

Interactive comment on “

On the sub-micron aerosol size distribution in a coastal-rural site at El Arenosillo Station (SW-Spain)” by M. Sorribas et al.

Anonymous Referee #2

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Review of ‘on the sub-micron aerosol size distribution in a coastal-rural site at El Arenosillo Station (SW-Spain) by M. Sorribas et al.

This paper describes two years of aerosol size distributions from El Arenosillo Station (ARN). The authors present statistics of observed size distributions (i.e., mode concentrations and diameters) and describe changes in measured size distributions during nucleation events. Two types of nucleation events are identified based on wind direction, temperature conditions and available particle surface area.

General comment: this paper was difficult to read due to the poor quality of English
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throughout. I may have missed some important points because of that. Please have someone edit it for grammar and clarity prior to re-submitting it. I've made a pdf of my scribbled on copy but I'm not sure how useful it will be to the authors.

Science comments: The abstract mentions 3 modes: nucleation, Aitkin and accumulation mode, but then presents mean geometric diameters for four modes – need to clarify in abstract.

In section 2.3 ‘dataset’ –loss calculations for 16.5 nm particles were done – what about losses for larger particles? –explain why periods of rain influence are separated out

In section 3.1 ‘Mean levels’ (note I would change section name to ‘mode descriptions’ –the concentrations measured at ARN are compared with those from 1 site in China, a site in Italy and a site in Finland with the conclusion that ‘particle concentrations at ARN are closer to measured levels at rural areas in similar latitudes in Europe’. This is a pretty sweeping generalization based on very few points. I believe EUSAAR data or the WDCA/EBAS could provide more aerosol concentration data for Europe to back up this claim. Alternatively, Spracklen has a paper in ACP comparing modeled and measured CN concentrations at a variety of sites around the world – including seasonal variability. This would be a better point of comparison.

–Should not combine percentiles and means in figures or discussion. Use either means and standard deviations together or medians and percentile together. Otherwise are mixing statistics.

–In discussion of figure 5b and d it is unclear where the values come from (e.g., 570 cm³, 230 cm³, 60%). Are these numbers for the whole 2year period or an average over a month(s). Likewise, it is unclear where the 0.5 and 1 /cm³ values for concentration changes in accumulation and nucleation mode come from.

–earlier in manuscript April is not mentioned as a dust-influenced month but here it is specifically discussed as such. Do you see the dust influence in the AERONET

measurements (i.e., does Angstrom exponent decrease?).

–‘It is not possible to indicate the reason for this behavior, since it would take many more years with measurements.’ But you could suggest possibilities or indicate what measurements you would need. Were no changes in meteorology or trajectory path observed?

–If nucleation and accumulation modes are anti correlated shouldn’t they show opposite trend lines? Figure 5b and d both show increasing trends.

–do geometric mean diameters of dust months look different from non-dust months?

Section 3.3 –Please comment on Nacc – do the seasonal peaks in Nacc correspond to dust?

–“This observations [suggests] that the particle growth rate was higher during the spring months.” I am missing something I think. Why does peaking at the same time mean the growth rate is higher? Is growth rate the same as nucleation rate?

–“...could be due to an increase of the atmospheric mixing and then the dilution processes with respect to spring and summer times.” I would think there was less mixing/dilution in the winter due to lower boundary layer heights.

–need to be careful comparing with mountain sites – they have different drivers of diurnal cycles.

Section 3.4.1 –“The banana shape [observed] for these two events allows determining that these events were produced simultaneously in a large area (at least 100 km)” How is this the case? Please provide a reference. (also area has units of km²)

Section 3.4.2 – need to define ultrafine size range – is there any indication of sub-um sea salt aerosol during PB days?

Conclusions –“This anti-correlation between both modal concentrations produced a weak seasonal evolution of Nt.” I’m not sure I agree with this statement. Figure 5a

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shows a fairly strong increase in Nt along with weak trends in Nnuc and Nacc and a fairly strong trend in Nait. Perhaps I am misunderstanding what is meant by evolution.

Other comments Section 3.2 –what is the 75% quality criteria?

Section 3.4.2 – need to define ultrafine size range

Figures 1 – put an arc on windrose representing ‘pure’ and ‘non-pure’ 4 –Make major ticks more obvious so can figure out how to line up numbers in text with bars. 5-Make major ticks more obvious so can line up months with points. I would either rearrange figure so the left column has the four trend plots stacked and the right column has the percentile plots. OR I would put the percentile bars on the main plots and get rid of the ‘subplots’. Also should say what black line (trend line) is in caption. 7- add vertical lines to delineate seasons 12 – say what the colors are in the caption or add a legend.

Please also note the supplement to this comment:

<http://www.atmos-chem-phys-discuss.net/11/C659/2011/acpd-11-C659-2011-supplement.pdf>

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