

Interactive comment on “An observation-based approach to identify local natural dust events from routine aerosol ground monitoring” by D. Q. Tong et al.

E. Gerasopoulos (Editor)

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Received and published: 15 May 2012

1) To avoid a strictly technical paper, probably not appropriate for ACP, I suggest that the part of your paper dealing with the climatological aspects of local dust needs enhancement and improvement. You might also think of slightly changing the title of your manuscript accordingly. In this direction, I suggest you further inquire the processes (meteorological etc) behind the observed seasonalities per dust area, as well as for the 4 year cycle that seems to exist (is it mainly driven by SOD data?). In parallel, and as you have mentioned there are limitations based on data geographical distribution and coverage as well as possible biases due to selection criteria or IMPROVE data validity,

C2558

please evaluate the impacts on presented local dust temporal and spatial patterns. A more thorough comparison with previous studies in the area would help.

2) Please make sure that you specify what is new and what is not in your work, and refer to what is gained on top of existing methodologies or other tools. For this, a concentration of previous studies with the same goal (internationally) would certainly add on the discussion. Additionally, the utilization of other methodologies or even the breakdown of your criteria to gradual steps, would enable to follow the efficiency of your suggested full method compared to more simplistic approaches. It would also help the discussion of limitations of your method, in areas with lack of chemical analyses e.g. Africa and Asia (your conclusions section).

3) Great effort in this work is paid on distinguishing local to transported dust. However, information is not clear about what is considered transported in your case, how often is it encountered and which are the main characteristics (e.g. PM_{2.5}/PM₁₀ ratios). In a similar vein, the ratio of 0.35 adopted in this study seems to be arbitrary. A short sensitivity study on the choice of the ratio might add on the discussion.

4) As also mentioned by one of the reviewers, the application of hierarchical cluster analysis on IMPROVE data set is one of the new aspects of this work. To this end, this should be highlighted in the text. Please provide more info on this analysis. How is the choice of the six clusters made? Can you identify and distinguish the rest of the groups?

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 4279, 2012.

C2559