

Interactive comment on “A comprehensive modelling way for assessing real-time mixings of mineral and anthropogenic pollutants in East Asia” by F. Lasserre et al.

Anonymous Referee #1

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- 1) Does the paper address relevant scientific questions within the scope of ACP? The paper addresses interactions between the Asian gas and dust plumes and thus falls within the scope of ACP.
- 2) Does the paper present novel concepts, ideas, tools, or data? The interaction of large scale dust events with urban-scale emissions is an area of on-going research.
- 4) Are the scientific methods and assumptions valid and clearly outlined? I am uncomfortable about the degree of simplicity and the associated justifications in the scientific method.

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a) DPM: Have the authors considered whether sedimentation should also be included as part of the dust transport process?

Why is the maximum size fraction limited to 13 μM ? Presumably much larger size fractions are also transported, and while these will not impact on PM10 for the purposes of model verification, they will impact on optical depth calculations and SO₂ uptake and transformation calculations.

Could the authors also clarify whether the dust loss through rain-out is explicitly included- this was unclear from the text (line 26 p11900)?

Strictly speaking, Fig. 3 should also include a dust source flux.

b) SO₂:SO₄. The authors need to provide a better justification for omitting SO₄ production in cloud-water. A number of the references that they provide suggest that aq-SO₄ production may be significant. Also, have the author's accounted for the SO₃ fraction of SO₂ which is directly emitted from combustion sources?

Has effective plume height been taken into account when modelling the emissions from large buoyant industrial sources such as power stations?

The authors are assuming that the rate of SO₂->SO₄ conversion on the particle surface is instantaneous. Is this justified in Kulshrestha et al. (2003)? If not, then the authors need to come up with another reference to justify this assumption. Moreover, if the chemical conversion rate is fast, then the rate of SO₂-SO₄ conversion will be limited by the mass transport rate of SO₂ to the particle surface. How is this modelled?

c) BC. In referring to black carbon, are the authors using elemental carbon only as a tracer, or the sum of elemental carbon and primary organic carbon. If black carbon = EC then the authors need to demonstrate that it is the dominant anthropogenic PM10 emission otherwise the direct comparison of BC + Dust against PM10 observations becomes questionable.

Doesn't the use of BC as a tracer for all anthropogenic emissions (without justification

as noted above) also make the comparison of observed and modelled AOT questionable? Further to the issue of AOT, I'm not comfortable with the use of level 1.0 AOT data for model verification.

5) Are the results sufficient to support the interpretations and conclusions? This appears to be the case for the dust transport component of the paper. Some of the other results are fairly preliminary in nature and rely on order-of-magnitude comparisons with literature data, often for different averaging times and sampling periods.

6) Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? More detail needs to be added, particularly with respect to the dust and SO₂ interactions.

7) Do the authors give proper credit to related work and clearly indicate their own new/original contribution?

The paper appears to have properly credited other researchers and data sets.

8) Does the title clearly reflect the contents of the paper? The title is very general and perhaps reflects on-going work in addition to work which is reported in the paper.

9) Does the abstract provide a concise and complete summary? OK

10) Is the overall presentation well structured and clear? In my opinion the paper is too long. As discussed in (13) it would benefit from being targeted at one aspect of the problem which the authors have studied.

11) Is the language fluent and precise?

Some of the language is not grammatically correct. However, with care, the authors' intentions can usually be understood. Nevertheless, the paper would benefit considerably from having the grammar corrected.

12) Are mathematical formulas, symbols, abbreviations, and units correctly defined and used? There are some problems with the presentation of mathematical formulas within

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the paper. For example, the formula on line 6 page 11904 should be correctly formatted and numbered.

13) Should any parts of the paper (text, formulas, figures, tables) be clarified, reduced, combined, or eliminated? It is suggested that the authors consider shortening the paper. This could be done by considering only the dust transport and the interaction of dust and SO₂. This would have the advantage of highlighting the strongest part of the paper which I believe is the dust transport and verification (Fig 6-12) and the interaction of the dust and anthropogenic SO₂. It is also suggested that the contents of Page 11902 are not particularly relevant and could be removed.

The authors could then concentrate on providing further clarification to this shortened version of the paper. The authors might also like to consider increasing the size of the figures in order to make them easier to read.

14) Are the number and quality of references appropriate? Yes

Interactive comment on Atmos. Chem. Phys. Discuss., 7, 11895, 2007.

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