Atmos. Chem. Phys. Discuss., 14, C4568–C4572, 2014
www.atmos-chem-phys-discuss.net/14/C4568/2014/

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Long term trends in aerosol optical characteristics in the Po Valley (IT)" *by* J. P. Putaud et al.

J. P. Putaud et al.

jean.putaud@jrc.ec.europa.eu

Received and published: 8 July 2014

Reply to Referee #1's comments:

We would like to thank Referee #1 for useful suggestions for improving our manuscript, and interesting remarks regarding the possible impact of meteorology on the trends we observed.

About Referee #1's general comment:

Concerning the importance of results and their tight presentation, I feel some points deserve more discussion, e.g. the different seasonality observed for PM2.5 and AOT (the role of meteorology is not really constraint by observational evidence). In addition

a conceivable trend in local meteorology is worth to be considered due to its potential impact on air quality (is there some evidence for a “regional climate change”?).

Our reply follows:

The different seasonality for PM2.5 at the ground and AOT at the IPR site are extensively discussed in Barnaba et al., J. Geophys. Res, 115, D19209, doi:10.1029/2009JD013002, 2010. This difference can be explained by changes in the aerosol vertical profile as observed from the lidar measurements we have been performing at our site since 2006. To support our statement, we have inserted in the revised manuscript “which strongly influences the shape of the aerosol vertical profile at IPR (Barnaba et al., 2010).”

Regional climate change affecting precipitation frequency, average wind speed and mixed boundary layer height could of course have an impact on the aerosol concentration and other aerosol extensive properties at ground level. No clear trends were observed for the precipitation frequency and wind speed during the studied period (Fig. 1), but the height of the atmospheric mixed boundary layer is not determined routinely at our site. However intensive variables are not affected by pollution dispersion (contrary to extensive variables), and the decrease in the aerosol single scattering albedo (our most important observation) is therefore very unlikely to be driven by regional climate change. If any, the effect of the decreasing precipitation frequency observed in 2008 – 2010 would be an increase in the aerosol SSA since precipitations leave preferentially small hydrophobic carbonaceous (and therefore light absorbing) particles in the atmosphere.

Replies to specific comments:

- Page 9044, line 21-22: I guess that a nephelometer TSI Model 3563 (and not 3753) was used. Typo corrected.

- Page 9050, line 7: Figure 8 and not Fig. 7b is meant. Corrected.

ACPD

14, C4568–C4572, 2014

- Page 9050, lines 11-12: Do you have an idea why the brown carbon burden increased at this site?

R: As a suggestion, we inserted “during which wood burning for domestic heating was more and more used (EDGAR data base).”.

- Figures 1 through 6: In general, the standard deviation of the monthly mean values should be presented in some way, to get an impression about the variability of the data (if error-bars cause confusing figures, a rough number specified in the caption may suffice).

R: Error bars representing standard deviations have been included in Figures 1 to 6 of the revised manuscript.

- Figure 4: The seasonality of the presented data points (monthly means) appears somewhat vague. Here, I would appreciate an additional plot showing the stacked mean seasonality as boxplot.

R: Seasonal variations in the AOT are clearly visible in Fig. 2 below. However, seasonality is not the topic of this work (it comes as a side product only) and was not intended to be discussed in depth for each variable. For consistency, we prefer not to include Fig. 2 in the manuscript either. Instead, we have included in Section 3.1.2 the sentence “Seasonal median values of the AOT at 440 nm are 0.20, 0.34, 0.39, and 0.25 for winter, spring, summer, and autumn, respectively.”.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 9041, 2014.

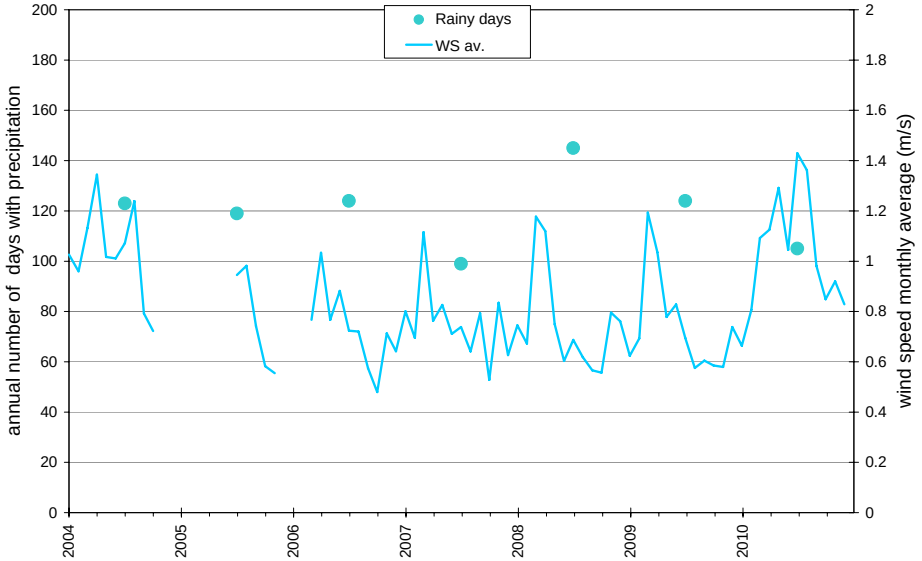

Fig. 1. variations in relevant meteorological variables during the studied period.

ACPD
14, C4568–C4572, 2014

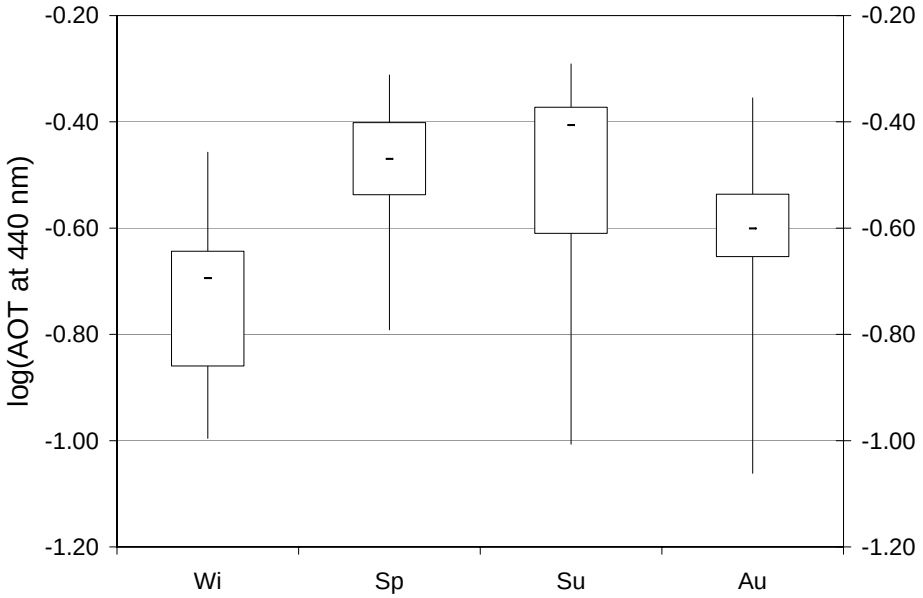

Fig. 2. seasonal variations of the AOT at 440 nm. Dashes indicate median values, rectangles median $\pm$ 1 standard deviation, and whiskers the 5th and 95th percentiles.

ACPD
14, C4568–C4572, 2014