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Atmospheric Chemistry and Physics Discussions

Interactive comment on "The impact of channel effect on Asian dust transport dynamics: a case in southeastern Asia" *by* C.-Y. Lin et al.

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Reviewer #1:

SpeciïňĄc points: 1. Is this "super dust event" an extreme case, or is it characteristic of Asian dust outïňĆow events that impact Taiwan? How does the WRF dust simulation compare with the ground-based monitor PM10 data? You show the ground-based observations in Figs. 2 and 3. Can you show corresponding results from the model?

R: 1. Yes, this was the highest Asian dust concentration event ever recorded in Taiwan. However, the transport path is not unique. The transport path just followed the movement of continental high pressure system. Actually, we did study a few significant dust cases with this similar uneven dust concentration and will be discussed later in

a separate paper. 2. The comparison between ground monitoring and simulation has been included in this revised version (Page18L18-Page 19L7).

2. There is much repeated discussion of detailed meteorology, speciïňĄcally the changing wind ïňĄelds, pressure ïňĄeld, and the blocking effect of the CMR, in discussing Figs. 4, 5, and 8, e.g. on p. 26449 -26453. I would encourage the authors to simplify, focus on the message, and avoid unnecessary repetition.

R: The original Figures 4 and 5 have been integrated into one figure (Figure 4 in this revision). Also, we improved the presentation in this revision to simplify and focus on the message as reviewer's suggestions (Page11,L19-Page13,L17)

3. p.26443, Line 25: "documented from theoretical postulation" – a bit awkward. How about simply "proposed"?

R: Text has been amended (Page 4,L17)

4. p.26443, Line 28: "the air mass could be channeled". How about more simply "the ïňĆow could be channeled"?

R: Text has been amended (Page 4, L19)

5. p.26446, lines 13-15, Are you saying that the GOCART dust module used to represent dust emission in the WRF model? It's not clear what you mean by "study" here.

R: Yes, the GOCART dust module used to represent dust emission in the WRF model. We amended the text in this revision (Page 8, L14)

6. Ref: Fig.4: In addition to the red "dollar" signs, I see small, yellow "inïňĄnity" symbols, unevenly distributed on the maps. What do these represent? I don't think the synoptic maps in Fig.4 are very useful. You are focused on the coastal region. I see no reason to show regions west of 110oE or north of 40oN, except for panel (e), where you discuss the origin of the dust. I think the maps in Fig.5 are much more helpful for the reader to visualize the frontal passage and the associated wind ïňĄeld. I suggest

eliminating the weather charts in Fig.4 and relying instead on those in Fig.5 to make your points. Can you superimpose the dust event symbols on to Fig.5, for example?

R: The “yellow infinity symbols” is represented to the haze report by FGGE data. As suggested by reviewer, we integrated the weather charts and superimpose the dust symbols into one figure in this revision (Figure 4).

7. p.26449, lines 13-15: “They indicated that the cold air mass mixed with the warm sea surface temperature (SST) in the low boundary, typically migrated westward, and regenerated the semi-permanent subtropical high of the eastern PaciïňĄc.” This seems a bit unclear to me, and I’m not sure it adds much; suggest you leave this out.

R: Thank you very much for reviewer’s comment. We dropped these 3 lines in this revision.

8. p.26449, lines 27-29: “The depth of the northeasterly continental outïňĆow usually shrinks to below 1500m when the northeasterly continental outïňĆow travel southward in the low altitudes (Lin et al., 2010).” I think the authors are describing subsidence in the wake a of a cold front passage; the language is a little awkward.

R: Text has been amended (Page 13, L8-9)

9. p. 26450, ref. Fig.6b: the “model” winds you show those of the NCEP GFS or from the WRF simulation?

R: Those are the results from WRF simulation. Text has been amended (Page 14, L17-18)

10. p.26452, section 4, Figure 8: This would be the WRF-Chem dust simulation, right? For Fig. 8, I suggest you choose an alternative color palette for Figs 8, 10, 11, 12, and 13. The grey color used for highest values doesn’t work for me. The purple tends to obscure the underlying map in Fig.8.

R: Yes, Figure 8 is the results of WRF-chem dust simulation. We improved the quality

of these figures and amended the presentation of color scale in this revision (Figure 7)

11. As for my comments on Fig.4, I would strongly suggest that you show a more limited domain in Fig.8, such as is used in Figs. 5 and 9, focusing on the Taiwan Strait.

R: Thank you very much for the reviewer’s suggestions. We reorganized the domain as shown in Figure 7 in this revision.

12. Figures 10, 11, 12, 13: I don’t think it’s necessary to show multiple panels (multiple times) for each cross-section to illustrate your point. Try picking a single time, say 21 March 06:00 UTC, and create a single 4-panel ïňĄgure for all cross-sections. This would help the reader better compare and contrast the structures between locations.

R: Thank you very much for the reviewer’s suggestions. We reorganized the figures presentation in this revision (Figure10-13)

13. Figure 14: This is a nice way to demonstrate the channeling and blocking effects of the topography. You show the meridional wind speed as a function of time and latitude for the 2 sections. It is not clear, however, if these are surface wind speeds, or averÂňaged over a particular altitude range. The ïňĄgure legend is an example of unnecessary wordiness. You only need to say “Temporal variation of N-S component of wind speed during 20–23 May 2010” and “The contour is shown in 3ms-1 interval” once.

R: Text has been amended for the captions of Figure 14.

14. With great respect to the authors, the paper would beneïňĄt by being proof-read by a native English speaker. There are some phrases, such as “The differences in concen-tration can be reached to 5 times in less than 100 km in the west-east bound distance,” where this would help.

R: This revision has been proof-read by a native English speaker.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 26441, 2011.