Review of "The Spatial and Temporal Impact of the Dust Storm During February 26, 2023, on Meteorological Conditions and Air Quality Across New Mexico and West Texas" by M.C. Robinson, K. Schueth, and K. Ardon-Dryer

*General Comments:*

This paper examines the meteorological conditions and air quality impacts of a severe dust storm in New Mexico and West Texas in February 2023. Multiple observational datasets are used to characterize the features of the event and associated weather conditions. It is found that the upper-level jet streak, the passage of a cold front, and the formation of thunderstorms along the dryline all contribute to the high wind speeds during the event. The resultant visibility reduction and dramatic increase in PM values highlight the severity of the event. Overall, the study provides a timely and detailed analysis of an extreme dust storm (e.g., the highest $PM_{2.5}$ record at Lubbock, Texas, in the past 20 years), which can potentially advance the current understanding of severe dust storms in the southern U.S. However, I found a few aspects that can be further improved. See my comments below for details.

*Specific comments:*

1. The introduction section can be improved by adding a brief review of dust storms in the southwestern U.S., particularly over New Mexico and western Texas, as background information and by adding a few lines to highlight the motivation and novelty of this study. For instance, what are the key research questions that would be addressed in this study?

2. It would be great to add some discussion about the uncertainties of the datasets used in the study, especially the ground measurements, if possible, and how those may affect the analysis and results.

3. I think Figs. S1-S4 contain information that helps better understand the analysis and should be moved to the main text, given that currently only four figures are in the main text.

4. It would be interesting to add some analysis or discussion about the physical mechanisms and unique aspects of this dust storm, for instance, what caused the strong winds? Lines 131-133 provide some discussion, but it would be interesting to show more if possible.

5. Line 49, airports over certain regions, or the whole U.S.?

6. Lines 57-58, a severe storm with heavy precipitation can also reduce visibility and increase surface wind but without any dust storms.

7. Section 2.3, why is the RAPv3 selected for the analysis? What variables are used?

8. Lines 129-130, which figure do you refer to?

9. Line 142, can you please provide definitions for 'blowing dust,' 'vicinity blowing dust,' and 'dust storm'?

10. Line 216, is there an upper limit of $PM_{10}$ measurement?

11. Line 265, is it the daily average of 26 Feb. 2023?

12. Line 280, how are correlations calculated? Do you use hourly data of the day? Are auto-correlations considered?

13. Line 285, are the correlations significant?

14. The current title indicates that meteorological conditions are affected by the dust storm. However, the text suggests the other way around. Please consider rewording to avoid confusion.

15. In Figure 2, please consider reducing the density of contours. In Fig. 2a-b, is the shading total wind speed? Also, can you please add labels for temperature and geopotential height? Similarly, for Fig. 2c, please add labels for surface height. And why are these time snapshots, i.e., 18UTC on 26 Feb. and 00UTC on 27 Feb., selected? When did the storm start?