



EGUsphere, referee comment RC2  
<https://doi.org/10.5194/egusphere-2022-588-RC2>, 2022  
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## **Comment on egusphere-2022-588**

Anonymous Referee #2

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Referee comment on "Where does the dust deposited over the Sierra Nevada snow come from?" by Huilin Huang et al., EGU Sphere,  
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This study integrates the WRF-Chem simulations with satellite data and reanalysis products in spring to understand: (a) where does the dust deposition on the Sierra Nevada come from? (b) how is the dust transported to the mountainous regions? and (c) how is the dust deposited on the Sierra Nevada? The self-organizing map (SOM) analysis is applied to identify four major clusters of dust sources. Dust deposition onto the Sierra Nevada is believed to be an important factor that will affect the snow melt in the region and influence the water resource in the American West. Results from this study are an important contribution to the study of dust-cryosphere interactions. The paper is generally well written. I recommend the paper be published in ACP after addressing some minor issues below.

1. in the abstract, it is necessary to say which data have been used in this study.

2. lines 116-118: please explain why you didn't use outputs from full simulations (September 20, 2018 to August 2021)?

3. lines 137-140: How does WRF-Chem define PM<sub>10</sub>? Is it defined with geometric size or aerodynamic size?

4. lines 230-232 (and throughout the paper): please consider to use alternative words for "underestimates" and "underestimation". It is kind of weird when one says that observations "underestimate" something with a reference to model simulations.

5. Figure 2: Given that (c) and (d) are for dust optical depth, I would suggest that they also show dust optical depth ion (a) and (b). Also there is clear difference between MERRA-2 and MIDAS in terms of spatial pattern. Please explain the difference.

6. Figure 3 caption: "Figure 5" should be "Figure 6", I guess.

7. Figure 10: These violin plots are not straightforward or even confusing. It was very hard for me to figure it out and understand. Is it possible to change it to a more conventional PDF line plots?