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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Source attribution of climatically important aerosol properties measured at Paposo (Chile) during VOCALS" *by* D. Chand et al.

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Dear Dr. Barry Huebert, Thank you for meticulously going through our MS and for the constructive comments. We have incorporated your inputs. Our replies to your specific comments are below:

Page 17861, line 11: Although I probably sometimes do it myself, I hate to see, "are comparable with" in scientific papers. It's so vague that it tells you nothing quantitative. The only thing it conveys is, "we found nothing new."

Since we give the range explicitly, we do not see a problem Nevertheless, we could rephrase to say: "...west coast of South America are in the lower end of the range of

aerosols ...."

Page 17862, line 27: grasses also contain a fair amount of Si. These little shards of glass are part of the reason most animals can't digest them.

Yes, certainly some plants have Si in them. We would suggest noting this in the text in the last line of the page (line 28). The line would read: "...dust re-suspension and in part due to Si incorporated into some plant species."

Page 7864, line 19: Come on, now. Does anyone think that a critical diameter can be known to 0.5 nm? Even the 69 is too many significant figures. We should avoid implying that we know any measured or computed value to 1 part in138, unless it's a very precisely measured quantity like CO2.

We regret that our point was less than clear. What is given here is the mean and standard deviation of the mean. The intent is to show that there is very low variance and thus that an assumption of constant critical diameter is quite reasonable. We agree that we have only 1 significant figure - and in fact that is all we use, i.e., 70 nm. We have revised the text as follows. "...value of 69 $\pm$ 0.5 nm (mean $\pm$ SD). The low variance of the mean suggests the assumption of a constant critical diameter is reasonable. Hence, in the absence of ...."

Page 17864, line 22: The authors should clarify, though, that CCN above 300 nm can be very important for many cloud processes, such as drizzle formation.

Well yes, sort of. OPC particles in the range that is the focus of this study (submicron range, < 1 μm) are hardly "giant CCN". We are trying to get the total number of CCN in this instance and will emphasize this in the text.

Page 17866, lines 1&2: Isn't this circular? Reproducing the observations with a function tuned to those observations isn't a very noteworthy proof of the validity of the function.

We believe the reasoning is not really circular. While the PMF analysis IS based on

observations, the degree to which it reproduces those observations is not clear from either the profile (figure 6) or contribution (figure 7) matrices. The regression comparison shows clearly how good the PMF model is, i.e., how well it can QUANTITATIVELY reproduce the observations. In principle, one can get this from internal PMF diagnostics but we do not give these and, in any case, they can be a bit obscure. The regression analysis is fairly transparent.

Page 17869, lines 21-27: They should also add to this summary what I think may be the most important observation of this section: the balance between dilution by entrainment and enhancement by sources is one of the most critical factors controlling concentrations. We often forget how large a role dynamics and vertical fluxes play.

We have added a sentence 'It is also noteworthy that the linkage between the wind speed of the trajectory and the observed concentrations of aerosol species suggests that these aerosol concentrations result from a balance between entrainment and sources along the trajectory'. This sentence is added just after 'In summary, due to the flow channeling effects of the Andes mountains, most of the air masses arriving at Paposo in the marine boundary layer have a southerly origin.'

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 17853, 2010.