nearest ocean cell to Athens would enable an visibility-AOD comparison since 1981 when visibility values were still degrading.

Minor comment: 1) Many typos and text spacing problems persist in the document and have to be corrected. The first of many are listed by page number; line number (suggested correction): Page 1; Line 18 ("34%"), Page 1; Line 22 ("the 1950s"), Page 2; Line 46 ("containing"), Page 3; Line 82 ("oldest time"), Page 4; Line 90 ("construction"), Page 5; Line 118 ("...the year. The periods..."), Page 5; Line 129 ("Mediterranean"), Page 5; Line 136 ("60%"), Page 6; Line 173 ("Po Valley"), Page 7; Line 180 ("...subsequent reduction in vehicle use..."), Page 7; Line 201 ("with the naked eye."), Page 8; Line 208 ("Davis (1991)."), Page 10; Line 272 ("Overall, visibility did not exceed..."), Page 11; Line 312 ("different approaches, as for instance..."), Page 12; Line 343 ("...resulting in the reduction of visibility."), Page 13; Line 364 ("In other cases..."), Page 14; Line 491 ("increase of construction in the city."). I'd recommend an grammatical editor

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to correct these and other errors prior to publication in final form.

2) Figure 2a should be referenced in the text before Figure 2b.

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