

COMMENTS TO THE AUTHOR(S)

We thank the reviewers for their time and their constructive comments that helped to improve the manuscript. We also would like to thank the Editor for handling our manuscript.

We have considered all comments and suggestions carefully. Please find below our detailed response.

Comments:

Chen et al. “Atmospheric Forcing of Dust Source Activation across East Asia”

Response to Reviewer #RC1

Most of my concerns have been revised, and I only have a few minor suggestions.

Minor comments:

1. Fig. 2: The current figure shows absolute dust source activation frequency under cloud-associated and clear-sky conditions. To make the relative importance of these two conditions clearer, I suggest also showing their fractional contributions to total dust activation (e.g., similar to Fig. 9), as an additional panel.

Thanks for your suggestion. We have added a third panel to Fig. 2 (Section 4.1, Page 9, Lines 232–233) showing the fractional contributions of clear-sky dust source activation to the total dust activation frequency.

2. Line 287 & Fig. 4d: Fig. 4d appears to indicate that clear-sky dust source activations dominate in the Taklimakan Desert across most seasons, while the authors indicate that cloud-associated activations are prevalent during spring in Line 287. It would be helpful if the authors could state this more explicitly in the text and briefly explain how this result fits with the subsequent discussion of synoptic versus LLJ-related forcing.

Thanks for your suggestion. We have revised the text to clarify that both clear-sky and cloud-associated DSA events occur throughout the year, while cloud-associated activations become particularly prevalent during spring (Section 4.3, Page 12, Lines 297–308). We added explanatory text linking cloud-associated activations to synoptic systems and convective activity, and clear-sky activations to boundary-layer processes such as LLJ breakdown and mountain–valley winds (Section 4.3, Page 10, Lines 263–268).

3. Lines 290–294: The link between the observed diurnal cycle of dust activation and synoptic-scale systems in spring is not entirely clear here. In particular, it is difficult to see how the diurnal timing alone supports the attribution to synoptic forcing. The authors may consider clarifying the physical reasoning or revising these sentences to improve readability and logical flow.

Thanks to the reviewer for this helpful comment. We have revised the text to clarify that the interpretation is based not only on the diurnal timing itself, but also on the broader temporal distribution and seasonal enhancement of cloud-associated DSA during spring (Page 13, Lines 307–308).

4. Lines 303–308: The additional explanation here may not be necessary. The diurnal cycle of wind gusts and the timing of dust activation over the Tibetan Plateau appear broadly similar to those over the Alashan Plateau and Taklimakan Desert. Given this similarity, it is not clear why convective processes are considered negligible over the Tibetan Plateau. The authors may wish to clarify this distinction or temper the interpretation.

We agree that the diurnal timing of dust activations over the Tibetan Plateau shares similarities with those observed over the Alashan Plateau and Taklimakan Desert, yet the Tibetan Plateau exhibits a different seasonality, with peak dust source activation occurring in winter rather than spring. We have therefore tempered our interpretation (Page 1, Line 21; Page 13, Line 326).

5. Section 4.4 & 4.5: The evidence here mainly shows that LLJs and dust activation tend to occur around the same time, rather than proving that LLJ breakdown directly causes all of these events. Because LLJs can also occur together with larger-scale weather systems, especially in spring, it would help to slightly soften the wording in Sections 4.4 and 5. Also, as I mentioned in the previous round of review, the overlap of different mechanisms should be explicitly discussed in the main text rather than only being acknowledged in figure captions.

Thanks to the reviewer for this constructive comment. We have softened the wording throughout Sections 4.4 and 4.5 by replacing more definitive terms such as “therefore” and “triggering” with more cautious expressions such as “favouring” or “associated with”. We have also expanded the discussion in the main text to explicitly acknowledge that LLJs can occur together with larger-scale synoptic systems and that multiple mechanisms may interact to favour DSA events across East Asia. The following text has been added to the manuscript in Page 17, Line 421–425; Page 22, Line 521–523.