

Interactive comment on “Dust aerosol effect on semi-arid climate over Northwest China detected from A-Train satellite measurements” by J. Huang et al.

Anonymous Referee #2

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General comments:

This manuscript presents an analysis of the effects of dust aerosols on cloud properties by comparing the differences in aerosol and cloud properties between semi-arid regions in northwest China (CSR) and northwest US (USR). The subject is well fit the scope of this journal. It should be publishable if the following points are clarified in revision.

Specific comments:

1. Page 2, line 11: It is indicated in Page 5 that five years of MODIS data are used for the analysis, why only “a 3-month period” here?

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2. Page 3, line 2-3: “the remaining approximately 50% is subject to long-range transport to the Pacific Ocean and beyond” is probably too large, since main aerosol mass is contributed by the larger particles, especially coarse mode dust particles.

3. Page 3, line 13: “society” can be removed since it is also a human factor.

4. Page 3, line 14: “Many factors that cause these disasters are natural, but human factors appear to dominate”. Based on what is this concluded?

5. Page 6, line 12: “The depolarization ratio is low (close to zero) for other types of aerosols”. SEM or TEM experiments show that most of aerosol particles are non-spherical, especially soot particles. How soot and other non-spherical particles are excluded from dust particles?

6. Page 7, line 11: “global” should be added prior to “temperature”.

7. Page 7, line 13: “observed climate observations” should be changed to “observed climate factors”.

8. Page 7, line 20: syntax error.

9. Page 7, line 22: How “moisture-bearing winds” can “cool down such regions”?

10. Page 8, line 15: Change “play as an important role as cloud condensation nuclear” to “play an important role as cloud condensation nuclei”.

11. Page 8, line 17-19: What are the main sources for aerosol in USR?

12. Page 8, line 28: Here CMA is inconsistent with the description on Page 7 which says “Gansu Meteorological Bureau”.

13. Page 9, line 11-12: not clear to the reader. Percentage of what?

14. Page 9, line 14-16: this can not convince the reader.

15. Page 9, line 29 to line 2 on page 10: This sentence should be clarified.

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16. Page 11, line 5: “effective radius of cloud particles” should be added prior to “Re”.
17. Page 11, line 9-11: Since the meteorological and many other conditions are different between USR and CSR, it is very difficult to draw a conclusion as described in these lines.
18. Page 12, line 7: “climatology and semi-arid climates” can be changed to “climatic conditions”.
19. Page 12, line 13-14: need to be clarified.
20. Page 12: line 17-18: “cloud effective height” should be explained.
21. Page 13, line 13-18: It shows that 77% of the difference in LWP between CSR and USR is due to human activity such as agriculture and industrial activities. Is this really true? If this is true, then human activities should not be suggested as “make some contribution to the regional interaction among aerosol-cloud-radiation-precipitation processes”, it is absolutely a dominating factor.

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