

Comments on “Emission, transport and radiative effects of mineral dust from Taklimakan and Gobi Deserts: comparison of measurements and model results” by Chen et al.

This manuscript studied the mineral dust aerosols in terms of emission, transport or mass balance, and radiative effects in East China using both observations and WRF-Chem. The conclusions that the Gobi Deserts is the primary contributor to dust concentrations against the Taklimakan Deserts in East Asia is of great interest. I suggest publication of this manuscript after addressing the following comments.

- 1) Besides comparing WRF-Chem AOD with AERONET AOD at single grid point, I suggest add MODIS daily AOD along with WRF-Chem results in the study domain to see spatial patterns.
- 2) Please add a panel in Figure 1 to show the dust source function in East Asia, i.e. plot variable of “EROD” in WRF-Chem input.
- 3) Include one or two sentences to explain why this specific dust event was selected in your study. For example, is it because that this dust event is very severe? If so, how abnormal is it? Comparing this dust event with the climatology of dust activities in this area help the audience get a general idea of your study.
- 4) Please compare the values of dust emission and its radiative effects in this study with values in other studies that used WRF-Chem or other climate models.
- 5) In figure 2, include the differences in wind and temperature between observation and model results to better illustrate how well the model can capture the meteorological fields.
- 6) Generally speaking, dust aerosols have positive heating rate, but Figure 15 shows negative values between 85°E–90°E and 105°E–115°E within 900–700 mb. Please explain this.
- 7) In Figure 14, please indicate the direct radiative forcing is at all-sky or clear-sky conditions.
- 8) Double check the figure captions. For example, caption of Figure 15 is not clear: Over what latitude range the vertical profiles were averaged. The color bar of Figure 15 needs to be changed: two white boxes between 0 and -0.04.
- 9) Contours in Figure 7 for geopotential height and temperature are not clear. Try to plot one of them as shadings.
- 10) Line 34 and 35, revise this sentence. E.g. “WRF-Chem well captured the meteorological conditions and the spatial and temporal variations in dust aerosols over East Asia.”
- 11) Line 39 and 40, delete “the differences of” and change “lead to the differences of” to “influence”.
- 12) Line 42, change “classified” to “divided” or other word.
- 13) Line 49, change the sentence to “During the second state...”.
- 14) Line 86-89, include reference for this sentence.
- 15) Line 93 and 97, consider delete the citations of Wikipedia websites.
- 16) Line 101, add “including” or “for example” before “dust emission”.
- 17) Line 185, change “time domain” to “integration period”.

- 18) Line 440, "Figs. 12" should be "Fig. 12".
- 19) Line 566, change "In additions" to "In addition".
- 20) Double check the usage of EM dash, EN dash, minus sign, and hyphen as well as radiative effect and radiative forcing in the whole manuscript. In this study, I think it is radiative effect.
- 21) There are many acronyms, please delete some of them if they are not used or used less than three times.
- 22) Please talk about the potential impacts of dust transport on the downwind regions, like the Korean Peninsula and Japan.
- 23) Is there a way to quantify the contributions of dust transport from TD and GD to dust mass balance in the downwind region in East Asia? If so, please add further analysis about this.